City of Bellevue
Development Services Department
Land Use Division Staff Report

Proposal Name:	Puget Sound Energy (PSE) - Energize Eastside South Bellevue Segment
Proposal Address:	Substation - 13625 SE 30th Street and south to the Bellevue city limits at 6927 128th Place SE within the Puget Sound Energy (PSE) existing transmission line corridor.
Proposal Description:	Recommendation of approval on Conditional Use Permit and Administrative Approval of Critical Areas Land Use Permit for the construction of a new substation and 230 kV transmission lines in the City of Bellevue. PSE plans to construct a new substation in Bellevue ("Richards Creek substation") and to upgrade approximately 16 miles of two existing 115 kV transmission lines with 230 kV lines across multiple jurisdictions from Redmond to Renton (collectively referred to as the "Energize Eastside project" or "the Project"). In Bellevue, PSE is applying for permits to construct the Project in two phases. The first phase ("South Bellevue Segment"), the subject of PSE's proposal and this Staff Report, includes upgrading 3.3 miles (Bellevue portion) of existing 115 kV lines with 230 kV lines between the Lakeside substation and the southern city limits of Bellevue. The remainder of the southern portion of the Project crosses Newcastle and an area of unincorporated King County, and terminates in Renton. Bellevue only has permitting authority for work proposed in its jurisdiction. PSE's proposal involves the replacement of existing wooden H-frame poles with steel monopoles. Within the existing utility corridor, the proposed pole locations for the rebuilt lines will generally be in the same locations as the existing poles. Construction of the Richards Creek substation, a new 230 kV to 115 kV substation, will be directly south of PSE's existing Lakeside switching station. The new substation will be located on parcel 102405-9130 (13625 SE 30th Street), which is currently used as a PSE pole storage yard. The parcel is 8.46 acres in size and contains critical areas (steep slopes, wetlands, and streams). Access to the substation site is from SE 30th Street.
File Numbers:	17-120556-LB and 17-120557-LO
Planner:	Heidi M. Bedwell, Environmental Planning Manager
Applicant:	PSE Bradley Strauch
Recommendations Included:	Conditional Use Permit (Process I, Land Use Code 20.30B)
Decisions Included:	Critical Areas Land Use Permit (Process II, Land Use Code 20.30P)
Director's Recommendation:	**Approval with Conditions** Mike Brennan, Director Development Services Department By: _____ Elizabeth Stead, Land Use Director

City of Bellevue
Development Services Department
Land Use Division Staff Report

Application Date:	September 8, 2017
Notice of Application:	October 12, 2017
Public Meetings:	November 14, 2017; September 6, 2018
Recommendation/Decision Publication Date:	January 24, 2019
Pre-Hearing Conference Date:	February 13, 2019 at 10:30 a.m.
Public Hearing:	March 28, 2019 at 6:00 p.m.

Deadline for Appeal of Process II Administrative Decision

- Critical Areas Land Use Permit: February 7, 2019 (14 days following publication of a notice of decision)

For information on how to appeal a City of Bellevue land use decision, visit https://bellevuewa.gov/city-government/departments/city-clerks-office/hearing-examiners-office/how-to-file-an-appeal or call the Hearing Examiner's Office425-452-6934. Appeal of any Process II Administrative decision must be made by 5 p.m. on the date noted for appeal of the decision. Appeal of the Critical Areas Land Use Permit decision must be made to the City of Bellevue City Clerk's Office.

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I. REQUEST AND REVIEW PROCESS

A. Request

Puget Sound Energy, Inc. (PSE) has applied to the City of Bellevue for a Conditional Use Permit and a Critical Areas Land Use Permit for the construction of a new substation and 230 kilovolt (kV) transmission lines. PSE proposes the construction of a new substation in Bellevue (the "Richards Creek substation") and the upgrade of 16 miles of two existing 115 kV transmission lines with 230 kV lines from Redmond to Renton (collectively referred to as the "Energize Eastside project" or "the Project"). PSE is applying for permits to construct the Energize Eastside project in two phases. PSE has applied for permits for the first construction phase of the total Project in Bellevue, unincorporated King County, the City of Newcastle, and the City of Renton.

The first phase of the Energize Eastside project in Bellevue (the "South Bellevue Segment") is the subject of this Staff Report. The South Bellevue Segment includes construction of the Richards Creek substation and upgrading 3.3 miles (the Bellevue portion) of existing 115 kV transmission lines with 230 kV lines between the Lakeside substation and the southern city limits of Bellevue. The remainder of the south portion of the Project continues through Newcastle, unincorporated King County, and Renton. Bellevue only has permitting authority for work proposed in its jurisdiction. The Project and PSE's specific proposal for the South Bellevue Segment involves the replacement of existing wooden H-frame poles with steel monopoles. Within the existing utility corridor, the proposed pole locations for the rebuilt lines will generally be in the same locations as the existing poles.

The Richards Creek substation, needed to step down voltage from 230 kV to 115 kV, will be constructed directly south of PSE's existing Lakeside switching station. The new substation will be located on parcel 102405-9130 (13625 SE 30th Street), currently used as a PSE pole storage yard. The parcel is 8.46 acres in size and contains critical areas (steep slopes, wetlands, and streams). Access to the substation site is from SE 30th Street.

B. Review Process

The City of Bellevue review process for the Energize Eastside project began with pre-submittal public outreach conducted by PSE in coordination with City staff, followed by completion of technical studies and the preparation of an Environmental Impact Statement (EIS), with the Final EIS published in March 2018.[1]

[1] The Final EIS and supporting documentation are incorporated by reference under the terms of Bellevue City Code (BCC) 22.02.020 and Washington Administrative Code (WAC) 197-11-635. The Final EIS and supporting documentation is publicly available at: http://www.energizeeastsideeis.org/library.html. In addition, the Final EIS together with the supporting documentation are available for review in the City of Bellevue Records Room, Lobby Floor, Bellevue City Hall, 450 110th Avenue NE. The Final EIS is also included in the

PSE submitted permit applications for its South Bellevue Segment proposal in September 2017. Public noticing of PSE's application was provided through a radius mailing and a mailing to interested parties (including those identified through the EIS process), publication in the City's Weekly Permit Bulletin, and installation of six notice signs. As required by the City of Bellevue Land Use Code (LUC), two public meetings were held following the application and prior to making the recommendation and decision contained in this Staff Report. The review also included collection of public comments, revision requests from the City of Bellevue's Environmental Planning Manager to PSE, and PSE's responses to the City's requests. Notice of publication of this Staff Report was also provided through mailings, and the City's Weekly Permit Bulletin, as required by code.

The City of Bellevue LUC requires different review processes for different permit types. In this case, PSE's proposal includes both a Process I (LUC 20.35.100 - Hearing Examiner quasi-judicial decision) and a Process II (LUC 20.35.200 - Administrative decision) permit application, each of which is described below, along with a summary of the associated appeal opportunities.

A Critical Areas Land Use Permit (CALUP) is a Process II land use decision, an administrative decision made by the Director of the Development Services Department (DSD). A CALUP is required per LUC 20.25H.055, Uses and Development Allowed within Critical Areas. PSE's proposed use is a Utility System, and portions of the South Bellevue Segment proposal will be located within critical areas and critical area buffers and structure setbacks. Appeal of a Process II decision is consolidated with the Process I public hearing on the recommendation for the Conditional Use Permit (CUP), described below. Following a hearing before the Hearing Examiner on a Process II appeal of the CALUP, the Hearing Examiner issues a decision on the Process II appeal, and this Hearing Examiner decision may be appealed to Superior Court (LUC 20.35.250.F).

A CUP is a Process I land use decision processed pursuant to LUC 20.35.100 to 20.35.140. A Process I land use decision is a quasi-judicial decision issued by the Hearing Examiner following the recommendation of the Director and input received at the required public hearing. Per LUC 20.20.255.C, a CUP is required for new or expanding electrical utility facilities proposed on sensitive sites as described by Figure UT.5a (revised to Map UT-7) of the Utilities Element of the City of Bellevue Comprehensive Plan (UT Element 2015).[2] The decision of the Hearing Examiner on a Process I application is final unless appealed to the City Council. The City Council action deciding any appeal and approving,

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Department of Development Services (DSD) official files for Permit Nos. 17-120556-LB and 17-120557-LO.

[2] The UT Element of the Comprehensive Plan, including Map UT-7, is available on the City's website at: https://bellevuewa.gov/UserFiles/Servers/Server_4779004/File/pdf/PCD/07_Utilities_FINAL_20150807.pdf. Comprehensive Plan Map UT-7 is also included as Attachment F to this Staff Report.

approving with modifications, or denying a project is the final City decision on a Process I application. A final decision by the City Council following a Process I appeal may be appealed to Superior Court (LUC 20.35.150.D).

II. PROPOSAL DESCRIPTION

A. Purpose

The purpose of the Energize Eastside project is to meet local demand growth and to protect reliability in the Eastside of King County, roughly defined as extending from Redmond in the north to Renton in the south, and between Lake Washington and Lake Sammamish. It is PSE's responsibility to plan and operate the electrical system while complying with federal standards and guidelines.

The purpose of the Project defined PSE's broad objectives as follows:

- Address PSE's identified deficiency in transmission capacity.
- Find a solution that can be feasibly implemented before system reliability is impaired.
- Be of reasonable Project cost.
- Meet federal, state, and local regulatory requirements.
- Address PSE's electrical and non-electrical criteria for the Project.

Electricity is currently delivered to the Eastside area through two 230 kV/115 kV bulk electric substations – the Sammamish substation in Redmond and the Talbot Hill substation in Renton – and distributed to neighborhood distribution substations using 115 kV transmission lines (see Figure II-1). Although numerous upgrades have been made to PSE's 115 kV systems (including new transmission lines), the primary 115 kV transmission lines connecting the Sammamish and Talbot Hill substations have not been upgraded since the 1960s, and no 230 kV-to-115 kV transformer upgrades have been made at these substations. Since then, the Eastside population has grown from approximately 50,000 to nearly 400,000. Both population and employment growth are expected to continue, but at a slower pace of around 2% per year, according to Puget Sound Regional Council (PSRC) estimates. A report prepared for PSE projects that electrical customer demand on the Eastside will grow at a rate of approximately 2.4% per year through 2024.[3]

[3] Quanta Services, 2015. Supplemental Eastside Needs Assessment Report, Transmission System, King County. Prepared for Puget Sound Energy, April 2015 (hereinafter "Quanta Supplemental Eastside Needs Assessment Report"). The Quanta Supplemental Eastside Needs Assessment Report is included in the Phase I Energize Eastside project EIS materials and is publicly available at: http://www.energizeeastsideeis.org/library.html. In addition, the Quanta Supplemental Eastside Needs Assessment Report is included in the DSD official files for Permit Nos. 17-120556-LB and 17-120557-LO.

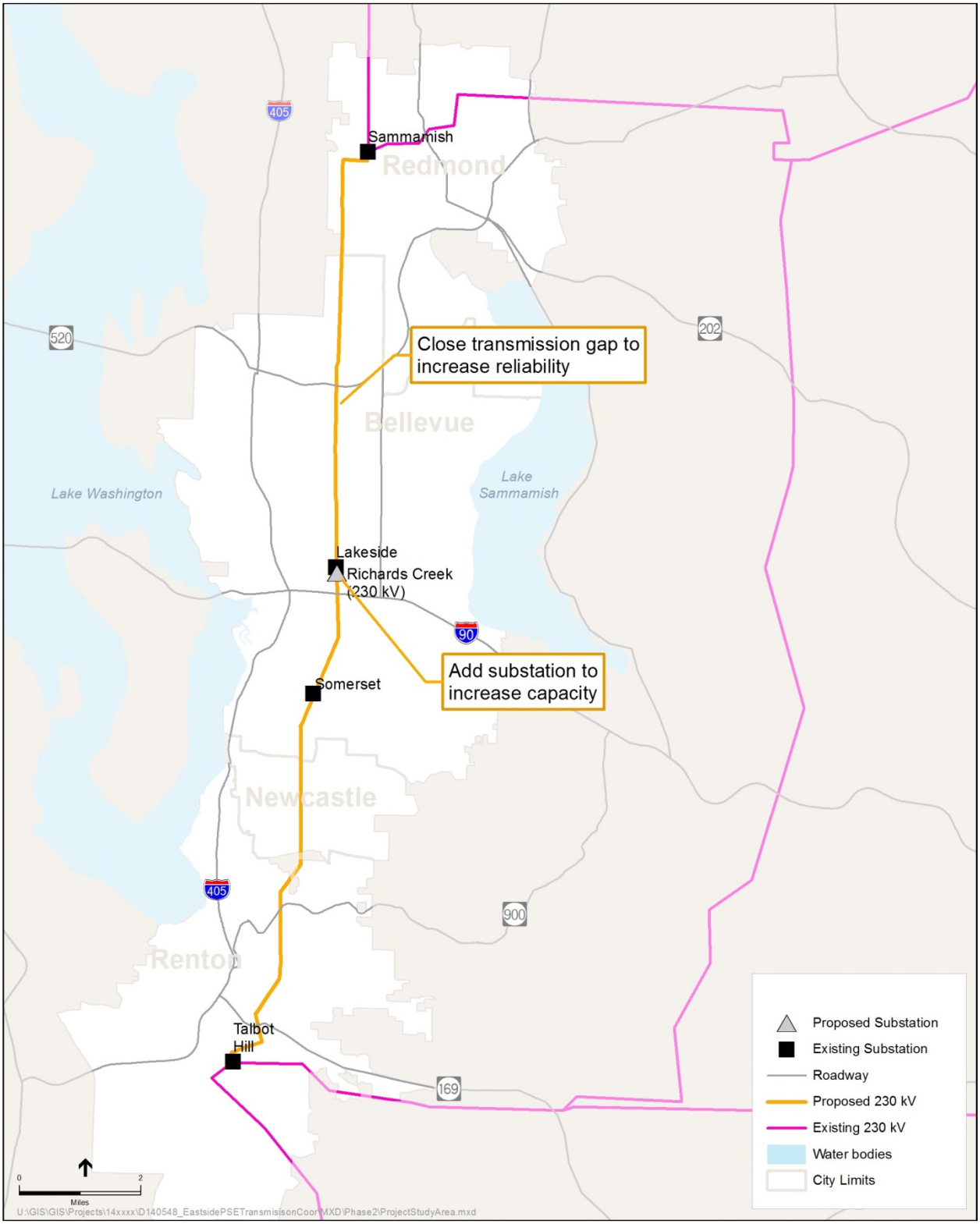

Figure II-1 Proposed 230 kV Transmission Line Route for the Energize Eastside Project

As required by federal regulations, PSE performs annual electric transmission planning studies to determine if there are potential system performance violations (transformer and line overloads) under various operational and forecasted electrical use scenarios. These studies are generally referred to as "reliability assessments."

The need for additional 230 kV-to-115 kV transmission transformer capacity and 230 kV support in the Eastside was identified in the 1993 annual reliability assessment, and has been included in PSE's Electrical Facilities Plan for King County (System Plan) since that time.[4] In 2009, PSE's annual reliability assessment found that if one of the Talbot Hill substation transformers failed, it would significantly impair reliability on the Eastside. Replacement of a failed 230 kV transformer can take weeks, or even months, to complete depending on the level of failure and other site-specific parameters. Since 2009, other reliability deficits have been identified. These include concerns over the projected future loading on the Talbot Hill substation and increased use of Corrective Action Plans (CAPs) to manage outage risks to customers in this portion of the PSE system.

Between 2012 and 2015, PSE and the City of Bellevue commissioned three separate studies by two different parties that confirmed the need to address Eastside transmission capacity:

- City of Bellevue Electrical Reliability Study prepared by Exponent, 2012.[5]
- The Quanta Eastside Needs Assessment Report, 2013.[6]
- The Quanta Supplemental Eastside Needs Assessment Report, 2015.

The Quanta Eastside Needs Assessment Report and Supplemental Eastside Needs Assessment Report, performed by Gentile (with Quanta Technology) for PSE in 2013 and 2015, respectively, confirmed that if growth in demand continued as projected, then the Eastside's existing grid would not meet federal reliability requirements by the winter of

[4] PSE's September 2017 "Energize Eastside Conditional Use Permit, Description of Proposal – South Bellevue Segment" (hereinafter "PSE South Bellevue Segment CUP Analysis") was submitted in connection with the application for Permit Nos. 17-120556-LB and 17-120557-LO and is included in this Staff Report as Attachment C. Page 36 of the PSE South Bellevue Segment CUP Analysis contains quotations from PSE's System Plan.

[5] Exponent. 2012. City of Bellevue Electrical Reliability Study, Phase 2 Report. Prepared for the City of Bellevue, dated February 2012. The Electrical Reliability Study, Phase 2 Report, prepared by Exponent (hereinafter "Exponent 2012") is publicly available at: http://www.energizeeastsideeis.org/uploads/4/7/3/1/47314045/final_electrical_reliability_study_phase_ii_report_2012.pdf. In addition, Exponent 2012 is included in the DSD official files for Permit Nos. 17-120556-LB and 17-120557-LO.

[6] Quanta Services, 2013. Eastside Needs Assessment Report, Transmission System, King County. Prepared for PSE in October 2013 and updated February 2014 (hereinafter "Quanta Eastside Needs Assessment Report"). The Quanta Eastside Needs Assessment Report is included in the Phase I Energize Eastside Project EIS materials and is publicly available at: http://www.energizeeastsideeis.org/library.html. In addition, the Quanta Eastside Needs Assessment Report is included in the DSD official files for Permit Nos. 17-120556-LB and 17-120557-LO.

2017/2018 and the summer of 2018 without the addition of 230 kV-to-115 kV transformer capacity in the Eastside area.

Furthermore, the City of Bellevue commissioned a separate study to evaluate PSE's system, which also confirmed the need for the Energize Eastside project.[7] As part of the EIS prepared for the Energize Eastside project, in 2015, Stantec Consulting Services Inc. also reviewed PSE's analysis and determined that the approach to the needs assessment followed standard industry practice.[8]

In June 2018, PSE notified the City of Bellevue that the actual peak demand in the summer of 2017 was equal to the peak demand projected for summer 2018, and warned that during peak summer demand periods CAPs would be in place that include intentional load shedding (rolling blackouts) for Eastside customers.[9] Following a request for additional information from the City, PSE explained that it did not perform any analysis on the electrical loads for the August 2017 dates, but increased air conditioning was a likely contributor.[10] PSE's planning-level modeling found that both summer and winter peak customer load were driving the need for additional transmission capacity. Additional information regarding PSE's determination of operational need is discussed in **Section VIII.C** of this Staff Report in connection with Electrical Utility Facilities Decision Criteria LUC 20.20.255.E.3.

B. Background

The Utilities (UT) Element policies of the Comprehensive Plan and LUC 20.20.255 – Electrical Utility Facilities, govern the review and approval of new and expanding electrical utility facilities. Pursuant to LUC 20.20.255, any new or expanding electrical facility proposal identified as a sensitive site requires an Alternative Siting Analysis. The transmission corridor alignment and new electrical utility facility components (substation) within the alignment in the South Bellevue Segment are identified as sensitive sites on Map UT-7 of the UT Element (see Attachment F to this Staff Report).

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[7] Utility System Efficiencies, Inc. (USE), Independent Technical Analysis of Energize Eastside for the City of Bellevue, WA. Version 1.3., dated April 28, 2015 (hereinafter "USE 2015"). USE 2015 is included in this Staff Report as Attachment D.

[8] Stantec, 2015. Review Memo on the Eastside Needs Assessment Report. Prepared for Environmental Science Associates (ESA), Seattle, WA; prepared by Stantec Consulting Services, Inc., Markham, OR, dated July 31, 2015 (hereinafter "Stantec 2015"). Stantec 2015 is included in the Energize Eastside Project EIS materials and is publicly available at: http://www.energizeeastsideeis.org/library.html. In addition, Stantec 2015 is included in the DSD official files for Permit Nos. 17-120556-LB and 17-120557-LO.

[9] Letter from Dan Koch, PSE Director of Electric Operations, to Brad Miyake, City Manager of the City of Bellevue, dated June 8, 2018. PSE's June 8, 2018 letter (PSE 6-8-18) is included in the DSD official files for Permit Nos. 17-120556-LB and 17-120557-LO.

[10] Email from Brad Strauch, PSE Program Manager, to Heidi Bedwell, City of Bellevue Environmental Planning Manager, dated October 26, 2018 at 4:47 PM. PSE's October 26, 2018 email (PSE 10-26-18) is included in the DSD official files for Permit Nos. 17-120556-LB and 17-120557-LO.

PSE began working with residents of Bellevue and City staff several years prior to submittal of the CUP and CALUP applications to determine the best possible route for the transmission lines. This included coordination with a Community Advisory Group (CAG), City staff, and the public. The Alternative Siting Analysis described in **Section IV.A.1** of this Staff Report further describes the outreach efforts and criteria PSE used to arrive at the selection of its preferred alternative (i.e., PSE's proposed alignment).[11]

The EIS process also provided opportunities for public input, including scoping meetings and opportunities to comment on two draft EISs prior to publication of the Final EIS in March 2018. The Phase 1 Draft EIS provided a programmatic assessment of various wire and non-wire alternatives to address PSE's Project objective, which is to address a projected deficiency in its transmission system and increase system reliability.[12] The Phase 1 Draft EIS helped inform the City and PSE regarding the impacts of the various alternatives and helped to develop the scope of the Phase 2 Draft EIS, both in terms of the range of alternatives needed and the impacts that needed to be further evaluated.

The Phase 2 Draft EIS provided a project-level assessment of impacts across all jurisdictions with respect to PSE's proposed transmission lines and the Richards Creek substation.[13] The Phase 2 Draft EIS examined four alignment options between the proposed Richards Creek substation and the southern city limits of Bellevue, referred to in the EIS as the Willow 1, Willow 2, Oak 1, and Oak 2 Options. In the Final EIS, the Willow 1 Option design was refined and referred to as PSE's proposed alignment. PSE's proposed alignment in the Final EIS is the same as is proposed for the permit applications evaluated in this Staff Report.

[11] PSE's September 2017 Alternative Siting Analysis, submitted in connection with the application for Permit Nos. 17-120556-LB and 17-120557-LO, is included as Attachment B to this Staff Report.

[12]The Phase I Draft EIS and supporting documentation are incorporated by reference under the terms of BCC 22.02.020 and WAC 197-11-635. The Phase I Draft EIS and supporting documentation is publicly available at: http://www.energizeeastsideeis.org/library.html. In addition, the Phase I Draft EIS and supporting documentation are available for review in the City of Bellevue Records Room, Lobby Floor, Bellevue City Hall, 450 110th Avenue NE. The Phase I Draft EIS is also included in the DSD official files for Permit Nos. 17-120556-LB and 17-120557-LO.

[13]The Phase 2 Draft EIS and supporting documentation are incorporated by reference under the terms of BCC 22.02.020 and WAC 197-11-635. The Phase 2 Draft EIS and supporting documentation is publicly available at: http://www.energizeeastsideeis.org/library.html. In addition, the Phase 2 Draft EIS and supporting documentation are available for review in the City of Bellevue Records Room, Lobby Floor, Bellevue City Hall, 450 110th Avenue NE. The Phase 2 Draft EIS is also included in the DSD official files for Permit Nos. 17-120556-LB and 17-120557-LO.

C. Substation Upgrades[14]

A component of PSE's proposal is to develop the Richards Creek substation south of PSE's existing Lakeside substation at 13625 SE 30th Street (parcel 102405-9130) (Figure II-2). The 8.46-acre property is zoned Light Industrial (LI) as are the properties to the north, west, and south. Properties east of the site are zoned Office and Limited Business (OLB) and Multifamily Residential (R-10). The central portion of the site is currently used by PSE as a pole storage yard. It is partially fenced and has a flat storage area consisting of paved driveways and gravel.

The Richards Creek substation is a necessary component of the 115 kV alignment upgrade to 230 kV, which is mapped as a sensitive site in the City's Comprehensive Plan (see Attachment F to this Staff Report [Map UT-7]). Normal practice would be to have the 230 kV Richards Creek substation co-located with the adjoining 115 kV Lakeside substation; however, due to topographic and environmental constraints south of the Lakeside substation, expanding the station in that direction would result in additional environmental impacts. Therefore, placing the two stations on separate parcels is proposed. Because the two yards have separate access points, they are required to have different names for operational and emergency purposes.

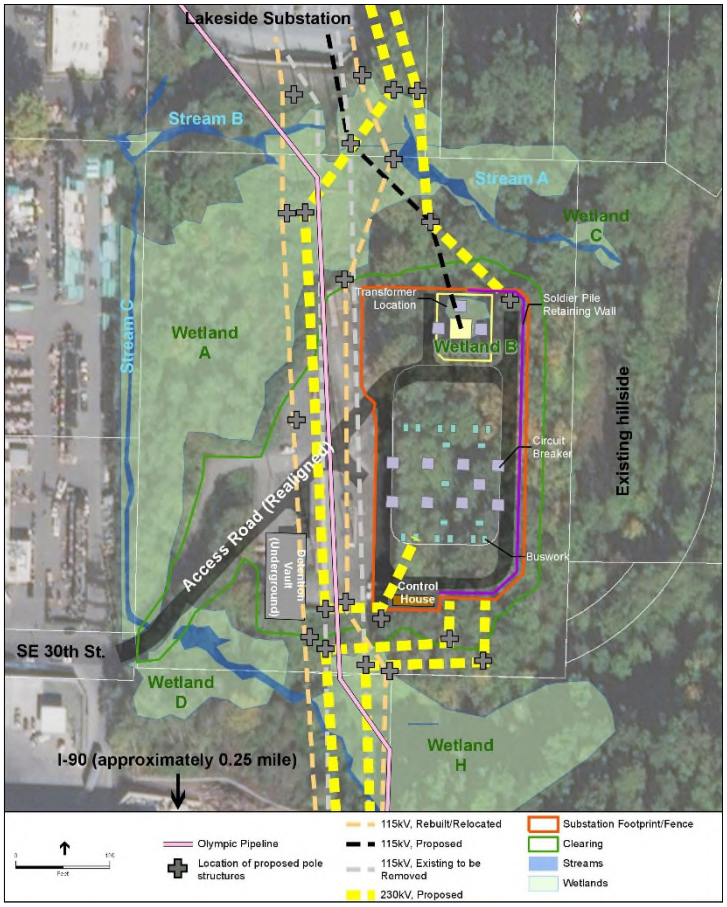

Figure II-2 Richards Creek Substation Site

Construction of the new substation requires clearing and grading to create a level area for the new transformer and supporting equipment. An approximately 25-foot high soldier-pile retaining wall on the east side of the parcel is proposed. The preliminary grading quantities provided by PSE are an estimated 27,480 cubic yards of excavation and 8,000 cubic yards of fill. Approximately 3,550 truck trips will be associated with excavation. Most excavated material will be removed, but some could be used to backfill and restore grades.

The drainage control system at the site requires trenching, placement of pipes, and connection to the City storm drainage system. Access to the substation site is via SE 30th Street. The existing driveway and access road will be paved and reconfigured. The

[14] PSE's Project Plans, submitted in connection with the application for Permit Nos. 17-120556-LB and 17-120557-LO, are included as Attachment A to this Staff Report.

reconfigured access road will be constructed of asphalt approximately 20 feet wide in general, 24 feet wide at the corners, and with 2-foot shoulders. A culvert replacement on the access road will be constructed in accordance with aquatic permit requirements, including limits on the timing for construction, protection of water quality, and other measures to protect stream and wetland habitat.

The substation yard will be surfaced with crushed rock. The substation will include the transformer and supporting equipment (e.g., circuit breakers, electrical buswork, control house, and connections to the new transmission lines). Concrete foundations will be poured to support this equipment, and the substation is designed in accordance with regulatory requirements and industry standards. All unpaved disturbed areas will be planted to control erosion and meet landscaping requirements. Construction will include the installation of appurtenant utilities, such as natural gas, water, and sewer pipelines, as well as transmission lines.

In addition to the construction of the new Richards Creek substation, some construction is proposed to accomplish the planned upgrades to the Lakeside substation. In general, all upgrades will occur within the existing footprint of the Lakeside substation. Work includes connecting the substation equipment to the new 230 kV transmission lines, including potential pole replacement and related grading and excavation. An existing 115 kV transmission line known as the Lakeside-Goodes Corner shares poles with the existing Lakeside-Talbot Hill No. 2 transmission line from the Lakeside substation to the south side of Interstate 90 (I-90). Because these poles will be replaced by the Energize Eastside project, the Lakeside-Goodes Corner transmission line also needs to be accommodated by the new poles. The line is shown on the plans connecting to a new corner pole on the south side of I-90 and connecting to an existing line running to the east.

All substation modifications are required to meet the design standards of LUC 20.20.255.F. Landscaping will be required to further screen the facilities from the surrounding neighborhoods. **Refer to the Conditions of Approval regarding the final plans for substation upgrades in Section X of this Staff Report.**

D. Proposed Alignment

PSE selected the Willow 1 route option as its proposed alignment based on the public outreach and technical review that occurred during the CAG and EIS processes. The major deciding factors include but are not limited to the following:

- By using this substation site and the existing corridor, additional easements or properties are not required.
- By using the existing corridor, the fewest number of trees will need to be removed.
- Use of the Willow 1 route, combined with optimized transmission line design and 230/230 kV operation, allows for the lowest potential alternating current (AC) interaction with the two petroleum pipelines that share the corridor.

All of the routes analyzed to meet the purpose and need for the Project, including Willow 1, traverse residential land use districts. By constructing the proposed transmission line facilities in the existing 115 kV transmission line corridor, site compatibility impacts are limited by this alternative (see LUC 20.20.255.D.2.d). By using the existing corridor, PSE minimizes tree removal and management within the corridor as compared to establishing a new corridor (see Attachment B to this Staff Report [Alternative Siting Analysis]). By using

the existing corridor, PSE can also better assess and limit potential interactions with a co-located petroleum pipeline system, as well as a natural gas pipeline that crosses the corridor.[15] The creation of new impacts to adjacent uses, including residential uses, is also minimized by utilizing the existing corridor for the proposal. As properties adjacent to the transmission line corridor currently have utility facilities in their viewsheds and neighborhoods, Willow 1 has lower impacts compared to establishing a new corridor. The Willow 1 route is the most consistent with PSE's hierarchy of preferred locations.

Based on the results of the required Alternative Siting Analysis, PSE selected the Willow 1 route, which includes the South Bellevue Segment and is the alignment under consideration in this Staff Report (see Figure II-3). The proposed transmission line extends from the existing Lakeside substation and the new Richards Creek substation to the southern city limits of Bellevue, where it passes into Newcastle. The South Bellevue Segment is 3.3 miles long and entirely within PSE's existing approximately 100-foot wide transmission line corridor.

The transmission line includes a variety of pole types, which are shown on Figure II-3 and Table II-1. Sixteen double-circuit 230 kV steel monopoles (meaning each pole supports two 230-kV circuits, consisting of three conductors [wires] per circuit) will replace 22 wooden H-frames north of SE Newport Way and between Somerset substation and SE 60th Street. Typical pole height is approximately 92 feet, and the maximum pole height is approximately 109 feet. South of SE 60th Street and between SE Newport Way and the Somerset substation, 26 pairs of single-circuit 230 kV steel monopoles will replace 26 wooden H-frames. In this geographic area, typical pole height is approximately 80 feet, and the maximum pole height is approximately 91 feet.

Although each route option analyzed by PSE had a range of impacts, PSE determined that Willow 1 will have the fewest negative impacts to Bellevue residents after considering the many factors identified in the required Alternative Siting Analysis. Several impacts that could not be avoided through route selection will be minimized or mitigated through measures that PSE has incorporated into the Project design. Additional information regarding PSE's compliance with the Alternative Siting Analysis requirements of the LUC is discussed below in **Section IV.A.1** of this Staff Report.

E. Pole Design

The proposed pole designs are shown in Figure II-4. Information about each pole type, including line configuration, typical height, and diameter, is listed in Table II-1. Simulations showing the proposed pole types are also provided in Figures II-5 through II-8. Additional detailed information for all pole locations can be found in Attachment A, Project Plans.[16]

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[15] DNV GL. 2016. A Detailed Approach to Assess AC Interference Levels Between the Energize Eastside Transmission Line Project and the Existing Olympic Pipelines, OLP16 & OPL20. Memo to: Puget Sound Energy, dated September 9, 2016 (hereinafter "DNV GL 2016"). DNV GL 2016 is included in the Phase 2 Energize Eastside Project EIS materials and is publicly available at: http://www.energizeeastsideeis.org/library.html. In addition, DNV GL 2016 is included in the DSD official files for Permit Nos. 17-120556-LB and 17-120557-LO.

[16] PSE's Photo Simulations are included as Attachment H to this Staff Report, and PSE's December 14, 2018 Pole Finishes Report-City of Bellevue (South) is Attachment J.

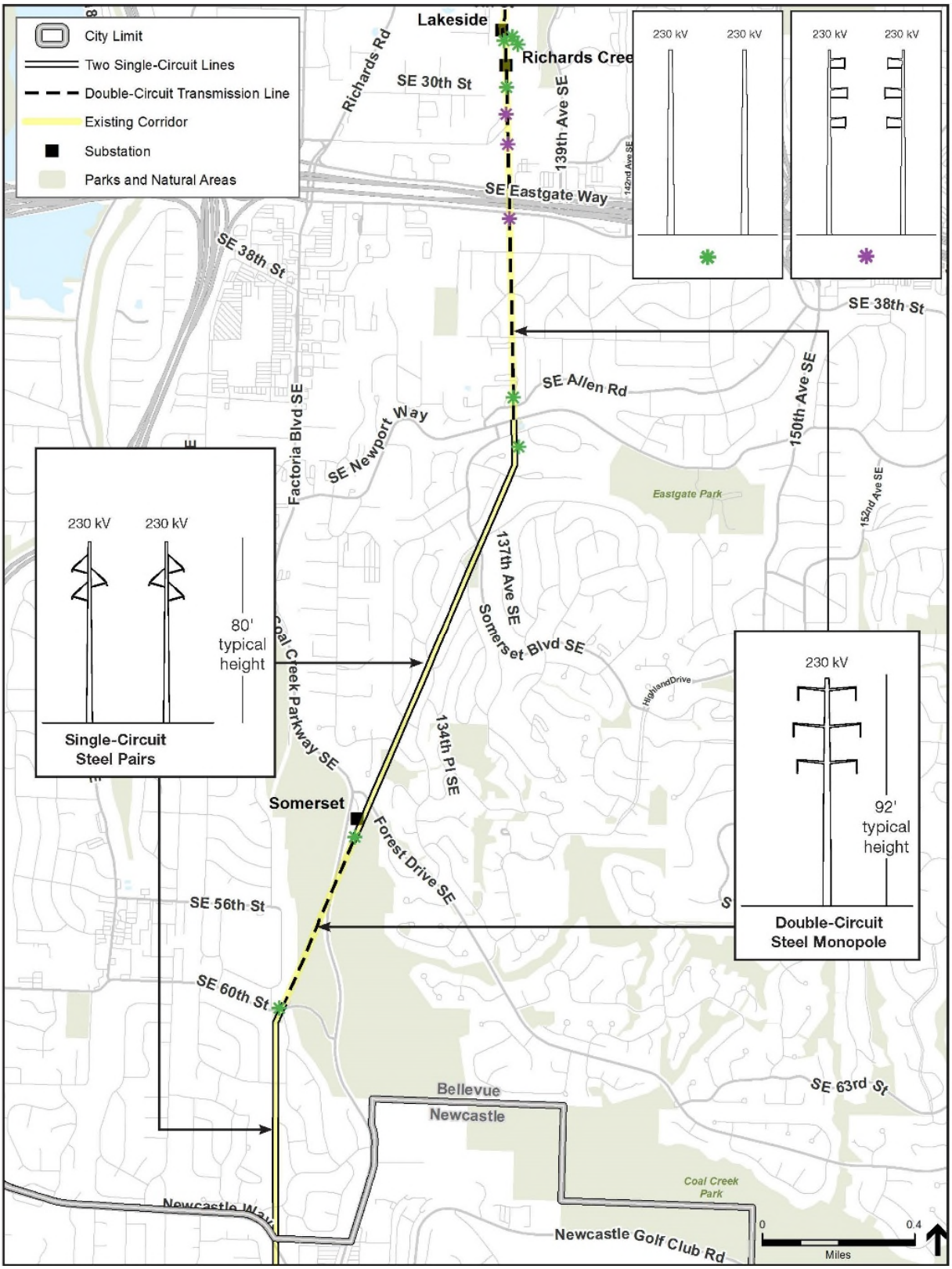
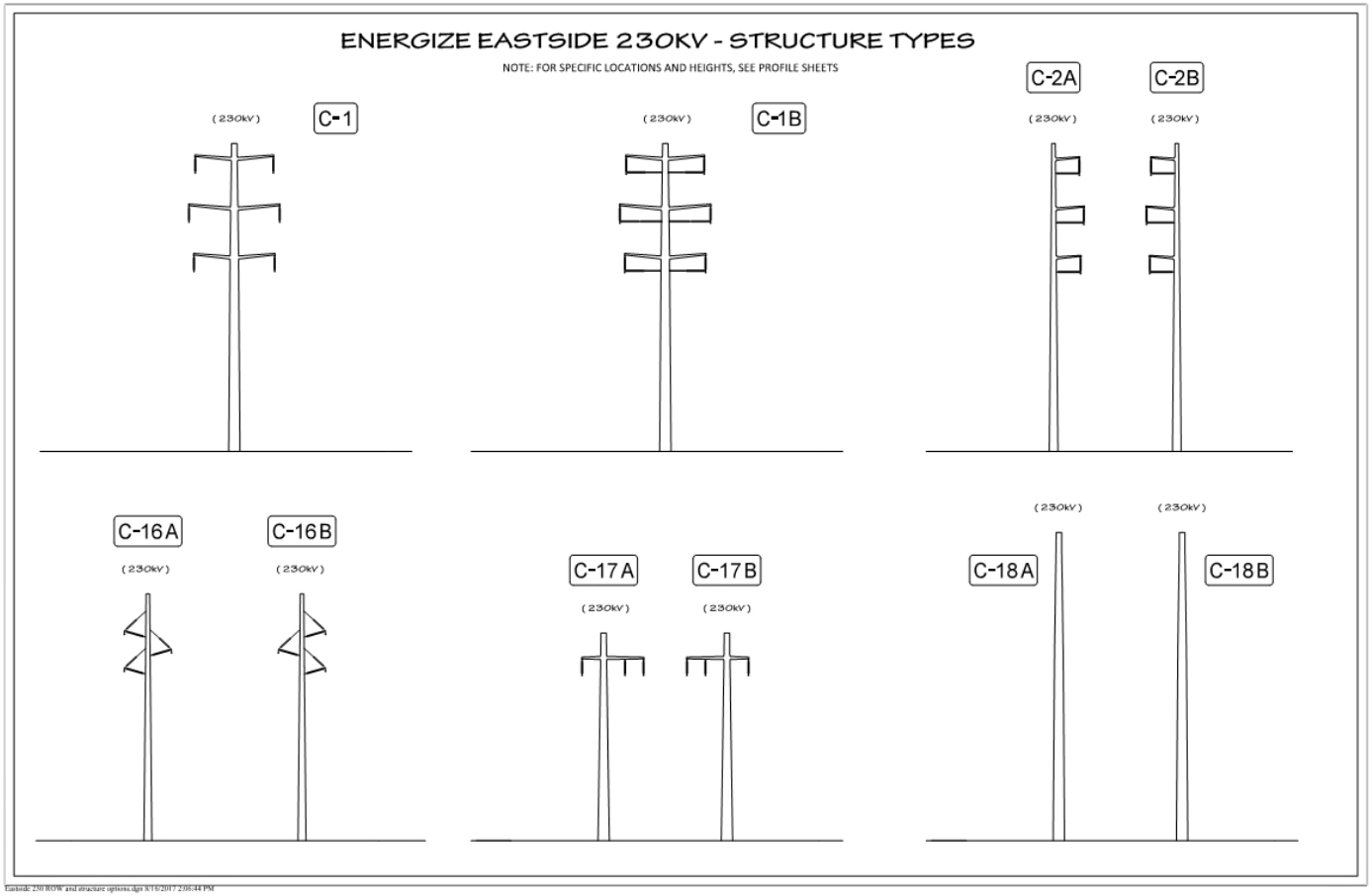


Figure II-3. Willow 1 Proposed Alignment



Structure Type	Naming Convention	Description
SCDE	C-18 A/B	Single circuit deadend
SCT	C-16 A/B	Single circuit tangent
DCT	C-1	Double circuit tangent (D denotes OHGW overhead groundwire)
DCA	C-1B	Double circuit angle - equiv to a C1 with a post brace to handle bigger angle
SCHDE	C-17 A/B	Single circuit horizontal deadend (only under SCL line)
SCA	C-2 A/B	Single circuit angle

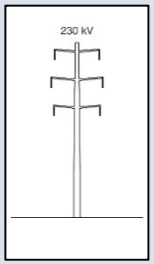
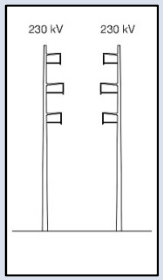
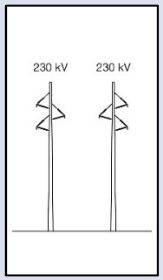
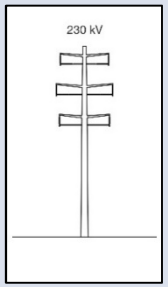
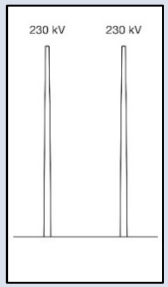
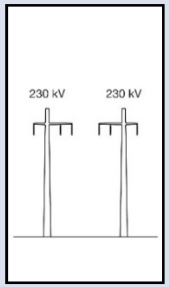
*number after type in table denotes angle

STRUCTURE TYPES
SOUTH BELLEVUE
BASED ON PSE ENGINEERING DESIGN REVISION K

Appendix A
Date: 8/20/2018

Figure II-4. Pole Structure Types

Table II-1. Pole Types

	C-1 pole	C-2 poles	C-16 poles	C-1B pole	C-18 poles	C-17 poles
Pole Type	One Double-Circuit Monopole	Two Single-Circuit Monopoles	Two Single-Circuit Monopoles	One Double-Circuit Monopole	Two Single-Circuit Monopoles	Two Single-Circuit Monopoles
Line Configuration	Six conductors total, three on each side of the pole	Three conductors stacked vertically on each pole	Three conductors stacked in a delta configuration (shown below)	Six conductors total, three on each side of the pole	Three conductors stacked vertically on each pole	Three conductors arrayed horizontally on each pole
Typical Height	95 feet	85 feet	79 feet	89 feet	91 feet	50 feet
Diameter (at base)	Typically 4.5–6 feet	Typically 3.5–5.5 feet	Typically 2.5–5.5 feet	Typically 4.5–6 feet	Typically 3.5–6.5 feet	Typically 3–5 feet
Diagram						
Simulation						No Simulation Available

Existing Pole Height: ~65-70 feet

Proposed Pole Height: ~70-100 feet

Figure II-5. Existing and Proposed Conditions of Richards Creek Substation from SE 30th Street Looking East

Existing Pole Height: ~55 feet

Proposed Pole Height: ~75 feet

Figure II-6. Existing and Proposed Conditions from 4411 Somerset Drive SE Looking Southeast

Existing Pole Height: ~60 feet

Proposed Pole Height: ~95 feet

Figure II-7. Existing and Proposed Conditions from 13630 SE Allen Road Looking Northeast

Existing Pole Height: ~65 feet

Proposed Pole Height: ~90 feet

Figure II-8. Existing and Proposed Conditions from 13744 SE Allen Road Looking Northeast

F. Vegetation Removal

Vegetation management activities, including tree trimming and tree removal, are proposed to meet the North American Electric Reliability Corporation (NERC) vegetation management standards for electric transmission lines. The overall size of the vegetation management/maintenance area typically varies by transmission pole type (see Figures II-9 through II-11).

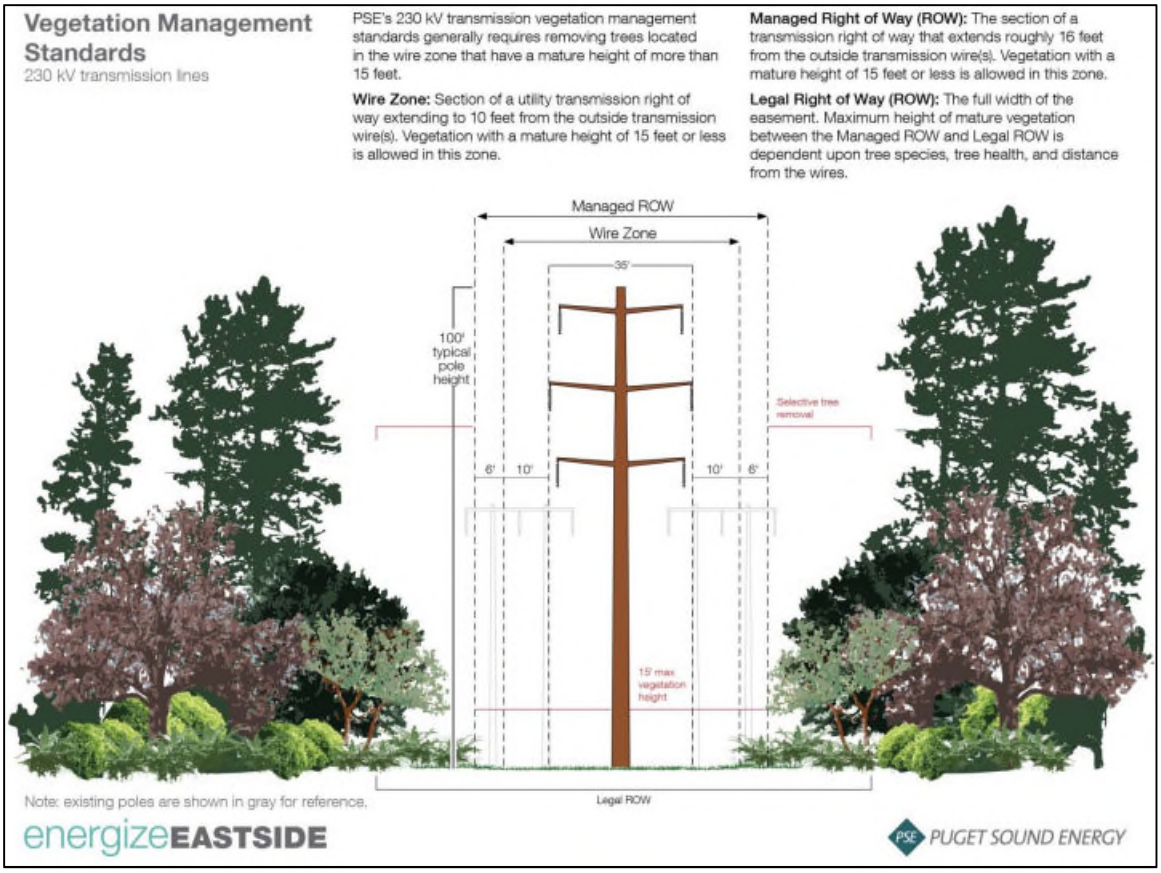


Figure II-9. Vegetation Management Standards (C-1 Pole Type)

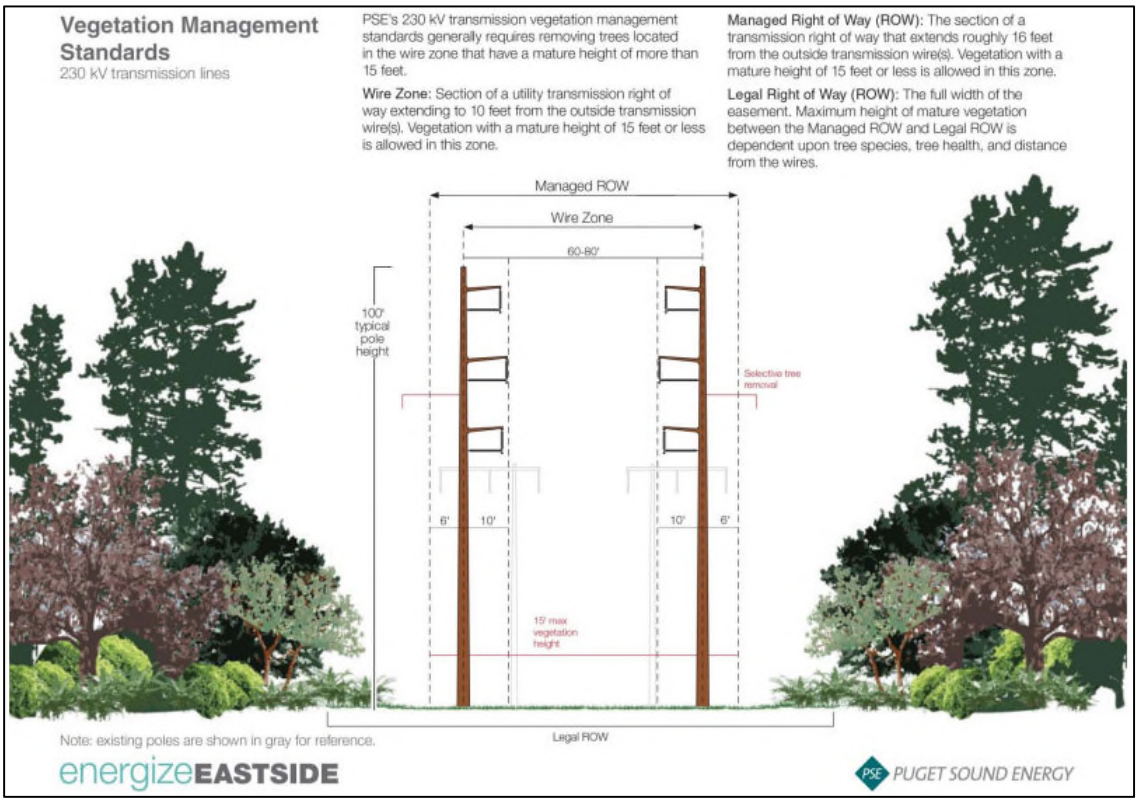


Figure II-10. Vegetation Management Standards (C-2 Pole Type)

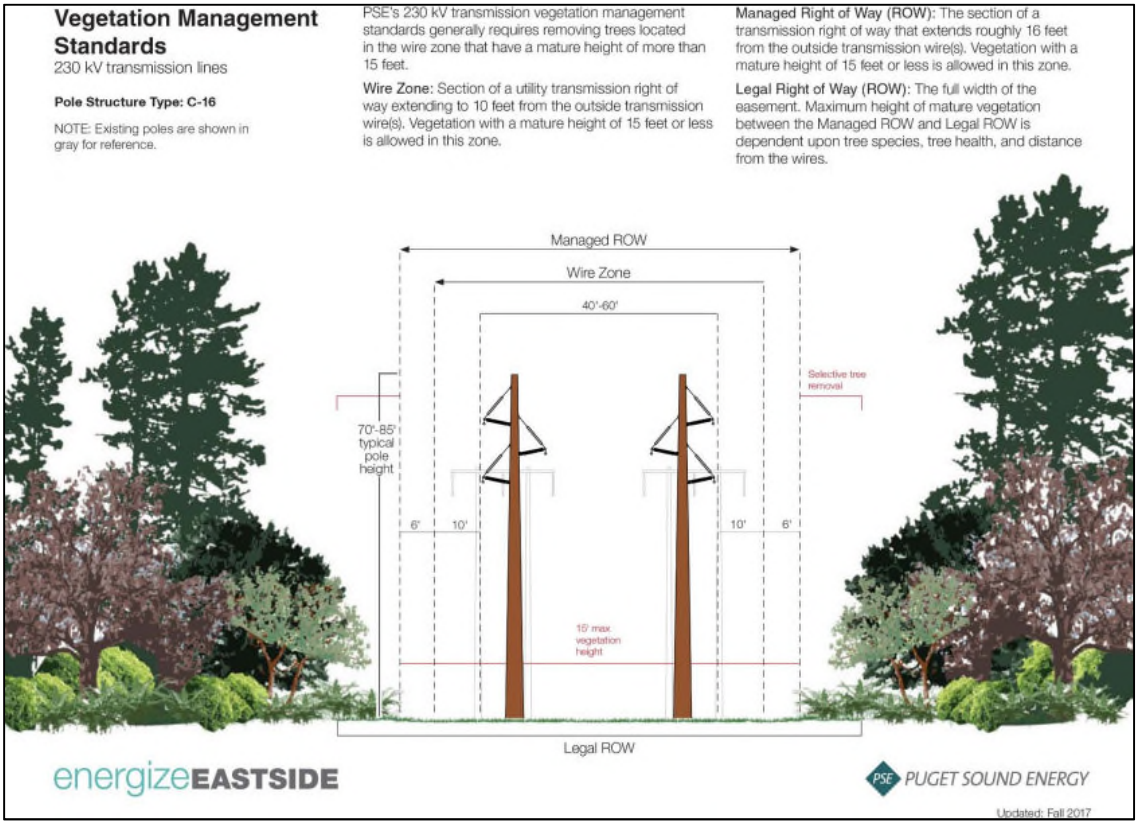


Figure II-11. Vegetation Management Standards (C-16 Pole Type)

Based on the strict application of these standards, PSE will remove any vegetation within the wire zone that matures to a height of more than 15 feet), unless terrain conditions allow at least 20 feet of clearance between the lowest conductor and the potential mature height of the vegetation.[17] Within the managed right-of-way, PSE will conduct selective vegetation removal and maintenance on a case-by-case basis based on the proximity of vegetation to its built infrastructure, as determined in the field by PSE vegetation maintenance crews. Trees outside of the managed right-of-way but within the legal right-of-way could also be trimmed to maintain at least 16 feet of clearance from the conductors, or removed based on a combination of tree height, species, health, and distance from the conductors. In general, it is assumed that trees with a height of 70 feet or greater between the managed right-of-way and the legal right-of-way will be removed, along with all dead or dying trees of any height. No trees are proposed for removal outside of the legal right-of-way as part of the Energize Eastside project.[18]

The transmission line and substation construction will require the removal of approximately 580 significant trees in the South Bellevue Segment as part of PSE's proposal due to NERC vegetation management standards. This tree removal is consistent with the analysis in the Final EIS (see Final EIS, Section 4.4.5). Of this total, approximately 95 trees are located either in the City right of way or within a City-owned (parks or utilities) property. Approximately 485 trees are located on non-city owned property, including the Richards Creek Substation property owned by PSE. Specifically, 108 trees are located on the Richards Creek Substation site, and the remaining 377 trees are located within the 3.3-mile South Bellevue Segment transmission corridor.

The Final EIS concluded that application of codes, standards, and regulations—including the City's critical areas requirements contained in Chapter 20.25H LUC—would adequately mitigate potential impacts due to vegetation removal in the South Bellevue Segment (see Final EIS, Section 4.4 & 4.4.5.6). **For a discussion of PSE's Tree Replacement Plan (included as Attachment E to this Staff Report), along with applicable City regulations and mitigation measures, refer to the State Environmental Policy Act (SEPA) review in Section VI and the Conditions of Approval in Section X of this Staff Report.**

III. SITE DESCRIPTION, ZONING/CONTEXT, and CRITICAL AREAS

A. Site Description

For the purposes of this Staff Report, PSE's proposal has been broken up into the substation and the South Bellevue Segment of the transmission line.

[17] PSE's August 30, 2017 Vegetation Management Plan, submitted in connection with the application for Permit Nos. 17-120556-LB and 17-120557-LO, is included as Attachment E to this Staff Report.

[18] See Letter from Brad Strauch, PSE Program Manager, to Heidi Bedwell, City of Bellevue Environmental Planning Manager, dated October 17, 2018. PSE's October 17, 2018 letter (PSE 10-17-18) is included in the Critical Areas Report, which is Attachment I to this Staff Report. PSE 10-17-18 is also included in the DSD official files for Permit Nos. 17-120556-LB and 17-120557-LO.

Richards Creek Substation. The property currently serves as a pole storage yard and has a utility corridor with existing transmission lines, water pipelines, and a petroleum pipeline through the center of the site. It is well screened from surrounding uses by mature vegetation (see Figure III-1 below).[19]

The site includes both slope wetlands (Wetlands A, B, C, and H), and riverine wetlands (Wetland D). Wetland A is a Category III wetland that is traversed by the existing PSE transmission line corridor, with areas of Himalayan blackberry and reed canarygrass monocultures. Wetland B is an undisturbed Category III wetland but is dominated by an understory of dense Himalayan blackberry. Wetland C is a small Category III forested slope wetland east of the proposed substation, and is dominated by a palustrine forested vegetation community including red alder, black cottonwood, salmonberry, and skunk cabbage. Wetland H is a Category II slope wetland that consists of native and non-native plant species, with prevalent invasive, non-native species in the existing transmission line corridor. Wetland D is a Category II wetland that, while comprised of native species, is also dominated by reed canarygrass, with some Himalayan blackberry.

Two stream systems are on or adjacent to the Richards Creek substation site. Stream A is an unnamed seasonal Type N stream that flows through Wetland C and into Wetland A. On the Critical Area Assessment Maps (see Attachment I to this Staff Report), Wetland A is shown to drain to Stream B and Stream F, which join and flow to Stream C, near the northeast corner of the site. This group of streams (Streams A, B, and F) is referred to below as the Stream A system. Habitat around this stream consists mainly of Wetland A and its buffer. The stream buffer for Stream C (East Creek a tributary to Richards Creek)

[19] The Critical Areas Report required by Part 20.25H LUC is attached to this Staff Report as Attachment I. The Critical Areas Report is comprised of the following documents submitted by PSE during the land use process:

(1) January 21, 2019 Technical Memorandum/Revised CAR Addendum prepared by the Watershed Company;

(2) December 2018 Revised Critical Area Report prepared by the Watershed Company, along with the Mitigation Plans and Critical Area Assessment Maps attached thereto;

(3) July 11, 2017 Revised Targeted Geologic Hazard Evaluation, prepared by GeoEngineers, along with the August 21, 2017 Memorandum supplementing this GeoEngineers' Evaluation;

(4) Letter from Brad Strauch, PSE Program Manager, to Heidi Bedwell, City of Bellevue Environmental Planning Manager, dated November 5, 2018;

(5) October 11, 2018 Technical Memorandum prepared by the Watershed Company;

(6) Letter from Brad Strauch, PSE Program Manager, to Heidi Bedwell, City of Bellevue Environmental Planning Manager, dated September 21, 2018;

(7) September 14, 2018 Memorandum re Landslide Deposits, prepared by GeoEngineers;

(8) September 21, 2018 Memorandum re Geologic Hazards, prepared by GeoEngineers;

(9) December 19, 2014 Geologic Hazards Evaluation and Preliminary Geotechnical Engineering Services, prepared by GeoEngineers;

(10) June 8, 2016 Geotechnical Engineering Services Report for Energize Eastside Project, prepared by GeoEngineers; and

(11) PSE Avian Protection Plan.

is a Type F stream that flows along the west edge of the site and is crossed by the existing access road. It is joined at the northeast corner of the site by a short stream (Stream D) and by Stream B, as noted above. In the discussion below, East Creek a tributary to Richards Creek refers to Streams C and D. The existing stream channel along the proposed Richards Creek substation has a limited riparian area with vegetation primarily on the east side of the channel.

The Richards Creek substation site is bordered to the north by PSE's existing Lakeside substation, to the west by industrial development including a water and wastewater supply company, to the south by King County's Factoria Solid Waste Transfer Station, and upslope to the east by a stormwater detention facility tract that is heavily vegetated. The Chestnut Hill Academy is northeast of the proposed substation site. The substation use is consistent with the uses in the area and the current use of the site.

Transmission Line. The transmission line corridor is an existing utility corridor that was established in the late 1920s and early 1930s. The current uses adjacent to the corridor developed over time as areas were annexed into the City and these areas became more densely populated. In most cases the properties adjacent to the corridor have landscape vegetation and residential yard areas within the transmission easement. The Olympic Pipeline Company operates two underground petroleum pipelines in the transmission corridor.

This Staff Report analyzes the South Bellevue Segment of the transmission lines, which is the portion of the transmission lines included in PSE's proposal. The South Bellevue Segment has been further broken into the smaller segments, defined roughly as follows:

Segment 1: Lakeside substation south to Richards Creek substation.
Segment 2: Richards Creek substation south to Newport Way.
Segment 3: Newport Way south to Coal Creek Parkway.
Segment 4: Coal Creek Parkway south to SE 60th Street.
Segment 5: SE 60th Street south to City Limits.

See Figures III-1 through III-5.

The South Bellevue Segment of the transmission lines crosses three unnamed Type N streams and four unnamed Type F streams (tributaries of East, Sunset, and Coal creeks). Four wetlands are located at the Somerset substation site and there are 8 wetlands along the transmission line corridor itself (See Attachment I to Staff Report).

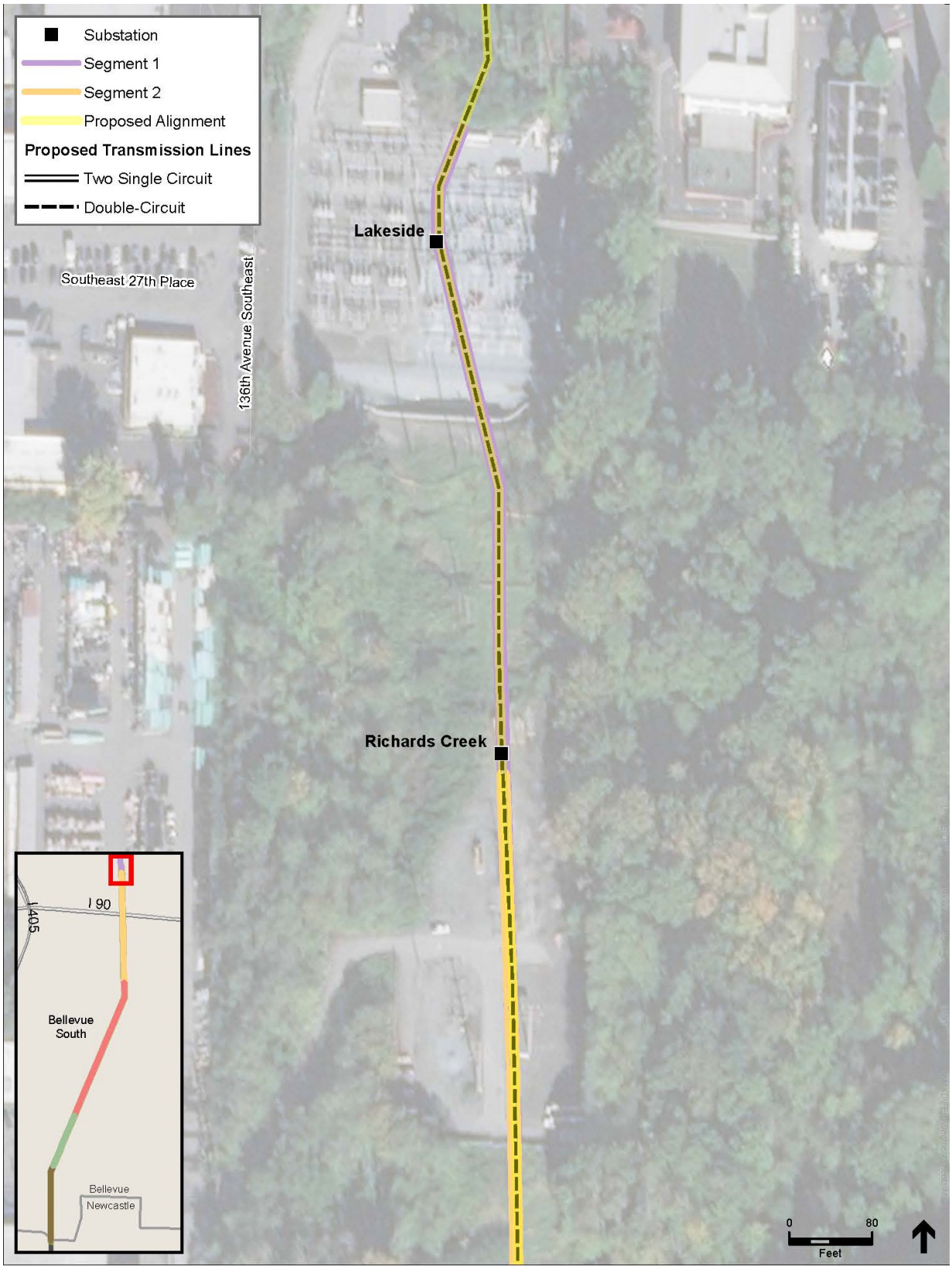


Figure III-1. Segment 1: Lakeside Substation to Richards Creek Substation

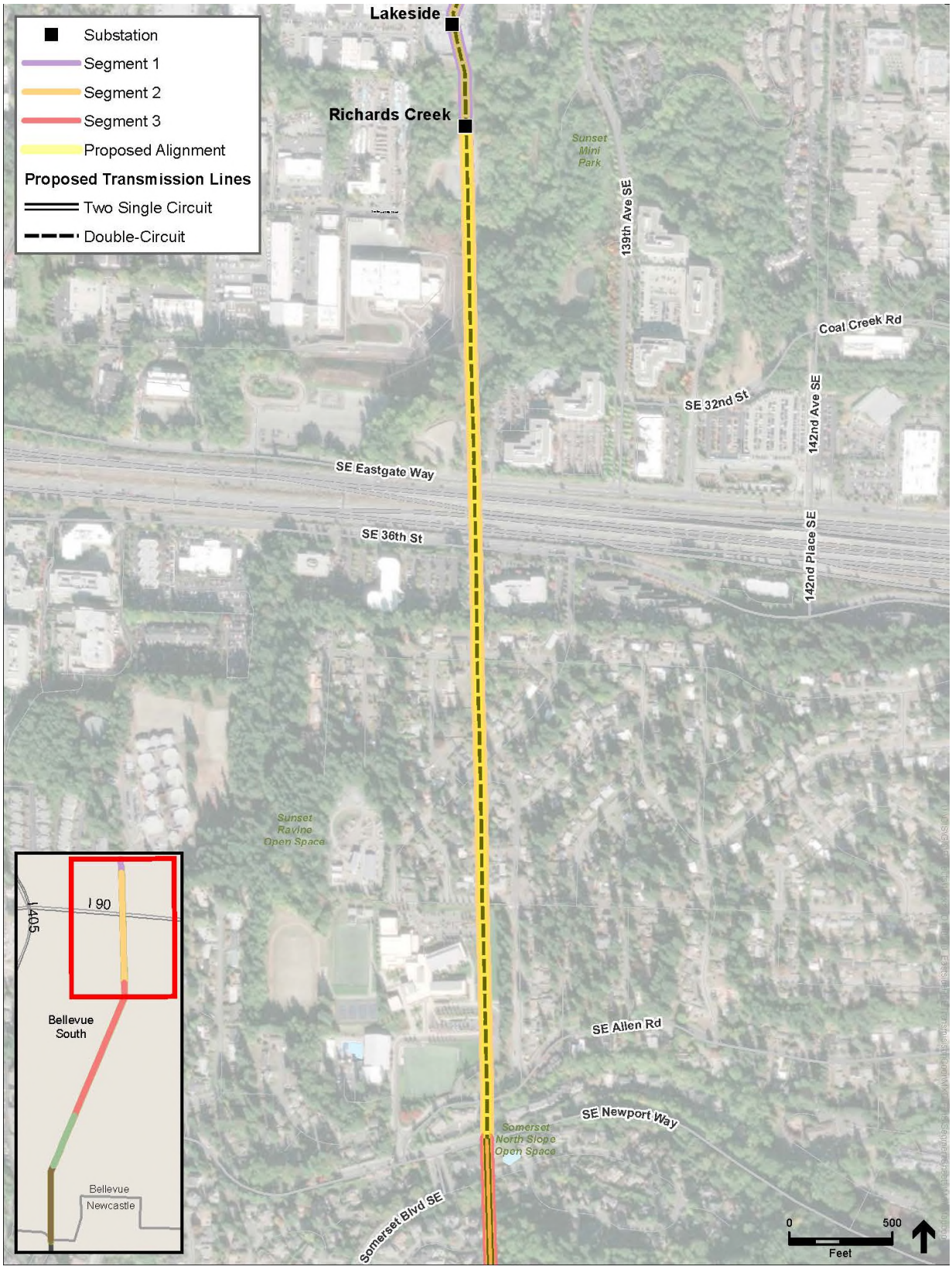


Figure III-2. Segment 2: Richards Creek Substation South to Newport Way

Figure III-3. Segment 3: Newport Way South to Coal Creek Parkway

Figure III-4. Segment 4 Coal Creek Parkway South to SE 60th Street

Figure III-5. Segment 5 SE 60th Street South to City Limits

B. Zoning/Context

The proposed South Bellevue Segment of the transmission line runs through multiple land use districts along PSE's proposed alignment. The percentage of the proposal abutting each district is summarized in Table III-I, and the districts are shown in Figure III-6.

Table III-1. Percentage of Transmission Line Abutting Each Zone

Zone	Percentage of Transmission Line
Single Family Residential	63.7%
Single Family Residential Estate	16.8%
Office and Limited Business 1	7.8%
Light Industrial	7.6%
Office and Limited Business 2	3.1%
Multi-Family Residential	1.0%

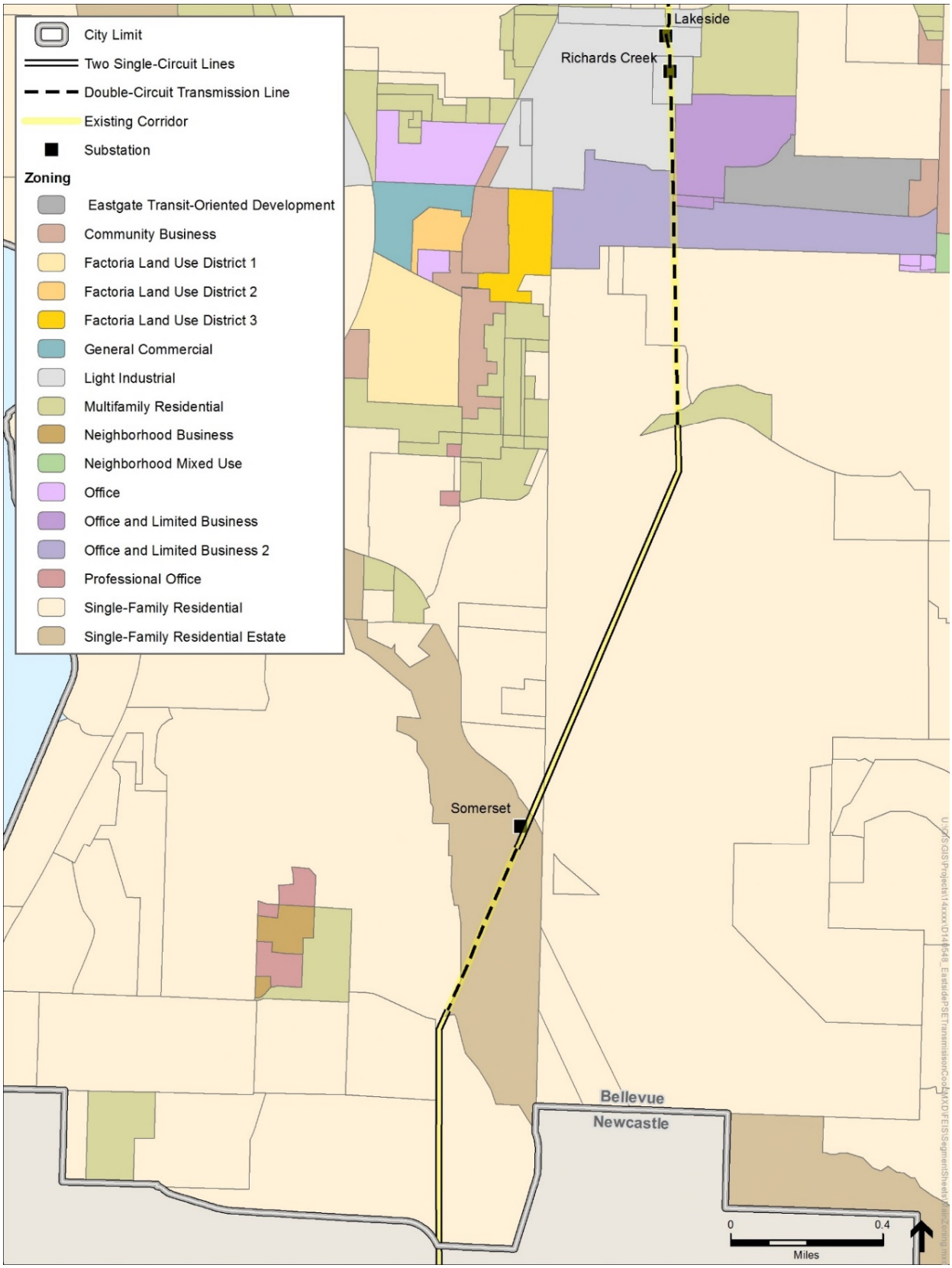


Figure III-6. Zoning Map

C. Critical Areas

This section of the Staff Report describes the critical areas through which PSE's proposed alignment passes. PSE has submitted Critical Area Reports, as required by Part 20.25H LUC, that further detail the existing functions and values of the subject critical areas; the reports are included Attachment I to this Staff Report.

1. Streams and Riparian Areas

Most of the elements necessary for a healthy aquatic environment rely on processes sustained by the dynamic interaction between the stream and the adjacent riparian area (Naiman et al. 1992). Riparian vegetation in floodplains and along stream banks provides a buffer to help mitigate the impacts of urbanization (Finkenbine et al. 2000 in Bolton and Shellberg 2001). Riparian areas support healthy stream conditions.

Riparian vegetation, particularly forested riparian areas, affect water temperature by providing shade to reduce solar exposure and regulate high ambient air temperatures, slowing or preventing increases in water temperature (Brazier and Brown 1973; Corbett and Lynch 1985).

Upland and wetland riparian areas retain sediments, nutrients, pesticides, pathogens, and other pollutants that may be present in runoff, protecting water quality in streams (Ecology 2001; City of Portland 2001). The roots of riparian plants also hold soil and prevent erosion and sedimentation that may affect spawning success or other behaviors, such as feeding.

Both upland and wetland riparian areas reduce the effects of flood flows. Riparian areas and wetlands reduce and desynchronize peak crests and flow rates of floods (Novitzki 1979; Verry and Boelter 1979 in Mitsch and Gosselink 1993). Upland and wetland areas can infiltrate floodflows, which in turn, are released to the stream as baseflow.

Stream riparian areas, or buffers, can be a significant factor in determining the quality of wildlife habitat. For example, buffers comprised of native vegetation with multi- canopy structure, snags, and downed logs provide habitat for the greatest range of wildlife species (McMillan 2000). Vegetated riparian areas also provide a source of large woody debris that helps create and maintain diverse in-stream habitat, as well as create woody debris jams that store sediments and moderate flood velocities.

Sparsely vegetated or vegetated buffers with non-native species may not perform the needed functions of stream buffers. In areas where the buffer is not well vegetated, it is necessary to either increase the buffer width or require that the standard buffer width be restored or revegetated (May 2003). Until the newly planted buffer is established the near term goals for buffer functions may not be attained.

Riparian areas often have shallow groundwater tables, as well as areas where groundwater and surface waters interact. Groundwater flows out of riparian wetlands, seeps, and springs to support stream baseflows. Surface water that

flows into riparian areas during floods or as direct precipitation infiltrates into groundwater in riparian areas and is stored for later discharge to the stream (Ecology 2001; City of Portland 2001).

Project Site Conditions: A total of 11 streams are located along the segment corridor. Streams are generally concentrated near the Richards Creek substation site and Coal Creek Natural Area. Three of the streams are located at the Lakeside substation site, two are at the Richards Creek substation site, and six are along the transmission line corridor. All of these streams are either a Type F or N stream. Stream classifications and buffer widths are summarized in the Critical Areas Report (see Attachment I to this Staff Report). Note that the streams are largely within wetlands or wetland buffers. The wetlands typically have buffer requirements that are equal to or larger than the required stream buffers. As a result, the stream buffers are also almost all contained within the wetlands or wetland buffers on the Richards and Lakeside substation sites.

Figure III-7. Stream Locations

The Critical Areas Report indicates that a tributary to Richards Creek found on the substation site, is used by some cutthroat trout, but habitat in this stream is degraded. The buffer does not provide optimal biofiltration to remove stormwater runoff from existing paved, pollution-generating surfaces draining toward the stream. Areas of dense invasive species along the existing stream channel impede habitat functions. The lack of plant species and structural diversity limits food sources and cover opportunities for most wildlife species. The stream is straight and choked with grass and vines in places. It lacks deep pool habitat with intervening riffles, and there is very little wood for protective cover or to provide scour to form and maintain pools. It has a western exposure due to an adjoining paved industrial supply storage area. As a result, it is exposed to direct afternoon sunlight from the west that tends to increase water temperatures. The stream channel gradient is much steeper upstream of an existing pair of culverts and becomes flatter below, causing sediment to accumulate at the culvert inlet and block flow. Frequent maintenance is needed to unclog the culverts to maintain flow. The channel downstream of the culverts also fills with sediment, causing flows to spill out onto an adjacent, lower paved industrial area.

Stream buffer conditions along the corridor are generally degraded due to the presence of invasive species and active transmission line management, which limits vegetation growth and impacts hydrologic and habitat functions.

2. Wetlands

Wetlands provide important functions and values for both the human and biological environment; these functions include flood control, water quality improvement, and nutrient production. These “functions and values” to both the environment and the citizens of Bellevue depend on their size and location within a basin, as well as their diversity and quality. While Bellevue’s wetlands provide various beneficial functions, not all wetlands perform all functions, nor do they perform all functions equally well (Novitski et al. 1995). However, the combined effect of functional processes of wetlands within basins provides benefits to both natural and human environments. For example, wetlands provide significant stormwater control, even if they are degraded and comprise only a small percentage of area within a basin.

Project Site Conditions: A total of 21 wetlands are located along the corridor. These wetlands are generally concentrated on or near the Richards Creek substation site or the Coal Creek Natural Area. Three of the wetlands are at the Lakeside substation site, six are at the Richards Creek substation site, and four are at the Somerset substation site. The remaining 8 wetlands are along the transmission line corridor (See Attachment I to Staff Report). Wetlands range in type from Category IV <2,500 square feet, unregulated wetlands to a Category II wetland. Generally, the wetlands have experienced past impacts or disturbance from the transmission line construction and maintenance. Many of these wetlands are degraded and consist of Himalayan blackberry and reed canarygrass monocultures. Where wetlands are higher functioning, the plant communities contain native species such as Pacific willow, red alder, salmonberry, giant horsetail, and lady fern.

Due to previous development/disturbance and existing land uses, buffer areas are mostly degraded, consisting of compacted soils and invasive vegetation (predominantly Himalayan blackberry and reed canarygrass).

3. Geologic Hazard Areas

Geologic hazards pose a threat to the health and safety of citizens when commercial, residential, or industrial development is inappropriately sited in areas of significant hazard. Some geologic hazards can be reduced or mitigated by engineering, design, or modified construction practices. When technology cannot reduce risks to acceptable levels, building in geologically hazardous areas is best avoided (Washington Administrative Code [WAC] 365-190-120).

Steep slopes may serve several other functions and possess other values for the City and its residents. Several of Bellevue's remaining large blocks of forest are in steep slope areas, providing habitat for a variety of wildlife species and important linkages between habitat areas in the City. These steep slope areas also act as conduits for groundwater, which drains from hillsides to provide a water source for the City's wetlands and stream systems. Vegetated steep slopes also provide a visual amenity in the City, providing a "green" backdrop for urbanized areas, enhancing property values and buffering urban development.

Project Site Conditions:

The submitted Critical Areas Report contains a geotechnical Report and Memo prepared by Geoengineers dated July 11, 2017 (see Attachment I to this Staff Report). The report characterizes the existing conditions in the project area. The report acknowledges the presence of steep slopes and areas of localized landslide hazards; however, no areas of active slope movement or instability were observed. The existing geology in the project area is characterized as "areas mainly consist of glacial drift, recessional outwash, glacially consolidated till and advance outwash deposits, with the exception of a small area of peat, fill, alluvium and Eocene age sedimentary rocks. Soil types anticipated in the project area include mainly silty gravel, silty sand, and silt." Much of the proposed project area includes areas of slope that were previously modified for either the original transmission line construction or other development activities. These areas are characterized by having little to no significant vegetation and contain cut and fill slopes, and rockeries and retaining walls.

4. Species of Local Importance

Urbanization, the increase in human settlement density and associated intensification of land use, has a profound and lasting effect on the natural environment and wildlife habitat (McKinney 2002, Blair 2004, Marzluff 2005, Munns 2006); is a major cause of native species local extinctions (Czech et al. 2000); and is likely to become the primary cause of extinctions in the coming century (Marzluff et al. 2001). Cities are typically located along rivers, on coastlines, or near large bodies of water. The associated floodplains and riparian systems make up a relatively small percentage of land cover in the western United States, yet they provide habitat for rich wildlife communities (Knopf et al. 1988), which in turn provide a source for urban habitat patches or reserves. Consequently, urban areas can support rich wildlife communities. In fact, species richness peaks for some groups, including songbirds, at an intermediate level of development (Blair 1999,

Marzluff 2005). Protected wild areas alone cannot be depended on to conserve wildlife species. Impacts from catastrophic events, environmental changes, and evolutionary processes (genetic drift, inbreeding, colonization) can be magnified when a taxonomic group or unit is confined to a specific area, and no one area or group of areas is likely to support the biological processes necessary to maintain biodiversity over a range of geographic scales (Shaughnessy and O'Neil 2001). As well, typological approaches to taxonomy or the use of indicators present the risk that evolutionary potential will be lost when depending on reserves for preservation (Rojas 2007). Urban habitat is a vital link in the process of wildlife conservation in the U.S.

Project Site Conditions:

As noted in the Critical Areas Report the project area is urban and mostly developed. The transmission line corridor contains little impervious surfaces and is mostly vegetated. Vegetation in the project area often consists of low-growing grasses, landscape plants, and invasive plant species (e.g., Himalayan blackberry and reed canarygrass) typical of disturbed areas. More valuable habitat in the project area includes forested areas on the Richards Creek substation site and in the Coal Creek ravine. However, existing maintenance activities associated with the transmission lines, established PSE programs and procedures, and the urban landscape setting reduce the likelihood that species of local importance will use the corridor areas for breeding.

Of Bellevue's 23 species of local importance, coho salmon are the only aquatic species known to occur in the project area. River lamprey are also presumed to occur in Coal Creek, although this has not been confirmed. Species that could breed in the project area but are considered unlikely to do so based on site disturbance are pileated woodpecker, green heron, red-tailed hawk, and western toad. Bald eagle, pileated woodpecker, Vaux's swift, purple martin, merlin, green heron, red-tailed hawk, and Townsend's big-eared bat have the potential to forage in the project area. The project area supports suitable habitat for pileated woodpeckers (e.g., green spaces east of the Richards Creek substation site, near Eastgate Park, and Coal Creek Park), green herons (e.g., Coal Creek and Richards Creek), and osprey.

A complete evaluation of habitat associated with species of local importance is provided in the December 2018 Revised South Bellevue Critical Areas Report, prepared by the Watershed Company, at Section 4.3.3 (see Attachment I to this Staff Report).

5. **Areas of Special Flood Hazard**

Floodplains provide both hydrologic and ecological functions. Flooding occurs when either runoff exceeds the capacity of rivers and streams to convey water within their banks, or when engineered stormwater systems are overwhelmed. Urbanization is linked with increased peak discharge and channel degradation (Dunne and Leopold 1978; Booth and Jackson 1997; Konrad 2000). Floodplains diminish the effects of urbanization by temporarily storing water and mediating flow to downstream reaches. The capacity of a floodplain to buffer upstream fluctuations in discharge varies according to valley confinement, gradient, local relief, and flow resistance provided by vegetation. Development within the

floodplain can dramatically affect the storage capacity of a floodplain, impact the hydrologic regime of a basin and present a risk to public health and safety and to property and infrastructure.

Project Site Conditions: Areas of special flood hazard in the project area include relatively small areas associated with Sunset Creek and Coal Creek, as determined by the Federal Emergency Management Agency (FEMA). These floodplains are highly modified and in the case of Sunset Creek contains both structures, roads, and other impervious surfaces.

IV. CONSISTENCY WITH LAND USE CODE AND ZONING REQUIREMENTS

A. Electrical Utility Facilities – LUC 20.20.255

The purpose of LUC 20.20.255 is to regulate proposals for new or expanding electrical utility facilities and to minimize impacts associated with such facilities on surrounding areas through siting, design, screening, and fencing requirements. The Electrical Utilities Facilities provisions of the LUC require an Alternative Siting Analysis (LUC 20.20.255.D), compliance with the applicable decision criteria (LUC 20.20.255.E), and compliance with applicable design standards regarding site landscaping, fencing, and height limitations (LUC 20.20.255.F). In turn, LUC 20.20.255.G provides broad authority for the City to impose conditions relating to the location, development, design, use, or operation of an electrical utility facility in order to mitigate environmental, public safety, or other identifiable impacts.

The Alternative Siting Analysis discussed in LUC 20.20.255.D is required for proposals that impact sensitive sites as identified on Map UT-7 of the Comprehensive Plan (see Attachment F to this Staff Report). In addition, all route alternatives considered by PSE traverse residential land use districts. PSE's proposed alignment, the "Willow 1" alternative, is specifically identified in and anticipated by Map UT-7. Thus, the Alternative Siting Analysis required by LUC 20.20.255.D applies to PSE's proposal.

Section IV.A of this Staff Report analyzes PSE's compliance with the Alternative Siting Analysis and design standards requirements in LUC 20.20.255.D and 20.20.255.F, respectively. Analysis of PSE's compliance with the Electrical Utilities Facilities decision criteria, contained in LUC 20.20.255.E, is provided in **Section VIII.C** (Electrical Utility Facilities Decision Criteria) of this Staff Report.

1. **Compliance with the Alternative Siting Analysis:**
   LUC 20.20.255.D requires that PSE identify alternative sites, provide required content showing analysis relating to identified sites, describe technologies considered for the proposal, and describe community outreach conducted for proposals relating to new or expanding electrical utility facilities on sensitive sites as identified on Map UT-7 of the Comprehensive Plan.

   As part of the subject application, PSE submitted an Alternative Siting Analysis (see Attachment B to this Staff Report) that contained information regarding the methodology employed, the alternative sites analyzed, the technologies considered, and the community outreach undertaken in connection with the proposal (see LUC 20.20.255.D). The Alternative Siting Analysis provided by PSE specifically considers: (1) three siting alternatives for the transmission line upgrades and proposed substation; (2) the relationship of each alternative alignment to the location of the actual demand for electrical service and to improved customer reliability; (3) the City of Bellevue's location selection hierarchy contained in LUC 20.20.255.D.2; and (4) the impacts of PSE's proposed alignment compared to a nonresidential siting.

   The Alternative Siting Analysis submitted by PSE satisfies LUC 20.20.255.D.1 because it specifically describes substation alternatives and three potential transmission line alignments, as analyzed in detail in the report prepared by

Tetra Tech for PSE titled *Eastside 230 kV Project Constraint and Opportunity Study for Linear Site Selection* (Tetra Tech 2013).[20] The Analysis determines that the three potential transmission line alternatives—the Willow 1 (proposed alignment), Willow 2, and Oak 1 routes—are all feasible, but Willow 1 is the alternative that limits environmental impacts and new impacts to adjacent uses. The option of placing the new 230 kV transmission lines underground is also discussed, with a cross reference to the Phase 1 Draft EIS, at Section 2.4.1.3 of the Analysis (see Attachment B to this Staff Report).

The three substation alternatives discussed in the Analysis are referred to as Westminster, Vernell, and Richards Creek. PSE selected these three substation sites for consideration because they are all owned by PSE; meet the objectives to site the 230 kV transformer at a central location between the existing 230 kV power sources at the Sammamish substation in Redmond and Talbot substation in Renton; accommodate the necessary improvements to serve the required 230 kV transmission lines to bring power to the centralized transformer; and distribute power to the existing network of 115 kV transmission lines. Because the Westminster site is farther away from the Lakeside 115 kV station, PSE determined that there was no benefit in using the Westminster site over the Richards Creek substation site. Similarly, the Vernell site, unlike the Richards Creek site, would not allow PSE to use the existing corridor and would require additional transmission lines between the site and the existing transmission line corridor.

The Alternative Siting Analysis submitted by PSE satisfies the requirements of LUC 20.20.255.D.2 because it accurately describes and maps the alternative sites, along with the applicable land use districts within which the sites are located, and analyzes both customer demand and operational need. For example, Appendix C in the Alternative Siting Analysis identifies the specific routes evaluated by PSE, and Section 2.3 of the Analysis summarizes the land use and zoning along each route. PSE also provided a copy of USE 2015 and excerpts from the Quanta Eastside Needs Assessment Report, the Quanta Supplemental Eastside Needs Assessment Report, Exponent 2012, and the Phase 2 Draft EIS to support its analysis of the proposed location and operational need. Each of these reports confirm the operational need identified by PSE.[21]

The Alternative Siting Analysis and the documents attached thereto comply with LUC 20.20.255.D.3 because they describe how the proposal is intended to provide reliability and describe the range of technologies considered (see Attachment B [Alternative Siting Analysis], pp. 18-24). Consistent with LUC 20.20.255.D.3.d, the Analysis provided by PSE describes mitigation measures, including: (1) limiting the proposal to the existing corridor, (2) pole height reduction and location mitigations, (3) compliance with City codes and

[20] Tetra Tech 2013 is attached (as Appendix C) to PSE's Alternative Siting Analysis.

[21] Further discussion of operational need is contained in Section VIII.C of this Staff Report in connection with the Electrical Utility Facilities Decision Criteria, see LUC 20.20.255.E.3.

standards, and (4) the Richards Creek substation wetland mitigation, culvert replacement and stream habitat improvement (described in more detail below).

The Analysis also explains that PSE's preferred alignment for the transmission line upgrades, the Willow 1 route, minimizes compatibility impacts because it does not require acquisition of additional easements; it removes the fewest number of trees; and it prioritizes safety by having the lowest potential AC interaction with the two petroleum pipelines that share the corridor. PSE has sought to mitigate impacts by reducing pole height and moving pole locations, where feasible and requested by a stakeholder, and through consideration of different pole colors to limit contrast with the skyline or adjacent uses. PSE will mitigate vegetation impacts by replanting both on and off-site consistent with a tree replacement plan (see Sections VI.A and X of this Staff Report for further discussion of tree replacement mitigation and the process for implementing the tree replacement plan).

With respect to the community outreach description required by LUC 20.20.255.D.4, the Alternative Siting Analysis describes how PSE began working with Bellevue residents and City staff several years prior to submittal of the CUP and CALUP applications to determine the best possible route for the proposed transmission lines. The CAG that participated in the outreach included 24 representatives from various interest groups across the Eastside, including neighborhood organizations, cities, schools, social service organizations, major commercial users, economic development groups, an environmental organization, and a property developer. The CAG met eight times between January 22 and December 10, 2014, and PSE attached the CAG Final Report to the Alternative Siting Analysis (see Appendix D to the Alternative Siting Analysis).

The CAG process was supplemented by a broad community outreach effort, which included three public open houses, six sub-area workshops, three sub-area committee meetings, and two question-and-answer meetings. The public submitted questions and comments via email, voicemail, and an online public comment form, resulting in approximately 2,300 comments and questions. A variety of options for the Energize Eastside project, both wire and non-wire, were evaluated as part of the CAG process. As a result of the process, and consistent with LUC 20.20.255.D, the Oak and Willow transmission line options were considered feasible and selected for further consideration as alternative alignments for the Project.

The programmatic EIS (the Phase 1 Draft EIS) was prepared to assess various wire and non-wire solutions, and a project-level EIS (the Phase 2 Draft EIS) was prepared to evaluate four alternative alignments between the proposed Richards Creek substation and the southern city limits of Bellevue, referred to in the EIS as the Willow 1, Willow 2, Oak 1, and Oak 2 Options. Consistent with SEPA, scoping meetings and a public comment period were held prior to development of both the programmatic and project-level Draft EISs, and public hearings and public comment periods were held following the release of each Draft EIS.

Ultimately, PSE selected the Willow 1 Option as its proposed alignment based on the public outreach and technical review that occurred during the CAG and EIS processes. All of the option routes, including Willow 1, traverse residential land use districts, but PSE determined that utilizing the existing corridor would minimize impacts associated with the Project on surrounding areas. As discussed above, PSE's decision to use the existing corridor minimizes tree removal as compared to establishing a new corridor and allows for better assessment of potential interactions with the co-located petroleum and natural gas pipeline (see DNV GL 2016). The existing corridor also minimizes the creation of new impacts to adjacent uses, including residential uses. As properties adjacent to the transmission line corridor currently have utility facilities in their viewsheds and neighborhoods, the Willow 1 route has lower impacts compared to establishing a new corridor.

The Alternative Siting Analysis (Attachment B to this Staff Report) contains sufficient information regarding the methodology employed, the alternative sites analyzed, the technologies considered, and the community outreach undertaken to satisfy the requirements of LUC 20.20.255.D. The Analysis includes numerous appendices addressing Project need, public outreach and input, and tracks the extensive environmental review undertaken in connection with the Project. The Analysis also explains how, by constructing the proposed transmission line facilities in the existing 115 kV transmission line corridor and selecting the Richards Creek substation, site compatibility impacts are limited by this preferred alternative. See LUC 20.20.255.D.2.d. Therefore, PSE's Alternative Siting Analysis complies with the provisions of LUC 20.20.255.D.

2. Compliance with LUC 20.20.255.F Design Standards:

a. <u>Site Landscaping (LUC 20.20.255.F.1)</u>:
Richards Creek Substation: At the Richards Creek substation site, LUC 20.20.520.F.2 requires 15 feet of Type I landscaping on all sides of the substation and additional requirements for portions of the site within critical areas. The substation site contains wetland and stream critical areas on the north, south, and western portions of the site.

As part of the CUP application, PSE submitted a Landscape Plan proposing that the required landscape screen approximately 30 feet in width along the east side of the substation with a combination of replacement trees and existing understory vegetation (see Attachment A to this Staff Report). The screen will be elevated above the proposed substation supported by a retaining wall and will screen the substation from undeveloped property that is forested and contains a stormwater detention facility that serves multi-family development farther east across 139th Ave SE.

LUC 20.20.520.F.6 states that if a proposal is located within a Critical Area Overlay District, the Director shall waive the planting requirement of F.2 and require the use of native vegetation within the critical area or critical area buffer in lieu of landscape development if the width of the existing vegetation is at least twice that as required under F.2. PSE's proposal includes an area on the north, south, and west sides that contains critical areas and is at least

twice the required 15-foot landscaping buffer. Plantings will be required to mitigate impacts to wetlands and stream buffers. These plantings will be located around the perimeter of the parcel, which will also enhance the function of the perimeter screening. With the mitigation plantings, this standard will be achieved. Rather than simply hydroseeding areas of disturbance, PSE shall plant groundcover or low growing shrubs in addition to the proposed trees in any areas outside of the required critical areas plantings surrounding the substation.

Lakeside Substation: The proposed work does not trigger additional site landscaping at this location.

Transmission Lines: N/A.

The final site and landscape plans for the substation are attached hereto (see Attachment A). **In addition, refer to the Conditions of Approval regarding site landscaping in Section X of this Staff Report.**

b. Fencing (LUC 20.20.255.F.2):

Richards Creek Substation: Substations are required to have sight-obscuring fencing not less than 8 feet in height. This requirement may be modified by the City if the site is not considered sensitive as referenced in Map UT-7 of the Comprehensive Plan, is adequately screened by topography and/or existing or added vegetation, or if the facility is fully enclosed within a structure. To the maximum extent possible, all electrical utility facility components, excluding transmission lines, shall be screened by either a site-obscuring fence or alternative screening.

The Richards Creek substation site is sufficiently screened by critical area vegetation (existing and proposed enhancement); and based on the site topography, its location at the end of a public street, and the proposed location of the substation footprint setback in the hill to the east, it is unlikely that the substation will be noticeably visible from outside the substation property. Therefore, the City concludes that a sight-obscuring fence is not required due to these circumstances.

Lakeside Substation: The site is currently fenced.

Transmission Line: N/A.

The final site and landscape plans for the substation are attached hereto (see Attachment A). **In addition, refer to the Conditions of Approval regarding site landscaping in Section X of this Staff Report.**

c. Required Setbacks (LUC 20.20.255.F.3):

The required structure setbacks for the Light Industrial zoning district are shown in Table IV-1:

Table IV-1. Required Setbacks

	Required	Proposed
Front (West)	15 feet	280 feet
Rear (East)	15 feet *	63 feet
Side	15 feet *	168 feet / 87 feet

*Rear and side yards are governed by the required landscaping standards per LUC 20.20.010 Footnote (2). The required landscaping for interior property lines in the LI Land Use District is 8 feet of Type III landscaping. However, as noted above, electrical utility facilities are required to provide 15 feet of Type I landscaping on all sides. Therefore, the effective setback requirement for side and rear yards for the Richards Creek substation is 15 feet.

The Richards Creek substation proposal conforms to the setback requirements.

d. Height Limitations (LUC 20.20.255.F.4):
The maximum structure height varies by land use district along the transmission line corridor. The tallest maximum height allowed along PSE's proposed alignment is 75 feet. The maximum heights listed in the code for each zone are shown in Table IV-2, along with the maximum height proposed in each zone.

Table IV-2. Maximum Height per Land Use Code and Proposed Project

Zone	Maximum Height per Land Use Code	Maximum Height Proposed
S.F. Residential (R-3.5, R-5)	35 feet	95 feet
S.F. Residential Estate (R-1)	35 feet	109 feet
Office and Limited Business (OLB)	45 feet	90 feet
Office and Limited Business 2 (OLB 2)	75 feet	85 feet
Light Industrial (LI)	45 feet	100 feet
Multi-Family Residential (R-10, R-15)	30 feet	90 feet

Under LUC 20.20.255.F.4, PSE may exceed the height of the underlying land use district provided that:

1) The requested increase for the poles is the minimum necessary for the effective functioning of the electrical utility facility; and
2) Impacts associated with the electrical utility facility have been mitigated to the greatest extent technically feasible. (LUC 20.20.255.F.4).

Finding: The heights proposed are the minimum heights possible given the constraints of a 230 kV system following the existing pole spacing in the corridor. PSE has explained that further modifications to necessary pole heights would increase the number of poles, result in increased tree removal to

accommodate the additional poles, and provide fewer screening options for both the existing and new pole locations within the corridor.[22]

In addition, PSE has provided information suggesting that electrical and magnetic fields (EMF) levels and the potential for interaction with the co-located Olympic pipeline system would increase with any reduction in pole height, or with the addition of significantly more poles (PSE 9-21-18). The proposal is located within the existing corridor long recognized in the City of Bellevue Comprehensive Plan as geographic location for the Project, and PSE has explained why the heights proposed are the minimum necessary for the effective functioning of the proposal. Therefore, PSE has established that the proposal is complies with LUC 20.20.255.F.4.a.

The Final EIS assessed potential impacts associated with the Energize Eastside project, including an assessment of PSE's project-level proposed alignment (Willow 1) and environmental impacts of the entire Project in light of this proposed alignment (see Chapters 1, 2, 4, 7, and 8 of the Final EIS). The Final EIS analyzed both cumulative impacts of the Project across all jurisdictions and specific impacts within the South Bellevue Segment.

As the analysis in the Final EIS confirmed, any impacts in the existing corridor resulting from increased pole heights in the South Bellevue Segment will be less than significant, with the exception of an 0.8 mile area where the transmission lines traverse a portion of the Somerset neighborhood. Section VI.C and Section VIII of this Staff Report discuss the significant, unavoidable adverse impacts to aesthetics and scenic views in the Somerset neighborhood as identified by the Final EIS. The discussion contained in Sections VI.C and VIII explain how and why the significant unavoidable adverse aesthetic impacts in Somerset have been mitigated to the greatest extent technically feasible. Moreover, the Conditions of Approval contained in Section X of this Staff Report mitigate identified environmental, aesthetic, and public safety impacts associated with PSE's proposal to the greatest extent technically feasible, consistent with LUC 20.20.255.F.4.b.

B. Critical Areas Requirements – LUC 20.25H

The City of Bellevue Land Use Code Critical Areas Overlay District (LUC 20.25H) establishes standards and procedures that apply to development on any site that contains in whole or in part any portion designated as critical area or critical area buffer. Regulated critical areas within the project area include wetlands, streams, geologic hazard areas, and flood hazard areas.

Per LUC 20.25H.055.B, a new or expanded utility system (including an electrical utility facility per LUC 20.50.050 and .018) is an allowed use within a critical area. Permanent impacts, vegetation conversion, and temporary impacts are expected to

[22] Letter from Brad Strauch, PSE Program Manager, to Heidi Bedwell, City of Bellevue Environmental Planning Manager, dated September 21, 2018. PSE's September 21, 2018 letter (PSE 9-21-18) is included in the Critical Areas Report, which is Attachment I to this Staff Report. PSE 9-21-18 is also included in the DSD official files for Permit Nos. 17-120556-LB and 17-120557-LO.

occur in wetlands, geological hazard areas, and buffer and structure setbacks associated with streams, wetlands, and geologic hazards.

1. **Consistency with LUC 20.25H.055.C.2 – New and Expanded Uses or Development**

   a. New or expanded facilities and systems are allowed within the critical area or critical area buffer only where no technically feasible alternative with less impact on the critical area or critical area buffer exists. A determination of technically alternatives will consider:

   i. The location of existing infrastructure;
   ii. The function or objective of the proposed new or expanded facility or system;
   iii. Demonstration that no alternative location or configuration outside of the critical area or critical area buffer achieves the stated function or objective, including construction of new or expanded facilities or systems outside of the critical area;
   iv. Whether the cost of avoiding disturbance is substantially disproportionate as compared to the environmental impact of proposed disturbance; and
   v. The ability of both permanent and temporary disturbance to be mitigated.

   Finding: The proposed route is within an existing corridor with 115 kV transmission lines and is adjacent to an existing substation and required connections to other PSE transmission lines. These lines are supported by H-frame poles, which are grouped in sets of two or three and are approximately 2 to 3 feet in diameter. For the most part existing access routes are proposed for construction and maintenance of the proposed Project.

   The objective of PSE's proposal is to increase the capacity of the Eastside electric grid to keep pace with projected increases in electricity demands during peak periods and ensure reliability of the system. As described in the Final EIS, PSE established broad objectives for the Project:

   - Address PSE's identified deficiency in transmission capacity.
   - Find a solution that can be feasibly implemented before system reliability is impaired.
   - Be of reasonable Project cost.
   - Meet federal, state, and local regulatory requirements.
   - Address PSE's electrical and non-electrical criteria for the Project.

   PSE concluded that the most effective and cost-efficient solution to meets its objectives is to site a new 230 kV transformer in the center of the Eastside, which would be fed by new 230 kV transmission lines from the north and south (see Stantec 2015).

   Three substation locations were considered (i.e., the Westminster, Vernell, and Richards Creek sites), and all were evaluated as part of the CAG process. The

sites were selected for consideration because they are all owned by PSE; meet the objectives to site the 230 kV transformer at a central location between the existing 230 kV power sources at Sammamish substation in Redmond and Talbot substation in Renton; accommodate the necessary improvements to serve the required 230 kV transmission lines to bring power to the centralized transformer; and distribute power to the existing network of 115 kV transmission lines.

The Richards Creek and Westminster sites are located along the existing corridor; however, the Vernell site would require a new 230 kV transmission line to follow a different corridor between the existing Sammamish substation in Redmond and the Lakeside substation in Bellevue as well as the installation of additional 115 kV lines to the existing Clyde Hill and Ardmore substations. Both the Westminster substation site and Richards Creek site would include impacts to wetlands, streams, and vegetation; however, the Westminster site is undeveloped and forested, likely resulting in more tree and vegetation removal than the Richards Creek site. It is anticipated that the entire wetland at Westminster would be affected by substation construction. This would result in greater wetland impacts than at Richards Creek. Also due to the small size of the Westminster site, the same opportunity for wetland mitigation would not be able to occur in the location of the impacts. The Vernell substation does not contain wetlands but has a small stream and contains the more extensive geologic hazard areas.

The Richards Creek substation site was selected because it is adjacent to the Lakeside substation, existing infrastructure, and required connections to other PSE transmission lines. In addition, a portion of it is currently used as a pole storage yard that includes a flat storage area consisting of paved driveways and gravel, which makes development of the site easier and results in disturbance to already impacted and degraded areas.

Several transmission corridor alternatives were also evaluated as part of the CAG process. Four corridor options were evaluated for the segment south of the Richards Creek substation site in the Phase 2 Draft EIS (the Oak 1, Oak 2, Willow 1, and Willow 2 Options). None of these routes would completely avoid critical area impacts. It was determined that siting the proposed route within the existing 115 kV corridor will result in the fewest impacts to critical areas and critical area buffers.

Total avoidance of critical areas is not feasible. Complete avoidance of wetlands is not possible in this area due to the fixed location of the substation site and the transmission line corridor. Existing access routes will be used to the extent feasible. Use of the existing corridor and locating the new poles generally close to the existing poles allows the use of existing access points in many instances without creating additional critical area impacts.

Alternative locations for substation and corridors would require relocation of existing infrastructure and creation of new infrastructure in locations not previously developed. Use of the existing, already developed and maintained corridor helps to reduce costs of the proposed Project and minimizes environmental impacts.

The proposal includes mitigation for temporary and permanent impacts. Areas that are temporarily disturbed will be restored in place, and permanent disturbance,

which in most cases involves conversion of vegetation from one plant community to another, will also be mitigated. Wetland and buffer impacts are able to be mitigated through wetland enhancement on existing substation sites. Refer to discussion below regarding wetland mitigation.

b. If the applicant demonstrates that no technically feasible alternative with less impact on the critical area or critical area buffer exists, then the applicant shall comply with the following:

i. Location and design shall result in the least impacts on the critical area or critical area buffer.

Finding: The proposed project will result in impacts to Category II, Category III, and Category IV wetlands. The vast majority of project impacts occur in the Richards Creek sub-basin and, more specifically, at or immediately adjacent to the proposed Richards Creek substation site. Impacts in the transmission line corridor (from new pole footprints) are also offset by the removal of existing poles. Two poles contributing 12 square feet (SF) of fill will be removed from Wetland A (Richards Creek); one pole contributing 6 SF of fill will be removed from the buffer of Wetland A (Richards Creek) near the Lakeside substation. Plans included in the Critical Areas Report identify where poles are being replaced and how much fill will be required under each construction method/pole location.

The following tables summarize wetland impacts:

Table IV-3. Summary of Wetland Impacts

	Category II Wetland Impacts	Area of Net Impact (SF)	Source of Impact
Richards Creek Sub-basin	Permanent	41	Development of Richards Creek Substation in Wetland D (Richards)
	Conversion	100	Legal ROW in Wetland D (Richards)
	Temporary	731	Clearing limits of Richards Creek Substation in Wetland D (Richards)

	Category III Wetland Impacts	Area of Net Impact (SF)	Source of Impact
Richards Creek Sub-basin	Permanent	2,534	Development of Richards Creek Substation in Wetlands A and B (Richards) and pole footprints in Wetlands A and H (Richards)
	Conversion	10,018	Legal ROW, managed ROW, wire zone, pole work area, access route, and/or pole buffer in the following Wetlands: A (Richards)and H (Richards)
	Temporary	8,252	Clearing limits of Richards Creek Substation, pole work area, pole buffer, and/or access route in Wetland A (Richards) and Wetland H (Richards)

	Category III Wetland Impacts	Area of Net Impact (SF)	Source of Impact
Coal Creek Sub-basin	Permanent	0	None
	Conversion	1,145	Wire zone and managed ROW in Wetland MB01
	Temporary	0	None

	Category IV Wetland Impacts	Area of Net Impact (SF)	Source of Impact
Coal Creek Sub-basin	Permanent	0	None
	Conversion	0	None
	Temporary	1,155	Pole buffer in Wetland A (Somerset); pole work area in Wetland D (Somerset)

Buffer impacts are generally on the Lakeside or Richards Creek substation site as a result of the substation construction. The remaining impacts are within the transmission line corridor and are because of vegetation management activities. Due to previous development/disturbance and existing land uses, buffer areas are mostly degraded, consisting of compact soils and invasive vegetation (predominantly Himalayan blackberry and reed canarygrass). However, some significant trees are present within the buffers. The health of the trees is mixed and in some cases degraded due to past pruning and vegetation management activities.

Table IV-4. Summary of Buffer Impacts

	Wetland and Stream Buffer Impacts	Area of Net Impact (SF)	Source of Impact
Richards Creek Sub-basin	Permanent	23,893	Development of Richards Creek Substation and pole footprint
	Conversion	22,885	Richards Creek Substation limit of vegetation management, Richards Creek Substation clearing limits, legal ROW, managed ROW, pole buffer, pole work area, access route, and wire zone
	Temporary	35,362	Richards Creek Substation clearing limits, pole buffer, pole work area, and access route
Coal Creek Sub-basin	Permanent	35	Pole footprint
	Conversion	7,734	Legal ROW, managed ROW, and wire zone.
	Temporary	5,407	Access route, pole buffer, and pole work area

No permanent or temporary impacts are proposed in geologic hazard areas. According to the Critical Areas Report, impacts to landslide hazard areas and steep slopes result from vegetation management and total 5,031 SF and 4,447 SF, respectively. Proposed buffer impacts result from access routes, pole buffer, pole work area, and vegetation management. One new pole is proposed in geologic hazard area buffers to replace five existing poles to be removed resulting in an overall decrease in fill in this critical area type.

As part of the proposed Project, two existing H-frame structures (which include a total of four poles) will be removed from a flood hazard area associated with Sunset Creek and replaced with two new poles. The existing H-frame poles are in a highly developed area with medium to high density residential development and paved roads and parking areas. Existing pole footprints are approximately 6 SF each, totaling approximately 24 SF of area.

Table IV-5. Summary of Floodplain Impacts

	Floodplain Impacts	Area of Net Impact (SF)	Source of Impact
Zone AE (Sunset Creek)	Permanent	32	Pole footprints in floodplain associated with Sunset Creek
	Conversion	4,508	Pole buffer, pole work area, access route, legal ROW, managed ROW, and wire zone in Sunset Creek floodplain
	Temporary	1,679	Access route, pole buffer, and pole work area
Zone A (Coal Creek)	Permanent	0	None
	Conversion	2,777	Legal ROW, managed ROW, and wire zone in Coal Creek floodplain.
	Temporary	0	None

Permanent impacts to critical areas are minimized and impacts are generally limited to vegetation conversion. Pole locations are designed to be in the vicinity of existing poles rather than in areas where critical areas have not been impacted in the past by poles. Where the existing poles are within a critical area, the new design moves the poles outside of the critical area and buffer to the degree feasible.

ii. Disturbance of the critical area and critical area buffer, including disturbance of vegetation and soils, shall be minimized.

Finding: Critical area and critical area buffer disturbances will be minimized through design practices and engineering controls. Best Management Practices (BMPs) will be used to minimize ground disturbance during construction, including during the use of existing, vegetated access routes. Poles that create disturbance of critical areas or critical area buffers will generally be accessed using existing, partially vegetated access (established during the original construction and re-used over time to maintain the corridor). Post construction, disturbed areas shall be restored.

Any equipment or vehicles will be staged and refueled outside of critical areas and critical area buffers. Containment measures will be included in the project-specific Construction Stormwater Pollution Prevention Plan (CSWPPP).

Tree removal activities will be performed in a manner to minimize impacts to underlying shrubs, groundcover, and other trees, without disturbance to soil. BMPs will be used to minimize ground disturbance in these areas and in areas of new access. Any permanent impacts to vegetation within a critical area or critical area buffer shall include replacement planting area. Restoration of temporary impacts

shall be with native plants where native plants are being removed. All other areas of temporary impact shall be re-vegetated except for those areas which contained impervious surfaces prior to construction activities. The final mitigation plan for permanent impacts and vegetation conversion in critical areas and critical areas buffers shall be developed consistent with the City's Critical Areas Handbook for species choice, plant size, and spacing. Trees within a critical area or critical area buffer shall be replaced at a minimum of a 3:1 ratio. All other areas of vegetation removal shall be mitigated in an equivalent area consistent with the replacement ratios contained in Attachment I (Critical Areas Report) to this Staff Report.

In critical areas or buffers, mats will be placed over existing vegetation where possible. When installing the new conductors, techniques will be used to avoid impacts to critical areas (i.e., shooting the wire from pole to pole or using guide wires). Stringing sites will be outside of critical areas where possible.

An Erosion Control Plan will be required to address construction staging and access. Areas disturbed for temporary access and staging will be restored in place following completion of construction activities. Only native seed mixes and/or native plantings shall be installed in critical areas or critical area buffers. **Refer to the Conditions of Approval regarding final mitigation plan and monitoring, construction staging and access, erosion control, and construction stormwater pollution prevention plans in Section X of this Staff Report.**

iii. Disturbance shall not occur in habitat used for salmonid rearing or spawning or by any species of local importance unless no other technically feasible location exists.

Finding: As described above, no other technically feasible location exists. The proposal minimizes disturbance to critical areas. No in-water work in Coal Creek or Sunset Creeks will occur. BMPs will be implemented to minimize the potential for sediment-laden runoff.

Construction associated with the proposed culvert replacement and stream realignment at the Richards Creek substation site will result in temporary disturbance to the stream. The only instream work is associated with the stream habitat improvement project on the Richards Creek substation site. Habitat improvements will result in net habitat benefits following Project implementation. In addition to reducing flooding, increasing streamflow conveyance capacity, and improving sediment transport and removal, the proposed culvert replacement and stream realignment will improve fish passage and in-stream and riparian habitat conditions. During construction, any fish isolated in the localized instream work area will be removed by the Project-specific fish biologist in the work area. Given the size and characteristics of the existing stream, it is expected that stranded fish can be located and captured using dipnets or small seines followed by electrofishing. Efforts to capture and relocate fish by netting methods will precede electrofishing. Captured fish will be released in unaffected reaches downstream of the project area. The applicant shall be required to receive state and federal permit approval for the proposed work and shall comply with approved in-water work windows as determined by these agencies. A copy of these approvals shall be

submitted to the City of Bellevue before any work associated with the stream occurs.

The December 2018 Revised South Bellevue Critical Areas Report, prepared by the Watershed Company, at Page 18, Section 4.3.3 (see Attachment I to this Staff Report), provides the following information about species of local importance in the project area:

> "Species that could breed in the project area but are considered unlikely to do so based on site disturbance are pileated woodpecker, green heron, red-tailed hawk, and western toad. Bald eagle, pileated woodpecker, Vaux's swift, purple martin, merlin, green heron, red-tailed hawk, and Townsend's big-eared bat also have the potential to forage in the project area."

PSE implements an Avian Protection Plan to protect avian wildlife from harmful interactions with its utility equipment.[23] The Plan includes preventing the creation of potentially harmful nests and monitoring known nest sites when construction activities occur in close proximity during the nesting season. Potential Project impacts to birds are mitigated through PSE's bird protection programs and procedures. Because the project area contains suitable habitat for pileated woodpecker, PSE shall also include the creation of wildlife snags as part of any mitigation plans. Final design shall also include wildlife snags designed as recommended from the State of WA Department of Fish and Wildlife where feasible and in consideration of PSE's Avian Protection Plan. Timing and location of construction work shall consider critical time periods such as the nesting season for species of local importance present in the South Bellevue Segment project area. A habitat biologist or other qualified professional shall submit a plan documenting recommended measures to limit impacts.

Refer to the Conditions of Approval regarding additional state and federal permitting, Stormwater and Erosion Control, and implementation of the Avian Protection Plan in Section X of this Staff Report.

iv. Any crossing over of a wetland or stream shall be designed to minimize critical area and critical area buffer coverage and critical area and critical area buffer disturbance.

Finding: No new permanent wetland or stream crossings are proposed.

The proposal includes culvert replacement associated with a small, perennial stream beneath the access driveway to the Richards Creek substation site. In addition to the new culvert crossing, the Project will restore and/or enhance adjoining habitat areas. This includes realigning and enhancing the stream sections extending upstream and downstream of the crossing and enhancing the new stream buffer including associated wetland areas.

[23] PSE Avian Protection Plan is included in Attachment I to this Staff Report (Critical Areas Report).

v. All work shall be consistent with applicable City of Bellevue codes and standards.

Finding: PSE's proposal will comply with applicable City of Bellevue codes and standards. **Refer to the Conditions of Approval in Section X of this Staff Report.**

vi. The facility or system shall not have a significant adverse impact on overall aquatic area flow peaks, duration or volume or flood storage capacity, or hydroperiod.

Finding: The proposed stream habitat improvement project at the Richards Creek substation site will improve hydrologic functions. It is designed to increase streamflow conveyance capacity, improve sediment transport, facilitate sediment removal from the system, and reduce flooding that now occurs on the adjoining property to the west.

Alterations within the floodplain are limited to vegetation removal and pole installation (replacement of two existing H-frame structures which includes 4 poles, with two new poles). These actions will not have significant adverse impacts on overall aquatic area peak flows, duration or volume or flood storage capacity, or hydroperiod because the poles will result in less fill in the floodplain and not expected to diminish the flood storage capacity of the floodplain.

vii. Associated parking and other support functions, including, for example, mechanical equipment and maintenance sheds, must be located outside critical area or critical area buffer except where no feasible alternative exists.

Finding: Pole footprints, portions of the Richards Creek substation including the culvert replacement at the entry road, and the access driveway are the only elements of PSE's proposal that must be located within critical areas or buffers. As discussed above, no other feasible alternative exists for these project elements.

viii. Areas of new permanent disturbance and all areas of temporary disturbance shall be mitigated and/or restored pursuant to a mitigation and restoration plan meeting the requirements of LUC 20.25H.210.

Finding: A mitigation plan has been provided as part of the subject application. The Final Mitigation Plan shall include the requirements of LUC 20.25H.210, including mitigation goals, performance standards, monitoring and maintenance protocols, and contingencies for the duration of the monitoring period. The Final Mitigation Plan shall depict tree and other vegetation to be removed within all critical area or critical area buffers. Trees within a critical area or critical area buffer shall be replaced at a minimum of a 3:1 ratio. All other areas of vegetation removal shall be mitigated in an equivalent area consistent with the replacement ratios contained in Attachment I (Critical Areas Report). Final design shall also include wildlife snags designed as recommended from the State of WA Department of Fish and Wildlife where feasible and in consideration of PSE's Avian Protection Plan. The mitigation plan shall include BMPs for construction sequencing, monitoring,

and maintenance and shall be developed consistent with the City's Critical Areas Handbook for species choice, plant size, and spacing.

Mitigation plans include wetland enhancement activities proposed on the Richards Creek and Somerset substations. These plans are included in Appendix A of the December 2018 Revised South Bellevue Critical Areas Report, prepared by the Watershed Company (see Attachment I to this Staff Report). **Refer to the Conditions of Approval regarding final mitigation and monitoring plans in Section X of this Staff Report.**

2. Consistency with Applicable Performance Standards:

LUC 20.25H.080.A & B – Performance Standards, General (streams) and Modification of Stream Channel
LUC 20.25H.100 –Performance Standards (wetlands)
LUC 20.25H.105 Mitigation and Monitoring- Additional Provisions (wetlands)
LUC 20.25H.125– Performance standards-Landslide Hazards and Steep Slopes

Consistency with LUC 20.25H.080.A – Performance Standards, General (Streams)

Development on sites with a Type S or F stream or associated critical area buffer shall incorporate the following performance standards in design of the development, as applicable:

1. Lights shall be directed away from the stream.

Finding: New lighting is only proposed at the substation site. It will be contained within the fenced, developed area, and will be directed away from the stream restoration area. The use of shields or other methods will be employed to reduce spillover into critical areas. **Refer to the Conditions of Approval regarding lighting in Section X of this Staff Report.**

2. **Activity that generates noise such as parking lots, generators, and residential uses shall be located away from the stream or any noise shall be minimized through use of design and insulation techniques.**

Finding: Noise generated from the Project after construction is expected to be minimal and limited mainly to the substation. Transformers and their cooling fans generate noise as could any ancillary equipment such as air handling equipment or backup generator testing. All equipment will be located within an enclosed area mainly upslope and away from on-site critical areas. PSE has established noise standards for transformers (upon initial installation) of 70 and 65 A-weighted decibels (dBA) at 1 meter with and without cooling, respectively. This noise level could be audible at adjacent critical areas, depending on their distance and the existing ambient noise level. Site plans also include noise attenuation measures to maintain noise levels at the nearest sensitive receptors within 5 dBA of existing ambient noise levels, which will ensure that impacts to critical areas are minor and will not harm habitat near the substation. Transmission lines within the corridor will generate noise similar to existing conditions. While the transmission line will cross

some critical areas, there will be no substantial additional noise impact on critical areas.

Construction noise is regulated per the City Noise Control Code – Bellevue City Code (BCC) 9.18. **Refer to the Conditions of Approval regarding Noise in Section X of this Staff Report.**

3. **Toxic runoff from new impervious area shall be routed away from the stream.**

Finding: New impervious area is limited to the Richards Creek substation site. The Critical Areas Report notes new transformers will be constructed on top of and within an engineered pad lined with a berm to contain potential releases, referred to as an SPCC curb. The engineered pad beneath the transformers will be lined with a bentonite layer at an appropriate depth that (with the aid of the berm/SPCC curb that surrounds the transformer pad) will collect and hold unanticipated releases, preventing off-site migration to sensitive areas. With these measures in place it is expected that toxic runoff will be prevented from entering the stream.

Additionally, a stormwater vault will be located adjacent to the substation that will discharge into flow dispersion riprap before entering into the stream. The City's Utilities Department has approved the preliminary designs; however, they will review final draft designs to determine if an enhanced water quality facility will be required because the run off for this site flows to fish bearing stream. All design review, plan approval, and field inspection shall be performed under the individual permits and/or Utility Developer Extension Agreements depending on the extent of the work. **Refer to the Conditions of Approval regarding Stormwater in Section X of this Staff Report.**

4. **Treated water may be allowed to enter the stream critical area buffer.**

Finding: As noted above, a new stormwater vault will be located adjacent to the substation that will discharge into flow dispersion riprap in the stream and wetland buffer before entering into the stream.

5. **The outer edge of the stream critical area buffer shall be planted with dense vegetation to limit pet or human use. Preference shall be given to native species.**

Finding: Buffer area and enhancement planting associated with realigning Stream C will create a dense, functional buffer more protective of the stream than the existing condition. The Mitigation Plan includes dense, native plantings in the stream and wetland buffers. **Refer to the Conditions of Approval regarding final mitigation and monitoring plans in Section X of this Staff Report.**

6. **Use of pesticides, insecticides, and fertilizers within 150 feet of the edge of the stream critical area buffer shall be in accordance with the City of Bellevue's "Environmental Best Management Practices," now or as hereafter amended.**

Finding: The Critical Areas Report notes that weed control efforts in stream buffers will generally employ manual removal. Plans also call for the use of aquatic certified glyphosate to be used in reed canary infested areas. Any additional pesticide, insecticide, and fertilizer use shall be done in accordance with the City of Bellevue's "Environmental Best Practices" Parks Department Manual. **Refer to the Conditions of Approval regarding BMPs in Section X of this Staff Report.**

Consistency with LUC 20.25H.080.B – Modification of Stream Channel

1. When Allowed. A stream channel shall not be modified by relocating the open channel, or by closing the channel through pipes or culverts unless in connection with the following uses allowed under LUC 20.25H.055:
a. A new or expanded utility facility or system;
b. A new or expanded essential public facility;
c. Public flood control measures;
d. In-stream structures;
e. New or expanded public right-of-way, private roads, access easements or driveways;
f. Habitat improvement project; or
g. Reasonable use exception; provided, that a modification may be allowed under this section for a reasonable use exception only where the applicant demonstrates that no other alternative exists to achieve the allowed development. A critical areas report may not be used to modify the uses set forth in this subsection B.1.

Finding: Stream channel modification is proposed on the Richards Creek substation site in conjunction with the culvert replacement work and to enhance fish and wildlife habitat on-site, increase streamflow conveyance capacity, improve sediment transport, facilitate sediment removal from the system, and reduce flooding that now occurs on the adjoining property to the west. As the channel is stabilized and sediment transport is managed, the stream will improve fish passage and instream habitat. Additional riparian plantings will increase plant and structural diversity for birds and small mammals as well as aquatic species. As a habitat improvement project related to development of a utility facility, it meets the definition of an allowed use under LUC 20.25H.055.

2. Critical Areas Report Required. Any proposal to modify a stream channel under this section may be approved only through a critical areas report.

Finding: PSE proposes a stream channel modification, which includes a culvert replacement. PSE submitted a Critical Areas Report titled South Bellevue Critical Areas Report, Puget Sound Energy – Energize Eastside Project, dated August 2017 and revised December 2018 (see Attachment I to this Staff Report for complete Critical Areas Report) that satisfies this requirement. Specifically, the report details how the stream channel modifications will improve stream, stream buffer, and associated wetland functions and values.

In addition, PSE shall submit a Final Stream Habitat Improvement Plan consistent with the plans submitted as part of this application in Attachment I (Critical Areas Report). The Plan shall be submitted as part of the required clearing and grading permit. All plant species, size, and spacing shall be consistent with the standard found in the City's Critical Areas Handbook. Plan shall include methods for fish exclusion, construction sequencing, monitoring and maintenance. **For more information, refer to the Conditions of Approval regarding Final Stream Habitat Improvement Plan in Section X of this Staff Report.**

Consistency with LUC 20.25H.100 –Performance Standards (wetlands)

i. Lights shall be directed away from the wetland.

Finding: New lighting is only proposed at the substation site. It will be contained within the fenced, developed area, and will be directed away from the wetland area. **Refer to the Conditions of Approval regarding lighting in Section X of this Staff Report.**

ii. Activity that generates noise, such as parking lots, generators, and residential uses, shall be located away from the wetland, or any noise shall be minimized through use of design and insulation techniques.

Finding: Noise generated by the Project after completion is expected to be minimal and limited mainly to the substation. The proposed stream restoration and buffer/wetland enhancement plantings at the substation site will help to screen the critical areas from the developed area and reduce noise within critical areas. Noise generated by the substation will be within the noise thresholds for the zoning district. The proposed substation is consistent with other uses in the area, and all equipment will be located within an enclosed area mainly upslope and away from on-site critical areas. Transmission lines within the corridor will generate noise similar to the existing corridor.

Construction noise is regulated per the City Noise Control Code – BCC 9.18. **Refer to the Conditions of Approval regarding Noise in Section X of this Staff Report.**

iii. Toxic runoff from new impervious area shall be routed away from the wetlands.

Finding: See response in section 2 above.

iv. Treated water may be allowed to enter the wetland critical area buffer.
Finding: See response in section 2 above.

v. The outer edge of the wetland critical area buffer shall be planted with dense vegetation to limit pet or human use.

Finding: The Final Mitigation Plan will include dense, native plantings in critical area buffers. As noted previously, Richards Creek substation site is owned and

operated by PSE; as such, human use outside of the developed substation is discouraged. Wetlands and buffers elsewhere in the corridor are generally degraded as a result of human development and extensive use of the corridor. The Final Mitigation Plan will depict tree and other vegetation to be removed within all critical area buffers. Trees within a critical area buffer shall be replaced at a minimum of a 3:1 ratio. Buffer mitigation planting will be directed to sites in the Richards Creek and Coal Creek basins that will allow for the greatest functional improvement to the overall critical areas functions in the project area, and will allow for limiting human and pet intrusion into the mitigation areas. **Refer to the Conditions of Approval regarding final mitigation and monitoring plans in Section X of this Staff Report.**

vi. Use of pesticides, insecticides, and fertilizers within 150 feet of the edge of the stream buffer shall be in accordance with the City of Bellevue's "Environmental Best Management Practices," now or as hereafter amended.

Finding: Weed control efforts in stream buffers will generally employ manual removal. Plans also call for the use of aquatic certified glyphosate to be used in reed canary infested areas. Any additional pesticide, insecticide, and fertilizer use shall be done in accordance with the City of Bellevue's "Environmental Best Practices" Parks Department Manual. **Refer to the Conditions of Approval regarding BMPs in Section X of this Staff Report.**

Consistency with LUC 20.25H.105 Mitigation and Monitoring-Additional Provisions: Wetland Enhancement as Mitigation

Finding: The overall strategy for wetland mitigation proposed by PSE, after all feasible avoidance measures were incorporated in the plans, is to mitigate for impacts in each of the two sub-basins where impacts will occur (i.e., the Richards Creek and Coal Creek sub-basins), and to consolidate mitigation to the extent possible to provide the best overall benefits from mitigation.

Most of the wetland impacts in the Richards Creek sub-basin will occur on the Richards Creek substation site. Therefore, this site is preferred for mitigation actions. As the Critical Areas Report notes wetland restoration and creation were considered for the property, but determined to be infeasible due to existing site conditions (most of the remaining vegetated area on-site is already wetland or stream) and the inability to appropriately buffer any new or restored wetland area. Existing wetland and wetland/stream buffers are degraded on the Richards Creek substation site and therefore provide ample opportunity for enhancement, the proposed mitigation strategy.

Enhancement actions will consist of removing/reducing the presence of nonnative plant species and installing a diverse native plant community are noted in the tables below.

The wetlands will also be enhanced with a realigned stream channel, installation of large woody debris, removal of invasive vegetation, and installation of native vegetation. The stream realignment allows for the creation

of more complex and higher quality riparian wetland and a buffer of substantial width along both sides of the stream, whereas the existing alignment is straight, borders a paved area, and is largely lined with reed canarygrass and bittersweet nightshade.

Table IV-7. Summary of Impacts and Compensatory Mitigation

IMPACTS and COMPENSATORY MITIGATION						
Critical Area Name	**Category**	**Type of Impact**	**Quantity (SF)**	**Mitigation Ratio**	**Mitigation Required (SF)**	**Amount (SF) and Location of Mitigation Proposed[2]**
Wetlands						
Wetland A	III	Conversion	9,945	2:1	19,890	19,890 Wetland A
Wetland A	III	Permanent	397	4:1	1,588	1,588 Wetland A
Wetland B	III	Permanent	2,060	4:1	8,240	3,587 Wetland A 4,653 Wetland D
Wetland D	II	Conversion	100	3:1	300	300 Wetland D
Wetland D	II	Permanent	41	6:1	246	246 Wetland D
Wetland H	III	Conversion	73	2:1	146	146 Wetland D
Wetland H	III	Permanent	77	4:1	308	308 Wetland D
				TOTAL	**30,718**	**30,718**
Buffers						
Combined Buffers	N/A	Permanent	23,893	1:1	23,893	23,893 Combined Wetland A/Wetland D/Stream C buffer
Combined Buffers	N/A	Conversion	22,886	0.5:1	11,443	11,443 Combined Wetland A/Wetland D/Stream C buffer
Combined Buffers	N/A	Redevelopment [3]	47,512[3]	N/A[3]	0[3]	NA
				TOTAL	**35,336**	**35,336**
ADDITIONAL RESTORATION (not required to mitigate impacts)						
Critical Area Name	**Category**	**Type of Activity**	**Quantity (SF)**			**Description**
Stream C	N/A	Restoration (Realignment)[4]	3,557			New stream channel
Wetland A	III	Enhancement	6,215			Area between new and old stream channel, outside of stream project grading boundaries
Wetland D	II	Enhancement	12,050			Area of Wetland D outside of stream project grading boundaries

1. Only activities resulting in a long-term change are included. Temporary impacts will be restored in place and are not shown in this table.
2. All wetland mitigation proposed is wetland enhancement.
3. This buffer area is already developed and is considered non-functioning; therefore, no mitigation is required.
4. Existing stream channel will be abandoned (not filled) with stream restoration/realignment activities.

Impact Location and Quantity	Existing condition	Proposed action
Wetland D (Richards) Permanent Impacts: 41 SF Vegetation Conversion: 100 SF	Wetland D is a riverine wetland dominated by an overstory of Pacific willow and red alder, and an understory significantly degraded with reed canarygrass, Himalayan blackberry, and nightshade.	Wetland fill associated with development of Richards Creek Substation culvert replacement. Conversion from forested wetland area to shrub wetland area to accommodate new, higher voltage transmission lines. Temporary impacts associated with clearing limits for Richards Creek Substation. Stream & wetland enhancement: wetland enhanced with removal of invasive vegetation, installation of native vegetation, realigned stream channel. The stream realignment allows for the creation of more complex and higher quality riparian wetlands and buffers of substantial width along both sides of the stream.
Wetland H (Richards) aka Wet JB01 Permanent Impacts: 77 SF Vegetation Conversion: 73 SF	Wetland H is a slope wetland that consists of native and non-native plant species. Prevalent invasive, non-native species are located in the existing transmission line corridor and include reed canarygrass, birdsfoot trefoil, and Himalayan blackberry.	Wetland fill associated with pole footprints. Conversion from forested wetland area to shrub wetland area to accommodate new, higher voltage transmission lines. Temporary impacts associated with clearing limits for Richards Creek Substation, pole work areas, and access routes. Mitigation for wetland loss and conversion provided through enhancement of Wetland D.

Impact Location and Quantity	Existing condition	Proposed action
Wetland A (Richards) Permanent Impacts: 397 SF Vegetation Conversion: 9,945 SF	Wetland A is a large slope wetland that crosses existing PSE transmission line corridor. As a result, areas that have experience past impacts or disturbance from the transmission line are degraded and consist of Himalayan blackberry and reed canarygrass monocultures.	Wetland fill associated with development of Richards Creek Substation, including culvert replacement and pole footprints. Conversion from forested wetland area to shrub wetland area to accommodate new, higher voltage transmission lines and substation. Temporary impacts associated with clearing limits for Richards Creek Substation and pole work areas. Stream & wetland enhancement: wetland enhanced with removal of invasive vegetation, installation of native vegetation, realigned stream channel, installation of LWD. The stream realignment allows for the creation of more complex and higher quality riparian wetlands and buffers of substantial width along both sides of the stream, whereas the existing alignment is straight, borders a paved area, and is largely lined with reed canarygrass and nightshade.
Wetland B (Richards) Permanent Impacts: 2,060 SF	Wetland B is a small slope wetland that is dominated by an understory of dense Himalayan blackberry. Some native plants are present to a lesser extent and include Pacific willow, red alder, salmonberry, giant horsetail, and lady fern.	Wetland fill associated with development of Richards Creek Substation. Mitigation for wetland loss provided through enhancement of Wetlands A and D.

Coal Creek Sub-Basin Wetlands

Wetland Impacts: Wetland MB01 is a depressional wetland in the existing transmission line corridor and adjacent to a well-used trail. It is dominated by a mix of native and non-native species including Pacific willow, red-osier dogwood, bittersweet nightshade, and Himalayan blackberry. Approximately 1,146 SF of forested wetland area will be converted to shrub wetland area to accommodate the new, higher voltage transmission lines.

Coal Creek Sub-basin Wetland Buffers: Buffer impacts are generally located in the existing transmission line corridor. Due to previous development/disturbance and existing land uses, buffer areas are mostly degraded, consisting of compact soils and invasive vegetation (predominantly Himalayan blackberry and reed canarygrass). Approximately 35 SF of impacts from buffer loss are associated with pole footprints. Also, 7,734 SF of conversion from forested buffer area to shrub buffer area will be converted to accommodate the new, higher voltage transmission lines, as well as temporary impacts associated with access route and pole work areas. **Refer to the Conditions of Approval regarding final wetland and buffer mitigation and monitoring plans in Section X of this Staff Report.**

Wetland buffer enhancement at the Somerset substation site will include the removal of invasive vegetation and installation of native vegetation.

Table IV-8. Impact & Restoration Summary

IMPACTS					
Critical Area Name	**Category**	**Type of Activity**	**Quantity (SF)**	**Mitigation Ratio**	**Mitigation Required (SF)**
Wetland MB01	III	Conversion	1,146	2:1	2,292
Combined Buffers	na	Permanent	35	1:1	35
Combined Buffers	na	Conversion	7,734	0.5:1	3,867

RESTORATION			
Critical Area Name[2]	**Category**	**Type of Activity**	**Quantity (SF)**
Somerset Wetland A	IV	Enhancement	2,300
Combined Somerset Buffers	NA	Enhancement	3,950

IMPACT & RESTORATION SUMMARY					
				Mitigation Proposed	
Critical Area Type	**Type of Activity**	**Quantity (SF)**	**Total Mitigation Required (SF)**	**Type**	**Qty (SF)**
Wetland	Conversion	1,146	2,292	Enhancement	2,300
	Permanent	0			
Buffer	Conversion	7,734	3,902	Enhancement	3,950
	Permanent	35			

1. Only activities resulting in a long-term change are included. Temporary impacts will be restored in place and are not shown in this table.
2. Critical Areas as identified in the Somerset Substation wetland delineation (The Watershed Company, February 2017) and delineation report, documented separately from the Energize Eastside delineation study.

Consistency with LUC 20.25H.125 Performance Standards – Landslide Hazards and Steep Slopes Project Impacts:

A. Structures and improvements shall minimize alterations to the natural contour of the slope, and foundations shall be tiered where possible to conform to existing topography.

Finding: Site improvements (pole removal, pole replacement, access routes, and vegetation management) are not anticipated to adversely impact the natural contour of regulated slopes. It is anticipated that a temporary working bench may be necessary to install poles in some locations. Temporary access routes will generally follow preciously established access trails and routes and developed landscape. Therefore, little cutting, or filling will be required. Geotechnical recommendations describe clearing activities be restricted to that necessary to auger the hole for the poles.

The Richards Creek substation site activities that include vegetation management, tree removal, and temporary access routes (associated with the proposed pole replacement activities) will maintain the overall existing site topography. A soldier pile wall is proposed at the Richards Creek substation site. The use of retaining wall for the new substation reduces disturbance and grading of existing slopes.

So long as geotechnical recommendations are followed, the proposal will minimize alteration to slope contours. **Refer to the Conditions of Approval regarding geotechnical reporting and recommendations in Section X of this Staff Report.**

B. Structures and improvements shall be located to preserve the most critical portion of the site and its natural landforms and vegetation.

Finding: The existing roadway will be realigned and will not significantly impact natural landforms and vegetation. Soldier pile walls and retaining walls are proposed for the Richards Creek substation site. The use of retaining walls will reduce disturbance and grading of the existing natural slopes, which would be otherwise necessary without construction of the walls.

Site improvements include localized vegetation management, including tree removal, and the use of existing access routes (associated with the proposed pole replacement activities). The proposed tree removal and surface disturbance will be limited to reduce potential impacts to natural landforms and vegetation. Tree removal is limited to that needed for pole installation and to meet federal NERC standards to maintain safe clearances between vegetation and utility lines.

C. **The proposed development shall not result in greater risk or a need for increased buffers on neighboring properties.**

Finding: The proposed development includes vegetation management, including tree removal and the use of existing access routes (associated with the proposed pole replacement activities), which will be followed by mitigation measures to reduce potential impacts to geologic hazards that include landslide and steep slope hazards.

Vegetation removal may impact slope stability by reducing root strength in soil and by modifying surface and subsurface hydrology. Page 2 of GeoEngineers Geotechnical Report dated July 11, 2017 and found in Attachment I to this Staff Report, notes "*In general, tree removal will increase the impact on slope stability for steep slopes or landslide hazard areas. However, fewer impacts are expected in areas where tree removal is isolated to one or two trees and the steep slope or landslide hazard area is otherwise stable and well vegetated. Additionally, fewer impacts are expected at the toe of the slope, compared to tree removal within the body or at the top of the slope. Much of the tree removal near/on steep slope areas north of I-90 are situated in the PSE parcel that will be developed for the Richards Creek Substation. GeoEngineers completed a geotechnical engineering report for this substation in a report dated September 23, 2016 and an addendum report dated April 4, 2017. The new substation will require some retaining walls along the south side of the parcel where existing steep slopes are mapped, and a soldier pile wall on the east side of the site. The soldier pile wall (and eastern limits of the new substation) will be located east of the existing eastern steep slope area. Thus, construction of the substation and soldier wall will result in removal of this small steep slope area and the hillside will be stabilized by the wall. As such, the proposed tree removal located within the steep slopes of the substation limits will not affect the stability of the hillside."*

Mitigation measures include BMPs to reduce potential impacts to geologic hazards in the vicinity of neighboring properties. BMPs include plant replacement, scattering trimmed or removed tree debris, and chipping wood to reduce potential impacts to work areas. Removal of vegetation by hand and/or using limited access machinery will reduce potential impacts to landslide and steep slope hazard areas. If these BMPS and geotechnical recommendations are implemented, GeoEngineers determines that the proposed Project will not require additional buffers to protect geological hazard areas. To ensure recommendations are followed, a project geotechnical engineer shall be on-site to inspect construction activities and a report documenting adherence with the recommendations shall be submitted

of the City of Bellevue. **Refer to the Conditions of Approval regarding geotechnical recommendations in Section X of this Staff Report.**

D. **The use of retaining walls that allow the maintenance of existing natural slope area is preferred over graded artificial slopes where graded slopes would result in increased disturbance as compared to use of retaining wall.**

Finding: No retaining walls or grading activities are proposed in the transmission line corridor. Soldier pile walls and retaining walls are proposed for the Richards Creek substation site. The use of retaining walls will reduce disturbance and grading of the existing natural slopes, which would be otherwise necessary without construction of the walls to accommodate a flat area for the substation improvements.

E. **Development shall be designed to minimize impervious surfaces within the critical area and critical area buffer.**

Finding: Neither in the transmission line corridor nor the substation site are new impervious surfaces proposed within landslide or steep slope critical areas or critical area buffers.

F. **Where change in grade outside the building footprint is necessary, the site retention system should be stepped and regrading should be designed to minimize topographic modification. On slopes in excess of 40 percent, grading for yard area may be disallowed where inconsistent with this criterion.**

Finding: No change in grade associated with a building footprint is proposed within the transmission line corridor. And no part of the proposal includes the creation of yard area.

G. **Building foundation walls shall be utilized as retaining walls rather than rockeries or retaining structures built separately and away from the building wherever feasible. Freestanding retaining devices are only permitted when they cannot be designed as structural elements of the building foundation.**

Finding: No retaining walls are proposed within the transmission line corridor. However, for stability purposes, drilled pier foundations will be used for select poles in the corridor. The new substation is not a building and, thus, does not have typical foundation walls, except for the control house within the substation; as such, soldier pile and retaining walls will be necessary to retain the required grade changes. PSE does not propose the use of rockeries. Where poles cannot be installed using the direct imbed method, PSE shall

submit plans showing compliance with geotechnical recommendations made by GeoEngineers June 2016 for any foundation designed poles. **Refer to the Conditions of Approval regarding geotechnical recommendations in Section X of this Staff Report.**

H. **On slopes in excess of 40 percent, use of pole-type construction which conforms to the existing topography is required where feasible. If pole-type construction is not technically feasible, the structure must be tiered to conform to the existing topography and to minimize topographic modification.**

Finding: The new substation cannot be tiered and was situated east of the existing Olympic pipeline system. This requires construction of a soldier pile wall east of the existing slope area. No additional structures are proposed.

I. **On slopes in excess of 40 percent, piled deck support structures are required where technically feasible for parking or garages over fill-based construction types.**

Finding: No parking or garage structures are planned for the new substation site. Pile-supported deck structures are not feasible for a substation. The substation grades will require cutting into the slope on the east side, which will then be retained with a soldier pile wall.

J. **Areas of new permanent disturbance and all areas of temporary disturbance shall be mitigated and/or restored pursuant to a mitigation and restoration plan meeting the requirements of LUC 20.25H.210. (Ord. 5680, 6-26-06, § 3).**

Finding: BMPs for pole installation will be implemented during construction and the disturbed area will be restored after pole installation by seeding or revegetating, essentially covering the disturbed areas. In the event that work areas are wet or have standing water, driving mats will be used under all equipment. Additionally, for poles located in geological hazard areas, the old poles will be cut off approximately 1–2 feet below the ground surface and the remaining portion of each pole left in place.

Where pole installation requires the permanent removal of vegetation PSE shall prepare a final mitigation plan showing vegetation to be replaced in the vicinity of the permanent impact. Any permanent impacts to vegetation within a critical area or critical area buffer shall include replacement planting area. Trees proposed for removal in a critical area or critical area buffer shall be replaced at a 3:1 ratio. Tree species shall be native species found in the City's native plant list located in the Critical Areas Handbook.

Where vegetation clearing is required to reestablish access on existing trails or old access routes, BMPs will be implemented; these BMPs may include, but are not limited to outsloping road surfaces, crowning road surfaces (where appropriate, such as at ridge tops and where roads climb gently inclined surfaces) and installing water bars or rolling dips at regularly spaced intervals to avoid concentrating surface water flow along the road surface. After construction, disturbed areas will be graded to a stable, free-draining configuration, treated with appropriate erosion control measures, and seeded. Grading associated with reestablishment and post-construction stabilizing will be conducted on an as-needed basis and limited in vertical and horizontal extent. Most, if not all, access routes can be abandoned following construction using erosion control measures and seeding.

PSE proposes options for mitigation of vegetation management and tree removal in geologic hazard areas include limiting disturbance to these areas by large equipment (only by foot and hand-cutting with chainsaws), leaving cut stumps in place, and chipping or scattering tree debris where feasible. In areas where tree removal is clustered, erosion control BMPs will be implemented, such as grass seeding, leaving stumps, scattering straw and/or replacement plantings of native shrubs or small trees to reduce concentrated flows and minimize disturbance.

Refer to the Conditions of Approval regarding the mitigation plan and geotechnical recommendations in Section X of this Staff Report.

V. SUMMARY OF TECHNICAL REVIEWS

A. Noise

The new substation will be an operational noise source. Transformers and their cooling fans generate noise as will ancillary equipment such as air handling equipment or backup generator testing. PSE has established noise standards for transformers (upon initial installation) of 70 and 65 dBA at 1 meter with and without cooling, respectively. This level of noise could be audible at adjacent sensitive land uses, depending on their distance and the existing ambient noise level.

Electrical substations are exempt from the maximum permissible noise levels established in Chapter 173-60 of the Washington Administrative Code. Consequently, substation operations are likely consistent with local municipal codes governing noise sources. However, the substation could result in a noticeable increase in local ambient noise levels and result in a minor noise impact.

The proposed 230 kV transmission lines are not expected to produce a noticeably greater level of noise (from corona effects) than the existing lines.

Mitigation: Although electrical substations are exempt from the maximum permissible noise levels established in Chapter 173-60 of the Washington Administrative Code, the transformers could result in a noticeable increase in local ambient noise levels and therefore elicit an adverse community reaction. The proximity of sensitive land uses was considered when siting the new transformers. PSE's site plans include noise attenuation measures to maintain noise levels at the nearest receptors within 5 dBA of existing ambient noise levels.

B. Clearing and Grading

A Clearing and Grading Permit is required for PSE's proposal per BCC 23.76.035. The permit application must be in accordance with the Clearing and Grading Code, as outlined in the submittal requirements and the Clearing and Grading Development Standards, which are available on the City of Bellevue website at:

https://development.bellevuewa.gov/UserFiles/Servers/Server_4779004/File/pdf/Development%20Services/cg-DevStds2017.pdf

Various soil and erosion conditions will be encountered along the transmission line route, and erosion and sedimentation control should be specifically addressed for each area. Work within critical areas or buffers should be identified on the construction drawings and in the Construction Stormwater Pollution Prevention Plan, and provided with exceptional erosion and sedimentation protection. No untreated construction stormwater will be allowed to discharge in the City storm drain system and/or within the critical areas. Turbidity monitoring will be required at all discharge points.

C. Utilities

The CUP application has been reviewed and no further utility revisions are needed at this time. The Utility Department approval of the CUP application is based on the

preliminary utility design only. This conceptual review of the proposal has no implied approvals of the engineering design and specifications. Changes to the site layout may be required to accommodate the utilities. Minimum setback requirements shall be met during the review and approval of the utility permit application(s).

Storm Drainage: The redevelopment will provide water quality mitigation that will treat the proposed road surface (pollution-generating surface). Stormwater runoff from the hard surface will be collected in a detention system, and the water quality design flow rate must be the full 2-year release rate from the detention facility for this location. An enhanced water quality facility will most likely be required because the runoff for this site flows to fish-bearing stream.

Refer to the Conditions of Approval regarding utilities in Section X of this Staff Report.

D. Transportation

Traffic Impacts and Mitigation

Traffic impacts from this Project will be temporary and occur only during the construction phase. These impacts will be the result of needed travel lane and sidewalk closures to allow for safe installation of power lines within City right-of-way. Appropriate mitigation will be specified in the required right-of-way permit for this project (traffic control, detours, etc.). No permanent traffic impacts will be created by this project.

Street and Access Improvements

PSE proposes to construct the new Richards Creek substation and to upgrade 3.3 miles of existing power transmission lines between PSE's existing Lakeside switching substation and the southern city limits of Bellevue. The existing wood H-frame poles will be replaced with steel monopoles within the existing utility corridor. Some poles/structures will be located within City right-of-way (ROW).

Access to Richards Creek substation will be provided via the existing driveway from SE 30th Street.

Access to the existing and proposed poles/structures and transmission lines will be provided by using the existing or historic access corridor, and by creating new access roads as necessary. At some sites, access roads my need to be improved to accommodate construction equipment. All work in ROW related to these access roads needs ROW Use Permits and must meet City of Bellevue and current Americans with Disabilities Act (ADA) standards.

The final engineering plans must show all transportation-related improvements and must be consistent with the Transportation Development Code (Chapter 14.60 BCC), Transportation Department Design Manual, and the ADA prior to approval of construction drawings.

1. The Richards Creek substation driveway is located at the east end of SE 30th Street (dead end street). The existing driveway will be improved to provide a concrete driveway approach at SE 30th Street per the City of Bellevue Transportation Design Manual. Driveway approach shall be a minimum of 26

feet wide. Minimum of 30-feet distance is required from the right-of-way line to the new gate located on the private driveway/access road.

2. A street light analysis is required for SE 30th Street. Street lighting shall meet Bellevue's minimum standards.

3. Engineering design plans must be submitted for review and approval for each new and removed pole located within City right-of-way, sidewalk easements, and within 20-feet of the ROW or sidewalk easement areas.

4. All new or modified access road connections to public roadways for the installation of new structures and overhead transmission lines, and removal of existing poles must meet Transportation Design Manual requirements.

5. All areas disturbed (i.e., pavement, curb and gutter, landscaping, driveways, etc.) by the Project shall be restored after construction to its previous or an improved state per City of Bellevue ROW standards including current ADA standards.

6. All structures installed by the Project must meet the City's sight distance criteria per the Transportation Design Manual (RL-110-1, RL-110-1, RL-120-1 and sections 21 and 22).

Use of the Right of Way During Construction
Applicants often request use of the right of way and of pedestrian easements for materials storage, construction trailers, hauling routes, fencing, barricades, loading and unloading and other temporary uses as well as for construction of utilities and street improvements. A Right of Way Use Permit for such activities must be acquired prior to issuance of any construction permit including demolition permit. Sidewalks may not be closed except as specifically allowed by a Right of Way Use Permit. **See Section X for related Conditions of Approval regarding use of the ROW.**

Pavement Restoration
The City of Bellevue has established the Trench Restoration Program to provide developers with guidance as to the extent of resurfacing required when a street has been damaged by trenching or other activities. Under the Trench Restoration Program, every street in the City of Bellevue has been examined and placed in one of three categories based on the street's condition and the period since it has last been resurfaced. These three categories are "No Street Cuts Permitted," "Overlay Required," and "Standard Trench Restoration." Each category has different trench restoration requirements associated with it. Damage to the street can be mitigated by placing an asphalt overlay well beyond the limits of the trench walls to produce a more durable surface without the unsightly piecemeal look that often comes with small strip patching.

The applicant will be required to restore all damaged pavement within City right-of-way caused by construction activities related to this Project. Limits and extent of pavement restoration shall be as required by the Right-of-Way Use Permit. **See Section X for related Conditions of Approval regarding pavement restoration.**

E. Fire

Bellevue Fire Department has no concern with the Energize Eastside proposed location as submitted. Any changes to the location will require further review. Because the proposal is using the existing corridor, no additional fire department staffing, or resources will be required as a result the Project.

VI. STATE ENVIONMENTAL POLICY ACT (SEPA)

The City of Bellevue, in cooperation with the Partner Cities of Kirkland, Newcastle, Redmond, and Renton, conducted environmental review of the Energize Eastside project over the course of several years. The culmination of this environmental review was issuance of the March 1, 2018 Final EIS. The Final EIS built upon the previous Phase 1 Draft EIS and Phase 2 Draft EIS, released in January 2016 and May 2017, respectively.

An EIS is the most detailed form of environmental review required under SEPA and is prepared when an agency determines that it is probable that a project would have significant environmental impacts. The Phase 1 Draft EIS assessed a range of impacts and implications associated with broad alternatives for addressing PSE's objectives in a non-project, or programmatic, EIS. The environmental review undertaken by the Partner Cities and memorialized in the Phase 2 Draft EIS and Final EIS considered the impacts on the environment of the entire Energize Eastside project throughout each jurisdiction—extending from Redmond in the north to Renton in the south. The Phase 2 Draft EIS incorporated the Phase 1 Draft EIS by reference and presented a project-level environmental review.

Based on the results of the Phase 2 Draft EIS analysis, PSE refined the proposed route of the transmission lines and associated Project components. The Final EIS assessed PSE's project-level proposed alignment (Willow 1) and considered environmental impacts of the entire Project in light of this proposed alignment (see Chapters 1, 2, 4, 7, and 8 of the Final EIS). While environmental analysis in this Staff Report focuses on the impacts reviewed for the portions of the Project currently under consideration in connection with Permit Nos. 17-120556-LB and 17-120557-LO, the environmental review in the Final EIS was not limited to a segment or portion of the Energize Eastside project. Instead, the Final EIS presented a comprehensive environmental assessment of the entire Project, including a full analysis of potential impacts and cumulative impacts associated with the construction and operation of PSE's proposed alignment.

The Energize Eastside Project Final EIS and supporting documentation fulfill SEPA requirements for the Energize Eastside project and are incorporated by reference under the terms of BCC 22.02.020 and WAC 197-11-635. The Final EIS, along with all background and supporting analyses, studies, and technical reports are publicly-available here:

http://www.energizeeastsideeis.org/library.html

In addition, the Energize Eastside Project Final EIS together with the supporting documentation are available for review in the City of Bellevue Records Room, Lobby Floor, Bellevue City Hall, 450 110th Avenue NE. Likewise, PSE submitted technical information with the permit applications, which is attached hereto and/or included in the DSD official files for Permit Nos. 17-120556-LB and 17-120557-LO. The City also requested additional information from PSE during the land use process, and these requests are included in the DSD files as well.[24]

[24] See, e.g., Letter from Heidi Bedwell, City of Bellevue Environmental Planning Manager, to Brad Strauch, PSE Program Manager, dated August 14, 2018. The City's August 14, 2018 letter to PSE is included in the DSD official files for Permit Nos. 17-120556-LB and 17-120557-LO.

The Bellevue Environmental Procedures Code, Chapter 22.02 BCC, provides substantive authority to mitigate impacts disclosed through the environmental review process. Pursuant to RCW 43.21C.060, the City's Comprehensive Plan is a possible basis for the exercise of substantive SEPA authority. BCC 22.02.140.B.1. Although PSE's proposal is consistent with the Comprehensive Plan,[25] the Comprehensive Plan is nonetheless a designated SEPA policy basis for substantive conditioning of PSE's proposal.

Substantive SEPA authority to condition PSE's proposal is available in cases where development regulations do not exist or do not apply, or where unanticipated impacts occur that are not mitigated by existing regulations. In cases where the City has adopted development regulations to systematically avoid or mitigate adverse impacts, those standards and regulations, where applicable, will normally constitute adequate mitigation of the impacts. LUC 22.02.140.C.

To the extent the City's development regulations do not adequately regulate pipeline safety, the exercise of substantive SEPA authority, based on applicable Comprehensive Plan policies, provides for the imposition of mitigation measures identified in the Final EIS. The Conditions of Approval contained in Section X of this Staff Report identify specific mitigation measures, and the discussion below regarding Environmental Health—Pipeline Safety identifies the applicable Comprehensive Plan policy bases for substantive conditioning of the proposal under SEPA.

Within the South Bellevue Segment, the Final EIS disclosed that the Energize Eastside project could have significant unavoidable adverse impacts to the aesthetic environment where the transmission lines will traverse a portion of the Somerset neighborhood. PSE's proposal is compatible and consistent with the land use pattern in this area of Somerset, but the increased pole height in this area will contrast with the low buildings and low vegetation that result from the private covenants protecting views in Somerset to a greater extent than the current transmission line. The significant, unavoidable adverse impacts in Somerset are discussed below in Section VI.C and in Section VIII (Applicable Decision Criteria) of this Staff Report.

Finally, and consistent with the analysis contained in the Phase 1 Draft EIS, the Phase 2 Draft EIS, and the Final EIS, a discussion of the elements of the environment that are not significantly affected by PSE's proposal after application of the City's codes, regulations and standards is included below as well.

A. Trees

As indicated in the Final EIS and Phase 2 Draft EIS (see Phase 2 Draft EIS, Section 3.4.2.1), trees provide numerous functions and benefits, including wildlife habitat for breeding, rearing, and foraging. Trees also provide direct and indirect benefits to aquatic habitats by reducing stormwater flows, controlling stream temperatures (by providing shade), and reducing streambank erosion. Heavily vegetated and forested areas also provide wildlife corridors to enhance wildlife population connectivity to various habitat types that support such activities as breeding, foraging, and rearing.

[25] See Section VIII.D.1 – Applicable CUP Decision Criteria (LUC 20.30B.140) for a discussion of the proposal's consistency with the Comprehensive Plan.

Approximately 580 significant trees will be removed in the South Bellevue Segment as part of PSE's proposal, which is consistent with the analysis in the Final EIS (see Final EIS, Section 4.4.5). Of this total, approximately 95 trees are located either in the City right of way or within a City-owned (parks or utilities) property. The Final EIS concluded that application of codes, standards, and regulations—including the City's critical areas requirements contained in Chapter 20.25H LUC—would adequately mitigate potential impacts due to vegetation removal in the South Bellevue Segment (see Final EIS, Section 4.4 & 4.4.5.6).

The removal of 66 trees located in the right-of-way will be mitigated using the methods outlined in the Council of Tree and Landscape Appraisers, *Guide for Plant Appraisal*, and a total value of the trees will be provided to the City of Bellevue for replanting in the City right-of-way or other City-owned parcels. PSE shall prepare a final tree removal plan depicting trees to be removed in the right-of-way including their size and species. This plan shall be submitted to the City of Bellevue for approval. PSE and the City will identify and agree upon an independent third party certified arborist to determine the total value of trees removed from the City right-of-way. The arborist shall use the methods outlined in the Council of Tree and Landscape Appraisers, *Guide for Plant Appraisal*, and PSE shall pay for the arborist appraisal.

For the removal of trees located either within a City-owned (parks or utilities) property or private property, tree replacement will be established through a ratio based on tree size (See Table VI-1 below). Approximately 29 trees are located within a City-owned property. Of the total trees proposed for removal, approximately 485 trees are located on non-city owned property, including the Richards Creek Substation property owned by PSE. Specifically, 108 trees are located on the Richards Creek Substation site, and the remaining 377 trees are located within the 3.3-mile South Bellevue Segment transmission corridor. These trees located on private property will also be replaced based the following replacement ratio:

Table VI-1. Tree Replacement Ratio

Tree Size (dbh)	Replacement Ratio
< 6″	As requested by property owner
6″ to ≤ 12″	1:1
> 12″ to < 30″	2:1
≥ 30″	3:1

Any trees located in a critical area or critical area buffer shall be replaced at a 3:1 replacement ratio regardless of their size. In order to mitigate for the proposed tree removal, PSE proposes an adaptive Tree Replacement approach. The approach includes the following steps:

- At the time of construction, document trees that are removed on a property-by-property basis. This documentation will include the tree species, inventory tag number, and diameter at breast height (dbh) at the time of removal.

- Cross-reference the documentation with the proposed landscape and tree replacement plan that was provided to the property owner. The plan will be based on PSE's Energize Eastside 2018 plant palette. Changes to the proposed plan could occur based on a number of factors, including property ownership changes or prior tree removal by the owner.
- Update the landscape and tree replacement plans to incorporate any changes and provide to the City as documentation. This will document each tree that was removed and the replacement trees that are installed.
- Upon completion of replanting, PSE will provide a summary report that documents the number and types of trees that have been removed and the replacement trees that have been planted.
- PSE will guarantee plant survival for one year after the planting, with replacement of the plant as the primary remedy.
- Based on the agreed-upon replacement ratios, PSE will provide a financial guarantee that covers the estimated cost of tree replacement (including materials and labor) prior to the issuance of the Clearing and Grading permit. Release of said guarantee by the City will occur upon PSE's submittal of the summary planting report.
- To serve as a basis for the financial guarantee and overall tree replacement requirement, PSE is proposing to replace trees using the ratios noted above in Table VI-1.

It is anticipated that most replacement trees can be planted in areas where the tree removal is occurring. However, if this is not feasible then PSE will focus tree replacement efforts in secondary planting areas outside the managed right-of-way but within PSE's easement boundaries or on other portions of those properties where trees have been removed as part of the project. PSE will give preference to native planting for tree replacement in these areas. If the number of trees cannot be met within the corridor then PSE will identify additional planting areas. An emphasis will be placed on finding receiving sites within 0.25 miles of the corridor. A GIS analysis will identify these opportunity areas and PSE will reach out to landowners to discuss interest in receiving plant material.

Finally, if tree plantings required to meet the tree replacement ratios proposed cannot be accommodated by the previously discussed approaches, PSE will pursue planting programs to address the final tree planting. PSE has also been participating in the Energy Saving Trees program, which provides trees to those residents that want to add trees to their property in a manner that can help offset energy usage. While in most cases these trees are not along the project corridor, they are in the City and help advance mitigate for potential tree loss due to factors such as mortality and property owner changes (i.e., a new property owner removes existing trees due to landscaping preferences).[26] PSE initiated this program in early 2018 in an effort to offset anticipated tree removal associated with the Energize Eastside project. During the spring event, PSE and the Arbor Days Foundation provided 551 trees to 300

[26] Although PSE's proposal is not located within a Shoreline Overlay District, the advance mitigation concept has also been adopted by the City in Chapter 20.20E LUC in connection with Shoreline Overlay Districts (see LUC 20.25E.065.F.8.i.).

Bellevue residents. During a fall 2018 event, another 163 trees were provided to Bellevue residents for a total of 714 trees offered as part of this program. These figures are included to demonstrate the success of the planting program. However, any trees used to account for replanting as part of the subject permit shall be offered after clearing and grading permit submittal and before construction commences.

As memorialized in the recommended Conditions of Approval described below in Section X of this Staff Report, PSE shall submit a final Tree Replacement plan as part of the required clearing and grading permits consistent with Attachment E (Vegetation Management Plan), which was submitted as part of PSE's application. More generally and consistent with the Final EIS, the Conditions of Approval identified below in Section X adequately mitigate expected impacts caused by tree removal. **Refer to the Conditions of Approval in Section X of this Staff Report for the specific mitigation measures.**

B. Environmental Health – Pipeline Safety

The Project site is occupied by a portion of the Olympic Pipeline system, which consists of 400 miles of underground pipelines within a 299-mile corridor. One of the pipelines crosses through the middle of the Richards Creek substation site and continues along the South Bellevue Segment, centrally located within PSE's existing corridor. Likewise, the presence of transmission lines in the corridor contributes to the long-term risk of an accidental release by increasing the risk of corrosion due to electrical interference, and by providing a path for a ground fault or lightning strike to conduct electricity and cause damage to the pipelines. Any unintentional release from the pipelines poses serious safety risks, the severity of which will depend on the characteristics and quantity of the pipeline product released, the presence of ignition sources, and the geographic context of the release.

The Final EIS concluded that the probability of a pipeline release and fire occurring and resulting in fatalities remained low under PSE's proposed alignment, both during construction and over the long term. However, potential public safety impacts would be significant if this unlikely event were to occur. Section 4.9 of the Final EIS analyzed the environmental consequences of such an incident, along with a description of the operational concerns for the Energize Eastside project that affect pipeline safety. Section 5.9 of the Final EIS addressed the construction aspects of the Project that affect pipeline safety. Section 5.9.4 of the Final EIS identified recommended mitigation measures applicable during construction. Section 4.9.8 of the Final EIS described the mitigation measures that would be used during operation of the Project and recommended additional measures to avoid, minimize, and mitigate environmental health and safety impacts related to pipeline safety.

PSE's proposal incorporates some of the recommendations made during the EIS process related to pipeline safety, including the following engineering aspects: initially operate both lines at 230 kV rather than one line at 230kV and the other line at 115kV; minimize points of pipeline and transmission line divergence along the corridor; use a delta conductor configuration; and locate poles and pole grounds away from the pipeline(s). PSE also will perform an additional AC Interference

Study prior to construction that incorporates the final transmission line route, configuration, and operating parameters to confirm that current densities remain within acceptable levels, and to inform Olympic of any locations where additional measures may be needed to protect the pipelines. The full pipeline safety assessment is available at Section 4.9 of the Final EIS.

As the pipeline operator, Olympic Pipeline Company (Olympic) is responsible for operating and maintaining its pipelines in accordance with or to exceed the U.S. Department of Transportation Pipeline and Hazardous Materials Safety Administration (PHMSA) Minimum Federal Safety Standards in 49 CFR Part 195 (and Washington State UTC's adopted and enhanced regulations contained in WAC, Title 480). The regulations are intended to ensure adequate protection for the public and to prevent pipeline accidents and failures.

Because Olympic, the pipeline operator, is responsible for the safety of its pipeline system in compliance with federal safety requirements, safety measures to be used as part of the Project will be determined by Olympic in coordination with PSE and based on a review of final design, site-specific conditions, and field measurements. Olympic has indicated it will identify specific measures, or a suite of measures, following the detailed engineering analysis of the final design and based on site-specific conditions and field measurements conducted at project start-up and during peak loading scenarios, and in consideration of the AC Interference Study that incorporates the final transmission line route, configuration, and operating parameters. After the transmission line is installed and energized, Olympic is expected (due to its independent obligation to protect the pipeline from damage) to measure the AC interference with the pipeline in order to ensure all interference risks have been fully mitigated under steady-state operation of the transmission line.

A primary goal of the City of Bellevue's Utilities (UT) Element of the Comprehensive Plan is "to ensure reliable utility service is provided in a way that balances public concerns about infrastructure safety and health impacts, consumer interest in paying a fair and reasonable price for service, potential impacts on the natural environment, and aesthetic compatibility with surrounding land uses." With that goal in mind, Bellevue's Comprehensive Plan Policy UT-94 states the following: "*Require in the planning, siting, and construction of all electrical facilities, systems, lines, and substations that the electrical utility strike a reasonable balance between potential health effects and the cost and impacts of mitigating those effects by taking reasonable cost effective steps*." Several UT Element policies call for ensuring that health and safety are protected as infrastructure projects are developed, including UT-3 ("use design and construction standards that are environmentally sensitive, safe, cost-effective, and appropriate").

Although the probability of a pipeline release that results in a fire and/or injury or fatalities is low, the potential public safety impacts of such an event would be significant. The Conditions of Approval in Section X of this Staff Report impose reporting and coordination requirements that are intended to facilitate transparency and City oversight—to the extent feasible and available to a local jurisdiction—in connection with pipeline safety. These requirements include measures to protect the pipelines from interaction with the new transmission lines; the submission of a Construction Management and Access Plan regarding pipeline safety; various field

verification, engineering, construction, and monitoring requirements; and documentation showing coordination between PSE and Olympic to evaluate and implement mitigation measures to reduce electrical interference on the Olympic pipeline system to safe levels.

The specific Conditions of Approval addressing pipeline safety are intended to ensure that every effort is made to minimize risks to public safety and strike a balance between potential health effects and the costs of mitigating those effects. Therefore, Project-specific mitigation measures, as proposed in the Final EIS and as applicable to PSE's proposal, are required and included in the Conditions of Approval pursuant to BCC 22.02.140.B.1 and 22.02.140.C.

C. Impacts to Scenic Views and Aesthetic Environment in Somerset

Changes to the aesthetic and visual environment will occur as a result of development of the new Richards Creek substation and transmission lines. As the analysis in the Final EIS confirmed, contrast with the existing aesthetic environment will generally be low due to the location of the substation and the transmission lines within the existing corridor. The one exception is where the transmission lines will traverse a portion of the Somerset neighborhood.

Building and vegetation heights are lower in Somerset than other areas of the corridor due to private covenants, making the existing aesthetic environment within that neighborhood unique when compared to other neighborhoods in Bellevue along the corridor. As a result, the degree of contrast created by the taller poles will be substantial. Figure VI-1 shows the aesthetic impact area along the segment (immediately uphill and downhill of the transmission lines). Due to this contrast, the Final EIS disclosed significant unavoidable adverse impacts to the aesthetic environment in the approximately 0.8-mile Somerset segment along the existing corridor in Somerset.

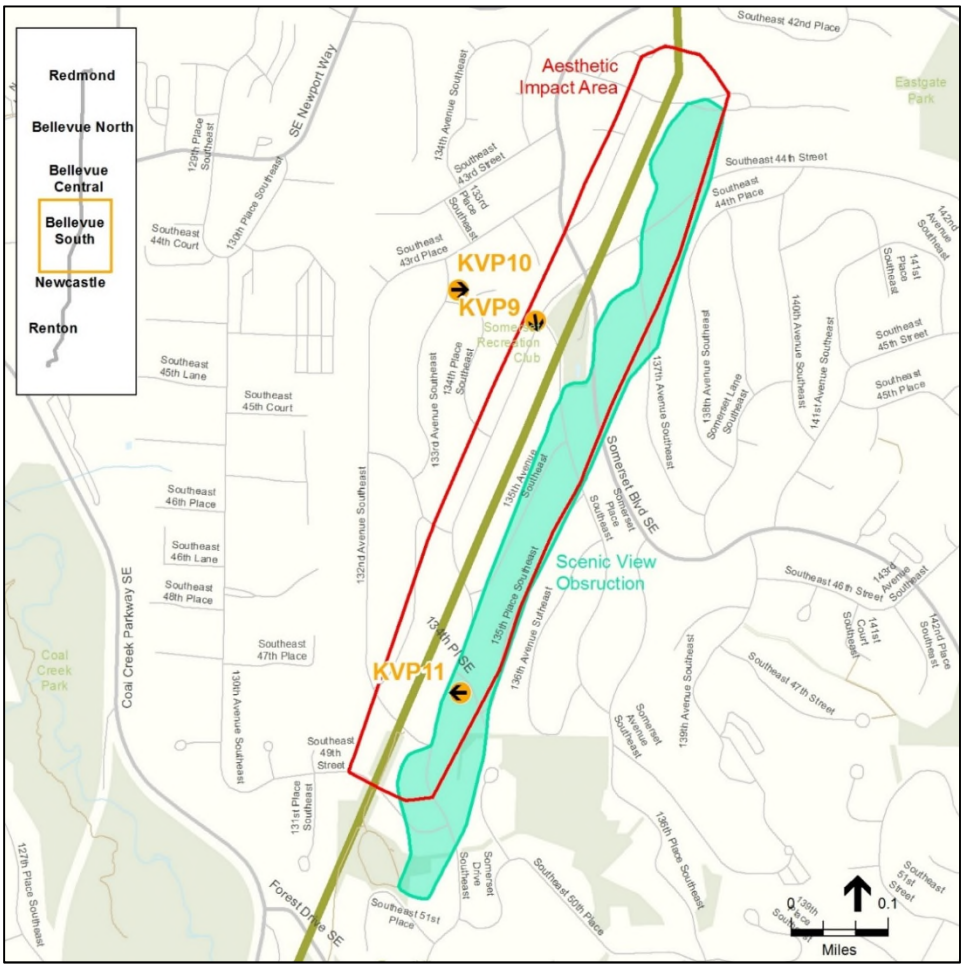


Figure VI-1. Aesthetic Impact Area and Scenic View Obstruction Area

As discussed above, a primary goal of the City of Bellevue's UT Element is "to ensure reliable utility service is provided in a way that balances public concerns about infrastructure safety and health impacts, consumer interest in paying a fair and reasonable price for service, potential impacts on the natural environment, and aesthetic compatibility with surrounding land uses." A robust economy and sustainable city require adequate and reliable power supply (see Policy UT-99). This requires a balance between the needs of a regional electrical utility and the desire for the utility to be compatible with the local context and land use pattern (UT-95, UT-96, UT-97, and UT-99).

PSE's electrical utility facilities in their current locations have become a fixture in the landscape and are permitted in all land use districts. PSE has also chosen to locate the proposal within a corridor that has long been recognized in the City's Comprehensive Plan as the location for the Project (see Attachment F [Map UT-7]) in order to avoid the introduction of impacts to new areas of the City. PSE has also sited and designed the proposal to minimize impacts to the extent feasible, including modifications to pole design to reduce the necessary height in the Somerset segment to respond to the existing physical characteristics of this unique neighborhood. To address aesthetic impacts to the surrounding environment and reduce contrast with the surrounding environment, PSE shall implement the

proposed pole finishes identified in Attachment J to this Staff Report (see Conditions of Approval in Section X).

Although the aesthetic impacts in the Somerset segment are considered significant, the Project helps ensure reliable electrical service for the City that is considered essential in the Comprehensive Plan, and the City has chosen not to protect private views in policy or code. PSE's proposal was designed to avoid new impacts by using the existing easement; limiting vegetation clearing and replacing trees where possible; positioning new poles and adjusting pole height to the greatest extent possible; and using color treatments on the poles and landscaping to reduce contrast between the Project and its surroundings. Further modifications to necessary pole heights within the Somerset neighborhood would increase the number of poles in the neighborhood (approximately 24 additional poles) and result in additional impacts to the character and appearance of the immediate vicinity (see PSE 9-21-18). An increase in pole number required for shorter poles would result in increased excavation, require more tree removal to accommodate the additional poles, and provide fewer screening options for both the existing and new pole locations within the corridor.

Undergrounding the line was also suggested in the Final EIS as a mitigation measure. However, the cost of doing so would be especially high in Somerset due to severe elevation changes, and it would likely require diverting the Project from the existing transmission corridor due to the presence of the Olympic pipeline and the significant constraints on the location of another underground utility line within the pipeline easement. PSE determined that placing a transmission line underground would require permission from both Olympic (if in the existing corridor) and each property owner along the corridor, regardless of whether the existing corridor or a new corridor was used. Gaining such permission would likely delay the Project and thus not meet the Project objectives regarding timing. Given the high cost of acquiring and developing a new underground corridor, and the likely delays it would entail, undergrounding was not considered a feasible option. Thus, PSE's proposal strikes a reasonable balance between ensuring reliable utility service and maintaining compatibility with surrounding land uses to the greatest extent feasible.

D. Land Use and Housing

PSE's proposal utilizes PSE's existing 115 kV transmission line corridor. Although PSE plans to remove and replace the existing wooden 115 kV H-frame structures, this planned pole replacement would not change existing or future land uses, zoning designations, or housing stock because the land is already in use as a transmission line corridor and does not require additional easements or property acquisitions. PSE's proposal will not result in the removal of existing housing, and the Final EIS determined that impacts to housing would be less-than-significant.

Further, LUC 20.20.255 specifically regulates PSE's proposal. As explained above in Section IV.A, the purpose of LUC 20.20.255 is to regulate proposals for new or expanding electrical utility facilities and to minimize impacts associated with such facilities on surrounding areas through siting, design, screening, and fencing requirements. As explained below in Section VIII, the proposal is also consistent with the applicable Comprehensive Plan policies and the Richards Valley, Factoria, and Newport Hills Subarea policies (see also Attachment G to this Staff Report).

Compliance with the applicable decision criteria (LUC 20.20.255.E) and design standards regarding site landscaping, fencing, and height limitations (LUC 20.20.255.F), along with the Conditions of Approval identified below in Section X, will mitigate impacts to land use.

E. Water Resources.

The Final EIS concluded that potential impacts to water resources as a result of the Richards Creek substation would be less-than-significant because PSE would be required to comply with applicable federal, state, and local regulations to protect water resources and will implement appropriate BMPs to protect nearby water bodies. Application of codes, standards, and regulations—including the City's critical areas requirements contained in Chapter 20.25H LUC—will adequately mitigate expected impacts to water resources resulting from the new Richards Creek substation.

Likewise, potential impacts on water resources associated with the transmission lines and poles in the existing corridor will be fully mitigated through compliance with applicable regulations. As described above in Section IV.B and below in Section VIII and the Conditions of Approval in Section X, impacts on wetlands and buffers will be mitigated in accordance with applicable critical area requirements. Therefore, impacts will be less-than-significant.

F. Plants and Animals

Impacts to trees are discussed above in Section IV.A. Impacts to other plants animals will be adequately addressed through compliance with critical areas regulations and other applicable regulations and standards. For more information, refer to the Critical Areas Land Use Permit discussion in Section VIII of this Staff Report and to the Conditions of Approval in Section X.

G. Environmental Health – Air Quality and Greenhouse Gas Emissions (GHG)

Section 4.5 of the Final EIS disclosed that operational GHG impacts would result primarily from the removal of trees and vegetation that would reduce ongoing sequestration of CO2 from the atmosphere. To a lesser degree, GHG emissions impacts would result from employee vehicle trips to maintain the new facilities. The Final EIS concluded that the sequestration losses resulting from tree removal required by the Project would be less-than-significant. No significant adverse impacts to air quality are expected, and the Conditions of Approval identified below in Section X adequately mitigate expected impacts caused by tree removal.

H. Recreation

As described in the Final EIS, impacts to recreation from PSE's proposed alignment in the South Bellevue Segment would be less-than-significant because vegetation clearing and changes to poles and wires would not affect the use of recreation sites. In reaching this determination, the Final EIS analyzed potential impacts to specific recreation sites in this segment and explained why impacts would be below the level of significance. As conditioned, no significant impacts to recreation are expected in connection with PSE's proposal, and the City's codes and requirements adequately mitigate any expected impacts.

I. Historic and Cultural Resources

The Final EIS disclosed that (1) there are no known cultural, historic, or archeological resources at the substation site or along the transmission route; (2) there are some potential historic resources (e.g., the Eastside Transmission System), which are eligible for listing but would require an eligibility determination by the Washington State Department of Archaeology and Historic Preservation (DAHP); and (3) during construction, previously unidentified resources may be discovered.

PSE has prepared a historic property inventory.[27] The Conditions of Approval identified below require that PSE consult with DAHP, affected Tribes, King County Historic Preservation Program (KCHPP), and other appropriate stakeholders prior to construction and develop resource-specific mitigation measures. PSE is also required to consult with these stakeholders if a protected historic, cultural, or archaeological resource is identified during construction.

The Conditions of Approval require PSE to develop mitigation measures specific to those resources during consultation with DAHP, affected Tribes, and any other appropriate stakeholders. The Conditions of Approval also require that a final determination and mitigation measures report shall be submitted to the City of Bellevue to the extent allowed by law. If no impacts to historic or cultural resources are identified, then no mitigation is necessary.

J. Environmental Health – Electric and Magnetic Fields (EMF)

Section 4.8 of the Final EIS disclosed that all parts of the Energize Eastside project would have associated magnetic fields during operation that would vary depending on the pole type and electrical load. Operation of the proposed transmission lines would result in a decrease of magnetic field levels for all segments and options. There are no known health effects from power frequency EMF. For all proposed segments and options analyzed in the Final EIS, the calculated magnetic field levels would be well below reference guidelines. Therefore, under PSE's proposed alignment, impacts would be less-than-significant.

K. Environmental Health – Noise

As described in the Final EIS, noise impacts will be below the level of significance and addressed through regulatory requirements. As discussed above in Section V.A, electrical substations are exempt from the maximum permissible noise levels established in Chapter 173-60 of the WAC, but PSE's site plans include noise attenuation measures to maintain noise levels at the nearest receptors within 5 dBA of existing ambient noise levels. Other potential noise impacts, including construction noise, will be effectively mitigated through compliance with the critical areas regulations and the Noise Control Code, Chapter 9.18 BCC.

[27] Letter from Brad Strauch, PSE Program Manager, to Heidi Bedwell, City of Bellevue Environmental Planning Manager, dated December 13, 2018. PSE's December 13, 2018 letter (PSE 12-13-18) is included in the DSD official file for Permit No. 17-120556-LB.

L. Economics

As described in the Final EIS, mitigation for economic impacts from a project is not required under SEPA.

M. Earth Resources

Section 4.11 of the Final EIS has a robust discussion of Earth Resources and concluded that potential impacts would be less-than-significant. In addition, PSE has submitted the July 11, 2017 Revised Targeted Geologic Hazard Evaluation, prepared by GeoEngineers; the September 21, 2018 Memorandum re Geologic Hazards, prepared by GeoEngineers; and the September 14, 2018 Memorandum re Landslide Deposits, prepared by GeoEngineers. Each of these reports is included in Attachment I to this Staff Report.

No significant adverse impacts to earth resources are expected, and the Conditions of Approval identified below in Section X adequately mitigate expected impacts to earth resources.

N. Energy and Natural Resources

As described in the Final EIS, the Project would not affect the generation or consumption of energy, and any potential impacts to natural resources are not considered a significant impact.

O. Transportation

As described in the Final EIS, transportation impacts would be below the level of significance and addressed through regulatory requirements. As discussed above in Section V.D and below in the related Conditions of Approval, the City's codes, standards, and requirements adequately mitigate any expected impacts to Transportation.

P. Public Services and Utilities

As described in the Phase 1 Draft EIS and Final EIS, the Energize Eastside project would not significantly increase the demand for public services, or significantly hinder the delivery of services. Existing services are also adequate to address impacts from the Project. Therefore, no significant impacts to public services are expected, and the City's codes and requirements adequately mitigate any expected impacts to public services.

As described in the Phase 1 Draft EIS and Final EIS, the Energize Eastside project would not significantly increase the demand for utilities, or significantly affect utility operations, except with regard to electrical reliability, which will be improved by the Project. Storm drainage is discussed in Section V.C above; no significant adverse impacts to other utilities are expected; and the City's codes and requirements adequately mitigate any expected impacts to utilities.

VII. PUBLIC COMMENT

PSE's community outreach efforts regarding the construction of a new transmission line to connect the Talbot Hill and Lakeside substations, including the proposed Richards Creek substation adjacent to the Lakeside substation, began well before the CUP application was submitted. Consistent with the requirements of the LUC, public engagement regarding the specific proposal has continued throughout the CUP review process. All comments received by the City during the land use process are included in the DSD official file for Permit No. 17-120556-LB. Meetings held prior to permit application are documented in PSE's Alternative Siting Analysis (Attachment B to this Staff Report). Comments received during the EIS process, and response to those comments, are appended to the Final EIS as required by SEPA.

A. Public Noticing Requirements per LUC 20.35.120:

Application Date: September 8, 2017
Notice of Application: October 19, 2017
Minimum Comment Period: November 2, 2017
Promoted by:

- Weekly Permit Bulletin sent to properties within 500 feet of properties abutting the proposed transmission line and substation
- Weekly Permit Bulletin Webpage https://development.bellevuewa.gov/zoning-and-land-use/public-notices-and-participation/past-bulletins
- Permitting Webpage https://development.bellevuewa.gov/zoning-and-land-use/public-notices-and-participation/energize-eastside-updates
- Information signs along the route and substation (12 total signs)

B. Public Meetings Required by LUC:

Public meeting (required per LUC 20.35.300):
Date: November 14, 2017
Location: South Bellevue Community Center Community Room
Purpose: Project overview and the land use process
Promoted by: Weekly Permit Bulletin, Webpage, Direct Mailer
Number of attendees: approximately 60

Public meeting (required per LUC 20.20.255):
Date: September 6, 2018
Location: Bellevue City Hall
Purpose: Project overview and how to participate in a public hearing
Promoted by: Weekly Permit Bulletin, Webpage, Direct Mailer
Number of Attendees: approximately 20

C. Questions and Responses:

Public notice of the application for PSE's CUP and CALUP permits was published on October 19, 2017. During the land use process, the City has received written comment from about 100 individuals, which includes comments from citizens, organizations (e.g., Coalition of Eastside Neighborhoods for Sensible Energy (CENSE) and Citizens for Sane Eastside Energy (CSEE)), agencies (King County Wastewater Treatment

Division), and tribes (Muckleshoot Indian Tribe). A summary of the comments related to PSE's proposal is provided below.

In many cases, similar comments were made by more than one person. In those cases, comments are paraphrased and consolidated into one question (issue) and the questions have only one response. Comments were received primarily via email, with several commenters submitting supplemental material as attachments. Numerous emails were submitted with the same material as a form letter, or as the form letter with additional modifications. Comments were also provided on forms that were available at the November 14, 2017 public meeting, although no public comment testimony was taken at that meeting.

A selection of public comments received between the date of application and publication of this Staff Report are included in the below summary. Some individuals submitted comments on multiple occasions. Other comments raised purely legal arguments regarding PSE's phased construction, or the adequacy of the Final EIS, or argued that the City had failed to comply with its applicable land use processes (i.e., Process I, LUC 20.35.100 to 20.35.150, and Process II, LUC 20.35.200 to 20.35.250) in connection with processing PSE's permit applications. Copies of all the comments received during the land use process are included in the DSD official file for Permit No. 17-120556-LB.

With the exception of the agency and tribal comments, all of the comments received voiced opposition to PSE's proposal or the Energize Eastside project in general; opposition was stated either explicitly (e.g., "I oppose this project and it should not be approved") or implicitly (based on the content of the specific comment).

Table VII-1. Questions and Responses

Question/Theme	Comment Issue Summary	Response
Questions Related to Project Need:	PSE's Project would not increase reliability because the transmission problem it proposes to solve has not been demonstrated to exist, or can be solved with existing resources that PSE controls.	The City is aware of a number of questions regarding the need for the Energize Eastside project. These are discussed individually in the following responses.
[Project need continued]	WUTC is evaluating the need for the Energize Eastside project in PSE IRP Docket UE-160918, and the City should take that process into account. [Note comment letters were received for this permit review while WUTC review was occurring, but WUTC review is now complete.]	The City is aware that PSE's 2017 IRP was acknowledged by WUTC in May 2018 (as revised June 2018), and the WUTC acknowledgement specifically comments on PSE's limited disclosure of information regarding the need for the Project and response to public comment on the Energize Eastside project. Nevertheless, the WUTC stated that PSE "*complied with the letter of the law in Chapter 8 where it provided a history of its Needs Assessment Reports*." Further, the City of Bellevue has a prescribed set of criteria for approval of electrical utility facilities that differ from the WUTC mandate. The analysis in this Staff Report focuses on those criteria, and City policies supporting those criteria.
[Project need continued]	WUTC failed to protect Eastside Cities from unnecessary costs by not requiring PSE to better demonstrate the need for the Project, placing the burden on the Cities.	The City of Bellevue has a prescribed set of criteria for approval of electrical utility facilities that differ from the WUTC mandate. The analysis in this Staff Report focuses on those criteria, and City policies supporting those criteria.
[Project need continued]	Energy demand growth is not likely to be as great as PSE has projected. Electrical demand has been flat in recent years, not growing. An alternative method for estimating growth of electrical demand on the Eastside should be evaluated.	The growth estimates provided by PSE are based on PSE customer data and regional growth estimates by PSRC. The City is aware that PSE growth estimates have historically overestimated overall demand. First, overall demand can remain constant even as peak demand grows, due to conservation during off peak periods. In addition, the estimate suggested in some

		comments of using the regional average used by the Western Electricity Coordinating Council (WECC) (0.5%) is lower than both population and employment growth rates projected by PSRC for the Eastside area, and therefore may be too low. In June 2018, PSE notified the City of Bellevue that the actual peak demand in the summer of 2017 was equal to the peak demand they had projected for summer 2018, and warned that during peak summer demand periods, CAPs would be in place that include intentional load shedding (rolling blackouts) for Eastside customers (PSE 6-8-18). Following a request for additional information from the City, PSE explained that it did not perform any analysis on the electrical loads for the August 2017 dates, but increased air conditioning was a likely contributor (10-26-18). PSE's planning-level modeling found that both summer and winter peak customer load were driving the need for additional transmission capacity. Additional information regarding PSE's determination of operational need is discussed below in **Section VIII.C.3** of this Staff Report in connection with Electrical Utility Facilities Decision Criteria LUC 20.20.255.E.3.
[Project need continued]	PSE failed to respond to City requests for additional data supporting its statement in June 2018 that in 2017, summer peak loads had exceeded levels projected for summer 2018 in the Eastside Needs Analysis.	PSE did provide additional information clarifying specifically which peak load projection the June 2018 letter referred to, dates of the peak loads, and temperatures during the peak load period (see PSE 10-26-18). While providing some of the requested information, PSE also noted that it does not have some of the specific data requested, but provided the information that was relevant to the decision to put in place the contingencies that could lead to load shedding.

[Project need continued]	Contrary to PSE's statement that the "backbone of the system has not been upgraded in 50 years," the local transmission grid has been upgraded several times since this transmission line proposal was included in the Comprehensive Plan, providing adequate capacity for community needs.	The City is aware that there have been upgrades and additional 115 kV transmission lines built elsewhere in the Eastside since the time the possible need for this 230 kV transmission line was identified in the Comprehensive plan. PSE's statement refers to the central location of the transmission lines under review here and the fact that they remain 115 kV lines. This may be an overstatement, but this statement alone is not a significant factor in determining the need for the Project. Evaluation of the need for the Project has taken all transmission system changes and improvements into account.
[Project need continued]	PSE's motive for the Project is profit for a foreign owner/parent company. The Project is intended to generate revenue and does not have the region's best interests in mind.	The City does not regulate projects based on the motives of the applicant.
[Project need continued]	PSE's model used flawed assumptions by employing winter-time load factors combined with lower, summer-time capacity factors. PSE also ignored the possibility of "voltage collapse", which would cause widespread blackouts at the level of electrical load modeled, calling into question the accuracy of the model results.	The City hired Utility System Efficiencies, Inc. (USE) to evaluate scenarios independently. USE used summer ratings with summer loads and winter ratings with winter loads, and confirmed that there would be violations (overloads) in both heavy winter and heavy summer scenarios (see USE 2015). Voltage collapse was not identified as an issue in this independent analysis of the system.
[Project need continued]	The needs analysis used a flawed assumption regarding the amount of power flowing to Canada.	For PSE's needs assessment, PSE relied on ColumbiaGrid's determination that the 1,500 megawatt (MW) flow should be considered a firm commitment and was therefore required to be in its model. The City hired USE to evaluate scenarios independently, including ones that did not make these assumptions. The June 2018 disclosure that summer peak customer load in 2017 reached a level where CAPs are required, also indicates that the question of flows to Canada may be moot (see USE 2015; PSE 6-8-18; PSE 10-26-18).

[Project need continued]	The need analysis used flawed assumptions regarding PSE power generation during cold weather events.	The City is aware of the assumptions that were used in PSE's needs assessment. The Quanta Eastside Needs Assessment Report and Quanta Eastside Supplemental Needs Assessment Report indicated that the reason power generation was lowered was to facilitate south to north flow across the Norther Intertie, as indicated by ColumbiaGrid. USE 2015 also evaluated scenarios assuming PSE's power generation was running and concluded there would still be a need for the capacity improvement.
[Project need continued]	PSE's record on other aspects of its business suggest they should not be trusted. Examples include PSE's recent pipeline explosion in Greenwood and building without permits in Tacoma.	The City is aware of the examples cited. The City has worked diligently to obtain accurate and verifiable information regarding the Energize Eastside project and recognizes its responsibility to ensure compliance with all regulatory requirements within its authority.
[Project need continued]	An alternative needs analysis found that there was only one deficiency when 1,500 MW flows to Canada were eliminated.	The USE 2015 analysis did find that most of the problems identified by PSE planners would be eliminated in the Heavy Winter Scenario if the flows to Canada were curtailed, but also found that one transformer would be at risk, even if the Canadian flows were eliminated.
[Project need continued]	If ColumbiaGrid assumes that 1,680 MW of power supply from PSE generators would be running during a peak winter event when it does its modeling, why does PSE assume they would be off?	The transmission capacity deficiency identified by PSE could result in violations of the reliability standards, regardless of whether these generators were considered to be "on" or not. Stantec reviewed the results showing there were cases in which, even with these plants set as "on" in the model, there were still overloads in the Eastside, indicating that those overloads are a problem local to the Eastside (see Stantec 2015).
[Project need continued]	Assuming the flows to Canada are not required and would not be allowed if they endangered the grid, rolling blackouts are not likely to occur if the Project is not built, because there are ways for PSE to avoid	PSE's consultants found that, regardless of whether its generators were considered to be "on" or not, the model showed there would still be overloads in the Eastside that would require placing portions of the Eastside at risk for rolling blackouts, unless a transmission capacity improvement was made.

	them, including using local, 115 kV gas-fired plants owned by PSE.	
[Project need continued]	Growth in electrical demand will primarily be generated by growth and development in non-residential zones outside of the residential zones through which the majority of the Project would be built, in contradiction to Bellevue Land Use Code 20.20.255.G.	It is correct that the majority of the population and job growth expected within the City of Bellevue is planned and expected to occur outside of residential zones, according to the Bellevue Comprehensive Plan. However, the Project will protect reliability for the entire Eastside, the majority of which is residentially zoned and which includes residential zones in Bellevue. Compliance with the specific applicable criteria in LUC 20.20.255.G is analyzed throughout this Staff Report.
Questions Related to Potential Alternatives:	Better alternatives are available that are less expensive, safer, and/or more reliable. The City should require PSE to pursue other alternatives, such as batteries, solar, and other non-wire alternatives. These alternatives were not adequately evaluated as part of this Project.	The City has a duty to review a project as proposed by the applicant, in this case PSE. The City can only decide if the proposed Project is consistent with City rules and regulations. While the City did review many of the alternatives described in comments in the Phase 1 Draft EIS, it cannot require PSE to build an alternative that PSE does not see as feasible.
[Alternatives continued]	The Seattle City Light (SCL) transmission line could be "looped in" instead of building a new transmission line, and could be accessed through an Open Access Transmission Tariff (OATT).	PSE determined that additional 230 kV transmission is needed, and this will mean rebuilding the SCL line and sharing it, if used. SCL also indicated that it is not required to file a tariff (OATT) and expects to need the capacity on its line in the future.
[Alternatives continued]	What battery technology was considered by PSE in response to Bellevue Land Use Code 20.20.255.D.3? What was the rationale for the type and size of batteries considered?	The Alternative Siting Analysis included as Attachment B to this Staff Report demonstrates that PSE relied primarily on the Strategen report (Eastside System Energy Storage Alternatives Screenings Study), prepared for the Energize Eastside project in 2015 and updated in September 2018, to evaluate energy storage and battery alternatives. Generally, this Study looked at lithium-ion battery technology with a power rating of 328 MW to provide 2,338 MW hours to cover a period of 7.1 hours (the amount needed by 2021). Compliance with the Alternative Siting Analysis criteria in LUC 20.20.255.D.3 is analyzed in Section IV.A of this Staff Report.

Questions Related to Safety and Risk	The presence of the Olympic Pipeline system in the corridor presents a serious risk of catastrophic explosions and leaks caused by construction. PSE's safety record with gas pipelines heightens this concern, and commenters raised several questions about PSE's record.	The risks of accidents in the pipeline corridor is acknowledged and analyzed in the EIS. PSE and Olympic have worked together in the corridor for 40 years, and communicate regularly to coordinate activities related to pole replacement and other maintenance work. The risk assessment completed for the EIS indicates that there will be a very small increase in total risk during construction. The City is conscious of the need to ensure that PSE complies with safety requirements during construction and has exercised the authority available to a local permitting agency to ensure that every effort is made to minimize risk. See the discussion of Environmental Health-Pipeline Safety in Section VI.B and the Conditions of Approval regarding pipeline safety in Section X of this Staff Report.
	The presence of the Olympic Pipeline system in the corridor presents a serious risk of catastrophic explosions, fires, or leaks caused by natural forces, such as earthquakes, windstorms, and lightning.	Operational risks related to natural forces were analyzed in the EIS. Earthquakes and lightning strikes or wires downed by extreme weather events present risks of fault conditions or arcing from the transmission lines to the pipelines. The risk assessment included in the EIS determined that the Project is not expected to increase the risks of accidental release due to seismic activity or other natural forces, and that overall operational risks would decrease.
[safety/risk continued]	How long would it take for the Bellevue Fire Department to extinguish a fire if there were an accidental release from the Olympic Pipeline system that was ignited? What is the plan for the community, and how should people respond if a leak or explosion occurs?	Andy Adolfson, Deputy Chief of Operations for the City of Bellevue (WA) Fire Department provided a detailed response to questions about response times on October 23, 2018 in an email that is part of the record for this Project. The time it would take to extinguish a fire would depend on the scale of the release, but all fire trucks are equipped with a limited amount of foam concentrate for suppressing petroleum fires. The first priority would be to control or contain the spread of the fire, then work to extinguish it. Additional support could be provided by nearby fire departments, including

		Renton and Seattle. People who see, hear, or smell a release from a pipeline should move away quickly and call 911. Additional details are provided in the response from the Deputy Chief.
[safety/risk continued]	Concerns about risks specifically to Chestnut Hill Academy and Tyee Middle School – both from the Olympic Pipeline system and electromagnetic field (EMF) exposure from the transmission line, as well as from equipment at the new substation (for Chestnut Hill).	Regarding pipeline safety risks, risk during construction is discussed above; risk around schools can be reduced by scheduling construction near those facilities outside of the hours of school activities. Extensive health studies have not found a causal link between adverse health effects and EMF from electrical transmission lines. See Conditions of Approval regarding pipeline safety in Section X of this Staff Report.
[safety/risk continued]	More involvement from BP in project planning is needed to ensure safety. They have not attended public meetings.	The Partner Cities and the EIS Consultant Team contacted Olympic during the development of the EIS and provided an opportunity to comment during the EIS process. In addition, PSE has worked with Olympic directly. Neither the City of Bellevue nor PSE has the ability to require Olympic to attend public meetings. Olympic did provide information during the EIS process. See Section VI.B of this Staff Report for discussion of Environmental Health-Pipeline Safety, and see Conditions of Approval regarding pipeline safety in Section X.
[safety/risk continued]	EMF Risk. Commenters cited studies from the World Health Organization (WHO), National Cancer Institute, International Agency for Research on Cancer (IARC), and European Commission Scientific Committee on Emerging and Newly Identified Health Risks, noting potential EMF-related health effects (especially leukemia). Commenters also expressed concern about children being more susceptible and about potential exposure at Tyee Middle School.	The IARC does classify Extremely Low Frequency (ELF)-EMF as "possibly carcinogenic to humans" based on epidemiological studies. However, extensive health studies have not found a causal link between adverse health effects and ELF-EMF from electrical transmission lines. The 2011 IARC and WHO study cited by some commenters evaluated the possible association between the types of exposure from radiofrequency EMF from the use of wireless phones, not from ELF-EMF. Because there is no known causal link, there is no established EMF exposure limit in the

		U.S., other than workplace limits, which are far higher than any expected exposure at schools or other sites along the transmission corridor.
[safety/risk continued]	The Project would increase the risk of damage to pipelines if a line were to fall, as has occurred on this transmission corridor in the past.	PSE was asked about records of downed transmission lines, and PSE indicated that its records show falling trees and structural cross-arm failure were the causes. PSE's proposal is not likely to increase trees falling on the lines, and the proposed steel structures are expected to be stronger than the existing wooden ones and less prone to failure.
[safety/risk continued]	The taller poles would increase the risk of a pole falling on top of adjacent homes, with an increased potential for property damage and loss of life. Numerous homes are within 130 feet of the proposed pole locations. It is a real consideration in the Pacific NW, from a seismic event or landslide.	Transmission poles historically have not been toppled by earthquakes, regardless of height. Design standards required for transmission poles are the same for any height pole and make it extremely unlikely that poles would fall during a seismic event. Please see section VI.M, Earth Resources, for additional discussion of the Final EIS analysis regarding Earth Resources.
Questions Related to Process:	Public Meeting Logistics and Format. Some commenters had questions about the format of the public meeting (prior to the meeting), as well as how potentially affected property owners would be notified. One commenter stated that the November 14, 2017, meeting format only allowed for one-way communication from the City (and PSE) to the residents; more public dialog would have been helpful and beneficial.	The meeting format and notice requirements are specified in the City's Land Use Code. A meeting on September 6, 2018 provided opportunity for public dialogue as well as written comment.
[process continued]	Several commenters urged the City of Bellevue to reject the proposed Project because they believed that would best protect the interests of its residents, rather than promoting the business interests of PSE and its owners.	In making its decision on the Project, the City will weigh the interests of all of its citizens, including economic as well as environmental considerations, by applying the criteria and standards in the Land Use Code and SEPA regulations.
[process continued]	Comments on the EIS. Several commenters asked if their previous comments on the EIS	The EIS is part of the record for this permit process and the EIS has been incorporated by reference under the

	were being incorporated into the permit commenting process, or specifically asked that their EIS comments be carried over to this phase of the process. Some stated that their previous comments on the EIS had not been adequately addressed and that the permits should not be issued until comments and concerns were adequately addressed.	terms of BCC 22.02.020 and WAC 197-11-635. Comments received on the EIS that were submitted during the applicable comment periods are included in the Final EIS consistent with SEPA. The City considers the responses to comments that were provided in the Final EIS as adequate for SEPA purposes. The City has complied with its land use process in processing PSE's permit applications.
[process continued]	Permit Materials and Schedule. One commenter asked if the permit application materials were finalized as of November 2017 (or if any updates would be available), as well as associated schedule dates for future actions.	The City created a specific webpage on the City's website that contains information regarding PSE Permit Application Nos. 17-120556-LB and 17-120557-LO. Information included on the webpage included: Ongoing Permit Status; Permit Plans and Reports; How to Participate; Notices of Public Meeting and Hearings; and Information regarding the Final EIS.
Questions Related to Property Access:	Several commenters requested that site-specific property access be maintained during construction, such as to individual driveways or local roadways. Some of these included requests for direct coordination with PSE.	Site access will be maintained during construction. There may be brief times when access will need to be limited for safety purposes. PSE is coordinating directly with property owners along the corridor and will ensure that access for first responders is maintained.
Questions Related to Public Trail Access:	One commenter requested that construction/ truck access be avoided on the public pipeline trail during the wet winter months. Truck travel during wet conditions creates ruts that persist and make public trail access difficult.	A restriction on winter construction should not be needed except where recommended for critical areas. All access points will either be via existing improved roads, or temporary roads that will be improved with gravel to accommodate large trucks. Once installation is complete, PSE will be required to restore all temporary access areas. If an access road affects a trail on City-owned land, PSE will be required to coordinate any access restrictions with the Bellevue Parks Department.
Questions Related to Tree Canopy:	The amount of tree removal proposed is not consistent with City policy to increase tree canopy. Mitigation for tree removal for the transmission line and the substation should provide comparable ecosystem services (such as carbon sequestration, oxygen	The City is aware of the concerns listed regarding tree canopy loss. The City has policies to preserve tree canopy generally, and PSE has made and continues to make efforts to limit the amount of tree removal necessary as a result of its proposal. Mitigation for tree removal is required in critical areas and buffers areas

	production, air quality benefits), indirect benefits (such as mental and physical health), and the quality of the tree canopy as well as the quantity.	and will be provided. Mitigation will also be required for tree removal from public right-of-way or other public lands. PSE will also be required to submit a final Tree Replacement plan as part of the required clearing and grading permits consistent with Attachment E (Vegetation Management Plan) to this Staff Report. See Section VI.A of this Staff Report for a discussion of tree removal and mitigation measures, and see the Conditions of Approval in Section X of this Staff Report for information regarding the specific mitigation measures addressing tree removal in critical areas and non-critical areas.
Questions Related to Noise Pollution	One commenter expressed concern about noise pollution from new transmission lines.	Noise from the lines in nearby residential environments will be virtually the same as existing noise levels, and well below the limits required by local noise regulations.
Questions Related to Ratepayer Funds and Cost	The Project as proposed is unnecessary and wasteful of ratepayer funds. There are less costly ways to enhance the reliability and resiliency of the Eastside power grid.	The City of Bellevue does not establish rates or evaluate whether there are less costly means of accomplishing a project. It is the responsibility of the WUTC to determine if the cost of electrical upgrades is appropriate.
Questions Related to Property Value	Property values will decrease because of the proximity to taller poles and resulting EMF exposure.	While some studies have shown that a new transmission line can adversely affect property values, economic analysis for the EIS did not find studies that indicated a negative effect on property values due to the replacement of lower voltage with higher voltage transmission lines in an existing utility corridor.
Questions Related to Aesthetics and Views	The new poles will destroy views, especially in areas like Coal Creek Parkway and the Somerset and Newport Hills neighborhoods (as well as others). Several commenters stated that Bellevue is supposed to be a "city in a park," and that the aesthetic impacts of the Project (pole type and size, tree removal) are inconsistent with that stated ideal.	PSE's proposal will likely affect private views for some residents of Somerset uphill of the existing transmission line. For residents adjacent to the lines, taller poles may also remove obstructions to private views. No scenic views from parks or designated view corridors are expected to be impacted. Because the corridor already contains transmission lines, the proposal is not expected to alter the visual character of the neighborhoods it passes through, with the exception of an 0.8 area in the Somerset neighborhood that has

		developed a unique visual character due to private covenants. The unavoidable significant aesthetic and scenic resources impacts in Somerset are discussed in greater detail in the SEPA section and decision criteria analysis sections contained in Sections IV and VIII of this Staff Report. Private views in the City are not protected through government regulation or policy.
Questions Related to Inconsistency with City of Bellevue Land Use Code and Comp Plan	The Project is inconsistent with the Bellevue Land Use Code and Comprehensive Plan in that single-family homes and the neighborhood should be protected from the encroachment of more intense uses. In addition, the Project design contradicts the intended character of the neighborhood.	Transmission lines are an allowed and expected use in residential zones, and the proposal is consistent with applicable Comprehensive Plan policies, as discussed in Section VIII.D.1 of this Staff Report (see also Attachment G [Comprehensive Plan Policy Analysis] to the Staff Report). The proposal meets the requirements of the Land Use Code, including LUC 20.20.255, as discussed throughout this Staff Report.
Questions Related to Mitigation for Somerset	Given the higher degree of aesthetic impacts on views in the Somerset neighborhood, mitigation should be required – either run the line along a different corridor, or underground the transmission line (which would likely require a different corridor given the presence of the Olympic Pipeline system).	Four routes were considered for the South Bellevue Segment, one of which would have left the existing infrastructure in place, and two of which would have resulted in continued use of H-frame poles that would have only been 5 to 15 feet taller than the existing infrastructure. All of the option routes traverse residential land use districts, but the existing corridor route minimizes impacts associated views, tree removal, and pipeline interaction as compared to establishing a new corridor for the Project. One possible mitigation measure identified during the environmental review process was to select an option that would allow for shorter poles that are more similar to the existing 115 kV transmission line. This option was considered for the Somerset neighborhood but was not required for the reasons discussed in Section VI.C (Scenic Resources/Visual Impacts) and in Section VIII of this Staff Report.

		Mitigation measures are required to minimize the impact to surrounding neighborhoods. For portions of the transmission line where the poles will extend above the horizon for a large number of adjacent viewers, PSE will be required to adjust pole types and color to limit visual impacts. Specifically, to reduce aesthetic impacts to the surrounding environment and reduce contrast with the surrounding environment, PSE shall implement proposed pole finishes consistent with the recommendations found in Attachment J (Pole Finishes Report City of Bellevue (South)). Undergrounding the transmission line is not proposed because of cost and feasibility considerations. For further discussion of the cost and feasibility issues considered with respect to undergrounding, see Section VI.C of this Staff Report.
Agency/Tribal Coordination and Request for Information	The King County Wastewater Treatment Division (WTD) requested that the City submit construction drawings, especially in relation to two WTD project sites in the study area (the Coal Creek Trunk Line and the Coal Creek Siphon and Trunk Parallel). A map was included showing the specific areas of concern.	Potential impacts to utilities were described in the Phase 1 Draft EIS, which found that impacts could be adequately mitigated, and no significant impacts are expected. PSE will coordinate with King County WTD where PSE's proposed alignment is near existing or planned facilities. All potentially affected utilities must be shown on permit application plans, and conflicts can be addressed through the permit process. Information provided to PSE from King County will be utilized to avoid conflicts with existing and planned facilities.
[coordination continued]	The Muckleshoot Tribe requested that final copies of mitigation plans be submitted for review (specifically, for the East Creek tributary culvert/stream realignment project). They commented that the draft plans as presented in the Critical Areas Report were incomplete, and requested additional information on tree survey results, culvert design, sediment data, and sediment	PSE has provided a plan that has been reviewed and revised in response to requests over the course of the land use process. The EIS is considered and informs the City's permit review process, and comments submitted on the EIS during the applicable comment periods are included in the Final EIS consistent with SEPA. The proposed mitigation plan was available for the Final EIS, but it has been refined to address the comments from the Tribe.

	transport analysis. They also asked that their previous comments on the EIS be carried forward to the permitting stage.	
Other Questions	One commenter asked how much electricity would be needed for Sound Transit's Link light rail project on the Eastside, and if it would require energy from the Richards Creek substation.	The Energize Eastside project will serve the entire Eastside. It is beyond the scope of this permit analysis to look at individual projects that would be served by the proposed transmission lines.
[other/misc. continued]	Why was the Bellevue Segment split into two permits (Bellevue North and Bellevue South) rather being permitted in totality? Would it be functional if only one segment were permitted without the other? Would there be undisclosed risks or impacts as a result of only one segment being permitted?	PSE has chosen to construct the Energize Eastside project in phases. The City of Bellevue, as one of the jurisdictions with permitting authority over this multi-jurisdictional Project, processes the permit applications that it receives from PSE consistent with the City's LUC and other applicable codes and standards. The south segment of the Project provides additional capacity that addresses the Project need and could function whether or not the north segment is built. The north segment would provide redundancy in the supply of 230 kV power to the substation. As discussed above in Section VI of this Staff Report, the environmental review in the Final EIS was not limited to a segment or portion of the Energize Eastside project. Instead, the Final EIS presented a comprehensive environmental assessment of the entire Project, including a full analysis of potential impacts and cumulative impacts associated with the construction and operation of PSE's proposed alignment.
[other/misc. continued]	Mailed public notices were not distributed widely enough. The City did not provide adequate time for the public to review the Final EIS.	The EIS was prepared according to the City's adopted SEPA rules, including both the amount of notification and the duration of comment periods.
Stormwater	The Project site is an industrial site with extensive use of galvanized materials containing zinc. The Project does not adequately address water quality issues,	PSE's proposal complies with all City requirements for treatment of runoff. Some poles could be zinc coated to reduce aesthetic impacts, although most will not be because PSE prefers Corten-type finish. In any case,

	including enhanced treatment for zinc, or meet other stormwater requirements.	the proposal is not expected to result in large amounts of zinc reaching surface waters. No adverse impacts to water quality are expected.
Wetlands	This Project requires a Section 404 permit and a Section 401 Water Quality Certification. Thresholds for Section 404 and 401 permitting require analysis of the entire Project impacts, not just a partial phase in one municipality. The Project also requires a Hydraulic Project Approval.	The City of Bellevue does not administer Section 404 permits or Section 401 Certification. The EIS does analyze the entire corridor and may be used by state and federal agencies in their review of these permits and approvals. The Project must also comply with the State Hydraulic Code, which is beyond the jurisdiction of the City. The City will require evidence of receiving state and federal required approvals prior to construction. See Conditions of Approval in Section X of this Staff Report.
[wetlands continued]	The Project must fully mitigate the loss of Wetland D at the Richards Creek substation site. The Project must include monitoring of the wetland area south west of the new stream channel.	Mitigation will be provided as required by LUC 20.25H.105. See Conditions of Approval in Section X of this Staff Report.
Culvert and Stream Channel - Richards Creek 230 kV Substation	The new culvert and stream channel would increase peak flows to downstream systems, and the proposed culvert has a sediment trap within the structure. Comments suggested the sediment trap would be illegal, and also that the plans inadequately address stream functions.	The culvert and stream channel design is proposed as mitigation.
Conceptual Photo Simulations	The plan sheets show taller poles than shown in the conceptual photo simulations.	The photo simulations indicate all heights as approximate. The proposed poles are within the range of heights described in Chapter 2 of the Final EIS. It is acknowledged that pole heights shown on the transmission line site plans are greater than the simulations that were provided initially with the permit package. Revised and updated photo simulations are included as Attachment H to this Staff Report.

Plan Sheet Comments	The plan sheets show only one existing pole location where existing pole structures are H-poles. Sheet 5/25 shows three new high tension lines over I-90, with three new poles and a new line headed east extending off the plan sheet. This new line is not part of the Project proposal.	The transmission line site plans show a center point for each support structure to be removed or installed, and a single line indicating the conductors they support. The plan reviewers understand that the existing structures are generally H-frame structures made up of two or three poles. With regard the lines crossing I-90, it is correct that there is an additional line from the Richards Creek substation. The two 230 kV circuits and one 115 kV circuit will be borne on pairs of monopoles in this portion, with the 115 kV line heading east on the south side of I-90.
Impacts on Endangered Species	There is no final mitigation plan for impacts to wetlands and streams. The plan provided is missing important information that affects the impacts of the Project.	A preliminary mitigation plan was included with the Critical Areas Report, which is typical for projects with wetland impacts. A final plan is required prior to construction and must address any conditions required through permit review. See Conditions of Approval in Section X of this Staff Report.
Impacts on Endangered Species	The proposed stream reconfiguration proposed under the Energize Eastside project will likely reduce water quality and affect endangered species.	Compliance with Bellevue's critical areas regulations and stormwater management regulations is required and will ensure that the stream reconfiguration does not degrade water quality and therefore will not adversely affect endangered species that use the stream. See Conditions of Approval in Section X of this Staff Report.
Alternative Siting Analysis	PSE states that the proposed Energize Eastside corridor was chosen after extensive study. How can this be when PSE has still not produced any evidence that it has considered EIS comments from at least 2016 onwards? Why has PSE chosen a residential corridor rather than an industrial corridor for Energize Eastside? What will PSE do to mitigate the negative impact to the City of Bellevue view corridors?	PSE's Alternative Siting Analysis describes the process it used to arrive at the proposed Project configuration. This includes consideration of potential view, corrosion, displacement, and vegetation clearing impacts. There are no designated view corridors that would be impacted in the project area. For further information, see Attachment B (Alternative Siting Analysis) to this Staff Report and Section IV.A of the Staff Report.

VIII. APPLICABLE DECISION CRITERIA - FINDINGS AND CONCLUSIONS

Compliance with the following decision criteria of individual Land Use Code sections is described below.

Critical Areas Report Decision Criteria- LUC 20.25H.255
Critical Areas Land Use Permit – LUC 20.30P.140
Electrical Utility Facilities – LUC 20.20.255.E
Conditional Use Permit – LUC 20.30B.140

A. Critical Areas Report Decision Criteria- General Criteria LUC 20.25H.255

The Director may approve, or approve with modifications, the proposed modification where the applicant demonstrates:

1. The modifications and performance standards included in the proposal lead to levels of protection of critical area functions and values at least as protective as application of the regulations and standards of this code;

Finding: As required per LUC 20.25H.105 and discussed in Section IV Part B [Consistency with Land Use Code and Zoning Requirements], the applicant has demonstrated through a Critical Areas Report that the proposed wetland enhancement as mitigation leads to levels of protection of critical area functions and values at least as protective as application of the regulations and standards of this code. The proposal has demonstrated a functional lift associated with the proposed enhancement work which will result in greater protection than the standard code application for wetland mitigation.

Enhancement actions will consist of removing/reducing the presence of nonnative plant species and installing a diverse native plant community. The wetlands will also be enhanced with a realigned stream channel, installation of large woody debris, removal of invasive vegetation, and installation of native vegetation. The stream realignment allows for the creation of more complex and higher quality riparian wetland and a buffer of substantial width along both sides of the stream, whereas the existing alignment is straight, borders a paved area, and is largely lined with reed canarygrass and bittersweet nightshade. As the Critical Areas Report notes wetland restoration and creation were considered for the property, but determined to be infeasible due to existing site conditions (most of the remaining vegetated area on-site is already wetland or stream) and the inability to appropriately buffer any new or restored wetland area. Existing wetland and wetland/stream buffers are degraded on the Richards Creek substation site and therefore provide ample opportunity for enhancement, the proposed mitigation strategy.
Refer to the Conditions of Approval regarding final mitigation and monitoring plans in Section X of this Staff Report.

2. Adequate resources to ensure completion of any required mitigation and monitoring efforts;

Finding: A mitigation plan for all areas of temporary and permanent new disturbance is required to be submitted for review and approval by the City of Bellevue prior to issuance of the Clearing and Grading Permit. The mitigation plan shall include methods for

vegetation maintenance and monitoring and shall also include a maintenance and monitoring component for a period of not less than five years after any replanting effort within a critical area or critical area buffer. A monitoring report shall be submitted annually, and dead plant material shall be replaced during this maintenance and monitoring period.

As part of the Clearing and Grading Permit the applicant shall submit a cost estimate for the proposed planting materials and installation costs. An installation assurance device shall be provided to the City of Bellevue in the amount of 150% of the total cost prior to clearing and grading issuance. After the mitigation plans have been installed the city shall retain a maintenance assurance device in the amount of 20% of the total cost estimate for a minimum of five years. The maintenance surety shall be kept by the city until the performance objectives have been met. **Refer to the Conditions of Approval regarding final mitigation and monitoring plans in Section X of this Staff Report.**

3. The modifications and performance standards included in the proposal are not detrimental to the functions and values of critical area and critical area buffers off-site; and

Finding: In addition to the proposed wetland enhancement, the proposal includes culvert replacement associated with a small, perennial stream beneath the access driveway to the Richards Creek substation site. This includes realigning and enhancing the stream sections extending upstream and downstream of the crossing and enhancing the new stream buffer including associated wetland areas. Both the wetland enhancement and stream habitat improvement will enhance functions of the critical areas and critical area buffers off-site.

4. The resulting development is compatible with other uses and development in the same land use district.

Finding: The project involves the replacement of an existing transmission line; therefore, no change in land use proposed. The proposed substation is located adjacent to an existing substation and other light industrial uses and non-residential development. PSE's proposal is anticipated by and included in Bellevue's Comprehensive Plan (see Attachment F [Map UT-7] to this Staff Report). The proposal is limited to the existing corridor, and the Project, as modified, is compatible with and responds to the uses and development that has been built up around the transmission line corridor for decades.

B. Critical Areas Land Use Permit Decision Criteria - LUC 20.30P.140

The Director may approve, or approve with modifications, an application for a CALUP if the proposal meets all of the following criteria:

1. The proposal obtains all other permits required by the Land Use Code.

Finding: PSE has applied for a CALUP and CUP. In addition, construction permits will be required, including but not limited to ROW permits, utility permits, and clearing and grading permits. PSE shall also submit approved State and Federal permits to the City

to demonstrate compliance with all regulatory requirements. Before any direct wetland impacts occur, PSE shall obtain the necessary state and federal authorizations. PSE shall provide the City of Bellevue copies of all required permits from the WDFW and the U.S. Army Corps of Engineers, including any requirements from the U.S. Fish and Wildlife Service and National Marine Fisheries Service prior to the City of Bellevue's pre-construction meeting. **Refer to the Conditions of Approval regarding final mitigation and monitoring plans in Section X of this Staff Report.**

2. **The proposal utilizes to the maximum extent possible the best available construction, design, and development techniques which result in the least impact on the critical area and critical area buffer.**

Finding: The Project will utilize existing access points to minimize impacts on critical areas and critical area buffers. BMPs include plant replacement, scattering trimmed or removed tree debris, and chipping wood to reduce potential impacts to work areas. Removal of vegetation by hand and/or using limited access machinery will reduce potential impacts. PSE has designed the transmission line to locate poles in the general vicinity of existing impacts, limiting the number of new poles and minimizing vegetation removal with pole heights. Most poles will be direct imbed rather than constructed with foundations. Direct imbed pole technique minimizes ground disturbance and impacts to vegetation. Methods suggested for construction access and staging plans also demonstrate use of best available techniques for reducing impacts on critical area.

The final structure design for poles and other electrical equipment at proposed substation would comply with NESC 2017 as adopted by the UTC. To ensure the least impact on critical area and critical area buffer, the project geotechnical engineer shall certify that PSE has conducted geotechnical hazard evaluations for all proposed elements of the substation foundations, walls, and transmission poles, and that all geotechnical recommendations have been incorporated into project design. PSE is required to provide this required certification and supporting documentation to the City of Bellevue.

Furthermore, the geotechnical report provided to the City shall address all code requirements and provide a discussion of how the design meets or exceeds following:

- 2012 International Building Code (IBC), or as amended, parameters for short period spectral response acceleration (SS), 1-second period spectral response acceleration (S1), and Seismic Coefficients FA and FV presented in Table 2 of the geotechnical report
- Consistent with the project geotechnical engineer's recommendation, use soil input parameters for lateral load design that consider the effects of liquefaction through the application of p-multipliers for LPile parameters (LPile is a computer program used to analyze deep foundations under lateral loading).
- North of the proposed Richards Creek substation, reevaluate the lateral spreading risk to the proposed poles in this area once their final locations have been selected, to determine appropriate foundation dimensions.

- Where area subject to liquefaction are present, extend foundations below the loose to medium density liquefiable deposits into underlying dense, non-liquefiable soils.
- Reevaluate the axial capacity of the pole foundations and potential downdrag loads for poles in areas subject to liquefaction once final locations are selected, and consider these in the structural design.

For the life of the project, PSE shall develop a monitoring and maintenance program that includes inspection and reporting on the ability of the transmission line poles to resist seismic disturbances. As part of PSE's regular inspection of the poles, it shall monitor all poles for changes in conditions that could reduce the ability of the structures to resist seismic disturbances and then submit annual reporting to the City of Bellevue. If changes are identified during inspection and monitoring of conditions, PSE shall implement additional measures to reduce or minimize those impacts. **Refer to the Conditions of Approval regarding construction standards and Maintenance and Monitoring Plan requirements in Section X of this Staff Report.**

3. The proposal incorporates the performance standards of LUC 20.25H to the maximum extent applicable.

Finding: As discussed in Section IV of this Staff Report, PSE's proposal for a new or expanded utility facility is an allowed activity per LUC 20.25H.055 that meets the performance standards and additional provisions for the following:

Critical Areas – Streams	LUC 20.25H.080.A & 20.25H.080.B
Critical Areas – Wetlands	LUC 20.25H.100 & 20.25H.105
Critical Areas –Geologic Hazards	LUC 20.25H.125

4. The proposal will be served by adequate public facilities including street, fire protection, and utilities.

Finding: The proposed transmission lines will not impact any existing public facility service level. The Phase 1 Draft EIS and Final EIS concluded that the Energize Eastside project would not significantly increase the demand for public services, or significantly hinder the delivery of services. **Refer to Technical Reviews conducted by the Fire, Utilities, and Transportation in Section V of this Staff Report.**

5. The proposal includes a mitigation or restoration plan consistent with the requirements of LUC 20.25H.210.

Finding: PSE has submitted a Mitigation Plan and a Critical Areas Report with its permit applications. Both are consistent with LUC 20.25H.210, and the information contained therein shall be reflected in the final Plans submitted under the clearing and grading permits. **Refer to the Conditions of Approval regarding the final Mitigation Plans requirements contained in Section X of this Staff Report.**

Mitigation plans shall also include a maintenance and monitoring component for a period of not less than 5 years after any replanting effort. A monitoring report shall be submitted annually, and dead plant material shall be replaced during this maintenance

and monitoring period. **Refer to the Conditions of Approval regarding performance standards and Maintenance and Monitoring Plan requirements in Section X of this Staff Report.**

6. The proposal complies with other applicable requirements of this code.

Finding: As discussed in Section IV of this Staff Report, PSE's proposal complies with all other applicable requirements of the Land Use Code.

C. Electrical Utility Facilities Decision Criteria – LUC 20.20.255.E

A. The proposal is consistent with PSE's System Plan.

Finding: PSE's proposal was first included in PSE's System Plan in 1993 and has remained part of PSE's System Plan since that time (see UT Element 2015). The System Plan states, *"[t]he 230 kV sources for the 115 kV system in northeast King County are primarily the Sammamish and Talbot Hill substations. The loads on the 230 - 115 kV transformers in these stations will be high enough to require new sources of transformation*." Additionally, the "*Lakeside 230 kV Substation project [now referred to as Energize Eastside] will rebuild two existing 115 kV lines to 230 kV between Sammamish and Lakeside [where PSE proposes the construction of the Richards Creek substation], and between Lakeside and Talbot Hill*." Therefore, the specific South Bellevue Segment proposal, which is part of the multi-jurisdictional Energize Eastside project, is anticipated by and consistent with the System Plan.

Further, the purpose of PSE's proposal is to address a transmission deficiency that PSE has identified, based on federal transmission planning requirements and planning studies that have identified operational deficiencies and to increase reliability. If left unaddressed, the deficiency identified by PSE could affect the transmission system's ability to supply reliable power to the Eastside. As part of the System Plan, the Energize Eastside project is needed to ensure that PSE can provide for peak electrical demand in the Eastside portion of PSE's service area, including Bellevue, surrounding cities, and a portion of King County, without endangering PSE equipment or adversely affecting portions of the electrical grid operated by others.

PSE also conducts planning required for compliance with state and federal regulations, and PSE has continued to examine the timing and need for the Project as anticipated by its System Plan. In further planning, the 2014 and 2015 Quanta Supplemental Eastside Needs Assessment Report prepared for PSE found that the Project would likely be needed as early as the winter of 2017–2018 or summer of 2018. More recently, in June 2018, PSE informed several Eastside cities that its peak customer demand projections, which were the basis for determining the need for the Energize Eastside project, had been exceeded in the summer of 2017 (PSE 6-8-18). Additional information regarding PSE's determination of operational need is discussed below in Section IX.B.3 in connection with Electrical Utility Facilities Decision Criteria LUC 20.20.255.E.3.

Finally, PSE's proposal, as identified in its System Plan, is anticipated by and included in Bellevue's Comprehensive Plan. PSE last aligned its System Plan

with the current Comprehensive Plan during the 2015 Comprehensive Plan Update ("10-Year Update"), and consistent with the Growth Management Act (GMA), the Energize Eastside project is part of the UT Element of the Comprehensive Plan's identification of new and expanded electrical facilities and the general locations of conceptual alignments of PSE's planned energy facilities (see Attachment F to this Staff Report [Map UT-7]). Thus, the City's Comprehensive Plan confirms and documents that the proposal is consist with PSE's System Plan.

II. The design, use, and operation of the electrical utility facility complies with applicable guidelines, rules, regulations, or statutes adopted by state law, or any agency or jurisdiction with authority.

Finding: All PSE facilities that are part of the Bulk Electric System (BES)[28] and the interconnected western system are planned and designed in accordance with the latest approved version of the North American Electrical Reliability Corporation (NERC) Reliability Standards, and the Western Electricity Coordinating Council (WECC) standards and reliability criteria. These standards set forth the performance expectations that affect how the transmission system is planned, operated, and maintained. NERC has been certified as the Electrical Reliability Organization by the Federal Energy Regulatory Commission pursuant to the Federal Power Act.

The NERC standards mandate that certain forecasts and studies be completed to determine if the system has sufficient capability to meet expected loads now and in the future. When completing transmission planning studies, contingencies are simulated to determine if the electric system meets the mandatory NERC performance requirements[29] for a given set of forecasted demand levels, generation configurations and levels, and multiple system component outages. PSE has complied with these planning requirements, which has led to PSE's determination of the need for the Energize Eastside project.

With respect to state law requirements, PSE designs, constructs, and operates its facilities consistent with the National Electric Safety Code (NESC) as required by Washington State law.

In addition to compliance with state and federal laws, PSE will comply with the City of Bellevue regulations identified and described in this Staff Report. Specifically, PSE's proposal is required to comply with the code requirements of LUC 20.20.255, which regulates proposals for new or expanding electrical utility facilities; the proposal's compliance with LUC 20.20.255 is discussed throughout this Staff Report. **Refer to Sections IV.A and VIII.C of this Staff Report for a**

[28] Defined as facilities 100 kV and above.

[29] The transmission planning standards that were in effect in 2012-2013 were: TPL-001-3, TPL-002-0b 2nd Rev (TPL-002-2b), TPL-003-0b 2nd Rev (TPL-003-2b), and TPL-004-2. TPL-001-3, TPL-002-2b, TPL-003-2b, and TPL-004-2 are being retired as they are replaced in their entirety by TPL-001-4. Enforcement of the new standards began January 1, 2015.

discussion of how PSE's proposal has met the applicable City of Bellevue Electrical Utilities Facilities LUC requirements.

III. The applicant shall demonstrate that an operational need exists that requires the location or expansion at the proposed site.

Finding: The stated purpose of the Energize Eastside project is to meet local demand growth and protect reliability in the Eastside of King County, roughly defined as extending from Redmond in the north to Renton in the south, between Lake Washington and Lake Sammamish, and including the City of Bellevue. The Project was identified in the City's Comprehensive Plan UT Element policies for non-City-managed utilities and is shown on Map UT-7 – New or Expanded Electrical Facilities (see Attachment F to this Staff Report). That figure shows a potential need to expand both the transmission line and the Lakeside substation, which are the subject matter of PSE's proposal in the CUP and CALUP applications.

Comprehensive Plan Policy UT-47 directs the City to defer to the serving utility, in this case PSE, regarding the implementation sequence of components of the utility's plan. PSE originally identified an operational need based on the capacity deficiency on the Eastside in 1993. Between 2012 and 2015, PSE and the City of Bellevue commissioned three separate studies confirming the need to address Eastside transmission capacity:

- Exponent 2012 (City of Bellevue);
- Quanta Eastside Needs Assessment Report (PSE); and
- Quanta Supplemental Eastside Needs Assessment Report (PSE).

The 2014 and 2015 Quanta Supplemental Eastside Needs Assessment Report found that the Project would likely be needed as early as the winter of 2017–2018 or summer of 2018. Specifically, PSE's planning studies showed that systemwide peak winter power demand levels above 5,162 MW, or systemwide peak summer power demand above 3,625 MW, under certain contingencies, would result in overloads on Eastside equipment, which could result in the use of CAPs and attendant load shedding (Tables 3-1 and 3-2 in Quanta Supplemental Eastside Needs Assessment Report). The planning studies identified a violation of mandatory performance requirements where the forecasted peak load level was 3,625 MW, and the 2015 Quanta Supplemental Needs Assessment Report forecasted that violations of planning standards due to peak load would occur in 2018.

In addition to the planning studies commissioned by PSE, the need for the Energize Eastside project identified by PSE was independently verified in the USE 2015 report prepared for the City of Bellevue by Utility System Efficiencies, Inc. The USE 2015 report stated the following:

> *Several hypothetical scenarios were studied as part of the Optional Technical Analysis (OTA). Each one showed overloads in the 2017/18 timeframe, indicating project need in order for PSE to meet federal regulatory requirements for system reliability. The OTA results showed that reducing the Eastside area growth from 2.4% to 1.5% per year in*

> *the period from winter 2013/14 to winter 2017/18 still resulted in project need. Reducing PSE's King County growth while keeping the Eastside growth the same similarly resulted in a project need. Turning on additional generation in the Puget Sound area also resulted in a project need.*

Furthermore, as part of the EIS analysis prepared for the Project, in 2015, Stantec Consulting Services Inc., an electrical system planning and engineering consultant, also reviewed PSE's analysis and determined that the approach to the needs assessment followed standard industry practice (see Stantec 2015). Therefore, the studies performed by PSE in 2013 and 2015, along with the USE 2015 study prepared for the City, confirmed that operational needs exist to improve reliability for Eastside communities and to supply the needed electrical capacity for anticipated growth and development on the Eastside.

In June 2018, PSE sent letters to several cities on the Eastside stating that their peak customer demand projections, which were the basis for determining the need for the Energize Eastside project, had been exceeded in the summer of 2017 (see PSE 6-8-18). PSE indicated that the systemwide peak customer load in the summer of 2017 reached the levels earlier predicted for summer of 2018, exceeding 3,625 MW. This occurred in early August of 2017, following a brief period of unusually high daytime and nighttime temperatures (PSE 9-21-18; PSE 10-26-18).

PSE did not perform any analysis on the electrical loads for the August 2017 dates, but PSE indicated that increased air conditioning was a likely contributor. (PSE 10-26-18). PSE also noted that Northwest Energy Efficiency Alliance's Residential Building Stock Assessment found that in Washington state, the percentage of single-family homes that had mechanical cooling equipment has increased from approximately 34% to 52% in less than a decade. This information on actual demand supports PSE's planning level modeling, which found that both summer and winter peak customer load were driving the need for additional transmission capacity. It also demonstrates the consistency of PSE's proposal with its System Plan, which has long anticipated this growth in demand.

The geographic location of the Energize Eastside project is directly related to the operational need, local demand growth, and reliability considerations that PSE has identified and that the Project is designed to address. Specifically, the Project is located between Redmond and Renton, the two points where the system can connect to 230 kV bulk power on the Eastside. While PSE explored other options for siting the Project, the operational need identified by PSE is to expand the capacity for transforming 230 kV power to 115 kV through multiple jurisdictions on the Eastside.

Based on its siting analysis, and consistent with the findings of the Phase 1 Draft EIS, PSE found that locating the Project within an existing right-of-way has fewer impacts than creating a new right-of-way corridor, as well as being the location that provides the least costly way to develop the Project. The Project is therefore proposed in the existing 115 kV corridor connecting the Talbot Hill substation to the Lakeside substation.

PSE has also chosen to construct the Energize Eastside project in phases and has applied for local permit approvals in the South Bellevue Segment of the Project, which includes upgrading 3.3 miles (the Bellevue portion) of existing 115 kV lines with 230 kV lines between the Lakeside substation and the southern city limits of Bellevue. PSE's analysis supported and demonstrated that operationally the Project must include 230 kV transmission lines connecting the Talbot Hill substation in the south to a new transformer in central Bellevue. The full buildout of the Energize Eastside project will include a similar connection from the Sammamish substation in the north to provide redundancy, but the south portion of the Project that is the subject of PSE's current proposal can function independently.

Finally, PSE's normal practice would be to have a 230 kV station co-located with the adjoining 115 kV station; however, due to topographic and environmental considerations at the Lakeside substation, expanding the station would be challenging. Therefore, PSE determined that placing the two stations on separate parcels was the most effective approach. Because the two yards have separate access points, they are required to have different names for operational and emergency purposes. The operational need demonstrated by PSE supports both the location of the proposed Richards Creek substation and the Project's location, including the South Bellevue Segment, within the existing right-of-way.

IV. The applicant shall demonstrate that the proposed electrical utility facility improves reliability to the customers served and reliability of the system as a whole, as certified by the applicant's licensed engineer.

Finding: As noted above in Sections VIII.C.1 and VIII.C.3, the purpose of PSE's proposal is to address a transmission deficiency identified by PSE. If left unaddressed, this deficiency could adversely affect the reliability of the transmission system serving all of Bellevue and other Eastside communities.

As discussed throughout this Staff Report, several studies were commissioned by PSE and the City of Bellevue to examine the need for the Project, including how system reliability would be affected if the Project was not built. These studies were reviewed and confirmed by Washington State licensed engineer Jens Nedrud, PSE's Manager of System Planning.[30]

V. LUC 20.20.255.5.a. For the proposals located on sensitive sites as referenced in [Map UT-7] of the Utility Element of the Comprehensive Plan, the applicant shall demonstrate compliance with the alternative siting analysis requirements of subsection D of this section.

5.a Finding: The Energize Eastside project is proposed on a route that is shown as a sensitive site on Map UT-7 of the UT Element of the Comprehensive Plan

[30] July 20, 2017 letter from PSE to Heidi Bedwell, Environmental Planning Manager, regarding Reliability Certification for the Energize Eastside 230-kV Project (PSE 7-20-17). The PSE 7-20-17 letter is included in the DSD official files for Permit Nos. 17-120556-LB and 17-120557-LO.

(see Attachment F to this Staff Report). PSE provided a summary of its Alternative Siting Analysis, dated September 2017, which is attached hereto as Attachment B.

As explained in detail in Section IV.A.1 of this Staff Report, the Alternative Siting Analysis provided by PSE meets the requirements of LUC 20.20.255.D.

LUC 20.20.255.5.b. Where feasible, the preferred site alternative identified in subsection D.2.d of this section is located within the land use district requiring additional service and residential land use districts are avoided when the proposed new or expanded electrical utility facility serves a nonresidential land use district.

5.b Finding: The Energize Eastside project provides additional transmission capacity needed to accommodate exiting electrical demand and expected growth throughout the Eastside. Most of the population and employment growth in Bellevue to be served by the Project is expected to occur in non-residential zones and mixed-use zones. However, because transmission capacity must connect to the regional grid, it is not possible to construct the facility in a discrete zone or zones; the lines must cross several zones to reach the center of the Eastside, and the majority of the area it must cross is residentially zoned.

The portion of Bellevue that would be vulnerable to reduced electrical reliability if the Project is not built includes the area where the transmission lines and substation are proposed. PSE's South Bellevue Segment proposal, along with the multi-jurisdictional Energize Eastside project, will avoid new impacts to residential areas through its location in the existing utility transmission corridor. This location is anticipated by Map UT-7 and adheres to Comprehensive Plan Policy UT-98, which discourages the introduction of new aerial electric facilities in areas where none exist. Thus, the preferred Project site is located within districts that currently accommodate the corridor and require the service that the Project will provide.

The proposed transmission lines run through several residential and non-residential districts of Bellevue that will benefit directly from the Energize Eastside project. Improvements to reliability as a result of the Project will also benefit the entire City and other communities surrounding Bellevue, including both non-residential districts and residential districts.

Consistent with City policies on utility corridors, PSE's proposal makes use of an existing shared utility transmission corridor. By using an existing transmission line corridor that passes through residential areas, it is not feasible to avoid residential areas. In the Alternative Siting Analysis, routes passing through non-residential areas were considered as alternatives to building a portion of the new transmission line in the existing corridor where it passes through residential districts. This was examined specifically in the areas south of Lakeside substation. However, a study found that by having the line divert from the existing corridor, the Project could increase the potential for corrosion of the existing Olympic petroleum pipeline system that shares the corridor with the transmission

lines. Due to this safety consideration, PSE determined that keeping the transmission lines in the existing residential district route was preferable.

The new Richards Creek substation will be built in a non-residential district.

Consideration was given to avoiding residential districts consistent with Policy UT-67, which encourages consolidation of facilities in easements, even though the Project serves both residential and non-residential districts. Due to pipeline safety considerations, diverting the line off of the existing corridor in residential areas was determined to be less feasible that utilizing the existing corridor.

VI. The proposal shall provide mitigation sufficient to eliminate or minimize long-term impacts to properties located near an electrical utility facility.

Finding: As conditioned through the CUP and SEPA process, the mitigation proposed will minimize the long-term impacts to nearby properties. These include impacts related to visual impacts, tree and vegetation removal along PSE's proposed alignment, pipeline safety, historic and cultural resource protection, and other issues. **Refer to the discussions of mitigation measures, conditions and requirements contained in Sections III, IV, V, VI, VIII and X of this Staff Report.**

D. Conditional Use Decision Criteria – LUC 20.30B.140

1. The conditional use is consistent with the Comprehensive Plan.

Under the GMA, the City considers the location of existing and proposed utilities and potential utility corridors in land use planning, and PSE's proposal has been included in the Comprehensive Plan for many years (see Attachment F [Map UT-7]). The City must plan for the adequate provision of utilities consistent with the goals and objectives of its Comprehensive Plan, taking into consideration the public service obligation of the utility involved. (UT Element, p. 125.) As part of the City's land use planning for existing and proposed utilities, the Comprehensive Plan shows the general locations and conceptual alignments of the proposal in order to guide the conditional use review of transmission lines, routes, and substations (see Attachment F [Map UT-7]). Various policies in the Comprehensive Plan also recognize the planning and implementation of multi-jurisdictional utility facility additions and improvements such as the Energize Eastside project. (UT-18, UT-48, UT-72.)

The UT Element in the Comprehensive Plan is directly applicable to PSE's proposal. UT policies work in concert with the Land Use Element to ensure that the City will have adequate utilities to serve both existing development and future growth. (UT Element, p. 122.) While the Comprehensive Plan states that it is critically important to meet growing demand for utility services and provide reliability of the City's utilities systems, the Utilities Policies also recognize that it important to ensure that new and expanding utility facilities are sensitive to neighborhood character. (*Id.*, p. 139.)

Volume I of the Comprehensive Plan contains the General Policies, including the Utilities, Land Use, Urban Design, Economic Development, and Environment Policies, and was last updated in 2015. Volume II contains the Subarea Plans, including the Richards Valley, Factoria and Newport Hills Subarea Policies. Attachment G to this Staff Report provides a review of the proposal's consistency with the Comprehensive Plan policies and Subarea policies, and the analysis below explains why the proposal is consistent with the Comprehensive Plan.

Utilities (UT) Policies

Finding: Several UT policies call for planning and coordination to ensure reliable, sustainable, and quality service for the whole community. PSE has coordinated its system planning with the City and other agencies and is now proposing a project consistent with this system planning work and these policies. As discussed throughout this Staff Report, the location and conceptual alignment of the proposal in PSE's existing corridor is identified and included in the UT Element at Map UT-7 (see Attachment F to this Staff Report).

A recurring policy consideration in the UT Element is the necessity of reliable service that meets the needs of existing and future development. (see UT-1 (Manage utility systems effectively in order to provide reliable, sustainable, quality service), UT-45 (Coordinate with non-city utility providers to ensure planning for system growth consistent with the City's Comprehensive Plan and growth forecasts), UT-74 (Encourage system practices intended to minimize the number and duration of interruptions to customer service). Comprehensive Plan Policy UT-99 and the attendant discussion that accompanies this Policy explain this consideration in detail:

UT-99: Work with and encourage Puget Sound Energy to plan, site, build and maintain an electrical system that meets the needs of existing and future development, and provides highly reliable service for Bellevue customers.

Discussion: Providing highly reliable service is a critical expectation for the service provider, given the importance of reliable and uninterrupted electrical service for public safety and health, as well as convenience. Highly reliable service means there are few and infrequent outages, and when an unavoidable outage occurs it is of short duration and customers are frequently updated as to when power is likely to be restored. A highly reliable system will be designed, operated and maintained to keep pace with the expectations and needs of residents and businesses as well as evolving technologies and operating standards as they advance over time.

Consistent with UT-1, UT-45, UT-74, and UT-99, the stated purpose of the Energize Eastside project is to meet local demand growth and protect reliability in the Eastside of King County. PSE has described the need for the Project and its importance in helping to manage the utility system effectively. This stated need and purpose is consistent with and anticipated by UT Policies that require planning and coordination between the City and PSE to ensure reliable, sustainable, and quality service for the whole community. In addition,

Comprehensive Plan Policy UT-47 directs the City to defer to the serving utility regarding the implementation sequence of components of the utility's plan.

The UT Policies also balance the need for reliable and sustainable service with the environmental and land use considerations in the Comprehensive Plan. The UT Policies encourage environmentally sensitive construction standards (UT-3); consideration of the land use plan of the area (UT-7), surrounding neighborhoods (UT-8, UT-77, UT-95), greenbelt and open spaces (UT-69), and sensitive sites in close proximity to residentially-zoned districts (UT-96); and implementation of Low Impact Development principles and vegetation management (UT-13, UT-57, UT-66). The UT Policies encourage utility, consumer, and community education, outreach and input (UT-11, UT-75); a reasonable balance between potential impacts and the costs of mitigating those impacts (UT-94); and the integration of electrical and telecommunications infrastructure in order to avoid unnecessary degradation (UT-60, UT-65, UT-64). UT-97 summarizes the balancing required by the UT Element with the following language, "[a]void, minimize, and mitigate the impacts of new or expanded electrical facilities through the use of land use regulation and performance standards that address siting considerations, architectural design, site screening, landscaping, maintenance, available technologies, aesthetics, and other appropriate measures."

The Comprehensive Plan recognizes the tension between the utility's obligation to meet growing demand and provide reliability, and the policies that are designed to ensure that new and expanding utility facilities are sensitive to neighborhood character. Map UT-7 identifies planned electrical facilities that have the potential to create significant incompatibilities with Bellevue neighborhoods. Sensitivity factors such as proximity to residential neighborhoods, visual access, and expansion within or beyond an existing facility border were considered in identifying potential incompatibilities. The general locations and conceptual alignments of the proposal provided in Map UT-7 are intended to increase transparency of the siting process for PSE and the public, while also ensuring the utility's ability to meet system needs.

With the Conditions of Approval specified in Section X of this Staff Report, the proposal is consistent with the UT Policies. For example, PSE proposes to site the alignment in an existing corridor that is shared with another utility (the Olympic Pipeline system) and will consolidate the lines onto fewer poles. PSE will also be required to adjust pole types and color to limit visual impacts, develop vegetation management that maintains flexibility for property owners, and limit the number of telecommunications facilities that can be located on the transmission line to remain the existing number.

The Conditions of Approval also assure that the proposal will be compatible with the land use pattern established in the Comprehensive Plan and will minimize the impacts of the proposal on neighborhoods that surround, or are adjacent to, the existing corridor. The land use pattern established in the Comprehensive Plan along the existing corridor is a geographic area within the City where the electrical utility facilities have become a fixture of the landscape. The proposal will not be located in any new parks and open spaces and will be limited to the existing corridor. Where feasible, the proposal is designed to avoid and minimize

impacts to the character of existing neighborhoods by retaining and replacing trees within neighborhoods and parks, by limiting tree removal to the amount necessary to ensure safe operation of the proposed lines, and by avoiding or minimizing impacts to visual character. PSE will also be required to provide landscape screening and fencing of the Richards Creek substation as required by LUC 20.20.255.F (see Section IV.A of this Staff Report), and to contact the City regarding any proposed maintenance or removal of vegetation in City right-of-way.

Undergrounding the transmission line was suggested as a mitigation measure, but it was removed from consideration because of cost and feasibility considerations. For further discussion of the cost and feasibility issues considered with respect to undergrounding, see Section VI.C of this Staff Report and the discussion regarding undergrounding contained in Attachment B to this Staff Report (Alternative Siting Analysis).

Despite the Comprehensive Plan's anticipation of the proposal and the proposal's location in the existing corridor, one portion of the corridor, approximately 0.8 mile in length within the Somerset neighborhood (see the Final EIS, Figure 4.2-12), will be impacted by increased pole heights, as described in the Final EIS. The City's applicable Comprehensive Plan policies do not protect private views (see UT-8 and UT-95). However, this limited area in the Somerset neighborhood has lower building and vegetation heights due to private neighborhood covenants that restrict building and vegetation height to protect views. Therefore, the increased pole height will increase the contrast within this unique neighborhood between the utilities and the low buildings and low vegetation that result from the private covenants protecting views.

As explained in detail below in connection with conditional use decision criteria LUC 20.30B.140.B, PSE modified its pole design to reduce the necessary height in the Somerset neighborhood to respond to the existing physical characteristics of this neighborhood. Consistent with the Comprehensive Plan and Policy UT-8, these modifications to pole height and color are designed to minimize and mitigate the visual impacts in the Somerset neighborhood. Although the visual impacts in this area of the City are considered significant, these impacts do not create an inconsistency with the Comprehensive Plan when the entire residential community surrounding the transmission line in Somerset has been built next to the existing corridor. In addition, the proposal is consistent with the land use pattern in this limited area and, as modified, responds to the existing or intended character of the community.

Several UT policies call for ensuring the protection of health and safety as infrastructure projects are developed (UT-3, UT-92, UT-93, UT-94). These policies complement the Land Use policies that call for accommodating commercial uses that serve community needs, while also maintaining the health and vitality of residential areas (LU-1). Consistent with these policies, and with the Conditions of Approval specified for pipeline safety in Section X, the Project will not adversely affect public safety or the health or vitality of residential areas within the City.

Finally, while a portion of the proposal will cause visual impacts within the Somerset area, the Energize Eastside project helps ensure reliable electrical service for the City. PSE has located the proposal within the existing corridor long recognized in the Comprehensive Plan as the location for the Project; and PSE has sited and designed the proposal to minimize impacts to the extent feasible, within the constraints posed by meeting those other policy objectives identified by the City. In light of the balancing required by the UT Element and with the Conditions of Approval imposed under the City's regulations and SEPA review, the Project is consistent with the UT policies in the Comprehensive Plan.

Land Use (LU), Parks (PA), Urban Design (UD), and Neighborhoods (N) Comprehensive Plan Policies

Finding: In addition to the UT Element, policies from the Land Use, Parks, Neighborhoods, and Urban Design Elements of the Comprehensive Plan apply to PSE's proposal. The specific Land Use Policies that work in concert with the UT Element also balance reliable utility service with the protection of neighborhood character and preservation of parks, open space, and tree canopy throughout the City. See LU-2 (Retain the City's park-like character through the preservation and enhancement of parks, open space, and tree canopy throughout the City), LU-14 (Protect residential areas from the impacts of non-residential uses of a scale not appropriate to the neighborhood). The LU Element also calls for accommodating commercial uses that serve community needs, while also maintaining the health and vitality of residential areas (LU-1).

Similarly, several Park and Urban Design Policies focus on protecting the City's park-like character through preservation of tree canopy, mature trees, and natural systems while also recognizing the City's urban, suburban, and Pacific Northwest character (PA-30, PA-31, UD-2, UD-6, UD-54, UD-57.). Additional UD Policies and Neighborhood Policies promote water conservation and neighborhood safety, character, and diversity. (UD-56, N-1, N-9.)

The proposal, as conditioned, will be compatible with the land use pattern established in the Comprehensive Plan; the proposal will minimize impacts of the proposal on neighborhoods that surround, or are adjacent to, the existing corridor; and the proposal will not be located in any new parks and open spaces because it will be limited to the existing corridor. There would be no long-term impacts to land use and housing from the proposal, and the visual impacts in the Somerset area identified by the FEIS, while potentially unwelcome changes to views of the neighborhood and more distant scenic resources, are not anticipated to cause the health and vitality of this residential area to deteriorate.

Private and park properties within PSE's utility corridor are subject to restrictions determined by PSE to be necessary for safe operation of the transmission lines. To the extent tree removal will be required to ensure safe operation of the proposal and adequate distance from the lines, PSE will minimize tree removal to the maximum extent possible and replace trees within neighborhoods and parks. Therefore, the required tree removal associated with the proposal is not considered inconsistent with applicable LU, PA and UD Policies that recognize the City's park-like and Pacific Northwest character.

Similarly, operation of the Richards Creek substation will be compatible with the existing and nearby industrial land uses and neighborhood character. The proposed substation site is owned by PSE and has been used for storage of equipment and vehicles. Construction and operation of a new substation will not represent a substantive change to the existing conditions at the site and is consistent with the light industrial (LI) land use designation for the site.

Richards Valley (S-RV), Factoria (S-FA) and Newport Hills (S-NH) Subarea Plan Policies

Finding: The proposal is consistent with the Richards Valley (S-RV), Factoria (S-FA), and Newport Hills (S-NH) Subarea Plan Policies. The Richards Creek substation will be located in Richards Valley on an 8.46-acre property zoned LI that is adjacent to PSE's existing Lakeside substation and is currently used as a PSE pole storage yard. Richards Valley Subarea Plan Policy S-RV-20 encourages the use of common corridors for new utilities if needed, and Policy S-RV-33 encourages development for LI uses with sensitivity to the natural constraints of the sites.

An expanded substation in the South Bellevue Segment is a necessary component of the proposal, yet topographic and environmental constraints prevent the southern expansion of the existing Lakeside substation. Although PSE does propose some construction at the Lakeside substation, all upgrades to the Lakeside substation will occur within the existing footprint of this substation. The new Richards Creek substation will be located on a parcel adjacent to the Lakeside substation consistent with S-RV-20 and S-RV-33. Additional discussion of the location and development of the Richards Creek substation is in Sections II.C and III of this Staff Report.

Subarea Plan Policies S-RV-1, S-RV-6, S-RV-7, S-FA-8, S-FA-9, S-NH-8, S-NH-28, and S-NH-30 call for the protection of the natural environment, water resources, and critical areas in Richards Valley, Factoria and Newport Hills. Wetlands are generally concentrated on or near the Richards Creek substation site or the Coal Creek Natural Area, with 6 wetlands along the transmission line corridor. South of the proposed Richards Creek substation the existing corridor is characterized by the I-90 business corridor with commercial offices, high-tech industries, and commercial shopping centers. The Newport Hills Subarea is made up of single-family and multi-family neighborhoods with a core commercial district in the center of the community.

With the Conditions of Approval specified for vegetation and habitat protection, and consistent with the critical areas analysis found in Section IV.B, the proposal is consistent with Subarea Plan Policies S-RV-1, S-RV-6, S-RV-7, S-FA-8, S-FA-9, S-NH-8, S-NH-28, and S-NH-30.

Subarea Plan Policy S-FA-24 encourages the undergrounding of utility distribution lines in areas of new development and redevelopment, but does not discuss transmission lines. The use of the existing corridor, which is specifically identified in Map UT-7 (see Attachment F to this Staff Report), does not impose a

new transmission line on new areas and does not require the acquisition of new easements. Impacts generally associated with the undergrounding of the transmission lines are addressed in the Phase 1 Draft EIS. Although undergrounding the line was suggested as a mitigation measure in the Final EIS, it is no longer being considered for this segment due to cost and feasibility concerns similar to those discussed in Section VI.C. The removal of undergrounding of the transmission line from consideration due to infeasibility does not create a conflict with S-FA-24, particularly given that PSE's proposal is for utility transmission lines, not distribution lines.

2. **The design is compatible with and responds to the existing or intended character, appearance, quality of development, and physical characteristics of the subject property and immediate vicinity.**

   Finding: PSE's proposal is designed to respond to the existing and intended character appearance, quality of development, and physical characteristics of the subject property and the immediate vicinity. Because the Project is sited in an existing corridor shared with another utility (the Olympic Pipeline system), the Project will not introduce a change in land use. It will consolidate the lines onto fewer poles, which, although larger, will not increase visual clutter and could reduce it in some areas. Various pole treatments will be employed to complement the natural environment, and vegetation management will maintain the general appearance of landscaping in a similar manner as the present. Although a number of trees will be removed, the remaining and proposed trees will partially screen views of the taller poles. Likewise, the proposed substation will be screened by a slope and native vegetation. Reinstallation of telecommunications facilities on the same transmission facilities following construction will ensure that there will not be an increase in the number of telecommunications facilities to the maximum extent feasible.

   The City's Comprehensive Plan states that electrical utility facilities should be designed, constructed, and maintained to minimize the impact on surrounding neighborhoods (UT-8). The Somerset neighborhood developed around the transmission line corridor, so the increase in height of the current transmission line is not a new use. In the portion of the existing corridor within the Somerset neighborhood where the Project will significantly impact neighborhood character (see Figure 4.2-12 in the Final EIS), the pole design was modified to reduce the necessary height, using dual monopoles instead of single monopoles preferred in other locations within the corridor. These modifications to pole design respond to the existing physical characteristics of the Somerset neighborhood, which has lower building and vegetation heights than other areas of the corridor. The visual impacts in this area, while considered significant, will not cause blight, as defined in the Revised Code of Washington (RCW) 35.81.015, or cause substantial dilapidation or deterioration in this portion of the Somerset neighborhood.

   Further modifications to necessary pole heights within the Somerset neighborhood would increase the number of poles in the neighborhood and result in additional impacts to the character and appearance of the immediate vicinity. For example, the City requested that PSE provide additional information regarding pole heights in the Somerset neighborhood as part of the land use

process.[31] The analysis provided in response by PSE indicates that pole heights in the Somerset neighborhood could, on average, be reduced by around 16 feet. In order to facilitate this further reduction in pole height, however, the number of poles would more than double (approximately 24 additional poles) and poles would be sited on properties that do not have poles currently (approximately 17 poles sited on new properties). (PSE 9-21-18).

An increase in the number of poles in the Somerset neighborhood would also impact the physical characteristics of the corridor and the immediate vicinity because the quantity of excavation would more than double due to the increased number of poles. Similarly, additional vegetation impacts, including additional tree removal and fewer replanting options, would occur in the immediate vicinity of the shorter poles. With taller poles, the conductors are installed with more sag (i.e., they curve more), so the conductor attachment poles are farther from the ground, which allows for taller vegetation options. Thus, the increase in pole number required for shorter poles would result in increased excavation, more tree removal to accommodate the additional poles, and fewer screening options for both the existing and new pole locations within the corridor.

Shorter poles (or a significant increase in the number of poles) may also increase the potential for interaction with the co-located Olympic pipeline. While increased EMF levels and potential interaction with the pipeline are unrelated to the visual impacts to the Somerset neighborhood identified in the Final EIS, this information does suggest that the current proposal strikes a better balance.

The Comprehensive Plan lacks policies to protect private residential views. Nevertheless, because building and vegetation heights are lower in the Somerset neighborhood than other areas of the corridor due to private covenants, viewer sensitivity in portions of Somerset is higher than in other areas of the corridor. It is recognized that the contrast between the taller poles proposed by the Project and the current pole heights in Somerset, combined with high viewer sensitivity, could cause some Somerset residents to choose to move. However, the entire residential community surrounding the transmission line has been built next to the existing corridor, and the Project, as modified, is consistent with and responds to the existing or intended character, appearance, quality of development, and physical characteristics the Somerset community. Despite the visual impacts identified in the Final EIS, the Somerset neighborhood will continue to be a healthy, vibrant, and unique community. With the Conditions of Approval specified below for aesthetic impacts and vegetation management, the Project is consistent with LUC 20.30B.140.B.

3. **The conditional use will be served by adequate public facilities including streets, fire protection, and utilities.**

[31] Letter from Heidi Bedwell, City of Bellevue Environmental Planning Manager, to Brad Strauch, PSE Program Manager, dated August 14, 2018. The City's August 14, 2018 letter to PSE is included in the DSD official files for Permit Nos. 17-120556-LB and 17-120557-LO.

Finding: PSE's proposal will be served by all required public facilities, including streets, fire protection, water, stormwater control, and sanitary sewer as demonstrated in the Technical Review in Section V of this Staff Report.

4. **The conditional use will not be materially detrimental to uses or property in the immediate vicinity of the subject property.**

Finding: PSE's proposal will not be materially detrimental to uses or property in the immediate vicinity of the subject property so long as the proposal meets code requirements identified in Sections IV and VIII, and complies with the Conditions of Approval listed in Section X.

Construction impacts will be short-term, and any individual property will be affected for a few days over a few months. Notification of property owners has already begun and will continue through completion. Safety and environmental measures described in Sections IV, V, VI and X will minimize any potential damage to properties in the immediate vicinity during construction. Construction is not expected to be materially detrimental to adjacent properties.

Tree removal within PSE's easement is part of the easement agreement, and thus property owners were aware in purchasing property that they were subject to restrictions determined by PSE to be necessary for safe operation of the transmission lines. Therefore, required tree removal is not considered detrimental to properties.

While there are safety risks for occupants of adjacent properties associated with the high voltage lines and the presence of the Olympic Pipeline system, these risks will not increase with the Project, and will likely be reduced, as discussed in Section VI.B. The new poles will be less likely to fall than wood poles due to better foundations and higher strength material.

The Project will increase the height of poles and conductors, making the transmission lines a more prominent feature that generally contrasts with its surroundings. Removal of vegetation will also make the transmission lines more prominent. The taller poles will not significantly affect any public views, but will significantly impact the visual character of a portion of the Somerset neighborhood. This impact in the Somerset area is considered significant under SEPA, but the impacts to individual properties or uses in the immediate vicinity of the Project will not be materially detrimental. Likewise, and as discussed above in connection with CUP decision criteria LUC 20.30B.140.2, the entire residential community surrounding the transmission line has been built next to the existing corridor, and despite the visual impacts identified in the Final EIS, the Somerset neighborhood will continue to be a healthy, vibrant, and unique community.

Property owners closest to the transmission lines typically own and use the property beneath the transmission lines, subject to terms of the easement that was on the property when purchased. Visual enjoyment of their property will remain largely unchanged, with the exception that the poles will be larger, made of metal rather than wood, and in slightly different locations. In some cases, the new pole configuration will mean fewer poles, and the lines will be higher above

the line of sight for properties in the immediate vicinity, thereby reducing the visual impacts to some of the properties closest to the Project. PSE has also offered to work with each property owner to adjust the location of the new poles to the extent feasible for the convenience of individual property owners. These changes are not considered materially detrimental.

For properties farther from the lines but still nearby, such as those across the street to the east or west of the corridor, the visual impacts to neighborhood character will be more apparent. The transmission lines will become dominant features of the neighborhood. At present, trees, topography, and structures obscure the transmission line from the view of most properties that are not immediately adjacent to the lines, except at street crossings and at some uphill properties with open views. PSE's proposal will affect private scenic views upslope of the transmission lines in a portion of the Somerset neighborhood, but private views are not protected under City of Bellevue regulations or policy. These impacts, while potentially unwelcome changes to views of the neighborhood and more distant scenic resources, will not be materially detrimental to these properties or uses.

As conditioned, PSE's proposal will not be materially detrimental to uses or property in the immediate vicinity of the proposed substation or transmission line corridor. See Section X for the Conditions of Approval.

5. **The conditional use complies with the applicable requirements of the Land Use Code.**

   Finding: As conditioned, this Conditional Use Permit application has met the applicable performance standards and requirements of the Land Use Code. **For more information, refer to the discussion in Section IV – Consistency with Land Use Code and Zoning Regulations.**

IX. RECOMMENDATION AND DECISION

After conducting the various administrative reviews associated with PSE's proposal, including applicable land use consistency, SEPA, and City Code and Standard compliance reviews, the Director of Development Services does hereby **RECOMMEND APPROVAL** of PSE's proposal subject to the following conditions in addition to all design components included PSE's proposal.

X. RECOMMENDED CONDITIONS OF APPROVAL

Staff recommends imposing the following conditions to ensure compliance with the relevant decision criteria and code requirements. If imposed by the Hearing Examiner, these conditions must be complied with on plans submitted with the construction permits in addition to all design components included in PSE's proposal.

Applicable Codes, Standards, and Ordinances
PSE shall comply with all applicable Bellevue City Codes, Standards, and Ordinances including but not limited to:

Applicable Codes, Standards, & Ordinances	Contact Person
Clearing & Grading Code – BCC 23.76	Tom McFarlane tmcfarlane@bellevuewa.gov
Fire Code – BCC 23.11	Sean Nichols snichols@bellevuewa.gov
Land Use Code – BCC Title 20	Heidi Bedwell hbedwell@bellevuewa.gov
Noise Control Code – BCC 9.18	Heidi Bedwell hbedwell@bellevuewa.gov
Transportation BCC 14.60	Fay Schafi fschafi@bellevuewa.gov
Transportation ROW BCC 11.70 & 14.30	Tim Stever tstever@bellevuewa.gov
Utilities Codes – BCC Title 24	Art Chi achi@bellevuewa.gov

A. GENERAL CONDITIONS

1. **Changes to Pole Location and/or Alignment:** Changes to the pole location and/or alignment submitted as part of this Conditional Use application shall be reviewed as a Land Use Exemption to this Conditional Use approval prior to construction.

AUTHORITY: LUC 20.30B.175
REVIEWER: Heidi Bedwell, Land Use

2. **Conceptual Design Utilities:** Utility Department approval of the subject permits is based on the conceptual design only. Changes to the site layout may be required to accommodate the required utilities after utility engineering is approved.

AUTHORITY: BCC Title 24.02, 24.04, 24.06
REVIEWER: Arturo Chi, Utilities

3. **Clearing and Grading Permit Required:** An application for a clearing and grading permit must be submitted and approved before construction can

begin. Plans submitted as part of any permit application shall be consistent with the activity permitted under this approval.

AUTHORITY: LUC 20.30P.140; BCC 23.76.035 (Clearing & Grading Code)
REVIEWER: Thomas McFarlane, P.E.; Bellevue Development Services; Clearing & Grading Section

4. **Utility Permit and/or Utility Developer Extension Agreements:** The water, sewer, and storm drainage systems shall be designed per current City of Bellevue Utility Codes and Utility Engineering Standards. All design review, plan approval, and field inspection shall be performed under the individual permits and/or Utility Developer Extension Agreements depending on the extent of the work.

AUTHORITY: BCC Title 24.02, 24.04, 24.06
REVIEWER: Arturo Chi, Utilities

5. **Sight Distance:** All structures installed under terms of this proposal must meet the City's sight distance requirements.

AUTHORITY: BCC 14.60.240, 14.60.241; Transportation Design Manual (RL-100-1, RL-110-1, RL-120-1).
REVIEWER: Fay Schafi, (425) 452-4574

B. PRIOR TO ISSUANCE OF ANY BUILDING/ENGINEERING/CLEARING AND GRADING PERMITS

1. **Right-Of-Way Use Permit:** Prior to issuance of any construction or clearing and grading permit, the applicant shall apply for required right-of-way use permits from the City's Transportation Department, which may include:

- Designated truck hauling routes.
- Truck loading/unloading activities.
- Location of construction fences.
- Hours of construction and hauling.
- Requirements for leasing of right of way or pedestrian easements.
- Provisions for street sweeping, excavation and construction.
- Location of construction signing and pedestrian detour routes.
- All other construction activities as they affect the public street system.

In addition, the applicant shall submit for review and approval a plan for providing pedestrian access during construction of this project. Access shall be provided at all times during the construction process, except when specific construction activities such as shoring, foundation work, and construction of

frontage improvements prevent access. General materials storage and contractor convenience are not reasons for preventing access.

The applicant shall secure sufficient off-street parking for construction workers before the issuance of a clearing and grading, building, a foundation or demolition permit.

AUTHORITY: BCC 11.70 & 14.30
REVIEWER: Tim Stever, (425) 452-4294

2. **Civil Engineering Plans – Transportation:** Where required, civil engineering plans produced by a qualified licensed engineer must be approved by the Transportation Department prior to issuance of the clearing and grading permit. The design of all street frontage improvements and driveway accesses must be in conformance with the requirements of the Americans with Disabilities Act, the Transportation Development Code, the provisions of the Transportation Department Design Manual, and specific requirements stated elsewhere in this document. All relevant standard drawings from the Transportation Department Design Manual shall be copied exactly into the final engineering plans. Requirements for the engineering plans include, but are not limited to:

- Traffic signs and pavement markings.
- Curb, gutter, sidewalk, and driveway approach design. The engineering plans shall be the controlling document on the design of these features; architectural and landscape plans must conform to the engineering plans as needed.
- Curb ramps and crosswalks constructed per ADA standards
- Installation or relocation of streetlights and related equipment.
- Show the required sight distance triangles and include any sight obstructions, including those off-site. Sight distance triangles must be shown at all driveway locations and must consider all fixed objects and mature landscape vegetation. Vertical as well as horizontal line of sight must be considered when checking for sight distance.
- Landings on sloping approaches are not to exceed a 7% slope for a distance of 30 feet approaching the back edge of sidewalk. Driveway grade must be designed to prevent vehicles from bottoming out due to abrupt changes in grade.
- Driveway aprons must be constructed in accordance with Design Manual Standard Drawings SW-140-1 through SW-190-1.
- Location of fixed objects in the sidewalk or near the driveway approach.
- Trench restoration within any right of way or access easement.

The following street and access improvements are required to be designed and shown in the civil engineering plan set:

- Provide a concrete driveway approach at SE 30th Street Per City of Bellevue's Transportation Design Manual. Driveway approach shall be a minimum of 26-feet wide. Minimum of 30-feet distance is required from the right-of-way line to the new gate location.

- No fixed objects, including fire hydrants, trees, and streetlight poles, are allowed within ten feet of a driveway edge, defined as Point A in standard drawings SW-140-1 through SW-190-1. Fixed objects are defined as anything with breakaway characteristics greater than a four-inch by four-inch wooden post.

- A street light analysis is required for SE 30th Street. Street lighting shall meet Bellevue's minimum standards contained in the Transportation Design Manual Appendix A or as amended.

- The applicant shall be required to provide appropriate clearances as provided for in the most recent National Electric Safety Code (NESC) from existing overhead signal equipment for the installation of the overhead transmission lines.

- Construction of all street and access improvements must be completed prior to closing the clearing and grading permit and right of way use permit for this project. A Design Justification Form must be provided to the Transportation Department for any aspect of any pedestrian route adjacent to or across any street that cannot feasibly be made to comply with current ADA standards. Design Justification Forms must be provided prior to approval of the clearing and grading plans for any deviations from standards that are known in advance. Forms provided in advance may need to be updated prior to project completion. For any deviations from standards that are not known in advance, Forms must be provided prior to project completion.

AUTHORITY: BCC 14.60, Transportation Department Design Manual, and the Americans with Disabilities Act
REVIEWER: Fay Schafi, (425) 452-4574

3. **Turbidity and pH Monitoring Required:** A turbidity and pH monitoring plan must be submitted and approved prior to issuance of the clearing and grading permit. . The plan must be developed in accordance with the Turbidity & pH Monitoring Requirements contained in the Bellevue Clearing & Grading Development Standards, indicating appropriate locations and timing of turbidity

and pH sampling and testing. The plan must be implemented during site work and shall be modified as appropriate during construction to reflect pace and extent of construction activity.

AUTHORITY: BCC 23.76.160 (Clearing & Grading Code)
REVIEWER: Thomas McFarlane, P.E.; Bellevue Development Services; Clearing & Grading Section

4. **Drainage Report Required:** Provide a final drainage report that documents the storm drainage minimum requirements triggered for the project. In the report include either figure 2.2 or 2.3 from the Utilities Surface Water Engineering Standards. PSE shall document if the project qualifies as either new development or redevelopment and include a project summary. Document the amount of new, replaced and pollution generating impervious surface changes. PSE shall also document any work within any critical area, wetlands and/or buffers in the report.

AUTHORITY: Title 24.02, 24.04, 24.06 BCC
REVIEWER: Arturo Chi, Utilities

5. **Final Wetland Enhancement Plan:** PSE shall submit a Final Wetland Enhancement Plan consistent with the plans submitted as part of this application in Attachment I (Critical Areas Report). The Plan shall be submitted as part of the required clearing and grading permit . All plant species, size, and spacing shall be consistent with the standard found in the City's Critical Areas Handbook.

AUTHORITY: LUC 20.25H.220; 20.25H.230
REVIEWER: Heidi Bedwell, Land Use

6. **Final Stream Habitat Improvement Plan:** PSE shall submit a Final Stream Habitat Improvement Plan consistent with the plans submitted as part of this application in Attachment I (Critical Areas Report). The Plan shall be submitted as part of the required clearing and grading permit. All plant species, size, and spacing shall be consistent with the standards found in the City's Critical Areas Handbook. The Plan shall include methods for fish exclusion, construction sequencing, monitoring and maintenance.

AUTHORITY: LUC 20.20H.210, 20.25H.220, 20.25H.230
REVIEWER: Heidi Bedwell, Land Use

7. **Final Mitigation Plan for Permanent Impacts and Vegetation Conversion in Critical Areas and Critical Area Buffers:** PSE shall submit a

final mitigation plan for all permanent impacts and vegetation conversion activities consistent with Attachment I (Critical Areas Report) for review and approval by the City of Bellevue prior to issuance of the Clearing and Grading Permit. The Plan shall depict tree and other vegetation to be removed within all critical area or critical area buffers. Trees within a critical area or critical area buffer shall be replaced at a minimum of a 3:1 ratio. All other areas of vegetation removal shall be mitigated in an equivalent area consistent with the replacement ratios contained in Attachment I (Critical Areas Report). Final design shall also include wildlife snags designed as recommended from the State of WA Department of Fish and Wildlife where feasible and in consideration of PSE's Avian Protection Plan. The mitigation plan shall include BMPs for construction sequencing, monitoring, and maintenance and shall be developed consistent with the City's Critical Areas Handbook for species choice, plant size, and spacing.

AUTHORITY: Part 20.30P LUC
REVIEWER: Heidi Bedwell, Land Use

8. **Final Restoration Plan for Temporary Impacts in Critical Areas and Critical Area Buffers:** PSE shall submit a final restoration plan showing temporary construction impacts. Restoration of impacts shall be with native plants where native plants are being removed. All other areas of temporary impact shall be re-vegetated except for those areas which contained impervious surfaces prior to construction activities.

AUTHORITY: LUC 20.25H.220
REVIEWER: Heidi Bedwell, Land Use

9. **Avian Protection Program:** PSE shall implement their Avian Protection Plan consistent with Attachment I (Critical Areas Report), including methods and equipment to reduce avian collisions, electrocution, and problem nests. To reduce impacts to birds, the timing and location of construction work shall consider critical time periods such as the nesting season for species of local importance present in the Project area. A habitat biologist or other qualified professional shall submit a plan documenting recommended measures to limit impacts.

AUTHORITY: Part 20.30P LUC, LUC 20.20.255.G
REVIEWER: Heidi Bedwell, Land Use

10. **Critical Areas and Critical Area Buffers Maintenance and Monitoring Reports:** Mitigation plans shall include methods for vegetation maintenance and monitoring and shall be submitted as part of the required clearing and grading permit. Mitigation sites are required to be maintained and

monitored for five years to ensure the plants successfully establish. Annual monitoring reports are required to be submitted to document the plants are meeting approved performance standards. Photos from selected photo points shall be included in the monitoring reports to document the planting. Land Use inspection is required by Land Use staff to end the plant monitoring period.

Reporting shall be submitted no later than the end of each growing season or by December 31st, and shall include a site plan and photos from photo points established at the time of Land Use Inspection. Reports shall be submitted to Heidi Bedwell, or the City of Bellevue's successor Environmental Planning Manager, by the above-listed date and can be emailed to hbedwell@bellevuewa.gov or mailed directly to:

Environmental Planning Manager
Development Services Department
City of Bellevue
PO Box 90012
Bellevue, WA 98009-9012

AUTHORITY: Land Use Code 20.30P.140; 20.25H.220
REVIEWER: Heidi Bedwell, Land Use

11. **Assurance Device- Critical Areas Mitigation:** As part of the Clearing and Grading Permit, PSE shall submit a cost estimate prepared by a qualified professional for the proposed planting materials and installation costs. An installation security shall be provided to the City of Bellevue in the amount of 150% of the total cost. After the final mitigation plans have been implemented and inspected by the City, the installation assurance device will be released and the City shall request and retain a maintenance assurance device in the amount of 20% of the total cost estimate. The maintenance assurance device shall be kept by the City until the performance objectives have been met.

AUTHORITY: LUC 20.40.490
REVIEWER: Heidi Bedwell, Land Use

12. **Geotechnical Review:** The project geotechnical engineer (see BCC 23.76.030.G) must review the final construction plans, including all foundation, retaining wall, shoring, cut, and fill designs. A letter from the geotechnical engineer stating that the plans conform to the recommendations in the geotechnical report and any addendums and supplements must be submitted to the clearing and grading section prior to issuance of the construction permit.

AUTHORITY: BCC 23.76.050 (Clearing & Grading Code)
REVIEWER: Thomas McFarlane, P.E.; Bellevue Development Services; Clearing & Grading Section

13. **Seismic Design:** The project geotechnical engineer shall certify that PSE has conducted geotechnical hazard evaluations for all proposed elements of the substation foundations, walls, and transmission poles, and that all geotechnical recommendations have been incorporated into project design. PSE shall provide required certification and supporting documentation to the City of Bellevue. The geotechnical report shall address all code requirements and provide a discussion of how the design meets or exceeds following:

- The 2012 International Building Code (IBC), or as amended, parameters for short period spectral response acceleration (SS), 1-second period spectral response acceleration (S1), and Seismic Coefficients FA and FV presented in Table 2 of the geotechnical report
- Consistent with the project geotechnical engineer's recommendation, use soil input parameters for lateral load design that consider the effects of liquefaction through the application of p-multipliers for LPile parameters (LPile is a computer program used to analyze deep foundations under lateral loading).
- North of the proposed Richards Creek substation, reevaluate the lateral spreading risk to the proposed poles in this area once their final locations have been selected, to determine appropriate foundation dimensions.
- Where areas subject to liquefaction are present, extend foundations below the loose to medium density liquefiable deposits into underlying dense, non-liquefiable soils.
- Reevaluate the axial capacity of the pole foundations and potential downdrag loads for poles in areas subject to liquefaction once final locations are selected, and consider these in the structural design.

AUTHORITY: Part 20.30P LUC, LUC 20.20.255.G
REVIEWER: Heidi Bedwell, Land Use

14. **Final Landscape Plan Richard Creek Substation:** PSE shall submit a final landscape plan as part of the required construction permits consistent with the landscape plan submitted as part of this application (Attachment A [Project Plans]). In addition to the vegetation proposed, all disturbed areas not mitigated for critical area impacts shall be planted with low growing native vegetation. Landscape plan shall include plant species, quantity, spacing and cost estimate for plant material and installation. To ensure plant establishment, the applicant shall provide a landscape assurance device that shall cover 20% of the fair market value of labor and materials for the initial landscape installation of all areas of restoration required for the substation landscaping. This assurance

device will cover the landscape maintenance of the project for a period of one year from the date of final inspection.

AUTHORITY: LUC 20.20.520.K.1 & 2, 20.40.490
REVIEWER: Heidi Bedwell, Land Use

15. **Lighting Plan Richards Creek Substation:** PSE shall submit a lighting plan as part of the required clearing and grading permit showing proposed lighting at the substation. Lighting shall be designed to direct light away from the stream and wetland areas including the use of shields or other methods to reduce spillover into critical areas.

AUTHORITY: LUC 20.25H.080A and 100
REVIEWER: Heidi Bedwell, Land Use

16. **Tree Removal Non-Critical Areas:** PSE shall submit a final Tree Replacement plan as part of the required clearing and grading permits consistent with Attachment E (Vegetation Management Plan) submitted as part of this application.

AUTHORITY: LUC 20.20.255.G
REVIEWER: Heidi Bedwell, Land Use

17. **Mitigation for Tree Removal in City of Right-of-Way (Fee in Lieu Plan):** PSE has agreed to mitigate for the loss of trees located in the City right-of-way with a fee in lieu method. Mitigation will be based on a total value of the trees to be removed using the methods outlined in the Council of Tree and Landscape Appraisers, *Guide for Plant Appraisal.* The fee will be used for replanting in the City right-of-way or on other city owned parcels.

PSE shall prepare a final tree removal plan depicting trees to be removed in the right-of-way including their size and species. This plan shall be submitted to the City of Bellevue for approval. PSE and the City will identify and agree upon an independent third party certified arborist to determine the total value of trees removed from the City right-of-way. The arborist shall use the methods outlined in the Council of Tree and Landscape Appraisers, *Guide for Plant Appraisal.* PSE shall pay for the arborist appraisal. No tree removal is allowed until acceptance of the plan, appraisal, and payment to the City of Bellevue has occurred.

AUTHORITY: LUC 20.20.255.G
REVIEWER: Heidi Bedwell, Land Use

18. **Installation Surety-Tree Replacement (Non-Critical Areas):** PSE shall submit as part of the required Clearing and Grading permit a cost

estimate in the amount of the total trees proposed for replacement in non-critical areas. The estimate shall be based on the following replacement ratios contained in Table VI-1 of the Staff Report:

Tree Size (dbh)	Replacement Ratio
< 6″	As requested by property owner
6″ to ≤ 12″	1:1
> 12″ to < 30″	2:1
≥ 30″	3:1

The estimate and surety provided by PSE as required by this condition shall be in the amount of 100% of the estimated cost of tree replacement (including materials and labor). The surety will be released one year after tree replacement, consistent with the applicable Tree Replacement plan, is complete.

AUTHORITY: LUC 20.20.255.G
REVIEWER: Heidi Bedwell, Land Use

19. **Final Restoration Plan for Temporary Impacts (Non-Critical Areas):** PSE shall submit a final restoration plan showing temporary construction impacts. The impacts shall be restored with vegetation consistent with the pre-project condition when vegetation has been removed. Other improvements impacted by construction activities shall be restored in coordination with the underlying property owner.

AUTHORITY: LUC 20.20.255.G
REVIEWER: Heidi Bedwell, Land Use

20. **Pesticides, Herbicides and Fertilizers:** Applicant shall submit written information identifying the pesticide, herbicide and/or insecticide to be used AND written confirmation that the product used has been reviewed and approved by a consulting arborist. Work shall be done in accordance with the City of Bellevue's "Environmental Best Management Practices."

Prior to any use of pesticides, herbicides, and/or fertilizers associated with the proposal, the applicant must receive approval from Land Use under the required Clearing and Grading Permit.

AUTHORITY: LUC 20.25H.080, LUC 20.20.255G
REVIEWER: Heidi Bedwell, Land Use

21. **Pole Finish:** To reduce aesthetic impacts to the surrounding environment and reduce contrast with the surrounding environment, PSE shall

implement proposed pole finishes consistent with the recommendations found in Attachment J (Pole Finishes Report City of Bellevue (South)).

AUTHORITY: LUC 20.20.255.G
REVIEWER: Heidi Bedwell, Land Use

22. **Final Pipeline Interaction Assessment and Design Report:** To protect nearby pipelines from interaction with the new transmission lines due to AC current density, faults caused by lightning strikes, mechanical/equipment failure, or other causes, PSE shall continue to coordinate with Olympic and include safeguards in the project design. PSE shall optimize conductor geometry, where a true delta configuration provides the greatest level of field cancellation. PSE shall operate both transmission lines at equivalent voltage ratings. These safeguards shall be certified by an engineer licensed in the state of Washington. PSE shall also install an Optical Ground Wire (OPGW) shield wire or equivalent shield wire recommended by DNV GL 2016 on the transmission line poles.

PSE shall perform an AC Interference Study incorporating the final transmission line route, configuration, and operating parameters to confirm that current densities remain within acceptable levels. PSE shall provide Olympic with the Study and provide the City with documentation establishing that the Study was performed and submitted to Olympic.

The Study shall include a report detailing how the following have been addressed:

- PSE shall obtain and incorporate all of the pipeline parameters required for detailed modeling and study (i.e., locations and details of above-grade pipeline appurtenances/stations, bonds, anodes, mitigation, etc.).
- PSE shall assess the safety and AC corrosion risks under steady-state operating conditions on the transmission lines.
- PSE shall fully assess the safety and coating stress risks for phase-to-ground faults at transmission line structures along the entire area of co-location, including both inductive and resistive coupling.
- PSE shall reassess the safe separation distance at each pole location to minimize arcing risk based on NACE SP0177-2014 and considering the findings in CEA 239T817.
- Specify appropriate distances for pole grounds from the pipeline to avoid electrical arcing as recommended by the licensed engineer.
- PSE shall incorporate mitigation measures into the project design to prevent or minimize ground fault arcing to the pipelines in areas where the pipelines are within the modeled arcing distance of transmission line pole grounding rods.

AUTHORITY: BCC 22.02.140.B.1, 22.02.140.C
REVIEWER: Heidi Bedwell, Land Use

23. **Final Substation Plan:** Consistent with the project plans for the proposed substation, PSE shall comply with State and Federal standards to address the risk of substation fire. Designs should include the following:

- Control systems to shut down equipment experiencing a fault or malfunction;
- Systems to conduct lightning to the ground rather than through lines or equipment; and
- Alternative insulation systems for closely spaced equipment.

AUTHORITY: LUC 20.20.255.G, 20.20.255.E.6
REVIEWER: Heidi Bedwell, Land Use

24. **Construction Management and Access Plan (Pipeline Safety):** PSE shall develop Construction Management and Access Plan in coordination with Olympic's Damage Prevention Team that are mutually agreed upon by both parties. These plans shall outline the specific actions that PSE will take to protect the pipelines from vehicle and equipment surcharge loads, excavation, and other activities in consideration of Olympic's general construction and right-of-way requirements and in consultation with Olympic on the Energize Eastside project design specifically. The following general measures, at a minimum, shall be included in the Construction Management and Access Plan:

- Notify 'one-call' 811 utility locater service at least 48 hours prior to PSE or PSE-designated contractors conducting excavation work. (Olympic's line marking personnel will then mark the location of the pipelines near the construction areas. These procedures are designed to ensure that excavation will not damage any underground utilities and to decrease potential safety hazards.)

- Field verify the distance between the pipelines and transmission line pole grounds.

- Add the pipeline location and depth to project plans and drawings, and submit to Olympic for evaluation. To the extent that Olympic determines pipeline location and depth is secure or confidential information, this

information is not required to be submitted to the City of Bellevue under this condition.

- Arrange for Olympic representatives to be on-site to monitor construction activities near the pipelines.

- Identify demarcation and protection measures as recommended and required by Olympic.

- Provide all necessary information for Olympic to perform pipe stress calculations for equipment crossings and surface loads (surcharge loads). Based on pipe stress calculations and in coordination with Olympic, provide additional cover that may include installing timber mats, steel plating, or temporary air bridging; utilize a combination of these; or avoid crossing in certain identified areas to avoid impacts on the Olympic pipelines.

- Incorporate additional measures related to minimizing surcharge loads included in Olympic's general construction and right-of-way requirements.

- The Construction Management and Access Plan will identify contractor responsibilities including appropriately sized construction zones to protect the general public, construction timing limits, and other mitigation measures that will limit the exposure of the general public to potential pipeline incidents.

- No excavation or construction activity will be permitted in the vicinity of a pipeline until appropriate communications have been made with Olympic's field operations and its Right-of-Way Department. A formal engineering assessment (conducted by Olympic) may be required.

- No excavation or backfilling within the pipeline right-of-way will be permitted for any reason without a representative of Olympic on-site giving permission.

- Coordinate with Olympic regarding excavation and other construction activities to ensure that pipeline operating pressures are reduced prior to these activities when necessary.

- As directed by Olympic, use soft dig methods (e.g., hand excavation, vacuum excavation, etc.) whenever the pipeline(s) are within 25 feet of any proposed excavation or ground disturbance below original grade.

- Coordinate with Olympic to ensure that an Olympic representative, trained in the observation of excavation and pipeline locating, is on-site at all times during excavation and other ground-disturbing activities that occur within

100 feet of the pipelines where the pipelines are co-located with the proposed transmission lines.

- Where excavations are within 20 feet of the Olympic Pipeline system, the project geotechnical engineer shall consider temporary casing to reduce the risk of sloughing under the pipeline.

- As required by Olympic, steel plates or mats will be placed over the pipelines to distribute vehicle loads where construction equipment needs to cross over the pipelines.

- Utility settlement monitoring points will be established on the Olympic Pipeline corridor at the direction of Olympic where drilled shafts will be within 15 feet of a pipeline (or another distance as stipulated by Olympic) to monitor settlement during installation of the drilled shafts. Settlement monitoring points will be installed so that baseline readings of the settlement monitoring points may be completed prior to the contractor mobilizing to the site. Monitoring will continue during construction on a daily basis and twice a week in the 3 weeks following construction. The monitoring readings will be reviewed by the Engineer on a daily basis. If measured settlement exceeds 1 inch, or an amount specified by Olympic, the integrity of the utility will be tested and PSE will work with Olympic to repair any damage to the utilities as a result of construction.

- The Construction Management and Access Plan shall include monitoring procedures to ensure that all mitigation measures related to construction activities are followed.

The Construction Management and Access Plan shall be submitted to the City of Bellevue before construction permit issuance. After permit issuance, any revisions or updates to the Plan shall be provided to the City in a Final Construction Management and Access Plan before construction commences.

AUTHORITY: BCC 22.02.140.B.1, 22.02.140.C
REVIEWER: Heidi Bedwell, Land Use

25. **Construction Management and Access Plan (Recreation Uses and Schools):** To reduce impacts to recreation sites as a result of project construction, PSE shall include in their Construction Access and Management Plan the following:

- Steps to coordinate with the City of Bellevue Parks Department.
- Phasing plan schedules to avoid construction activity near recreation sites, including but not limited to public parks and Tyee Middle school, during time periods when the sites are most frequently used.

- Plans for alternative access points to recreation sites and trail detours where necessary.
- Notification of local schools, or private owners (including the Somerset Recreation Club) 60 days in advance of project construction within the recreation sites and again at least 2 weeks in advance of work commencing.
- The location of signs notifying users of any temporary closure of trails or recreations sites and installation of these signs 2 weeks in advance of closure.

The Construction Management and Access Plan shall be submitted to the City of Bellevue prior to the issuance of construction permits.

AUTHORITY: LUC 20.20.255.G
REVIEWER: Heidi Bedwell, Land Use

26. **Public Outreach Plan:** PSE shall submit to the City of Bellevue a public outreach plan that details how PSE will provide information to the public about the types and locations of expected construction impacts and mitigation measures. As part of the plan, a construction outreach team shall work with affected residents and business owners to minimize construction-related impacts throughout the duration of project construction. PSE will provide a contact with whom community members can address specific concerns both prior to and during project construction. Also as part of the plan, PSE shall submit to the City quarterly reports summarizing status of public outreach efforts including issues raised by the community and how PSE is addressing concerns. Reports shall be submitted to the Development Services Department Director through project completion.

AUTHORITY: LUC 20.20.255.G
REVIEWER: Heidi Bedwell, Land Use

C. AFTER CONSTRUCTION PERMIT ISSUANCE AND DURING CONSTRUCTION

1. **State and Federal Permit Compliance:** To reduce indirect and direct water quality impacts associated with construction of the new substation and transmission lines, PSE shall comply with applicable state and federal regulatory requirements. Before any direct wetland impacts occur, PSE shall obtain the necessary state and federal authorizations. PSE shall provide the City of Bellevue copies of all required permits from the WDFW and the U.S. Army Corps of Engineers, including any requirements from the U.S. Fish and Wildlife Service and National Marine Fisheries Service prior to the City of Bellevue's pre-construction meeting.

AUTHORITY: BCC 24.06.015, 24.06.020; LUC 20.20.255.E.2
REVIEWER: Heidi Bedwell, Land Use

2. **Cultural Resources Protection:** Prior to construction, PSE shall conduct archaeological resource surveys for the selected route that include subsurface testing and a second pedestrian and subsurface survey to assess staging areas, laydown areas, stringing sites, and access roads after more information on these locations is available.

Prior to construction, PSE shall develop resource-specific mitigation measures during consultation with the Washington Department of Archaeology and Historic Preservation (DAHP), affected Tribes, King County Historic Preservation Program (KCHPP), and other appropriate stakeholders if a protected archaeological resource is identified during the pre-construction archaeological survey or historic property inventory.

PSE shall prepare an Inadvertent Discovery Plan (IDP) for the project and discuss the IDP with contractor during pre-construction meeting(s).
PSE shall apply for an archaeological excavation permit from DAHP (WAC 25-48-060) if impacts to a protected archaeological resource cannot be avoided.

If any resources are determined eligible for listing in the National Register of Historic Places (NHRP) by DAHP, mitigation measures specific to those resources shall be developed during consultation with DAHP, affected Tribes, and any other appropriate stakeholders. Any final determination and mitigation measures developed based on this determination shall be reported to the City of Bellevue to the extent allowed by law.

During construction, PSE shall follow outlined procedures in the IDP in the event that archaeological resources are identified during construction activities.

During construction, PSE shall follow the procedures identified for any historic resources through consultation with DAHP.

AUTHORITY: LUC 20.20.255.G
REVIEWER: Heidi Bedwell, Land Use

3. **Drilled Shaft Installation Plan:** Prior to construction PSE shall submit a detailed Drilled Shaft Installation Plan prepared by their construction contractor describing casing and drilled shaft construction methods. The submittal will include a narrative describing the contractor's understanding of the anticipated subsurface conditions, underground pipelines, the overall construction sequence, access to the pole locations, and the proposed pole foundation installation equipment. The contractor shall submit a detailed direct embedment pole installation plan describing both uncased and temporary casing methods. If drilled shafts are used where groundwater is present, the

concrete for drilled shafts will be placed using the "tremie" method will be considered and evaluated by an onsite geotechnical engineer (described in the geotechnical report). The Plan shall be reviewed by the project geotechnical engineer before construction commences; the Plan shall include documentation of this review, which shall be provided to the City of Bellevue Development Services Department.

AUTHORITY: Part 20.30P LUC, LUC 20.20.255.G
REVIEWER: Heidi Bedwell, Land Use

4. **Geotechnical Inspection:** The project geotechnical engineer must provide geotechnical inspection during project construction when applicable. The geotechnical engineer must monitor and test soil cuts and fills for substation and pole foundations. The geotechnical engineer also must observe, monitor, and test any unusual seepage, slope, or subgrade conditions.

AUTHORITY: BCC 23.76.050, 23.76.160 (Clearing & Grading Code)
REVIEWER: Thomas McFarlane, P.E.; Bellevue Development Services; Clearing & Grading Section

5. **Rainy Season Restrictions:** Clearing and grading activity may be initiated during, or continue into the rainy season, which is defined as October 1 through April 30, only with written authorization of the Development Services Department. Should approval be granted for work during the rainy season, increased erosion and sedimentation measures, as appropriate for the anticipated rainy season conditions, must be implemented prior to beginning or resuming site work.

AUTHORITY: BCC 23.76.093.A (Clearing & Grading Code)
REVIEWER: Thomas McFarlane, P.E.; Bellevue Development Services; Clearing & Grading Section

6. **Street and Access Improvements:** All street and access improvements and other required transportation elements including street lights revisions, must be constructed by the applicant and accepted by the Transportation Department inspector. This includes improvements on SE 30th Street.

All areas disturbed (i.e., pavement, curb and gutter, landscaping, driveways, temporary access roads, etc.) by the project shall be restored after construction to its previous or an improved state per City of Bellevue ROW standards including current ADA standards.

AUTHORITY: BCC 14.60, Comprehensive Plan Policy UT-39, and the Transportation Department Design Manual.
REVIEWER: Fay Schafi, (425) 452-4574

7. **Pavement Restoration:** A no-street-cut moratorium is in effect on SE 30th Street. Should street cuts prove unavoidable or if the street surface is damaged in the construction process, a half-street or full-street (depending on the extent of street cuts or damage) grind and overlay will be required.

The applicant will be required to restore all damaged pavement within City right-of-way caused by construction activities related to this project. Limits and extent of pavement restoration shall be as required by the Right-of-Way use permit.

AUTHORITY: BCC 14.60. 250; Design Manual Design Standard #23
REVIEWER: Tim Stever (425) 452-4294

8. **Helicopter or Large Crane Use:** PSE shall identify any areas where a helicopter or large crane will be used to lift foundation rebar and/or poles over adjacent properties and into place, or to facilitate stringing the new transmission lines. PSE or its contractor shall provide copies of the "congested air" permit from the Federal Aviation Administration (FAA). PSE shall also coordinate with the City of Bellevue to determine where this type of construction is allowed.

AUTHORITY: Part 20.30M LUC
REVIEWER: Heidi Bedwell, Land Use

9. **Construction Stormwater Pollution Prevention Plan (CSWPPP):** The clearing and grading permit application must include a CSWPPP. The structure and content of the CSWPPP must follow the requirements of the Bellevue Clearing and Grading Code and the Bellevue Clearing and Grading Development Standards. BMPs in the plan include the following:

- Operating procedures to prevent spills.
- Control measures such as secondary containment to prevent spills from entering nearby surface waters.
- Countermeasures to contain, clean up, and mitigate the effects of a spill.
- Construction vehicle storage and maintenance and fueling of construction equipment will be located away from streams and wetlands.

To avoid groundwater contamination, if any pole installation sites are determined to need dewatering, PSE shall prepare and submit a dewatering

plan for City approval. The dewatering plan must include provisions for turbidity and pH monitoring of dewatering water. No refueling or staging shall be allowed within critical area or critical area buffers.

AUTHORITY: Part 20.25H LUC; Chapter 23.76 BCC
REVIEWER: Heidi Bedwell, Land Use; Thomas McFarlane, P.E., Bellevue Development Services, Clearing & Grading Section

10. **Traffic Management:** As part of the right-of-way use permit, PSE shall ensure that access to residential and commercial properties is maintained at all times, except when restricted access is required for safety while work is occurring. At major driveways, flagger control may be needed to facilitate alternating enter and exit traffic. Special treatment will be needed for developments with split driveways (with one driveway serving entering traffic and one serving exiting traffic) if traffic cannot easily be shifted to the other driveway for two-way operation. The contractor will be required to coordinate with property owners when driveways or alleys are affected by construction.

AUTHORITY: BCC 14.30
REVIEWER: Tim Stever, Transportation/Right-of-Way

11. **Pavement Degradation:** As part of the right-of-way permit inspection process, pavement degradation identified by the City that results from increased Project-related construction truck traffic or excavation shall be fully restored upon completion of construction activities. This includes restoration of streets, curbs, gutters, sidewalks, parking lots, driveways, and traffic signal induction loops where appropriate.

AUTHORITY: BCC 14.30
REVIEWER: Tim Stever, Transportation/Right-of-Way

12. **Coordination with other utility providers affected by proposal:** PSE will coordinate with any affected utility providers, as appropriate, to determine how best to avoid or minimize any impacts while Project construction is occurring. The City of Bellevue will review project designs prior to permit approval to ensure protection of other utilities. PSE and its contractors will be required to develop construction sequence plans and coordinate schedules for utility work to minimize service disruptions and provide ample advance notice when service disruptions are unavoidable, consistent with utility owner policies. Relocation plans and service disruptions shall be reviewed and approved by the affected utility providers before construction begins. PSE will coordinate with the other utility providers to assist in their planning efforts for public

outreach to inform their customers of potential service outages and construction schedules.

AUTHORITY: LUC 20.20.255.G
REVIEWER: Heidi Bedwell, Land Use

13. **Field Verification of Utility Locations:** PSE shall follow regulatory requirements to field-verify utility locations such as gas lines or the Olympic Pipeline system. Field verification of the Olympic Pipeline system may include methods as directed by Olympic, such as potholing using vacuum truck excavation to avoid damage to the pipelines.

AUTHORITY: BCC 22.02.140.B.1, 22.02.140.C
REVIEWER: Heidi Bedwell, Land Use

14. **Pipeline Marking Prior to Construction:** PSE shall coordinate with Olympic to ensure that line marking personnel mark the entire length of Olympic's pipeline within 50 feet of any excavation or ground disturbance below original grade, and not only the location of angle points (points of intersection).

AUTHORITY: BCC 22.02.140.B.1, 22.02.140.C
REVIEWER: Heidi Bedwell, Land Use

15. **Grounding System:** Qualified licensed engineer shall verify separation distances between the transmission grounding system and the pipeline meets the recommendations in the Final Pipeline Interaction Assessment and Design Report after poles are installed. If grounding distances are not consistent with the recommendations, PSE shall reinstall grounding system to comply with the recommendations.

AUTHORITY: BCC 22.02.140.B.1, 22.02.140.C
REVIEWER: Heidi Bedwell, Land Use

16. **Olympic's General Construction Requirements:** PSE shall comply with the approved Construction Management and Access Plan including the identified measures from Olympic's General Construction and Right of Way Requirements for all work proposed near the pipelines.

AUTHORITY: BCC 22.02.140.B.1, 22.02.140.C
REVIEWER: Heidi Bedwell, Land Use

17. **Mitigation and Monitoring Report- Construction Management and Access Plan (Pipeline Safety):** Consistent with the approved Construction

Management and Access Plan, PSE shall document all mitigation measures implemented, monitored, and conducted.

PSE will file a mitigation and monitoring report with the City of Bellevue that documents consultations with Olympic and mitigation measures to address safety-related issues. PSE shall file the mitigation and monitoring reports with the City of Bellevue quarterly during construction. The reports shall identify any additional mitigation measures and monitoring that may be required as a result of PSE's coordination with Olympic.

The mitigation and monitoring report shall demonstrate that sufficient pipeline safety measures have been implemented, and document all consultations with Olympic, including the sharing of modeling, engineering, and as-built information with Olympic to assist Olympic in its ongoing monitoring and mitigation responsibilities. The report shall identify any additional field surveys and data collection necessary for verifying mitigation measures following project start-up, and any proposed monitoring to ensure that mitigation measures related to operational issues are followed.

AUTHORITY: BCC 22.02.140.B.1, 22.02.140.C
REVIEWER: Heidi Bedwell, Land Use

D. FOR THE LIFE OF THE PROJECT

1. **Water Quality Protection:** During maintenance activities (for substation, poles, the transmission line corridor, and access roads) PSE shall prevent spills or leaks of hazardous materials, paving materials, or chemicals from contaminating surface or groundwater.

AUTHORITY: Part 20.25H LUC
REVIEWER: Heidi Bedwell, Land Use

2. **Maintenance and Monitoring Program-Structural Stability:** PSE shall develop a monitoring and maintenance program that includes inspection and reporting on the ability of the transmission line poles to resist seismic disturbances. As part of PSE's regular inspection of the poles, it shall monitor all poles for changes in conditions that could reduce the ability of the structures to resist seismic disturbances. PSE shall submit reporting to the City of Bellevue. If changes are identified during inspection and monitoring of conditions, PSE shall implement additional measures to reduce or minimize those impacts.

AUTHORITY: Part 20.30P LUC, 20.20.255.G
REVIEWER: Heidi Bedwell, Land Use

3. **Telecommunication Facilities:** PSE shall limit the number of telecommunications facilities installed on the 230 kV poles to the seven locations currently installed in the corridor. Reinstalled facilities shall be in approximately the same locations as they were previously. Facilities shall be required to get City approval per current land use regulations before reinstalling telecommunication equipment.

AUTHORITY: LUC 20.20.255.G, 20.20.255.E.6
REVIEWER: Heidi Bedwell, Land Use

4. **Electromagnetic Fields:** In the event that radio frequency interference is found by a radio operator, PSE shall de-tune pole structures by installing hardware (such as arresters).

AUTHORITY: LUC 20.20.255.G, 20.20.255.E.6
REVIEWER: Heidi Bedwell, Land Use

5. **Pipeline Safety During Operation:** PSE shall work with Olympic to evaluate and implement appropriate mitigation measures to reduce electrical interference on the Olympic Pipeline system to safe levels.

PSE shall provide information to Olympic as appropriate or when requested by Olympic for Olympic to record AC pipe-to-soil potentials and DC pipe-to-soil potentials during its annual cathodic protection survey.

PSE shall provide Olympic with as much advance notice as practical of when outages are planned on the individual circuits (i.e., when only one circuit of the double circuit transmission lines is in operation) to allow monitoring of the AC induction effects on the pipelines.

PSE shall provide Olympic with data on anticipated maximum loads under peak winter operating conditions on an annual basis, and provide copies to the City of Bellevue to verify that this data has been provided to Olympic.

After the transmission line is installed and energized, Olympic is expected (due to its federal requirements to protect the pipeline from damage) to measure the actual AC interference with the pipeline in order to ensure that all AC interference risks have been fully mitigated under steady-state operation of the transmission line. PSE shall cooperate with Olympic in completing a post-energization AC site survey to determine if any adjustments are needed to Olympic's pipeline protection systems. This survey should cover the entire length of the new transmission line in the South Bellevue Segment. PSE shall provide load data for the survey, along with any design or as-built information requested by Olympic.

PSE shall monitor oil insulation for evidence of arcing and gassing, and monitor substations for evidence of overloading, overheating, or malfunctions.

PSE shall submit to the City of Bellevue, upon request by the City, documentation sufficient to show compliance with the provisions imposed by this Condition of Approval.

AUTHORITY: BCC 22.02.140.B.1, 22.02.140.C
REVIEWER: Heidi Bedwell, Land Use

XI. ATTACHMENTS

A. Project Plans
B. Alternative Siting Analysis
C. PSE South Bellevue Segment CUP Analysis
D. Independent Technical Analysis of Energize Eastside (USE 2015)
E. Vegetation Management Plan
F. Comprehensive Plan, Map UT-7
G. Comprehensive Plan Policy Analysis
H. Photo Simulations
I. Critical Areas Report
J. Pole Finishes Report-City of Bellevue (South)

Acronyms and Abbreviations

AC	alternating current
ADA	Americans with Disabilities Act
BCC	Bellevue City Code
BES	Bulk Electric System
BFE	Base Flood Elevation
BMPs	best management practices
CAG	Community Advisory Group
CALUP	Critical Areas Land Use Permit
CAP	Corrective Action Plan
CAR	Critical Areas Report
CENSE	Coalition of Eastside Neighborhoods for Sensible Energy
CSEE	Citizens for Sane Eastside Energy
CUP	Conditional Use Permit
DAHP	Department of Archaeology and Historic Preservation
dBA	A-weighted decibels
DC	direct current
DSD	Department of Development Services
Ecology	Washington State Department of Ecology
EIS	Environmental Impact Statement
ELF	Extremely Low Frequency
EMF	electromagnetic field
FAA	Federal Aviation Administration
FEMA	Federal Emergency Management Agency
GHG	greenhouse gas
GMA	Growth Management Act
I-90	Interstate 90
IARC	International Agency for Research on Cancer
IBC	International Building Code
IDP	Inadvertent Discovery Plan
KCHPP	King County Historic Preservation Program
kV	kilovolt
LHNA	Lake Hills Neighborhood Association
LUC	Land Use Code
MW	megawatt
NERC	North American Electric Reliability Corporation
NESC	National Electric Safety Code
NPDES	National Pollutant Discharge Elimination System

NRHP	National Register of Historic Places
OATT	Open Access Transmission Tariff
OPGW	Optical Ground Wire
PGIS	pollution-generating impervious surface
PHMSA	Pipeline and Hazardous Materials Safety Administration
PSE	Puget Sound Energy
PSRC	Puget Sound Regional Council
RCW	Revised Code of Washington
ROW	right-of-way
SCL	Seattle City Light
SEPA	State Environmental Policy Act
SF	square feet
SF6	sulfur hexafluoride
SPCC	Spill Prevention, Control, and Countermeasure
SPPP	Stormwater Pollution Prevention Plan
TESC	temporary erosion and sediment control
USE	Utility System Efficiencies, Inc.
UTC	Utilities and Transportation Commission
WAC	Washington Administrative Code
WDFW	Washington Department of Fish and Wildlife
WECC	Western Electricity Coordinating Council
WHO	World Health Organization
WTD	Wastewater Treatment Division

Alphabetical Summary of References Cited

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The Watershed Company. October 11, 2018 Technical Memorandum.

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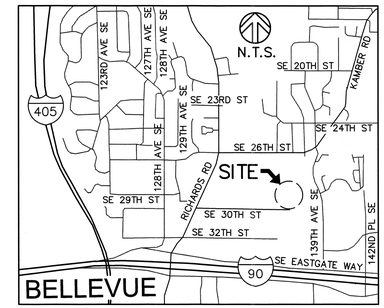
Attachment: A
Project Plans

PUGET SOUND ENERGY

RICHARDS CREEK 230kV SUBSTATION

SECTION 10, TOWNSHIP 24 NORTH, RANGE 5 EAST, W.M.

CITY OF BELLEVUE, KING COUNTY, WASHINGTON



SURVEY NOTES:

1. PURPOSE OF THIS SURVEY THIS SURVEY REPRESENTS EXISTING CONDITIONS AT THE SITE OF THE PROPOSED RICHARDS CREEK SUBSTATION. THE SURVEY WAS PERFORMED IN JANUARY, 2015.

2. BASIS OF BEARING WASHINGTON COORDINATE SYSTEM, NORTH ZONE, NAD-83/07, EXPRESSED IN US SURVEY FEET.

   VERTICAL DATUM NAVD-88
   ALL VERTICAL ELEVATIONS ARE BASED ON NAVD88 DATUM FROM GPS OBSERVATIONS USING THE WASHINGTON STATE REFERENCE NETWORK.

3. BENCHMARKS

   APS #8 - HUB FND
   NORTH=215796.04
   EAST=1313420.82
   ELEV=102.98

   APS #2773 - MON FND
   NORTH=216381.56
   EAST=1313836.47
   ELEV=127.78

   APS #2432 - REBAR/CAP
   FND 5/8 INCH
   NORTH=2155785.62
   EAST=1313771.17
   ELEV=129.05

   APS #2832 - SPIKE SET
   W/CAP
   NORTH=216204.66
   EAST=1313518.66
   ELEV=101.70

4. METHODOLOGY THIS SURVEY WAS BASED ON A RTK VRS SURVEY (USING TRIMBLE R8 UNITS AND CORRECTIONS USING THE WASHINGTON STATE REFERENCE NETWORK) IN COMBINATION WITH A CONVENTIONAL SURVEY (USING LEICA 1200 SERIES 1" - 5" TOTAL STATION). THIS NETWORK MEETS OR EXCEEDS THE ACCURACY STANDARDS SET BY WAC 332-130-090.

5. PROPERTY LINES THIS IS NOT A BOUNDARY SURVEY. BOUNDARIES OF ADJOINING PROPERTIES ARE APPROXIMATE, BASED ON THE BEST AVAILABLE INFORMATION AND ARE SHOWN FOR GRAPHIC PURPOSES ONLY.

6. MONUMENTATION VISITATION ALL SURVEY MONUMENTS AND OTHER SURVEY MARKERS SHOWN HEREON WERE OCCUPIED OR OBSERVED DURING THE MONTHS OF NOVEMBER AND DECEMBER 2014.

7. ENCUMBRANCES THIS SURVEY WAS PERFORMED WITHOUT THE BENEFIT OF A TITLE REPORT. ACCORDINGLY, ANY EASEMENTS OR RESTRICTIONS OF RECORD WHICH MAY BE REVEALED IN A TITLE REPORT HAVE NOT BEEN INCLUDED HEREON.

8. UNDERGROUND UTILITIES THE LOCATION OF SUBSURFACE UTILITIES ARE BASED ON OBSERVED UTILITY PAINT MARKS ON THE SURFACE, AND SET THERE BY OTHERS.

9. CONTOUR INTERVAL 2 FOOT

10. SUBSURFACE CONDITIONS WERE NOT EXAMINED OR CONSIDERED AS PART OF THIS SURVEY.

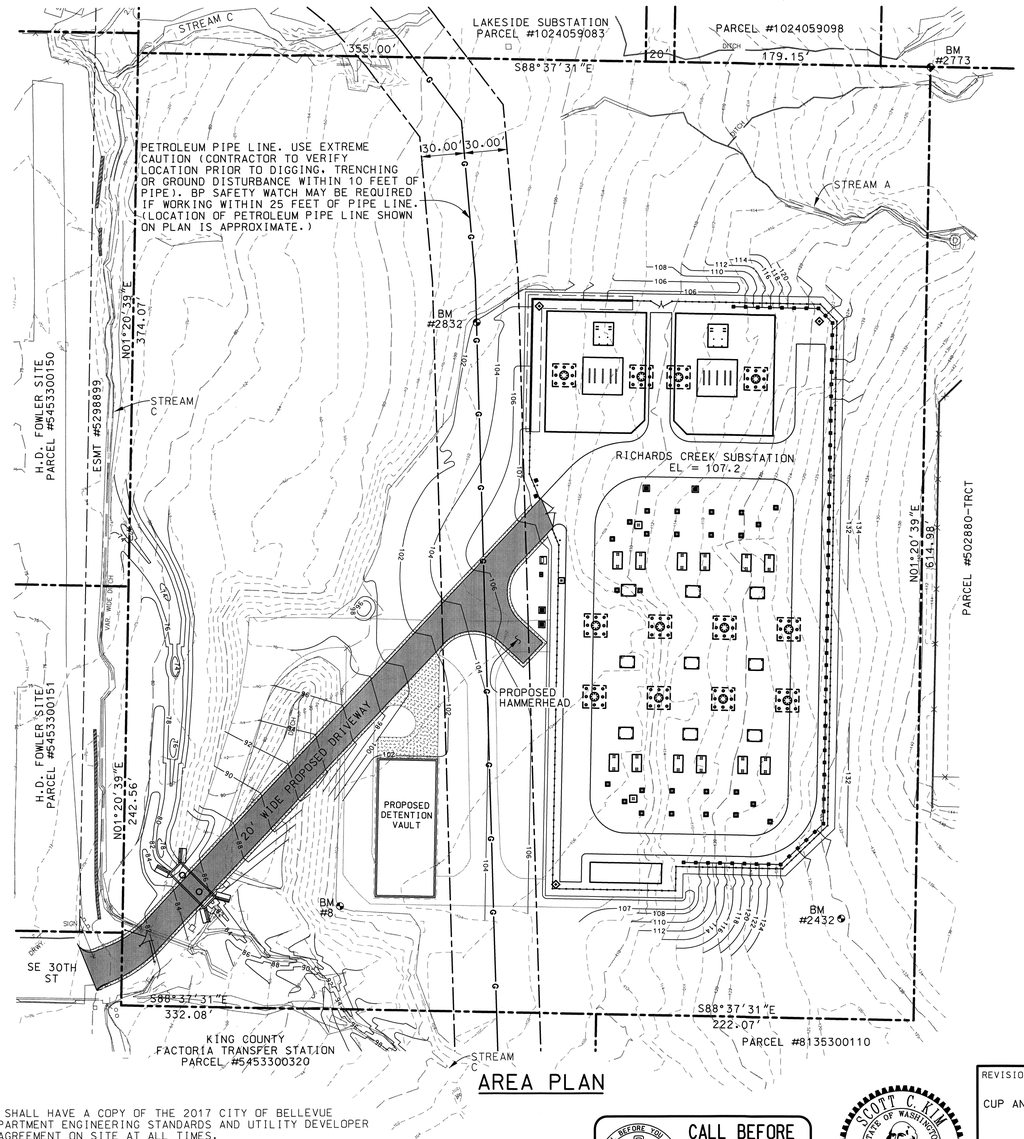
11. 1-800-424-5555 MUST BE CALLED NOT LESS THAN 48 HOURS BEFORE BEGINNING EXCAVATION WHERE ANY UNDERGROUND UTILITIES MAY BE LOCATED. FAILURE TO DO SO COULD MEAN BEARING SUBSTANTIAL REPAIR COSTS. (UP TO THREE TIMES THE COST OF REPAIRS TO THE SERVICE).

LEGAL DESCRIPTION:

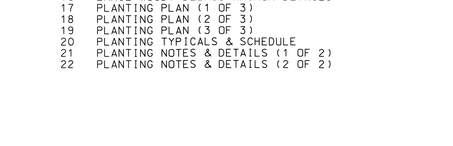
PARCEL C (TAX PARCEL 102405-9130):
THAT PORTION OF THE SOUTHEAST QUARTER OF THE NORTHWEST QUARTER OF SECTION 10, TOWNSHIP 24 NORTH, RANGE 5 EAST, W.M., IN KING COUNTY, WASHINGTON, DESCRIBED AS FOLLOWS:
BEGINNING AT THE NORTHWEST CORNER OF SAID SUBDIVISION;
THENCE SOUTHERLY ALONG THE WESTERLY MARGIN OF SAID SUBDIVISION 664.98 FEET, MORE OR LESS, TO THE NORTHWEST CORNER OF A TRACT CONVEYED TO KING COUNTY UNDER RECORDING NUMBER 5589770;
THENCE EASTERLY ALONG THE NORTH MARGIN OF SAID KING COUNTY TRACT, EXTENDED EASTERLY, A DISTANCE OF 554.152 FEET;
THENCE NORTHERLY PARALLEL TO THE WESTERLY MARGIN OF SAID SOUTHEAST QUARTER OF THE NORTHWEST QUARTER 664.98 FEET, MORE OR LESS, TO THE NORTH MARGIN OF SAID SUBDIVISION;
THENCE WESTERLY ALONG SAID NORTH MARGIN 554.152 FEET, MORE OR LESS, TO THE TRUE POINT OF BEGINNING.

SITE INFORMATION:

PROPERTY OWNER:	PUGET SOUND ENERGY
PARCEL NO:	102405-9130
ADDRESS:	13600 SE 30TH ST BELLEVUE, WA 98005
ZONING:	LI (LIGHT INDUSTRIAL)
LANDSCAPE SCREENING:	15' TYPE 1
COB UDEA #:	TBD
COB UTILITY GRID #:	I-11



AREA PLAN



PSE ENGINEERING CONTACTS
355 110TH AVE NE, BELLEVUE WA. 98004

GROUP	NAME	PHONE	EMAIL
PROJECT MANAGEMENT	MOLLY REED	425-462-3933	molly.reed@pse.com
ELECTRICAL	MIKE WOOD	425-647-1921	michael.wood@pse.com
CIVIL	SCOTT KIM	425-457-9866	scott.kim@pse.com
CONSTRUCTION MANAGEMENT	CODY SPENCE	425-456-2586	cody.spence@pse.com
CONTROLS	DAN MORMAN	425-456-2392	daniel.morman@pse.com
PERMITTING	BRAD STRAUCH	425-456-2556	bradley.strauch@pse.com

DRAWING LIST:

DRAWING NO:	SHEET NO:	TITLE:
D-19550	1	SITE LAYOUT AND GENERAL NOTES
D-19551	1	TOPOGRAPHIC AND BOUNDARY SURVEY (PARCEL C) #102405-9130
	2	TOPOGRAPHIC AND BOUNDARY SURVEY (PARCEL C) #102405-9130
D-19552	1	PRELIMINARY SITE PLAN B
	2	PRELIMINARY SITE PLAN B
D-19553	1	PRELIMINARY CLEARING, DEMOLITION AND TREE REMOVAL PLAN
D-19554	1	PRELIMINARY GRADING PLAN
	2	PRELIMINARY FENCING AND STATION DRIVEWAY LAYOUT PLAN
	3	PRELIMINARY SITE SECTION
	4	PRELIMINARY SITE SECTION
	5	PRELIMINARY ENTRANCE DRIVEWAY PLAN AND PROFILE
	6	PRELIMINARY ENTRANCE DRIVEWAY DETAIL
	7	PRELIMINARY GRADING SECTIONS AND DETAILS
	8	PRELIMINARY FENCING SECTIONS AND DETAILS
D-19555	1	LANDSCAPE PLAN 2
	2	LANDSCAPE DETAILS
D-18172	1	COVER SHEET
	2	GENERAL NOTES, TESC & QUANTITIES
	3	CONSTRUCTION SEQUENCE
	4	EXISTING CONDITIONS
	5	CHANNEL GRADING PLAN
	6	TESC & DEMOLITION PLAN
	7	TESC & DEMOLITION NOTES & DETAILS
	8	PROPOSED PLAN
	9	CULVERT DESIGN
	10	CULVERT & UTILITY CROSS-SECTION
	11	STATIONING & CROSS-SECTIONS
	12	STREAM CROSS-SECTIONS (1 OF 3)
	13	STREAM CROSS-SECTIONS (2 OF 3)
	14	STREAM CROSS-SECTIONS (3 OF 3) & PROFILE
	15	LARGE WOODY DEBRIS DETAILS
	16	LARGE WOODY DEBRIS ANCHOR DETAILS
	17	PLANTING PLAN (1 OF 3)
	18	PLANTING PLAN (2 OF 3)
	19	PLANTING PLAN (3 OF 3)
	20	PLANTING TYPICALS & SCHEDULE
	21	PLANTING NOTES & DETAILS (1 OF 2)
	22	PLANTING NOTES & DETAILS (2 OF 2)

NOTES:

1. CONTRACTOR SHALL HAVE A COPY OF THE 2017 CITY OF BELLEVUE UTILITY DEPARTMENT ENGINEERING STANDARDS AND UTILITY DEVELOPER EXTENSION AGREEMENT ON SITE AT ALL TIMES.
2. CRITICAL AREAS (WETLAND AND STREAM) ARE DEPICTED ON GRADING PLAN (D-18166, SHT 1).
3. NOTIFY BP PETROLEUM PRIOR TO ANY WORK.

CALL BEFORE YOU DIG
Call: TOLL FREE
1-800-424-5555

SCOTT C. KIM
STATE OF WASHINGTON
36044
REGISTERED
PROFESSIONAL ENGINEER

REVISION DESCRIPTION:	WO NUMBER: 111019489
CUP AND CALUP SUBMITTAL	

		DATE (M/D/Y)
CAD	J. Nelson	8/17/17
ENGINEER	S. KIM	08/17/17
REVIEWED		/ /
APPROVED	J. HENRY	08/17/17

SITE LAYOUT AND GENERAL NOTES
RICHARDS CREEK SUBSTATION

PUGET SOUND ENERGY
SUBSTATION ENGINEERING DEPARTMENT

DRAWING NO D-19550 | REV NO 0
SHEET: 1 OF 1
SCALE: 1"= 50'-0" | CLASS: SITE | FILE NO:
CADD NO: $$DGN$$ | CODE: RIC

DSD 000153

$USER$ $DATE$ $FILE$

WITHIN THE SW 1/4 OF THE NW 1/4 OF SECTION 10, T24N, R05E, BELLEVUE, WASHINGTON

LEGAL DESCRIPTIONS - PSE PROPERTIES

PARCEL A (TAX PARCEL 102405-9083):

THE WEST 260 FEET OF THE NORTH 230 FEET OF THE SOUTHWEST QUARTER OF THE NORTHEAST QUARTER OF THE NORTHWEST QUARTER;
EXCEPT PORTION THEREOF LYING WITHIN SOUTHEAST 26TH STREET;
AND WEST 355 FEET OF THE SOUTHWEST QUARTER OF THE NORTHEAST QUARTER OF NORTHWEST QUARTER;
EXCEPT THE NORTH 230 FEET THEREOF;

ALL IN SECTION 10, TOWNSHIP 24 NORTH, RANGE 5 EAST, W.M., IN KING COUNTY, WASHINGTON.

PARCEL B (TAX PARCEL 102405-9097):

THE EAST 20 FEET OF THE WEST 375 FEET OF THE SOUTHWEST QUARTER OF THE NORTHEAST QUARTER OF THE NORTHWEST QUARTER;
EXCEPT THE NORTH 230 FEET THEREOF; OF SECTION 10, TOWNSHIP 24 NORTH, RANGE 5 EAST, W.M., IN KING COUNTY, WASHINGTON.

PARCEL C (TAX PARCEL (TAX PARCEL 102405-9130):

THAT PORTION OF THE SOUTHEAST -QUARTER OF THE NORTHWEST QUARTER OF SECTION 10, TOWNSHIP 24 NORTH, RANGE 5 EAST, W.M., IN KING COUNTY, WASHINGTON, DESCRIBED AS FOLLOWS:

BEGINNING AT THE NORTHWEST CORNER OF SAID SUBDIVISION;
THENCE SOUTHERLY ALONG THE WESTERLY MARGIN OF SAID SUBDIVISION 664.98 FEET, MORE OR LESS, TO THE NORTHWEST CORNER OF A TRACT CONVEYED TO KING COUNTY UNDER RECORDING NUMBER 5589770;
THENCE EASTERLY ALONG THE NORTH MARGIN OF SAID KING COUNTY TRACT, EXTENDED EASTERLY, A DISTANCE OF 554.152 FEET;
THENCE NORTHERLY PARALLEL TO THE WESTERLY MARGIN OF SAID SOUTHEAST QUARTER OF THE NORTHWEST QUARTER 664.98 FEET, MORE OR LESS, TO THE NORTH MARGIN OF SAID SUBDIVISION;
THENCE WESTERLY ALONG SAID NORTH MARGIN 554.152 FEET, MORE OR LESS, TO THE TRUE POINT OF BEGINNING;
~~*EXCEPT THE SOUTH 50 FEET THEREOF DEEDED TO THE CITY OF BELLEVUE UNDER RECORDING NUMBER 8608150136~~.

*SINCE THIS LEGAL DESCRIPTION WAS CREATED THE SOUTH 50 FEET THEREOF DEEDED TO THE CITY OF BELLEVUE HAS REVERTED BACK TO PSE OWNERSHIP AS PER THE "NOTICE OF TERMINATION OF DEED OF DEDICATION", KING COUNTY RECORDING NUMBER 20151029000707.

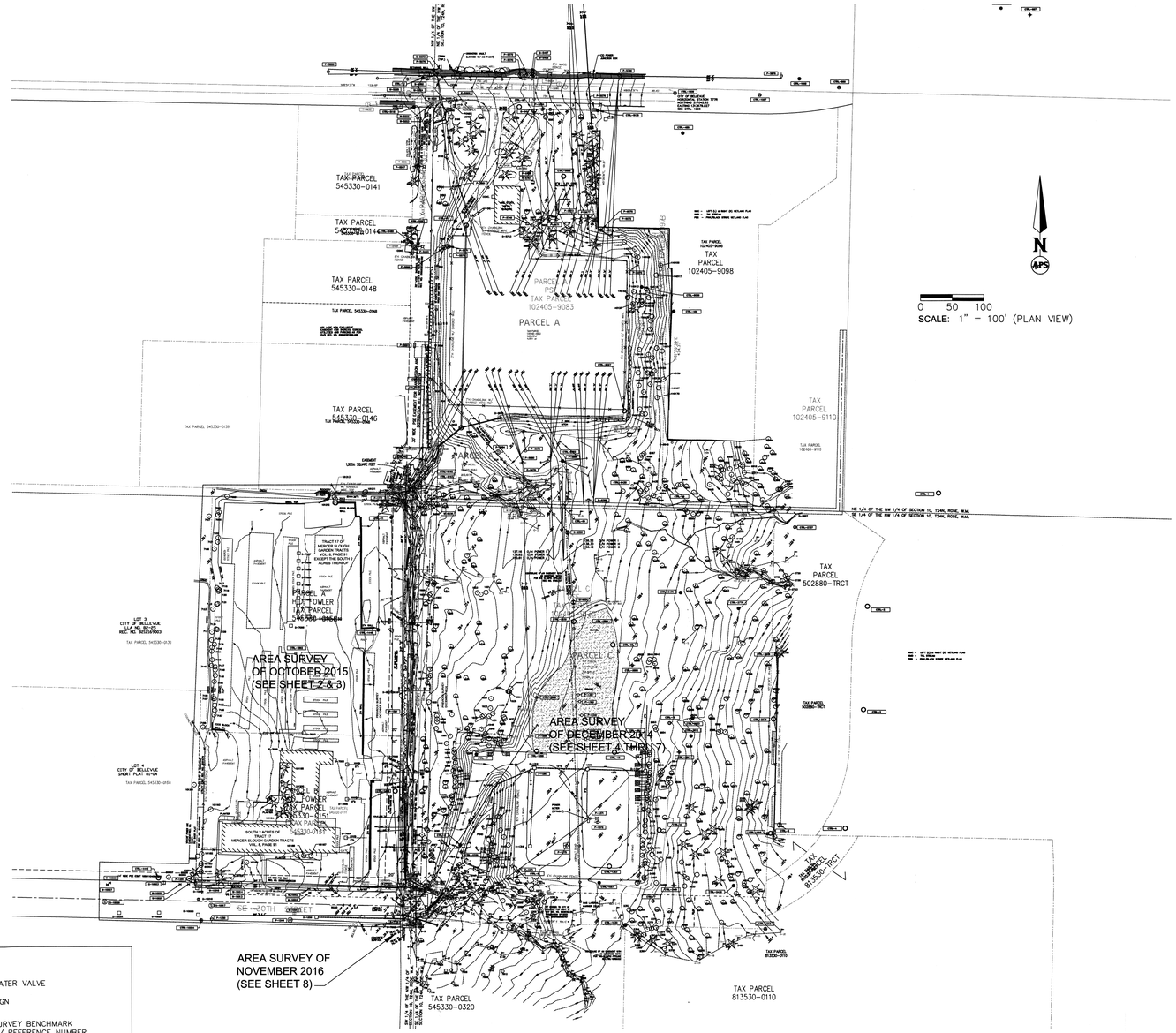
LEGAL DESCRIPTIONS - H.D. FOWLER PROPERTIES

PARCEL A (TAX PARCEL 545330-0150):

TRACT 17, MERCER SLOUGH GARDEN TRACTS, ACCORDING TO THE PLAT RECORDED IN VOLUME 8 OF PLATS, PAGE 91, IN KING COUNTY, WASHINGTON;
EXCEPT THE SOUTH 2 ACRES THEREOF;
TOGETHER WITH AN EASEMENT FOR INGRESS, EGRESS AND UTILITIES PURPOSES AS CREATED UNDER RECORDING NO. 5370143.

PARCEL B (TAX PARCEL 545330-0151):

THE SOUTH 2 ACRES OF TRACT 17, MERCER SLOUGH GARDEN TRACTS, ACCORDING TO THE PLAT THEREOF RECORDED IN VOLUME 8 OF PLATS, PAGE 91, IN KING COUNTY, WASHINGTON;
EXCEPT THE SOUTH 17.5 FEET AS CONVEYED BY DEED RECORDED UNDER RECORDING NUMBER 7103310534, IN KING COUNTY, WASHINGTON, FOR SOUTHEAST 30TH STREET.



DITCH LINE
GRAVELED AREA
ASPHALT PAVEMENT
FENCE LINE
CONC. ECO BLOCKS
POND
ROCKERY WALL
BUILDING
PROPERTY LINE
NEW X-SECTION LINE

SECTION LINE
1/16TH SECTION LINE
112 CONTOUR LINE (MINOR)
110 CONTOUR LINE (MAJOR)
B-1 NEW WETLAND FLAG (TWC-BLACK/PINK)
R1 NEW WETLAND FLAG (WMA-RIGHT BLUE/WHITE)
L1 NEW WETLAND FLAG (WMA-LEFT BLUE/WHITE)
A-1 NEW WETLAND FLAG
EDGE OF VEGETATION
D-1319 CB TYPE 1 W/ PIPE AND REFERENCE NUMBER
D-1409 STORM CULVERT AND REFERENCE NUMBER

100.9 GROUND SPOT ELEVATION
2840 DECIDUOUS TREE W/ REFERENCE NUMBER
2772 CONIFEROUS TREE W/ REFERENCE NUMBER
P-7701 TRANSMISSION POLE W/ REFERENCE NUMBER
① NEW WETLAND FLAG "DP-1"
② NEW WETLAND FLAG "TWL STREAM C WMCC-1R (9-17-5) FLAG"
③ NEW WETLAND FLAG "WMC-L2R FLAG"
④ NEW WETLAND FLAG "DP-2"

WATER VALVE
SIGN
CTRL-2339 SURVEY BENCHMARK W/ REFERENCE NUMBER
SURVEY WOOD HUB
SURVEY SET WOOD HUB
SURVEY FOUND REBAR AND CAP
SURVEY IRON PIPE
SURVEY SET NAIL
PLANTER
MAILBOXES
S-5062 SANITARY SEWER MANHOLE
SANITARY SEWER CLEANOUTS
BOLLARDS

STATE OF WASHINGTON SCOTT A. EDWARDS 41024 REGISTERED PROFESSIONAL LAND SURVEYOR 2/14/2017

Woman Owned Small Business VOSB cVE

APS SURVEY & MAPPING
13221 S.E. 26TH STREET, SUITE A
BELLEVUE, WASHINGTON 98005
TEL. (425) 746-3200
FAX: (425) 746-3342

LABOR CHARGE DESCRIPTIONS	ORDER NUMBER
TRANSMISSION CONSTRUCTION	
TRANSMISSION REMOVAL	
TRANSMISSION EXPENSE	

CURRENT REVISION DESCRIPTION:
12/7/16 – UPDATED ADDED OLYMPIC PIPELINE EASEMENTS, SHEET SETUP, AND TITLE
2/14/17 –ADDED WETLAND FLAGS & PROPOSED EASEMENTST

	APPROVAL	DATE (M/D/Y)
CADD/DRAFT	MAGG	/ /
SURVEYED BY	SAE	/ /
CHKD/APRVD	SAE	/ /
FOREMAN		/ /
LOG OUT	J. HENRY	08/17/17
		/ /

JOINT FACILITIES ARRANGEMENTS – OTHER UTIL.
J.F.N. NO.

PRIOR LINE NAME:
SURVEYOR/DATE:
EASEMENT: PERMIT & FRAN.:
DISTRICT OPER: T R Sect
REGION: PSE Map
COUNTY:
MAPPED: TSG Map

RICHARDS CREEK SUBSTATION MAPPING 2014-2016

PUGET SOUND ENERGY
MAJOR PROJECTS TRANSMISSION DEPARTMENT

DRAWING NO D-19551 REV NO 0
SHEET 01 OF 02
SCALE: SEE SCALE
CLASS:
MICROFILMED: FILE NO:
CADD NO:
CODE:

REV DATE DESCRIPTION

Plotted: DATE @ $TIME$ $USER$ REV DATE DESCRIPTION REV DATE DESCRIPTION REV DATE DESCRIPTION

DRAWING FILE NAME: P:\1005420\dwg\1005420T.dwg PLOTTED: Feb 15, 2017 - 2:38:07pm

DSD 000154

WITHIN THE NW 1/4 OF SECTION 10, TOWNSHIP 24 NORTH, RANGE 05 EAST, W.M., IN KING COUNTY, WASHINGTON

POWER STRUCTURE TABLE - (PARCEL C)

P-1232
TRANSMISSION POLE
(POLE ID @221581/167302)
1.2" X 3.85" GLU-LAM
N=215780.80
E=1313253.06
EL=81.00
Elevation Full Desc
80.30 NW COR. GLU LAM POLE
80.43 SW COR. GLU LAM POLE
81.00 SE COR. GLU LAM POLE
81.75 DOWN GUY (E)
82.30 DOWN GUY (NNE)
130.47 POWER INSULATOR C (W.)
132.86 POWER INSULATOR B (W.)
138.68 POWER INSULATOR A (W.)
140.13 POWER INSULATOR B (N.)
148.12 POWER INSULATOR A (N.)
147.73 POWER INSULATOR A (N.)
148.63 TOP OF POLE SOUTHWEST COR.

P-1239
POWER POLE
(POLE ID @221581/167302)
18" DIA. WOOD
N=215781.30
E=1313247.43
Elevation Full Desc
80.12 BASE OF POLE
97.93 O/H COMM A (N-S)
98.56 O/H COMM B (N-S)
100.64 POWER INSULATOR Y (N-S)
105.32 TOP OF POLE

P-1240
TRANSMISSION POLE
(NO POLE ID #)
24" DIA. STEEL
N=215736.95
E=1313254.99
Elevation Full Desc
80.63 BASE OF POLE
82.56 DOWN GUY (SE)
82.59 DOWN GUY (SE)
83.01 DOWN GUY (SE)
126.88 POWER INSULATOR F (NE)
127.88 POWER INSULATOR E (NE)
134.56 POWER INSULATOR D (NE)
134.95 POWER INSULATOR C (NE)
141.52 POWER INSULATOR B (NE)
142.26 POWER INSULATOR A (NE)
144.62 TOP OF POLE

P-1244
POWER POLE
(POLE ID @221575/167306)
18" DIA. WOOD
N=215726.17
E=1312947.37
Elevation Full Desc
80.17 POWER POLE
80.21 U/G CONDUIT 3.5 PVC EMPTY
80.82 DOWN GUY (S.)
81.86 DOWN GUY (E.)
100.33 O/H COMM B (N&W)
102.39 O/H COMM A (N&W)
105.96 POWER INSULATOR X
106.40 POWER INSULATOR Y (N&W)
107.39 TOP OF POLE

P-1249
DISTRIBUTION POLE W/ UG
(POLE ID# 221575/167292)
17' CLASS WOOD
N=215730.90
E=1312958.53
Elevation Full Desc
72.72 BASE OF POLE
94.35 O/H COMM "B"
95.08 O/H COMM "A"
99.01 POWER INSULATOR Y
105.95 TOP OF POLE

P-1250
TRANSMISSION POLE
(POLE ID @221576/167277)
18" DIA. WOOD
N=215732.36
E=1312944.16
Elevation Full Desc
68.68 TRANSMISSION POLE
122.71 POWER INSULATOR F
127.75 POWER INSULATOR E
132.75 POWER INSULATOR D
133.76 TOP OF POLE

P-1251
TRANSMISSION POLE
(POLE ID @221582/167297)
18" DIA. WOOD
N=215788.94
E=1312918.84
Elevation Full Desc
67.63 TRANSMISSION POLE
129.70 POWER INSULATOR C
134.56 POWER INSULATOR B
139.69 POWER INSULATOR A
140.52 TOP OF POLE

P-1271
POWER POLE W/LIGHT
(NO POLE ID #)
10" DIA. WOOD
N=215806.07
E=1313438.33
Elevation Full Desc
103.77 BASE OF POLE
126.96 POWER INSULATOR X (SW)
127.24 POWER INSULATOR X (NE)
128.00 TOP OF POLE

P-1287
GUY POLE (CONNECT TO P-1290)
(POLE ID @221600/167323)
12" DIA. WOOD
N=215965.20
E=1313448.74
Elevation Full Desc
100.36 BASE OF POLE
100.56 DOWN GUY
100.74 DOWN GUY (FARTHEST)
124.58 TOP OF POLE

P-1290
TRANSMISSION POLE
(POLE ID @221605/167323)
18" DIA. WOOD
N=216022.83
E=1313448.50
EL=100.94
Elevation Full Desc
100.83 DOWN GUY (FARTHEST)
100.86 DOWN GUY
100.94 BASE OF POLE
127.77 POWER INSULATOR X
143.45 O/H POWER F (SW.)
149.21 O/H POWER E (W.)
150.38 O/H POWER E (SW.)
152.28 O/H POWER D (S.)
158.00 O/H POWER D (S.)
158.08 O/H POWER D (N
161.44 TOP OF POLE

P-1347
POWER POLE TRAINING POLE
(NO POLE ID #)
E=1313537.10
EL=100.66

P-1348
POWER POLE TRAINING POLE
N=216030.55
E=1313534.34
EL=102.45

P-1349
POWER POLE TRAINING POLE
N=216005.67
E=1313530.90
Elevation Full Desc
102.91 BASE OF POLE
103.30 TOP OF POLE

P-1350
POWER POLE TRAINING POLE
N=216077.24
E=1313527.90
Elevation Full Desc
105.56 BASE OF POLE
131.16 TOP OF POLE

P-1351
POWER POLE TRAINING POLE
N=216086.18
E=1313530.37
Elevation Full Desc
102.39 BASE OF POLE
131.46 TOP OF POLE

P-1371
POWER POLE W/LIGHT
(NO POLE ID #)
10" DIA. WOOD
N=215892.30
E=1313544.71
Elevation Full Desc
104.36 BASE OF POLE
131.07 POWER INSULATOR X
131.75 TOP OF POLE

P-1372
TRANSMISSION POLE
(NO POLE ID #)
24" DIA. STEEL
N=215886.45
E=1313555.79
EL=104.97

P-1375
TRANSMISSION POLE
(NO POLE ID#)
24" DIA. STEEL
W/ POWER VAULT W/
POLE AND CONED IN BOTTOM
W/ FIXED LADDER
N=215886.72
E=1313505.72
Elevation Full Desc
104.17 BASE OF POLE

P-1391
TRANSMISSION POLE
(POLE ID# 222605/167323)
18" DIA. WOOD
N=216055.94
E=1313248.31
Elevation Full Desc
75.63 TRANSMISSION POLE
104.58 O/H POWER
128.52 POWER INSULATOR B
128.37 POWER INSULATOR C
131.14 POWER INSULATOR A
131.61 TOP OF POLE

TREE TABLE - (PARCEL C)

REF'S.	TREE DESC.	DIA. (INCHES)
1165	ALDER	14
1222	POPLAR	10 6
1223	POPLAR	10
1224	POPLAR	8
1443	CEDAR	36
1733	ALDER	9
1769	MAPLE	10 (2)6 6 (2)4
1770	ALDER	10
1808	ALDER	14 9 8
1810	ALDER	13 11 9
1811	ALDER	8
1812	ALDER	21
1820	ALDER	24
1821	ALDER	20
1822	MAPLE	11
1823	MAPLE	24
1824	MAPLE	24
1827	MAPLE	22 (2)15
1829	MAPLE	24 21 18 13
1830	MAPLE	13
1831	MAPLE	(2)15 14
1900	ALDER	10 9
1901	ALDER	9
1902	ALDER	8
1903	ALDER	8
1904	MAPLE	10
1905	ALDER	14
1908	ALDER	24
1908	ALDER	(2)12 10 9 (2)8 (2)6 CLUSTER
1908	ALDER	9
1910	ALDER	15 (2)8
1911	ALDER	10
1913	ALDER	10 9
1914	MAPLE	(2)12 11
1915	MAPLE	(2)18 11
1916	ALDER	11 5
1917	ALDER	9
1918	ALDER	9
1919	ALDER	11
1921	MAPLE	18 15 10 (2)8
1922	ALDER	13
1923	MAPLE	26 14
1924	ALDER	24
1925	ALDER	20
1926	ALDER	14
1927	ALDER	18
1928	MAPLE	9
1929	ALDER	13
1930	ALDER	13
1931	ALDER	13
1932	ALDER	12
1933	ALDER	11
1934	ALDER	22
1935	ALDER	12 9 8 (2)6 5 CLUSTER
1936	ALDER	9
1937	ALDER	8
1938	ALDER	16
1939	POPLAR	(2)12
1940	ALDER	16
1941	ALDER	9 (2)8 7
1942	ALDER	9
1943	ALDER	9
1944	ALDER	8
1945	ALDER	12
1946	ALDER	9
1947	ALDER	10
1948	ALDER	14
1949	ALDER	12
1950	ALDER	8
1951	ALDER	14
1952	ALDER	13
1953	ALDER	8
1954	ALDER	12
1955	ALDER	14
1956	ALDER	18
1957	ALDER	14
1958	ALDER	14
1959	ALDER	12
1960	ALDER	9 15
1961	POPLAR	12
1962	POPLAR	12 10
1964	ALDER	12
1965	ALDER	10 (2)9
1966	ALDER	9
1967	ALDER	9
1968	ALDER	9 10 7 5
1969	MAPLE	10
1970	ALDER	9 (2)7
1971	ALDER	9 11
1972	ALDER	9 8
1973	ALDER	8
1974	ALDER	10 (2)9 6
1975	MAPLE	8
1976	ALDER	11 7
1977	ALDER	9 7
1978	ALDER	11
1979	ALDER	14 4
1980	ALDER	10
1981	ALDER	9
1982	ALDER	9 8 7
1983	ALDER	18
1988	ALDER	12 10 6
1990	ALDER	12
1991	ALDER	12
1992	ALDER	13
1993	ALDER	8
1994	ALDER	9 5
1995	ALDER	10
1997	ALDER	8
2032	MAPLE	15
2033	ALDER	11
2034	ALDER	9 7
2035	ALDER	8
2037	ALDER	9
2038	ALDER	(2)8 6 5 CLUSTER
2072	ALDER	9
2073	ALDER	8 5
2074	ALDER	12 11
2075	ALDER	(2)9
2076	ALDER	9
2077	ALDER	9 8
2078	ALDER	10 9 6 5
2079	ALDER	8 7
2080	ALDER	9
2081	ALDER	10
2082	ALDER	9
2123	ALDER	12
2124	MAPLE	10
2125	ALDER	8
2126	ALDER	14
2127	MAPLE	9
2128	MAPLE	11
2129	ALDER	12 10 9 7
2130	ALDER	8
2131	ALDER	8
2132	ALDER	9 8
2133	ALDER	9
2134	ALDER	12
2135	ALDER	8 5
2136	ALDER	8
2137	MAPLE	8
2138	ALDER	9 4
2139	ALDER	11
2140	ALDER	11
2141	MAPLE	(2)10
2142	MAPLE	8 5 4
2143	ALDER	10 8
2144	ALDER	14
2145	ALDER	9
2146	ALDER	9
2147	ALDER	9
2148	ALDER	10
2149	POPLAR	12 6
2150	POPLAR	14 12 10
2151	POPLAR	10
2152	POPLAR	CLUSTER 15 TREES 3"-9" (15' DIA.)
2153	POPLAR	8
2154	POPLAR	9
2256	ALDER	8
2257	ALDER	8
2258	ALDER	9
2259	ALDER	12
2260	ALDER	9
2261	ALDER	8
2262	ALDER	9
2263	ALDER	8
2264	ALDER	10 5
2270	MAPLE	18
2271	ALDER	8
2272	MAPLE	9 8
2273	ALDER	12
2274	MADRONA	10
2285	ALDER	14
2286	ALDER	8
2287	ALDER	10 9
2288	ALDER	9
2289	ALDER	15
2300	POPLAR	11
2301	ALDER	10 9 6 6
2304	POPLAR	9
2305	POPLAR	10
2308	POPLAR	8
2308	MADRONA	(2)12
2317	ALDER	9
2353	CHERRY	12
2354	CHERRY	9 7 5
2355	MAPLE	28 12 8
2356	MAPLE	20
2357	MAPLE	(2)8
2362	ALDER	28
2363	MAPLE	12 18 9
2364	MAPLE	18
2365	MAPLE	20
2366	ALDER	9
2367	CEDAR	12
2370	CEDAR	14
2371	CEDAR	36
2372	MAPLE	18 8
2373	MAPLE	16
2374	MAPLE	16
2375	MAPLE	20 18
2376	MAPLE	14
2377	MAPLE	18
2378	MAPLE	12
2379	ALDER	11
2382	ALDER	8
2403	ALDER	7
2404	ALDER	15
2405	ALDER	9
2406	ALDER	11
2407	ALDER	11
2408	ALDER	10
2409	ALDER	12
2410	ALDER	10
2411	ALDER	11
2412	ALDER	10
2413	ALDER	8
2414	ALDER	11 9
2415	ALDER	11 9
2416	ALDER	18
2417	MAPLE	8
2418	ALDER	16 7
2419	ALDER	10 8
2420	ALDER	9
2421	ALDER	16
2422	FIR	16
2423	FIR	10
2424	MAPLE	20 18 (2)15 10 8
2425	MAPLE	12
2428	MAPLE	18
2427	MAPLE	20
2428	MAPLE	15 14
2433	MAPLE	12
2434	MAPLE	22 13 9
2435	MAPLE	9
2436	MAPLE	12
2437	MAPLE	12
2438	MAPLE	24
2439	MAPLE	18
2440	MAPLE	18
2441	MAPLE	8
2442	MAPLE	18 14
2443	MAPLE	12
2447	MAPLE	22
2450	MAPLE	15
2451	CEDAR	28
2452	MAPLE	26 (2)18
2456	MAPLE	24
2458	MAPLE	8 6
2460	MAPLE	24
2461	MAPLE	12
2462	HEMLOCK	8 (2)5
2463	MAPLE	14
2464	MAPLE	15 12
2465	MAPLE	20 9
2466	MAPLE	8
2470	MAPLE	22 10 8
2472	MAPLE	8
2473	MAPLE	14 4
2474	MAPLE	18
2475	MAPLE	20
2476	FIR	24
2477	MAPLE	16
2478	MAPLE	16
2479	MAPLE	11
2481	MAPLE	11
2482	MAPLE	18
2483	CEDAR	9
2484	ALDER	9
2485	MAPLE	8
2486	ALDER	14
2487	ALDER	8
2488	ALDER	8 12 5 5
2489	ALDER	9
2500	ALDER	9
2501	ALDER	14
2502	ALDER	9 8 7
2503	ALDER	9 8
2504	ALDER	12
2505	ALDER	8
2506	ALDER	(2)14
2507	ALDER	10
2508	ALDER	15 (2)11
2509	ALDER	8
2510	ALDER	14
2511	ALDER	8
2512	ALDER	9 8
2513	ALDER	11
2514	ALDER	9
2515	ALDER	9
2516	ALDER	8
2517	ALDER	9
2518	ALDER	9
2519	ALDER	12 7
2520	ALDER	9
2524	ALDER	(2)9
2525	FIR	34
2526	FIR	18
2527	MADRONA	24
2528	MADRONA	9
2529	FIR	9
2530	MAPLE	(2)22
2531	MAPLE	10
2532	MAPLE	20
2534	MAPLE	8
2535	MAPLE	8
2536	FIR	30
2537	MAPLE	9
2547	POPLAR	18
2548	ALDER	10
2570	MAPLE	15
2571	MAPLE	27 (2)20 18 9
2572	MAPLE	24 12
2573	MAPLE	18 17
2574	MAPLE	14 7
2575	MAPLE	12 7
2578	MAPLE	14 10 7
2588	POPLAR	8
2589	ALDER	8
2590	ALDER	9
2591	MAPLE	24 8
2592	MAPLE	10
2593	MAPLE	11 9
2594	MAPLE	30 15
2595	MAPLE	24
2596	MAPLE	18 (2)15
2597	MAPLE	18
2598	MAPLE	30 14
2599	MAPLE	24 18
2600	MAPLE	20
2601	MAPLE	24 13
2602	MAPLE	24 13
2603	MAPLE	14
2605	MAPLE	24
2606	MAPLE	22
2627	ALDER	12 10 8
2628	MAPLE	22
2629	MAPLE	8
2630	MAPLE	CLUSTER (2)22 15 13 11 9
2632	MAPLE	24 18 16
2634	MAPLE	20 12
2635	MAPLE	10 9
2636	MAPLE	20 12
2637	MAPLE	22 15
2638	MAPLE	13
2639	MAPLE	24 9
2640	ALDER	12
2641	POPLAR	12
2642	MAPLE	22 10
2643	MAPLE	22
2644	MAPLE	22
2645	MAPLE	(2)12 9
2646	MAPLE	24
2650	MAPLE	CLUSTER 18 16 15 13 12 12 10
2652	MAPLE	CLUSTER (2)22 (2)18 (2)9 (2)6
2653	MAPLE	30 25
2654	MAPLE	(2)20
2665	MAPLE	30
2667	CEDAR	24
2668	CEDAR	24
2669	CEDAR	9
2727	ALDER	10
2728	ALDER	9
2729	ALDER	8
2730	ALDER	10
2731	ALDER	12
2732	ALDER	8
2733	MAPLE	24
2734	ALDER	8
2735	ALDER	48
2736	MAPLE	24
2744	ALDER	15
2750	MAPLE	9
2751	MAPLE	24 18
2752	MAPLE	8
2753	MAPLE	16 30
2757	ALDER	(2)9
2758	FIR	10
2766	MAPLE	22 (2)20
2769	MAPLE	20 18
2835	MAPLE	CLUSTER 15 13 (2)12 10 (2)9
2836	MAPLE	15
2837	MAPLE	20
2838	MAPLE	CLUSTER 18 16 14 (2)12 10
2844	POPLAR	10
6025	DECIDUOUS	8
6026	DECIDUOUS	10 8
6229	ALDER	8
6231	MAPLE	14
6233	ALDER	10
6235	ALDER	12
6237	ALDER	10
6240	ALDER	10 8
6241	ALDER	10 12
6242	ALDER	10 8 (2)6
6411	MAPLE	14 8 10
6412	MAPLE	12 12 10 8 6
6413	DECIDUOUS	14
6420	ALDER	10 8
6421	DECIDUOUS	12
6470	ALDER	12 8
6471	ALDER	14
6472	MAPLE	28
6473	MAPLE	(2)12
6475	MAPLE	14
6476	MAPLE	18
6478	MAPLE	12 10
6479	MAPLE	18
6480	MAPLE	36 20
6481	MAPLE	22
6482	MAPLE	20
6483	MAPLE	20
6485	ALDER	17
6486	ALDER	17
6487	ALDER	18 (SNAG)
6488	CEDAR	12
6489	CEDAR	34
6490	MAPLE	36
6491	ALDER	10
6492	MAPLE	28
6493	ALDER	16
6494	ALDER	10
6495	MAPLE	(2)10
6496	ALDER	16
6497	ALDER	12
6498	ALDER	12
6499	ALDER	14
6500	ALDER	12
6501	ALDER	10
6502	ALDER	12

SURVEY CONTROL MONUMENTS TABLE - (PARCEL C)

CTRL-2
SPIKE SET W/ CAP
N=215228.55
E=1313663.35
EL=174.20

CTRL-3
SPIKE SET W/ CAP
N=215064.64
E=1313678.80
EL=161.64

CTRL-4
SPIKE SET W/ CAP
N=215677.05
E=1313947.79
EL=149.26

CTRL-5
SPIKE SET W/ CAP
N=215660.01
E=1313829.82
EL=140.83

CTRL-6
SPIKE SET W/ CAP
N=215974.06
E=1313653.18
EL=118.30

CTRL-7
REBAR/CAP SET 5/8IN
N=215781.20
E=1313643.32
EL=114.62

CTRL-8
HUB FND
N=215796.04
E=1313420.82
EL=102.98

CTRL-9
NAIL FOUND MNW KC CON
N=215848.52
E=1313338.16
EL=80.27

CTRL-10
NAIL SET MNW
N=215729.61
E=1313220.23
EL=77.41

CTRL-11
NAIL SET MNW
N=215369.56
E=1313229.82
EL=75.31

CTRL-16
NAIL SET MNW
N=215734.21
E=1313230.54
EL=77.93

CTRL-17
NAIL SET MNW
N=215903.79
E=1313363.94
EL=88.64

CTRL-18
SPIKE SET W/ CAP
N=215997.26
E=1313582.59
EL=102.93

CTRL-19
REBAR/CAP SET 5/8
N=216043.34
E=1313689.78
EL=115.39

CTRL-64
HUB SET
N=215369.34
E=1313518.12
EL=94.96

CTRL-65
SPIKE SET W/CAP
N=216168.05
E=1313580.16
EL=103.63

CTRL-1006
CITY OF BELLEVUE
HORIZONTAL STATION 777R
N=217042.62
E=1313679.827
EL=118.13

CTRL-104
BENCH MARK FND COB 104
N=217042.26
E=1312020.58
EL=80.89

CTRL-1001
MON FND W/C
N=217070.02
E=1313682.80
EL=81.50

CTRL-1002
MON FND W/C
N=217053.46
E=1311972.38
EL=80.21

CTRL-1016
REBAR/CAP FND 1/2IN DEA
N=215848.52
E=1313338.16
EL=80.27

CTRL-1018
REBAR/CAP FND 5/8
N=215727.22
E=1313621.24
EL=77.41

CTRL-1027
REBAR/CAP FND 5/8IN
N=215789.77
E=1313508.21
EL=75.31

CTRL-1030
REBAR/CAP FND 1/2IN DEA
N=215723.21
E=1313598.46
EL=77.93

CTRL-1255
SPIKE SET W/ CAP WK PT
N=215903.79
E=1313439.30
EL=100.38

CTRL-1322
SPIKE SET W/ CAP
N=215816.25
E=1313574.34
EL=106.23

CTRL-1448
NAIL FOUND MNW
N=216190.85
E=1313208.43
EL=75.46

CTRL-1449
MON FND
N=215935.14
E=1313235.28
EL=76.51

CTRL-1892
BOLT ON LIGHT POLE
W/ SPEAKER
N=216153.47
E=1313078.02
EL=84.02

CTRL-2326
LEAD/TACK FND GE 1 BORE
N=215538.84
E=1313338.73
EL=87.27

CTRL-2431
LEAD/TACK FND GE 1 BORE
N=215778.13
E=1313678.53
EL=116.30

CTRL-2432
REBAR/CAP FND 5/8 INCH
N=215785.82
E=1313771.17
EL=129.05

CTRL-2576
SPIKE SET W/ CAP
N=216048.97
E=1313634.43
EL=140.88

CTRL-2606
REBAR/CAP SET WK PT
N=216152.58
E=1313638.33
E=1313624.58
EL=138.13

CTRL-2611
REBAR/CAP FND 5/8
N=216024.92
E=1313624.08
EL=110.09

CTRL-2612
REBAR/CAP FND 5/8
N=216023.18
E=1313706.11
EL=118.77

CTRL-2613
LEAD/TACK FND G 1 BORE
N=215997.38
E=1313685.09
EL=118.88

CTRL-2633
NAIL FOUND BRASS W/ WA
N=216050.13
E=1313706.31
EL=123.06

CTRL-2737
REBAR/CAP SET 5/8 WK PT
N=216354.38
E=1313684.67
EL=132.71

CTRL-2770
REBAR/CAP FND 5/8
N=216225.54
E=1313779.41
EL=123.67

CTRL-2773
MON FND
N=216381.56
E=1313636.47
EL=127.78

CTRL-2832
SPIKE SET W/CAP
N=216204.66
E=1313518.66
EL=101.70

CTRL-2850
LEAD/TACK FND GE1 BORE
N=216135.39
E=1313611.09
EL=106.39

CTRL-2851
LEAD/TACK FND GE1 BORE
N=216200.40
E=1313585.43
EL=102.61

CTRL-2966
LEAD/TACK FND GE BORE
N=216459.26
E=1313459.26
EL=100.78

CTRL-6479
REBAR/CAP FND 5/8
N=216250.48
E=1313637.73
EL=113.35

STORM DRAIN TABLE (PARCEL C)

D-1145
CB TYPE 1
RIM EL=80.38
IE 12" CONC (W)=75.06
IE 8" PVC (S)=78.63

D-1146
CULVERT (INCOMING)
IE 8" PVC (W)=78.48

D-1220
CULVERT (INCOMING)
IE 18" CMP (NW)=81.17

D-1221
CULVERT (OUTGOING)
IE 18" CMP (SE)=78.25

D-1228
STORM MANHOLE
RIM EL=87.72
WATER LEVEL EL=84.19
IE 12" CONC (SE)=83.04
IE 12" CMP (NE)=83.04
BOTTOM STRUCT.=79.09

D-1229
CULVERT (OUTGOING)
PLUGGED UNDER WATER
IE 12" CONC (NW)=82.73

D-1252
CB TYPE 1
RIM EL=73.30
IE 12" CONC (E)=69.30

D-1318
CB TYPE 1
RIM EL=102.56
IE 6" CONC (TO VAULT)=96.51
IE 6" CONC (N)=96.46

D-1319
CB TYPE 1
RIM EL=100.10
IE 8" CONC (1318)=95.81
IE 12" CMP (1320)=95.72
IE 12" CMP (1409)=95.65

D-1320
CB TYPE 1
EL=102.11
IE 12" CMP (E)=98.17
IE 12" CMP (W)=98.09
IE 6" CMP (S)=98.55

D-1324
CB TYPE 1
EL=102.76
IE 12" CMP (W)=100.31
IE 8" PVC (N)=100.53
IE 6" PVC (S)=100.60

D-1409
CULVERT (OUTGOING)
IE 12" CMP (NE)=86.61

D-2723
STORM MANHOLE
LID EL=127.86
IE 18" CONC (S)=125.29

D-2527
CULVERT (OUTGOING)
IE 18" CONC (E)=129.19

D-2926
CULVERT IN 18 CMP
N=215769.37
E=1313315.52
IE 18" CMP (W)=81.26

D-2927
CULVERT OUT 18 CMP
N=215782.06
E=1313283.06
IE 18" CMP (E)=79.29

WATER STRUCTURE TABLE (PARCEL C)

W-5239
WELL HEAD
N=216390.78
E=1313291.33
LID EL=88.60
KNUCKLE EL=86.62

GAS TABLE (PARCEL C)

G-6355
CATHODIC STATION
A 3" PVC W/ CAP
1.5'H FOR
"OLYMPIC PETROLEUM PIPELINE"
N=216346.07
E=1313508.82
EL=93.52

G-6351
CATHODIC STATION
A 3" PVC W/ CAP
1.5'H FOR
"OLYMPIC PETROLEUM PIPELINE"
N=216234.85
E=1313517.65
EL=98.29

MISCELLANEOUS TABLE (PARCEL C)

M-6300
UNKNOWN PIPE
N=216385.60
E=1313430.79
IE 12" DI (W)=71.57

M-6301
UNKNOWN PIPE
N=216384.84
E=1313446.48
IE 12" DI (E)=71.75

LEGAL DESCRIPTIONS, GENERAL NOTES - (REFER TO SHEET 1 OF 2)
SURVEY CONTROL TABLE FOR PARCEL C - (REFER TO THIS SHEET)
UTILITIES TABLE FOR PARCEL C - (REFER TO THIS SHEET)

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STATE OF WASHINGTON
SCOTT A. EDWARDS
41024
REGISTERED
PROFESSIONAL LAND SURVEYOR
5-22-2015

Woman Owned Small Business
VOSB
cVE

APS
SURVEY & MAPPING
13221 S.E. 26TH STREET, SUITE A
BELLEVUE, WASHINGTON 98005
TEL. (425) 746-3200
FAX: (425) 746-3342
DRAWING: 1005347 / 1005347T-2015.DWG

REVISION DESCRIPTION:	WO NUMBER:	
		DATE (M/D/Y)
CAD	J. Nelson	8/14/17
ENGINEER	S. Kim	08/14/17
REVIEWED		/ /
APPROVED	J. Henry	08/17/17

RICHARDS CREEK SUBSTATION MAPPING 2014-2016

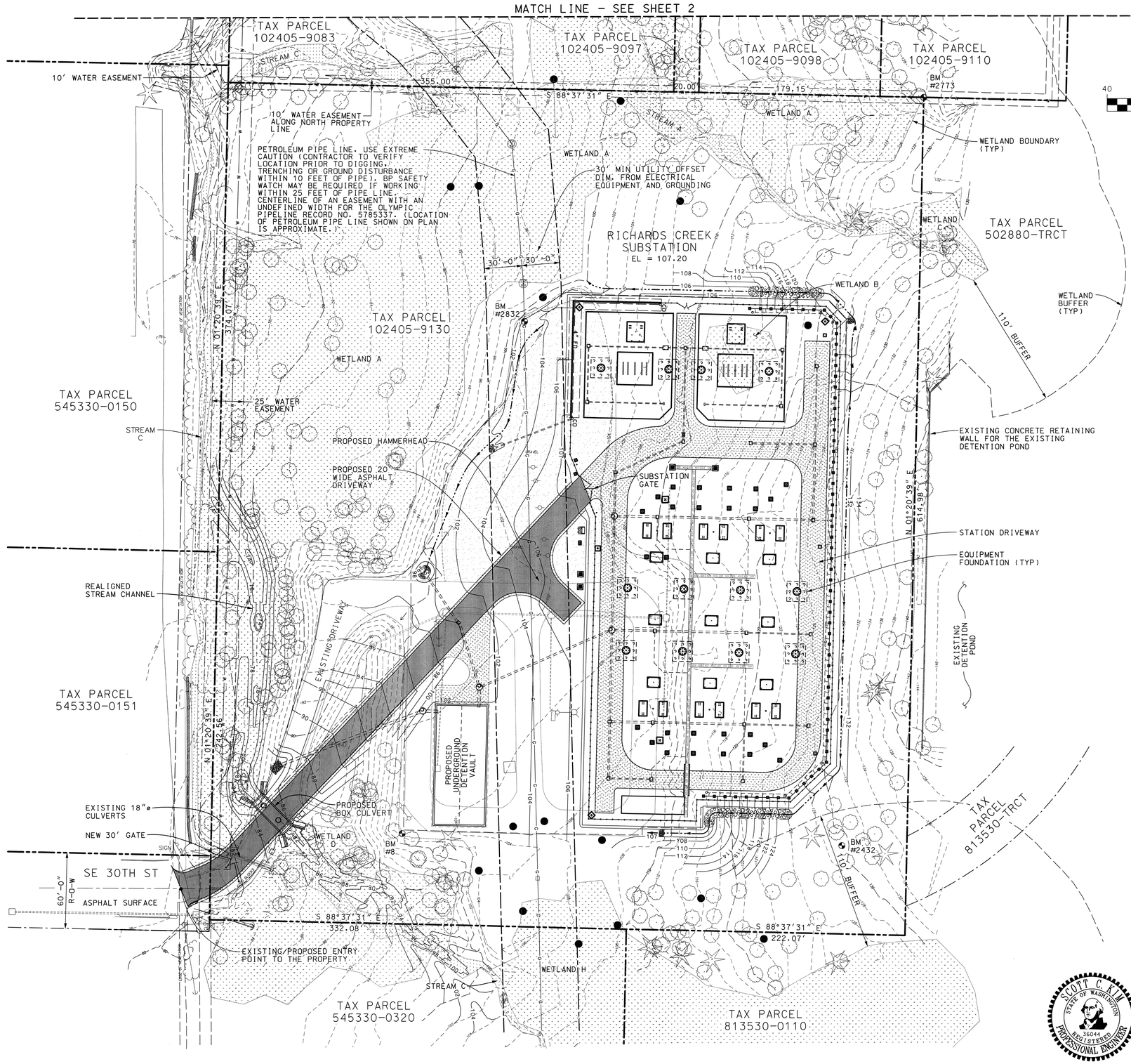
PUGET SOUND ENERGY
SUBSTATION ENGINEERING DEPARTMENT
DRAWING NO: D-19551
REV NO: 0
SHEET: 02 OF 02
SCALE: 1"= 50'
CLASS: SITE
FILE NO:
CODE:
CADD NO: $$DGN$$

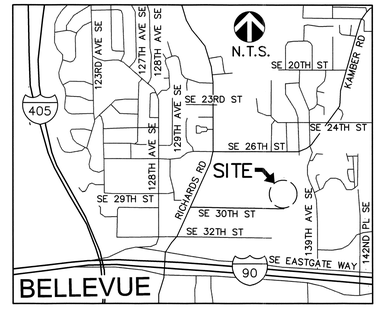
$USER$
$DATE$
$FILE$

DSD 000155

SECTION 10, TOWNSHIP 24 NORTH, RANGE 5 EAST, W.M.

CITY OF BELLEVUE, KING COUNTY, WASHINGTON





VICINITY MAP

LEGAL DESCRIPTION:

PARCEL C:
THAT PORTION OF THE SOUTHEAST QUARTER OF THE NORTHWEST QUARTER OF SECTION 10, TOWNSHIP 24 NORTH, RANGE 5 EAST, W.M., IN KING COUNTY, WASHINGTON, DESCRIBED AS FOLLOWS:
BEGINNING AT THE NORTHWEST CORNER OF SAID SUBDIVISION;
THENCE SOUTHERLY ALONG THE WESTERLY MARGIN OF SAID SUBDIVISION 664.98 FEET, MORE OR LESS, TO THE NORTHWEST CORNER OF A TRACT CONVEYED TO KING COUNTY UNDER RECORDING NUMBER 5589770;
THENCE EASTERLY ALONG THE NORTH MARGIN OF SAID KING COUNTY TRACT, EXTENDED EASTERLY, A DISTANCE OF 554.152 FEET;
THENCE NORTHERLY PARALLEL TO THE WESTERLY MARGIN OF SAID SOUTHEAST QUARTER OF THE NORTHWEST QUARTER 664.98 FEET, MORE OR LESS, TO THE NORTH MARGIN OF SAID SUBDIVISION;
THENCE WESTERLY ALONG SAID NORTH MARGIN 554.152 FEET, MORE OR LESS, TO THE TRUE POINT OF BEGINNING.

SITE INFORMATION:

PROPERTY OWNER:	PUGET SOUND ENERGY
PROJECT CONTACT:	MOLLY REED PHONE NO.:425-462-3933 EMAIL: MOLLY.REED@PSE.COM
PARCEL NO:	102405-9130
ADDRESS:	13600 SE 30TH ST BELLEVUE, WA 98005
ZONING:	LI (LIGHT INDUSTRIAL)
LANDSCAPE SCREENING:	LANDSCAPE TYPE 1A
COB UDEA #:	TBD
COB UTILITY GRID #:	I-11
PROPERTY SIZE:	8.46 ACRES
TOTAL PROJECT SITE AREA:	4.0 ACRES
TOTAL IMPERVIOUS AREA:	1.1 ACRES
TOTAL PERVIOUS AREA:	2.9 ACRES

LEGEND

- PROPERTY LINE
- EXISTING CONTOURS
- PROPOSED CONTOURS
- WETLAND BUFFER
- FENCE
- SOLDIER PILE WALL
- PROPOSED DRAINAGE PIPE
- EXISTING DRAINAGE PIPE
- PROPOSED DRAINAGE DITCH
- EXISTING CATCH BASIN
- PROPOSED CATCH BASIN, TYPE 1
- PROPOSED CATCH BASIN, TYPE 2
- PROPOSED GATE VALVE
- PROPOSED FOUNDATION
- PROPOSED VAULT
- PROPOSED STATION DRIVEWAY (GRAVEL)
- PROPOSED ACCESS DRIVEWAY (ASPHALT)
- PROPOSED TRANSMISSION POLE
- SURVEY BENCHMARK W/REFERENCE NUMBER
- PROPOSED CABLE TRENCH
- EXISTING YARD LIGHT
- EXISTING WATER VALVE

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SCOTT C. KIM
STATE OF WASHINGTON
36044
REGISTERED
PROFESSIONAL ENGINEER

REVISION DESCRIPTION:	WO NUMBER: 111019489	
CUP AND CALUP SUBMITTAL		

PRELIMINARY SITE PLAN B
RICHARDS CREEK SUBSTATION

		DATE (M/D/Y)
CAD	J. Nelson	8/22/17
ENGINEER		/ /
REVIEWED		/ /
APPROVED	J. Henry	08/22/17

PUGET SOUND ENERGY — SUBSTATION ENGINEERING DEPARTMENT

DRAWING NO: D-19552 — REV NO: 0

SHEET: 1 OF 2

SCALE: 1"= 40'-0" — CLASS: SITE

FILE NO:

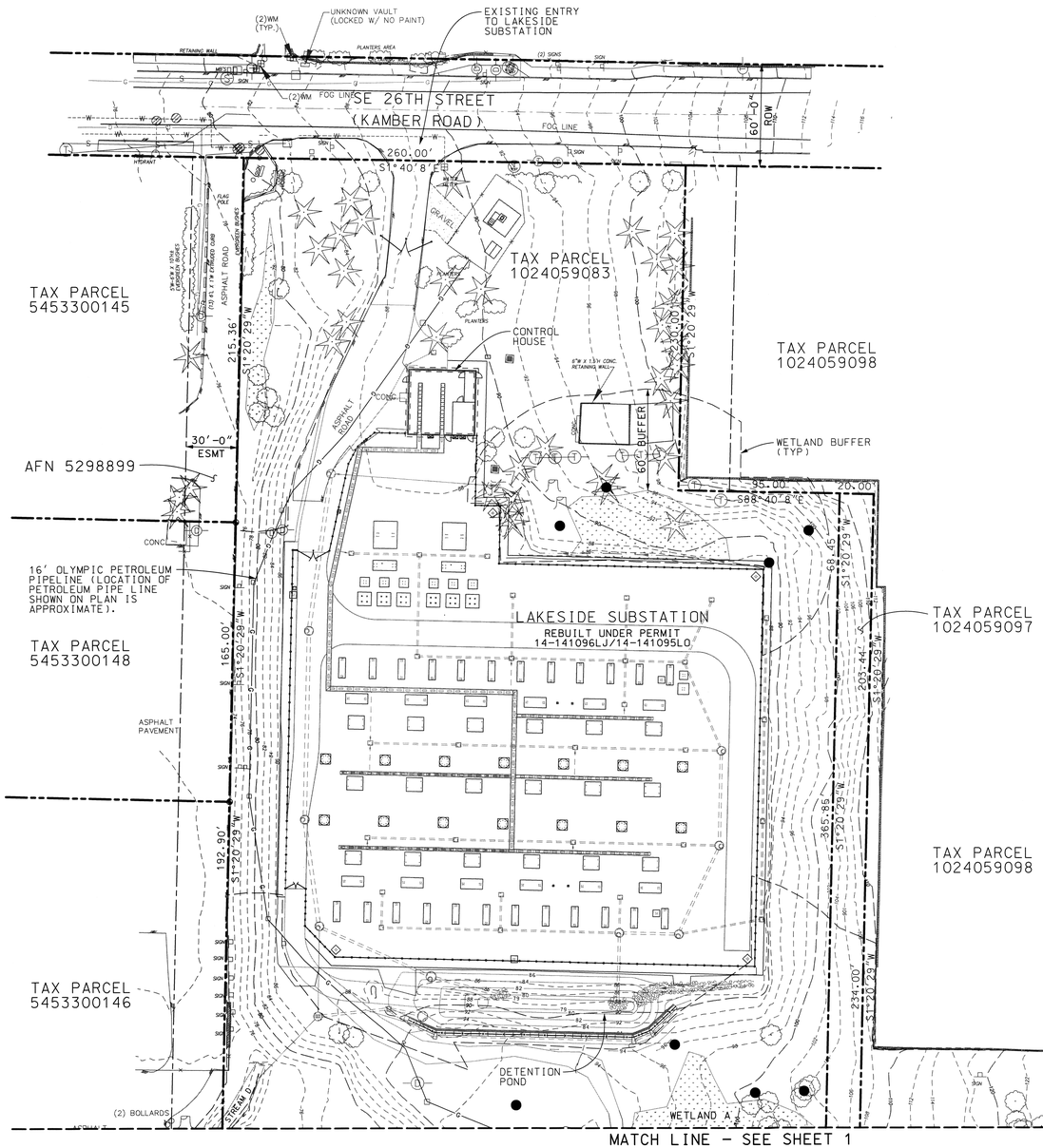
CADD NO: $$DGN$$ — CODE:

DSD 000156

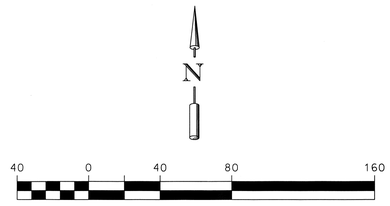
$FILE$

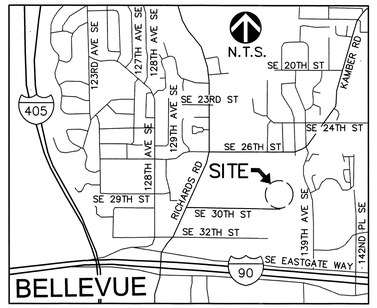
SECTION 10, TOWNSHIP 24 NORTH, RANGE 5 EAST, W.M.

CITY OF BELLEVUE, KING COUNTY, WASHINGTON



MATCH LINE – SEE SHEET 1





VICINITY MAP

LEGAL DESCRIPTION:

PARCEL A:
THE WEST 260 FEET OF THE NORTH 230 FEET OF THE SOUTHWEST QUARTER OF THE NORTHEAST QUARTER OF THE NORTHWEST QUARTER;
EXCEPT PORTION THEREOF LYING WITHIN SOUTHEAST 26TH STREET;
AND WEST 355 FEET OF THE SOUTHWEST QUARTER OF THE NORTHEAST QUARTER OF THE NORTHWEST QUARTER;
EXCEPT THE NORTH 230 FEET THEREOF;

ALL IN SECTION 10, TOWNSHIP 24 NORTH, RANGE 5 EAST, W.M., IN KING COUNTY, WASHINGTON.

SITE INFORMATION:

SEE SHEET 1

LEGEND

- PROPERTY LINE
- EXISTING CONTOURS
- WETLAND BUFFER
- SUBSTATION FENCE
- FENCE
- EXISTING RETAINING WALL
- EXISTING DRAINAGE PIPE
- EXISTING DRAINAGE DITCH
- EXISTING CATCH BASIN, TYPE 1
- EXISTING CATCH BASIN, TYPE 2
- EXISTING WATER VALVE
- EXISTING FOUNDATION
- EXISTING VAULT
- PROPOSED TRANSMISSION POLE
- EXISTING CABLE TRENCH

NOTES:

1. SUBSTANTIAL COMPLETION OF LAKESIDE SUBSTATION PHASE II CONSTRUCTION IS OCTOBER 2017.
2. PURPOSE OF PLAN SHEET IS TO DEPICT NEW POLE LOCATIONS.

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1-800-424-5555

SCOTT C. KIM
STATE OF WASHINGTON
36044
REGISTERED
PROFESSIONAL ENGINEER

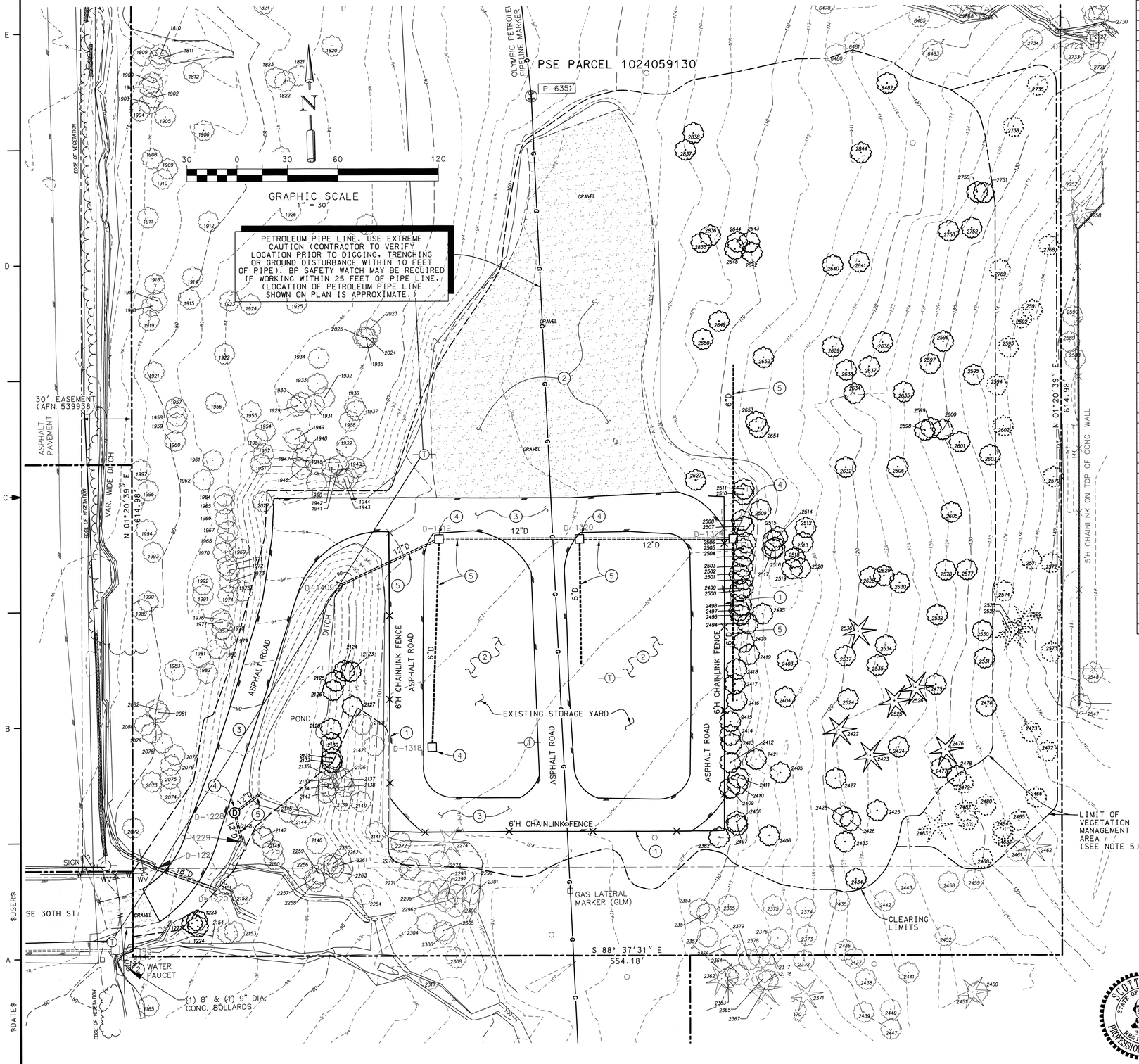
REVISION DESCRIPTION:	WO NUMBER: 111019489		PRELIMINARY SITE PLAN B RICHARDS CREEK SUBSTATION			
CUP AND CALUP SUBMITTAL						
		DATE (M/D/Y)	PUGET SOUND ENERGY	SUBSTATION ENGINEERING DEPARTMENT	DRAWING NO D-19552	REV NO 0
CAD	J. Nelson	8/17/17			SHEET: 2 OF 2	
ENGINEER	S. Kim	08/17/17				FILE NO:
REVIEWED		/ /	SCALE: 1"= 40'-0"	CLASS: SITE		CODE:
APPROVED	J. HENRY	08/17/17	CADD NO: $$DGN$$			

DSD 000157

$USER$
$DATE$
$FILE$

SECTION 10, TOWNSHIP 24 NORTH, RANGE 5 EAST, W.M.

CITY OF BELLEVUE, KING COUNTY, WASHINGTON



TREE REMOVAL SCHEDULE

REF #	TREE DESC.	DIA (INCHES)
1222	POPLAR	10.6
1223	POPLAR	10
1224	POPLAR	8
2123	ALDER	12
2124	MAPLE	10
2125	ALDER	8
2126	ALDER	14
2127	MAPLE	9
2129	ALDER	12,10.9.7
2130	ALDER	8
2131	ALDER	8
2132	ALDER	9.8
2382	ALDER	8
2405	ALDER	9
2406	ALDER	11
2407	ALDER	11
2408	ALDER	10
2409	ALDER	12
2410	ALDER	10
2411	ALDER	11
2412	ALDER	10
2413	ALDER	8
2414	ALDER	11.9
2415	ALDER	11.9
2416	ALDER	18
2417	MAPLE	8
2418	ALDER	16.7
2419	ALDER	10.8
2420	ALDER	9
2421	ALDER	14
2422	FIR	16
2423	FIR	10
2424	MAPLE	20,18,(2)15,10.8
2425	MAPLE	16
2426	MAPLE	18
2427	MAPLE	20
2428	MAPLE	15,14
2433	MAPLE	12
2434	MAPLE	22,13.9
2474	MAPLE	18
2475	MAPLE	20
2476	FIR	24
2477	MAPLE	12
2478	MAPLE	16
2494	ALDER	9
2495	MAPLE	8
2496	ALDER	14
2497	ALDER	8
2498	ALDER	8,12.5.5
2499	ALDER	9
2500	ALDER	9
2501	ALDER	10.9
2502	ALDER	9.8.7
2503	ALDER	9.8
2504	ALDER	12
2505	ALDER	8
2506	ALDER	(2)14
2507	ALDER	10
2508	ALDER	15.(2)11
2509	ALDER	11
2510	ALDER	14
2511	ALDER	8
2512	ALDER	9.6
2513	ALDER	11
2514	ALDER	9

TREE REMOVAL SCHEDULE

REF #	TREE DESC.	DIA (INCHES)
2515	ALDER	8
2516	ALDER	8
2517	ALDER	9
2518	ALDER	8
2519	ALDER	12.7
2520	ALDER	10
2524	ALDER	(2)9
2525	FIR	34
2526	FIR	18
2530	MAPLE	(2)22
2531	MAPLE	10
2532	MAPLE	20
2534	MAPLE	8
2535	MAPLE	8
2536	MAPLE	8
2537	MAPLE	30
2577	MAPLE	12.7
2578	MAPLE	14.10.7
2595	MAPLE	24
2596	MAPLE	18,(2)15
2597	MAPLE	18
2598	MAPLE	15.14
2599	MAPLE	24.18
2600	MAPLE	20
2601	MAPLE	24.13
2603	MAPLE	14
2605	MAPLE	20.24
2606	MAPLE	22
2628	MAPLE	22
2629	MAPLE	8
2630	MAPLE	CLUSTER (2)22.15.13.11.9
2632	MAPLE	24.18.16
2634	MAPLE	20.12
2635	MAPLE	10.9
2636	MAPLE	20.12
2637	MAPLE	22.15
2638	MAPLE	13
2639	MAPLE	24.9
2640	MAPLE	12
2641	POPLAR	12
2642	MAPLE	22.10
2643	MAPLE	22
2644	MAPLE	22
2645	MAPLE	(2)12.9
2649	MAPLE	24
2650	MAPLE	CLUSTER 18.16.15.15.12.12.10
2652	MAPLE	CLUSTER (2)22.(2)18.(1)9.(2)8
2653	MAPLE	30.25
2654	MAPLE	(2)20
2750	MAPLE	14
2751	MAPLE	24.18
2752	MAPLE	8
2753	MAPLE	16.30
2835	MAPLE	CLUSTER 15.13.(2)12.10.(2)9
2836	MAPLE	15
2837	MAPLE	20
2838	MAPLE	CLUSTER 18.16.14.(2)12.10
2844	POPLAR	10
6482	MAPLE	20

LEGEND

- EXISTING TREE (TO BE REMOVED)
- EXISTING TREE (TO BE TRIMMED) SEE NOTE 5
- EXISTING FENCE (TO BE REMOVED)
- 12"D EXISTING DRAINAGE (TO BE REMOVED)
- EXISTING ASPHALT (TO BE REMOVED)
- EXISTING GRAVEL (TO BE REMOVED)
- LIMITS OF VEGETATION MANAGEMENT
- LIMITS OF CLEARING
- PROPERTY LINE

TREE MANAGEMENT SCHEDULE

REF #	TREE DESC.	DIA (INCHES)
2460	MAPLE	24
2463	MAPLE	11
2464	MAPLE	15.12
2365	MAPLE	20.9
2466	MAPLE	8
2472	MAPLE	8
2473	MAPLE	14.4
2479	MAPLE	15
2480	MAPLE	11
2481	MAPLE	15
2482	MAPLE	16
2483	CEDAR	9
2527	MADRONA	24
2528	MADRONA	9
2529	FIR	9
2570	MAPLE	15
2571	MAPLE	27.(2)20.18.9
2572	MAPLE	24.12
2573	MAPLE	18.17
2574	MAPLE	14.7
2591	MAPLE	24.8
2592	MAPLE	10
2593	MAPLE	11.9
2594	MAPLE	30.15
2602	MAPLE	24.15
2735	MAPLE	48
2738	MAPLE	24
2768	MAPLE	22.(2)20
2769	MAPLE	20.18

DEMOLITION NOTES:

1. REMOVE EXISTING FENCING.
2. REMOVE EXISTING GRAVEL SURFACE.
3. REMOVE EXISTING ASPHALT ROAD.
4. DEMOLISH EXISTING CATCH BASIN.
5. REMOVE EXISTING STORM PIPE.

GENERAL NOTES:

1. UNLESS OTHERWISE NOTED FOR REMOVAL, CONTRACTOR SHALL PROTECT EXISTING TREES.
2. EXISTING 16" PETROLEUM PIPE LINE MUST BE PROTECTED AT ALL TIMES. CONTRACTOR SHALL BE RESPONSIBLE FOR CONTACTING BP COMPANY PRIOR TO CONSTRUCTION.
3. SEE SHEET D-18166, GRADING AND FENCING PLAN FOR CLEARING LIMITS.
4. DEMOLITION SHALL NOT BEGIN UNTIL TESC MEASURES ARE INSTALLED PER TESC PLAN.
5. TREES IN VEGETATION MANAGEMENT AREA SHALL BE CUT 10 TO 15 FEET ABOVE GRADE. CONTRACTOR SHALL REMOVE CUT VEGETATION.

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Call: TOLL FREE
1-800-424-5555

SCOTT C KIM
STATE OF WASHINGTON
36044
REGISTERED
PROFESSIONAL ENGINEER

REVISION DESCRIPTION:	WO NUMBER: 111019489
CUP AND CALUP SUBMITTAL	

PRELIMINARY CLEARING, DEMOLITION AND TREE REMOVAL PLAN RICHARDS CREEK

		DATE (M/D/Y)
CAD	J. Nelson	8/17/17
ENGINEER	S. Kim	08/17/17
REVIEWED		/ /
APPROVED	J. HENRY	08/17/17

PUGET SOUND ENERGY
SUBSTATION ENGINEERING DEPARTMENT

DRAWING NO: D-19553 | REV NO: 0
SHEET: 1 OF 1
SCALE: 1"= 30'-0" | CLASS: SITE
CADD NO: $$DGN$$ | FILE NO: | CODE: RIC

$FILE$

DSD 000158

SECTION 10, TOWNSHIP 24 NORTH, RANGE 5 EAST, W.M.

CITY OF BELLEVUE, KING COUNTY, WASHINGTON

PSE PARCEL 1024059130

PARCEL 1024059110

PARCEL 1024059098

PSE PARCEL 1024059097

PSE PARCEL 1024059083

PARCEL 5453300146

LIMITS OF VEGETATION MANAGEMENT AREA

RIDGE 107.20

SLOPE 3.5:1

SOLDIER PILE WALL

5' SHOULDER (TYP AROUND SUBSTAION, SEE DET 5, SHT 7)

CLEARING LIMITS

BM #8
CTRL 2432
EL=129.05

SLOPE 2:1

SLOPE 3:1 (TYP)

STATION CB (SEE DET 7, SHT 7)

N = 215965.12
E = 1313667.50

NORTH-SOUTH BASELINE
S 1°22'13" W

STATION ELEVATION
107.20

SPCC CURB (D-18168, DETAIL 1)

PROPOSED HAMMERHEAD

STATION DRIVEWAY (SEE DET 4, SHT 7)

CB IN DRIVEWAY (SEE DET 8, SHT 7)

EXISTING 16" OLYMPIC PETROLEUM PIPELINE

GRAVEL ACCESS DRIVE (SEE DET 2, SHT 7)

DETENTION VAULT SEE DWG D-18706

PROPOSED DRIVEWAY

QUARRY SPALLS (RIPRAP), TYP

CONSTRUCT SWALE TO DIRECT WATER TO STORM SYSTEM

LOCATION OF PETROLEUM PIPE LINE SHOWN ON PLAN IS APPROXIMATE.

30.00' OFFSET

BM #8
CTRL 8
EL=102.98

SLOPE 2.5:1

SLOPE 2:1

EAST-WEST BASELINE
N 88°37'47" W

FOR STREAM RESTORATION AREA GRADING, REFER TO DWG D-18172, SHEETS 1 THROUGH 22

30' EASEMENT (AFN 539938)

WETLAND A

WETLAND D

WETLAND H

STREAM C

STREAM D

C 8

D 8

A 3

B 4

GRAPHIC SCALE
1" = 30'

LEGEND:

- 107.20 — FINISHED GRADE ELEVATION
- PROPERTY LINE
- STATION FENCE
- RIDGE LINE
- FOUNDATIONS (REF ONLY)
- TYPE I CATCH BASIN (SEE DRAINAGE PLAN)
- VAULT
- RIP RAP
- WETLAND BUFFER
- SETBACK FROM BUFFER

CONSTRUCTION NOTES

1. ALL RIDGES TO BE ELEVATION 107.2. GRADING WITHIN RIDGES SHALL SLOPE DOWN AT A MINIMUM OF 0.5% TO CATCH BASIN ELEVATION. SEE D-18166, SHEET 7 FOR GRADING AROUND CATCH BASINS.
2. GRADING ON STATION DRIVE WITHIN RIDGES SLOPE DOWN AT A MINIMUM OF 0.5% AND A MAXIMUM OF 2.0% TO CATCH BASIN GRATE ELEVATION.
3. SEE DRAINAGE PLAN, DRAWING D-18167, SHEET 1, FOR RIM ELEVATIONS.
4. NOTIFY BP PETROLEUM PRIOR TO ANY WORK.

GRADING NOTES

1. THE CONTRACTOR SHALL NOTIFY THE ENGINEER IN THE EVENT OR DISCOVERY OF POOR SOILS, GROUNDWATER OR DISCREPANCIES IN THE EXISTING CONDITIONS AS NOTED ON THE PLANS.
2. MAXIMUM SLOPE STEEPNESS SHALL BE 2:1 ORIZONTAL:VERTICAL FOR CUT AND FILL SLOPES.
3. UNLESS OTHERWISE SPECIFIED, ALL EMBANKMENTS IN THE PLAN SET SHALL BE CONSTRUCTED IN ACCORDANCE WITH SECTION 2-03.3(14)B OF THE WSDOT STANDARD SPECIFICATIONS. EMBANKMENT COMPACTIONS SHALL CONFORM TO SECTION 2-03.3(14)C, METHOD B OF SAID STANDARD SPECIFICATIONS.
4. EMBANKMENTS DESIGNED TO IMPOUND WATER SHALL BE COMPACTED TO 95% MAXIMUM DENSITY PER SECTION 2-03.3 (14)C, METHOD C OF WSDOT STANDARD SPECIFICATIONS.
5. ALL AREAS RECEIVING FILL MATERIAL SHALL BE PREPARE BY REMOVING VEGETATION, NONCOMPLYING FILL, TOPSOIL AND OTHER UNSUITABLE MATERIAL, BY SCARIFYING THE SURFACE TO PROVIDE A BOND WITH THE NEW FILL, AND WHERE SLOPES ARE STEEPER THAN 3 HORIZONTAL TO 1 VERTICAL AND THE HEIGHT IS GREATER THAN 5 FEET, BY BENCHING INTO SOUND COMPETENT MATERIAL AS DETERMINED BY A SOILS ENGINEER.
6. GRADE BREAK LINES INDICATE A TRANSITION IN GRADE SLOPES. GRADE TO DRAIN AS NOTED BY SLOPE DIRECTION SYMBOLS.
7. DISTURBED AREAS NOT RECEIVING LANDSCAPING OR CRITICAL AREA ENHANCEMENT SHALL RECEIVE HYDROSEED ONCE FINAL GRADE IS REACHED.

REFERENCE DRAWINGS

D-19551 TOPOGRAPHIC AND BOUNDARY SURVEY (PARCEL C) #102405-9130

CALL BEFORE YOU DIG
Call: TOLL FREE
1-800-424-5555

SCOTT C KIM
STATE OF WASHINGTON
36044
REGISTERED
PROFESSIONAL ENGINEER

REVISION DESCRIPTION:	WO NUMBER: 111019489
CUP AND CALUP SUBMITTAL	

		DATE (M/D/Y)
CAD	J. Nelson	8 / 14 / 17
ENGINEER	S. KIM	08 / 14 / 17
REVIEWED		/ /
APPROVED	J. HENRY	08 / 17 / 17

PRELIMINARY GRADING PLAN RICHARDS CREEK SUBSTATION

PUGET SOUND ENERGY — SUBSTATION ENGINEERING DEPARTMENT

SCALE: 1"= 30'-0" | CLASS: SITE | CADD NO: $$DGN$$

DRAWING NO D-19554 | REV NO 0 | SHEET: 1 OF 8 | FILE NO: | CODE:

DSD 000159

$USER$ $DATE$ $FILE$

SECTION 10, TOWNSHIP 24 NORTH, RANGE 5 EAST, W.M.

CITY OF BELLEVUE, KING COUNTY, WASHINGTON

PSE PARCEL 1024059130

PROJECT BOUNDARY

614.98' N01°20'39"E

PSE PARCEL 1024059098

PSE PARCEL 1024059097

PSE PARCEL 1024059083

353'-3"

241'-3"

143'-0"

112'-0"

31'-0"

SOLDIER PILE WALL

43'-10½"

16'-7½"

11'-9½"

135°

20'-0"

15'R

25'-0"

69'-2½"

N = 215965.12
E = 1313667.50

45'R

25'R

15'-0"

17'-0"

66'-3"

74'-6"

8'-3"

86'-0"

222.07'

179.15'

85'-5½"

NORTH-SOUTH BASELINE
S 1°22'13" W

18'-3"

GATE

15'-0"

115'-9"

130'-0"

120'-0"

69'-3"

STATION ELEVATION
107.20

CONCRETE CURB; TYP (SEE DET 1, SHT 7)

35'R

60'R

5'R

203°

156°

23'-0"

GATE

12'-1½"

18'-10½"

RETAINING WALL AND FOOTING

49'-6"

81'-0"

160'-0"

122'-6"

130'-6"

253'-0"

413'-0"

DETENTION VAULT

ENTRANCE DRIVEWAY

S88°37'31"E

355.00'

30.00' OFFSET

30.00' OFFSET

PETROLEUM PIPE LINE. USE EXTREME CAUTION (CONTRACTOR TO VERIFY LOCATION PRIOR TO DIGGING, TRENCHING OR GROUND DISTURBANCE WITHIN 10 FEET OF PIPE). BP SAFETY WATCH MAY BE REQUIRED IF WORKING WITHIN 25 FEET OF PIPE LINE. (LOCATION OF PETROLEUM PIPE LINE SHOWN ON PLAN IS APPROXIMATE.)

EAST-WEST BASELINE
N 88°37'47" W

30' ENTRANCE / RIGHT OF WAY GATE (SEE D-13038)

LOCATE GATE AT STA 1+14.2 SEE D-18166, SHT 5)

PROJECT BOUNDARY

374.07' N01°20'39"E

H.D. FOWLER PARCEL 5453300150

242.56' N01°20'39"E

H.D. FOWLER PARCEL 5453300151

30' EASEMENT (AFN 539938)

SE 30TH ST

30 0 30 60 120

GRAPHIC SCALE
1" = 30'

LEGEND:

- PROPERTY LINE
- STATION FENCE
- SOLDIER PILE WALL
- FOUNDATIONS (REF ONLY)

NOTES

1. THE CONTRACTOR SHALL NOTIFY THE ENGINEER IN THE EVENT OR DISCOVERY OF POOR SOILS, GROUNDWATER OR DISCREPANCIES IN THE EXISTING CONDITIONS AS NOTED ON THE PLANS.
2. NOTIFY BP PETROLEUM PRIOR TO ANY WORK.
3. CONTRACTOR SHALL COORDINATE THE LOCATION OF THE PROPOSED 30' WIDE ENTRY GATE W/PSE CONSTRUCTION MANAGER PRIOR TO INSTALLATION.

REFERENCE DRAWINGS

D-19551	TOPOGRAPHIC AND BOUNDARY SURVEY (PARCEL C) #102405-913
D-19554	PRELIMINARY GRADING PLAN (SHEET 1 OF 8)

CALL BEFORE YOU DIG
Call: TOLL FREE
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SCOTT C. KIM
STATE OF WASHINGTON
Exp. 36044
REGISTERED PROFESSIONAL ENGINEER

REVISION DESCRIPTION:	WO NUMBER: 111019489
CUP ANC CALUP SUBMITTAL	

PRELIMINARY FENCING AND STATION DRIVEWAY LAYOUT PLAN RICHARDS CREEK SUBSTATION

		DATE (M/D/Y)
CAD	J. Nelson	8/14/17
ENGINEER	S. KIM	08/14/17
REVIEWED		/ /
APPROVED	J. HENRY	08/17/17

PSE PUGET SOUND ENERGY

SUBSTATION ENGINEERING DEPARTMENT

DRAWING NO D-19554 SHEET: 2 OF 8

REV NO 0

SCALE: 1" = 30'-0"

CLASS: SITE

FILE NO:

CODE:

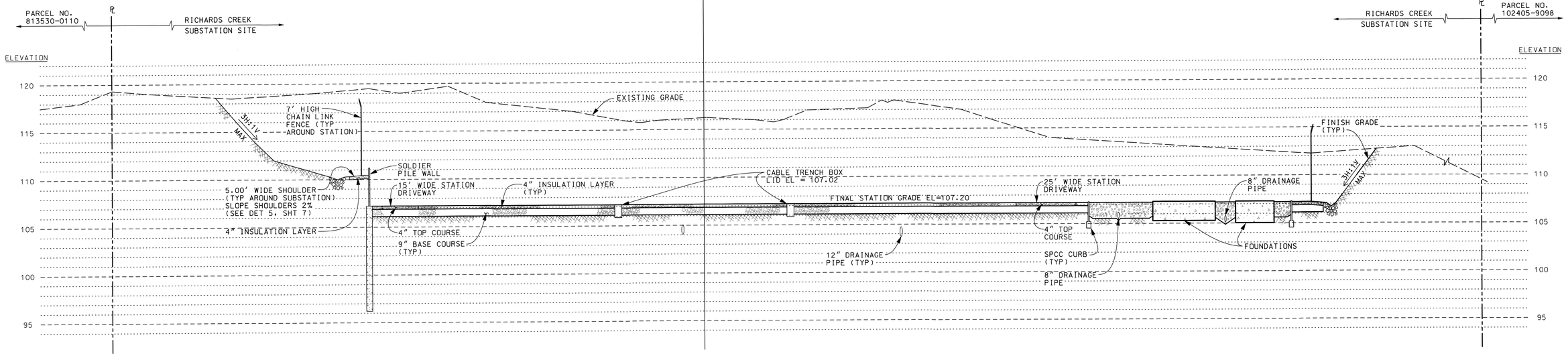
CADD NO: $$DGN$$

$USER$ $DATE$ $FILE$

DSD 000160

SECTION 10, TOWNSHIP 24 NORTH, RANGE 5 EAST, W.M.

CITY OF BELLEVUE, KING COUNTY, WASHINGTON



SITE SECTION A/1

(FACING WEST)

SCALE: HORIZ: 1"= 20'
VERT: 1"= 5'

CALL BEFORE YOU DIG
Call: TOLL FREE
1-800-424-5555

SCOTT C KIM
STATE OF WASHINGTON
36044
REGISTERED
PROFESSIONAL ENGINEER

REVISION DESCRIPTION:	WO NUMBER: 111019489
CUP AND CALUP SUBMITTAL	

		DATE (M/D/Y)
CAD	J. Nelson	8/14/17
ENGINEER	S. Kim	08/14/17
REVIEWED		/ /
APPROVED	J. HENRY	08/17/17

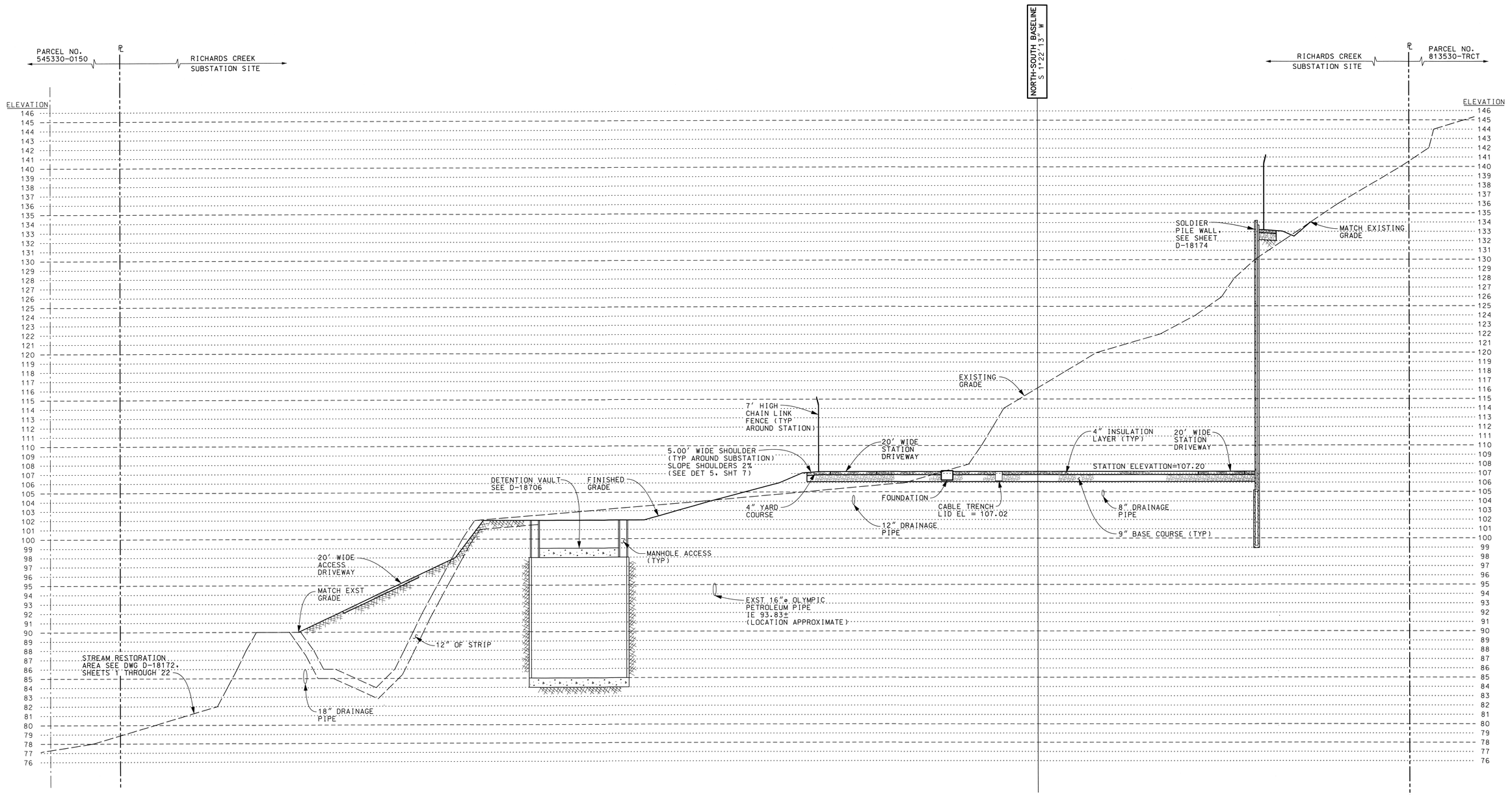
PRELIMINARY SITE SECTION RICHARDS CREEK SUBSTATION

PUGET SOUND ENERGY
SUBSTATION ENGINEERING DEPARTMENT

DRAWING NO: D-19554
REV NO: 0
SHEET: 3 OF 8
SCALE: 1"= 20'-0"
CLASS: SITE
FILE NO:
CODE:
CADD NO: $$DGN$$

$USER$
$DATE$
$FILE$

DSD 000161



SITE SECTION B/1

(FACING NORTH)

SCALE: HORIZ: 1"= 20'
VERT: 1"= 5'

$USER$

$DATE$

$FILE$

REVISION DESCRIPTION:	WO NUMBER: 111019489
CUP AND CALUP SUBMITTAL	

		DATE (M/D/Y)
CAD	J. Nelson	8/14/17
ENGINEER	S. KIM	08/14/17
REVIEWED		/ /
APPROVED	J. HENEY	08/17/17

SCOTT C. KIM — STATE OF WASHINGTON — 36044 — REGISTERED PROFESSIONAL ENGINEER

PRELIMINARY SITE SECTION RICHARDS CREEK SUBSTATION

PUGET SOUND ENERGY

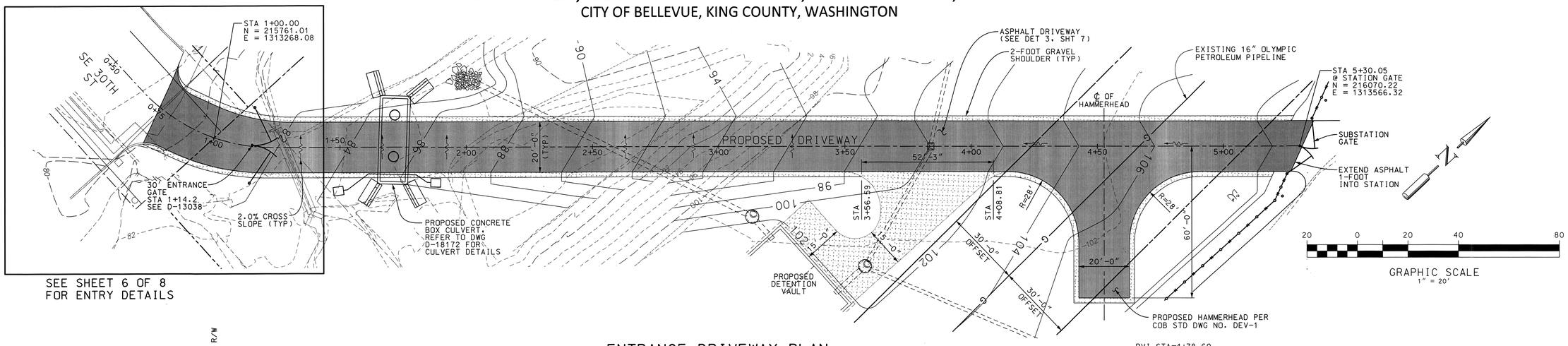
SUBSTATION ENGINEERING DEPARTMENT

DRAWING NO: D-19554
REV NO: 0
SHEET: 4 OF 8
SCALE: 1"= 20'-0"
CLASS: SITE
FILE NO:
CADD NO: $$DGN$$
CODE: RIC

DSD 000162

SECTION 10, TOWNSHIP 28 NORTH, RANGE 5 EAST, W.M.

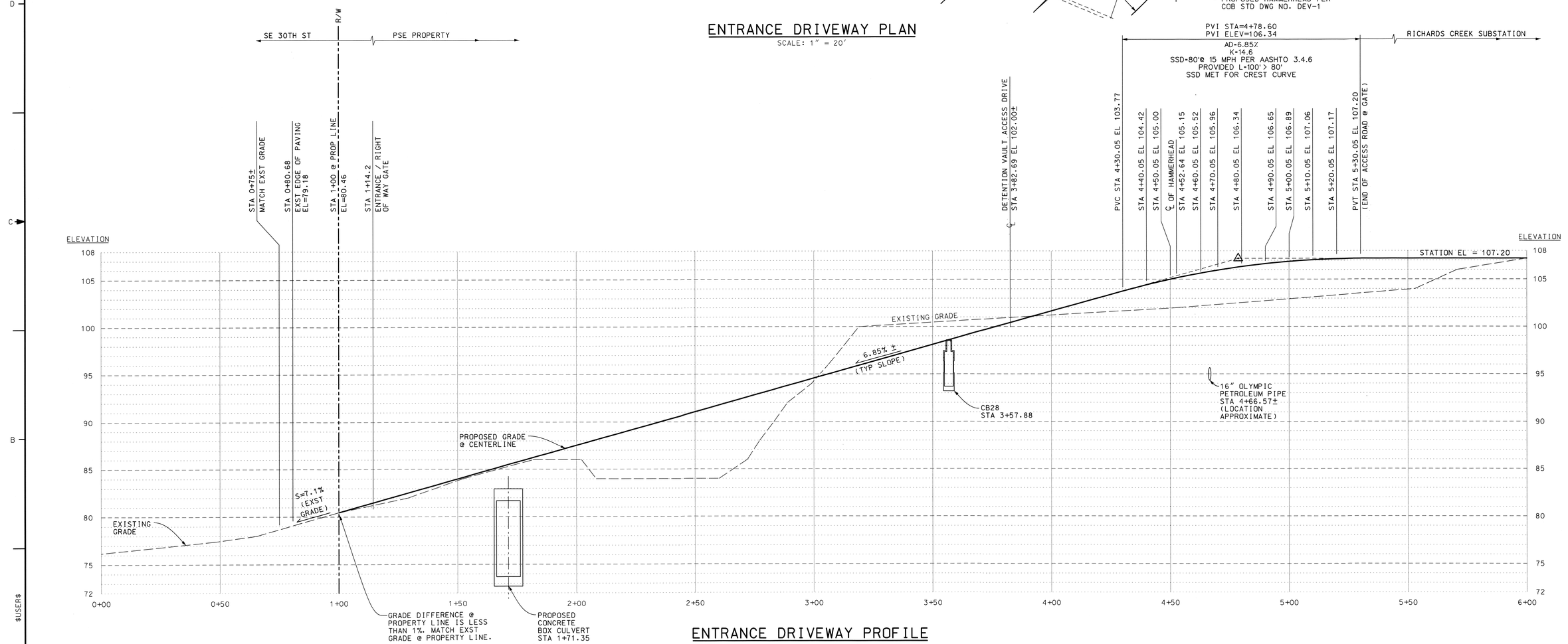
CITY OF BELLEVUE, KING COUNTY, WASHINGTON



SEE SHEET 6 OF 8
FOR ENTRY DETAILS

ENTRANCE DRIVEWAY PLAN

SCALE: 1" = 20'



ENTRANCE DRIVEWAY PROFILE

SCALE: HORIZ: 1"= 20'
VERT: 1"= 5'

CALL BEFORE YOU DIG
Call: TOLL FREE
1-800-424-5555

SCOTT C. KIM
STATE OF WASHINGTON
Reg. 36044
REGISTERED PROFESSIONAL ENGINEER

REVISION DESCRIPTION:	WO NUMBER: 111019489		
CUP AND CALUP SUBMITTAL			
		DATE (M/D/Y)	
CAD	J. Nelsen	8/14/17	
ENGINEER	S. KIM	08/14/17	
REVIEWED		/ /	
APPROVED	J. HENRY	08/17/17	

PRELIMINARY ENTRANCE DRIVEWAY PLAN AND PROFILE RICHARDS CREEK SUBSTATION

PUGET SOUND ENERGY

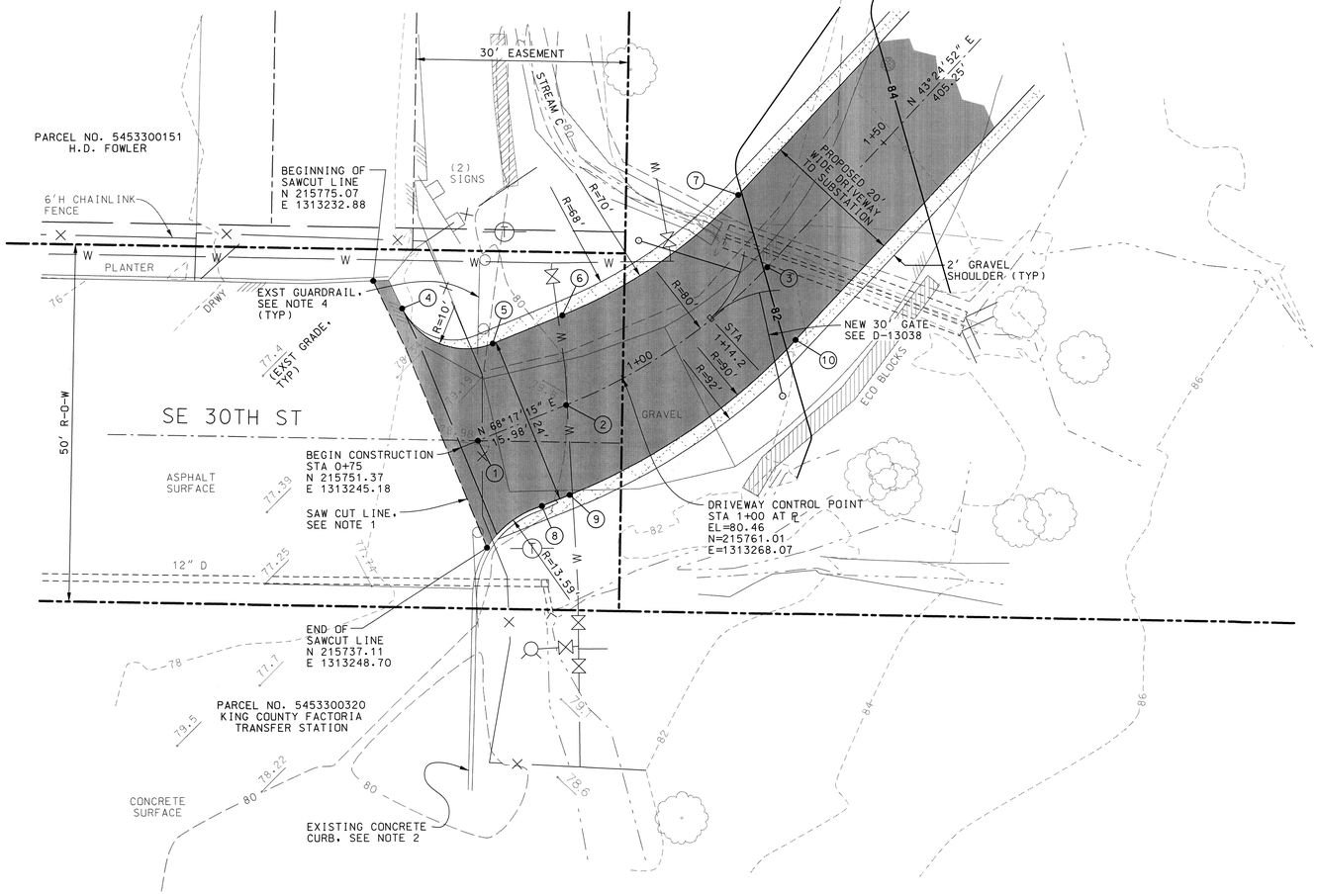
SUBSTATION ENGINEERING DEPARTMENT

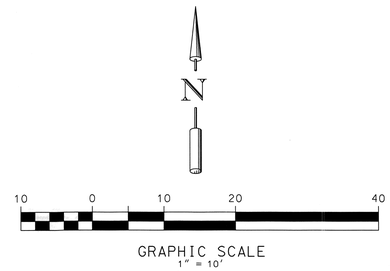
DRAWING NO: D-19554
REV NO: 0
SHEET: 5 OF 8
SCALE: NOTED
CLASS: SITE
FILE NO:
CADD NO: $$DGN$$
CODE: RIC

DSD 000163

$USER$ $DATE$ $FILE$

SECTION 10, TOWNSHIP 24 NORTH, RANGE 5 EAST, W.M.
CITY OF BELLEVUE, KING COUNTY, WASHINGTON





LEGEND

NEW PAVEMENT (SEE DETAILS 1 & 2 ON SHEET 4 OF 6)

2' WIDE GRAVEL SHOULDER

CONSTRUCTION NOTES

1. SAWCUT EXISTING PAVEMENT AND MATCH EXISTING GRADE AT THE SAWCUT LINE. FIELD VERIFY THE SAWCUT LINE PRIOR TO CONSTRUCTION AND FIELD ADJUST AS NECESSARY.
2. PROTECT EXISTING CONCRETE CURB.
3. PROTECT EXISTING UTILITY POLE.
4. REMOVE EXISTING GUARDRAIL AS NEEDED. REPLACE WITH NEW GUARDRAIL IN KIND PER PSE CONSTRUCTION MANAGEMENT.
5. REMOVE EXISTING FENCE AND INSTALL NEW FENCE IN KIND PER PSE CONSTRUCTION MANAGEMENT.
6. MINIMUM PAVEMENT RESTORATION LIMIT IS SHOWN ON THE PLAN. PSE CONSTRUCTION MANAGEMENT SHALL FIELD DETERMINE THE APPROPRIATE LIMIT OF PAVEMENT RESTORATION AND ADJUST AS NECESSARY.
7. CONTRACTOR SHALL PROTECT ADJACENT WETLANDS AND STREAMS AT ALL TIMES DURING CONSTRUCTION.
8. REMOVE SANDBAGS AND ECO BLOCKS AFTER CONSTRUCTION OF PROPOSED DRIVEWAY & CULVERT REPLACEMENT.

NORTHING – EASTING TABLE

(1) PI	N 215752.31 E 1313247.53	(6) PC	N 215770.00 E 1313259.57
(2) PC	N 215757.29 E 1313260.03	(7) PT	N 215786.93 E 1313284.52
(3) PT	N 215776.63 E 1313288.55	(8) PT	N 215742.95 E 1313256.50
(4) PT	N 215771.10 E 1313236.96	(9) PC	N 215744.52 E 1313260.43
(5) PC	N 215766.08 E 1313249.71	(10) PT	N 215766.28 E 1313292.51

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1-800-424-5555

SCOTT C. KIM
STATE OF WASHINGTON
16044
REGISTERED PROFESSIONAL ENGINEER

REVISION DESCRIPTION:	WO NUMBER: 111019489
CUP AND CALUP SUBMITTAL	

PRELIMINARY ENTRANCE DRIVEWAY DETAIL RICHARDS CREEK SUBSTATION

		DATE (M/D/Y)
CAD	J. Nelson	8/14/17
ENGINEER	S. KIM	08/14/17
REVIEWED		/ /
APPROVED	J. HENRY	08/17/17

PUGET SOUND ENERGY | SUBSTATION ENGINEERING DEPARTMENT

SCALE: 1"= 10'-0" | CLASS: SITE

CADD NO: $$DGN$$

DRAWING NO: D-19554 | REV NO: 0

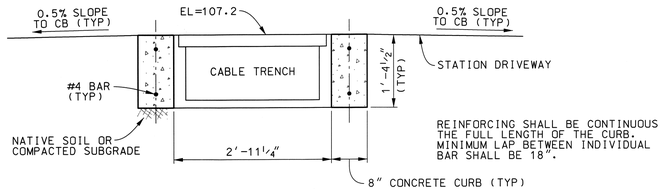
SHEET: 6 OF 8

FILE NO:

CODE: RIC

DSD 000164

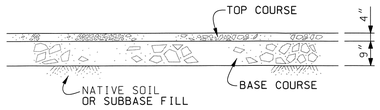
$USER$ $DATE$ $FILE$



CABLE TRENCH CURB SECTION

DETAIL 1/1

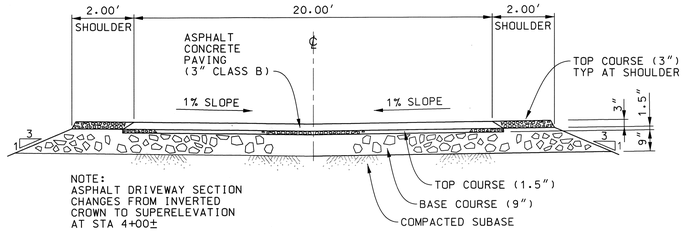
¾" = 1'-0"



MAINTENANCE ACCESS GRAVEL DRIVEWAY

DETAIL 2/1

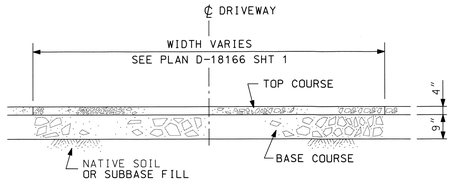
NTS



ASPHALT DRIVEWAY SECTION

DETAIL 3/5

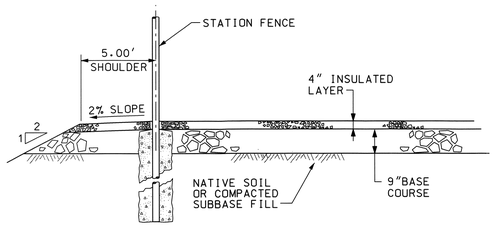
NTS



STATION DRIVEWAY DETAIL

DETAIL 4/1

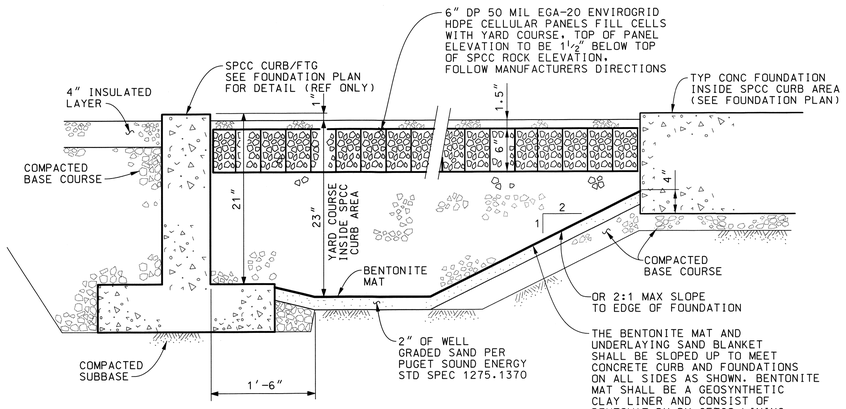
NTS



TYPICAL STATION SECTION

DETAIL 5/1

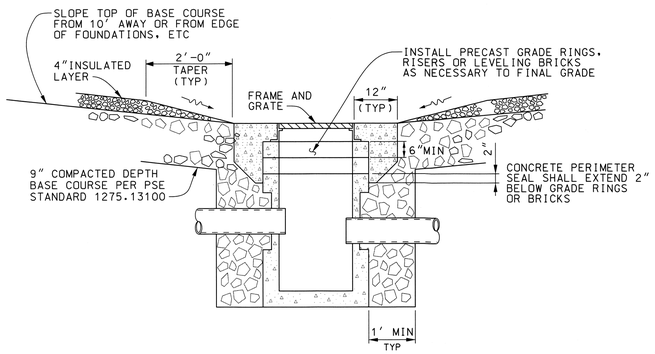
NTS



TYPICAL AREA INSIDE SPCC CURB

DETAIL 6/1

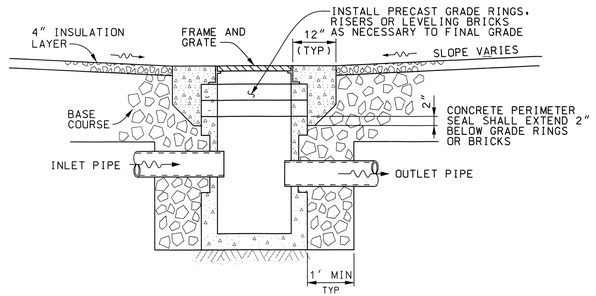
NTS



TYPICAL CATCH BASIN GRADING OUTSIDE OF SPCC AREA

DETAIL 7/1

NTS



TYPICAL GRADING FOR CATCH BASIN IN DRIVEWAY

DETAIL 8/1

NTS

CALL BEFORE YOU DIG
Call: TOLL FREE
1-800-424-5555

SCOTT C. KIM
STATE OF WASHINGTON
36044
REGISTERED PROFESSIONAL ENGINEER

REVISION DESCRIPTION:	WO NUMBER: 111019489		
CUP AND CALUP SUBMITTAL			
		DATE (M/D/Y)	
CAD	J. Nelson	8/14/17	
ENGINEER	S. KIM	08/14/17	
REVIEWED		/ /	
APPROVED	J. HENLEY	08/17/17	

PUGET SOUND ENERGY — SUBSTATION ENGINEERING DEPARTMENT

PRELIMINARY GRADING SECTIONS AND DETAILS RICHARDS CREEK SUBSTATION

DRAWING NO D-19554 — REV NO 0

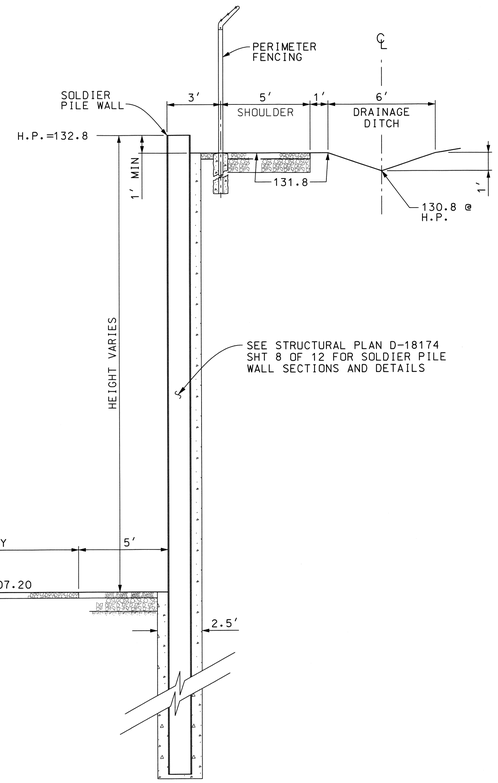
SHEET: 7 OF 8

SCALE: NOTED — CLASS: SITE — FILE NO:

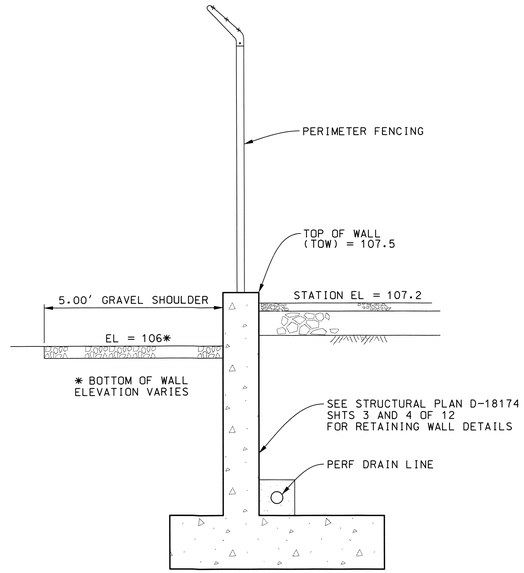
CADD NO: $$DGN$$ — CODE: RIC

DSD 000165

$USER$ $DATE$ $FILE$



TYPICAL SOLDIER PILE WALL SECTION C/1



RETAINING WALL SECTION D/1

CALL BEFORE YOU DIG
Call: TOLL FREE
1-800-424-5555

SCOTT C. KIM
STATE OF WASHINGTON
36044
REGISTERED PROFESSIONAL ENGINEER

REVISION DESCRIPTION:	WO NUMBER: 111019489		
CUP AND CALUP SUBMITTAL			
		DATE (M/D/Y)	
CAD	J. Nelson	8/14/17	
ENGINEER	S. KIM	08/14/17	
REVIEWED		/ /	
APPROVED	J. HENRY	08/17/17	

PRELIMINARY FENCING SECTIONS AND DETAILS RICHARDS CREEK SUBSTATION

PUGET SOUND ENERGY

SUBSTATION ENGINEERING DEPARTMENT

DRAWING NO: D-19554 | REV NO: 0

SHEET: 8 OF 8

SCALE: NONE | CLASS: SITE | FILE NO: | CODE: RIC

CADD NO: $$DGN$$

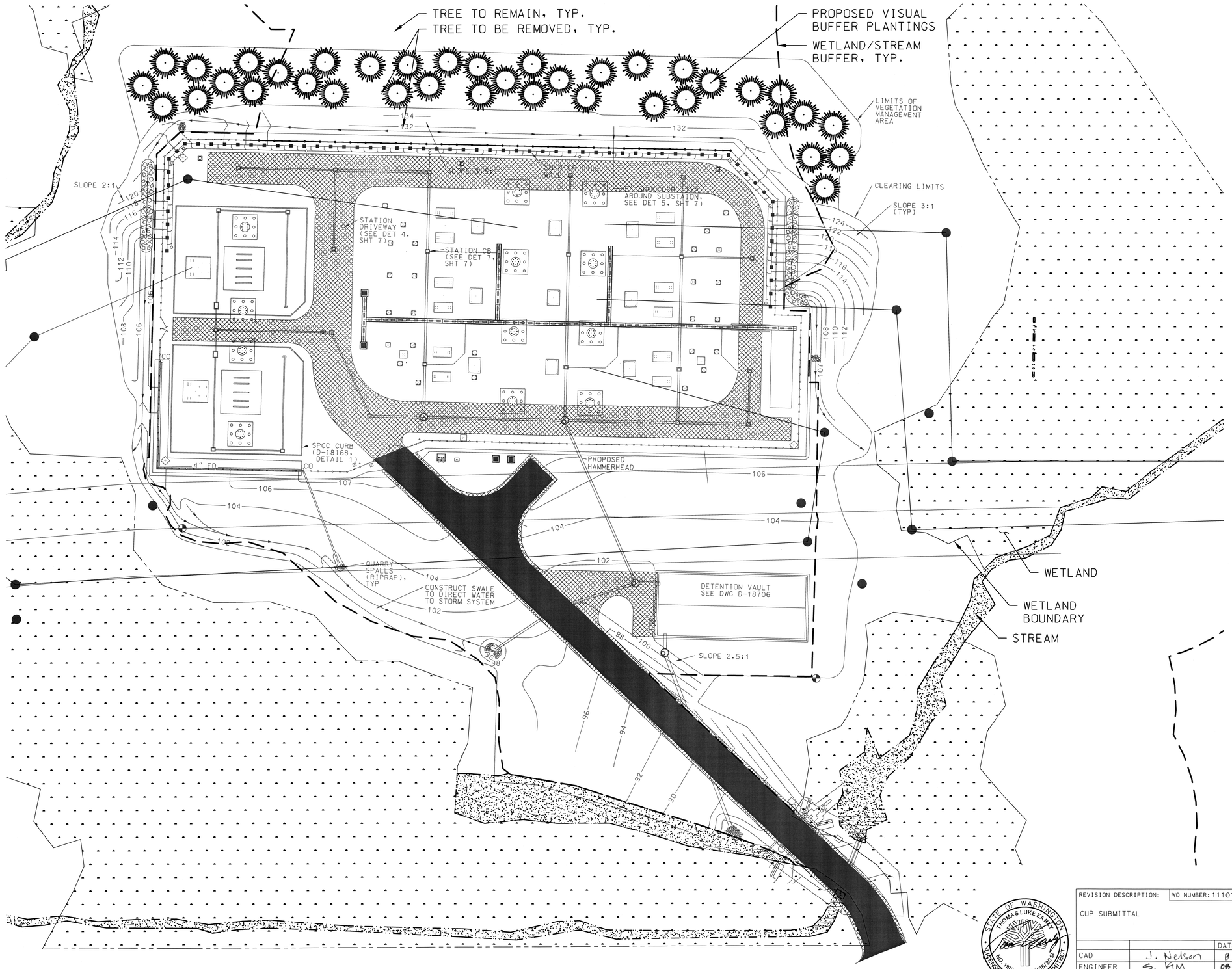
DSD 000166

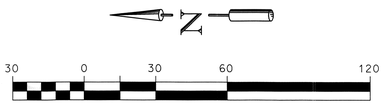
$USER$ $DATE$ $FILE$

SECTION 10, TOWNSHIP 24 NORTH, RANGE 5 EAST, W.M.

CITY OF BELLEVUE, KING COUNTY, WASHINGTON

PSE PARCEL 1024059130





GRAPHIC SCALE
1" = 30'

LEGEND:

- 107.20 — FINISHED GRADE ELEVATION
- PROPERTY LINE
- STATION FENCE
- RIDGE LINE
- FOUNDATIONS (REF ONLY)
- TYPE I CATCH BASIN (SEE DRAINAGE PLAN)
- VAULT
- RIP RAP
- WETLAND BUFFER
- SETBACK FROM BUFFER
- (38) SHORE PINE. PINUS CONTORTA VAR. CONTORTA. 6' TALL MINIMUM. EVEN BRANCHING WITH INTACT. HEALTHY LEADER. SPACE 20 FEET ON-CENTER FROM EXISTING AND NEW TREES.

CONSTRUCTION NOTES

1. ALL RIDGES TO BE ELEVATION 107.2. GRADING WITHIN RIDGES SHALL SLOPE DOWN AT A MINIMUM OF 0.5% TO CATCH BASIN ELEVATION. SEE D-18166. SHEET 7 FOR GRADING AROUND CATCH BASINS.
2. GRADING ON STATION DRIVE WITHIN RIDGES SLOPE DOWN AT A MINIMUM OF 0.5% AND A MAXIMUM OF 2.0% TO CATCH BASIN GRATE ELEVATION.
3. SEE DRAINAGE PLAN, DRAWING D-18167, SHEET 1, FOR RIM ELEVATIONS.
4. NOTIFY BP PETROLEUM PRIOR TO ANY WORK.

LANDSCAPE NOTES

1. EXISTING NATIVE SHRUBS AND GROUNDCOVER SHALL BE RETAINED AND PROTECTED WITHIN THE TREE MANAGEMENT AREA AND OUTSIDE OF THE LIMITS OF CLEARING.
2. NEW PLANTS SHALL ONLY BE INSTALLED AFTER OCTOBER 1ST AND BEFORE APRIL 1ST.
3. GRUB EXISTING VEGETATION WITHIN 3 FOOT RADIUS FROM CENTER OF NEW PLANTS.
4. THE CONTRACTOR SHALL NOTIFY THE ENGINEER IN THE EVENT OR DISCOVERY OF POOR SOILS. GROUNDWATER OR DISCREPANCIES IN THE EXISTING CONDITIONS AS NOTED ON THE PLANS.
5. NOXIOUS WEEDS SHALL BE REMOVED FROM ALL AREAS WITHIN THE LIMITS OF DISTURBANCE AND TREE MANAGEMENT AREA.
6. DISTURBED AREAS NOT RECEIVING LANDSCAPING OR CRITICAL AREA ENHANCEMENT SHALL RECEIVE HYDROSEED ONCE FINAL GRADE IS REACHED. SEE LANDSCAPE DETAILS FOR HYDROSEED SEED MIX.

REFERENCE DRAWINGS

D-18160	TOPOGRAPHIC AND BOUNDARY SURVEY (PARCEL C) #102405-9130
D-18164	TEMPORARY EROSION AND SEDIMENT CONTROL PLAN
D-18167	DRAINAGE PLAN
D-18166	GRADING PLAN

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STATE OF WASHINGTON
THOMAS LUKE EARY
NO 199 EXP. 07/08/2018
LICENSED LANDSCAPE ARCHITECT

REVISION DESCRIPTION:	WO NUMBER: 111019489
CUP SUBMITTAL	

DRAFT LANDSCAPE PLAN 2 RICHARDS CREEK SUBSTATION

		DATE (M/D/Y)
CAD	J. Nelson	8/30/17
ENGINEER	S. KIM	08/30/17
REVIEWED	E. DAHL	08/30/17
APPROVED	J. HENRY	08/30/17

PUGET SOUND ENERGY

SUBSTATION ENGINEERING DEPARTMENT

SCALE: 1"= 30'-0"

CLASS: SITE

CADD NO: $$DGN$$

DRAWING NO D-19555

REV NO 1

SHEET: 1 OF 2

FILE NO:

CODE:

DSD 000167

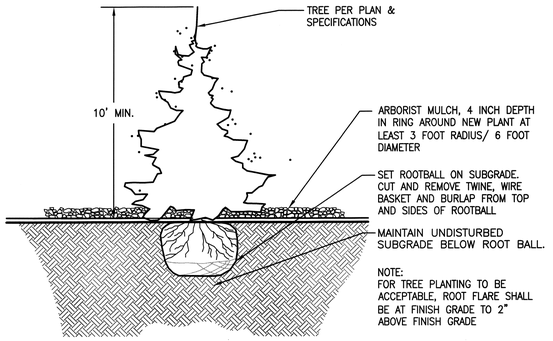
$USER$

$DATE$

SECTION 10, TOWNSHIP 24 NORTH, RANGE 5 EAST, W.M.

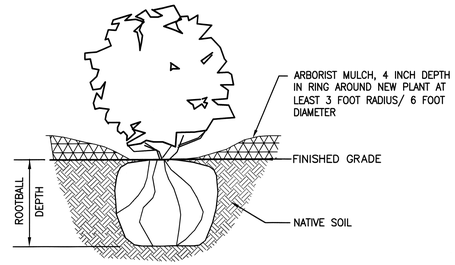
CITY OF BELLEVUE, KING COUNTY, WASHINGTON

PSE PARCEL 1024059130



CONIFEROUS TREE PLANTING DETAIL

NOT TO SCALE



NATIVE SHRUBS PLANTING DETAIL

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STATE OF WASHINGTON
THOMAS LUKE EARL
NO. 199 EXP. 07/08/2018
LICENSED LANDSCAPE ARCHITECT

REVISION DESCRIPTION:	WO NUMBER: 111019489
CUP SUBMITTAL	

		DATE (M/D/Y)
CAD	J. Nelson	8/30/17
ENGINEER	S. KIM	08/30/17
REVIEWED	E. DAHL	08/30/17
APPROVED	J. HENRY	08/30/17

PUGET SOUND ENERGY

SUBSTATION ENGINEERING DEPARTMENT

SCALE: 1"= 30'-0" | CLASS: SITE | CADD NO: $$DGN$$

DRAWING NO D-19555 | REV NO 1

SHEET: 2 OF 2 | FILE NO: | CODE:

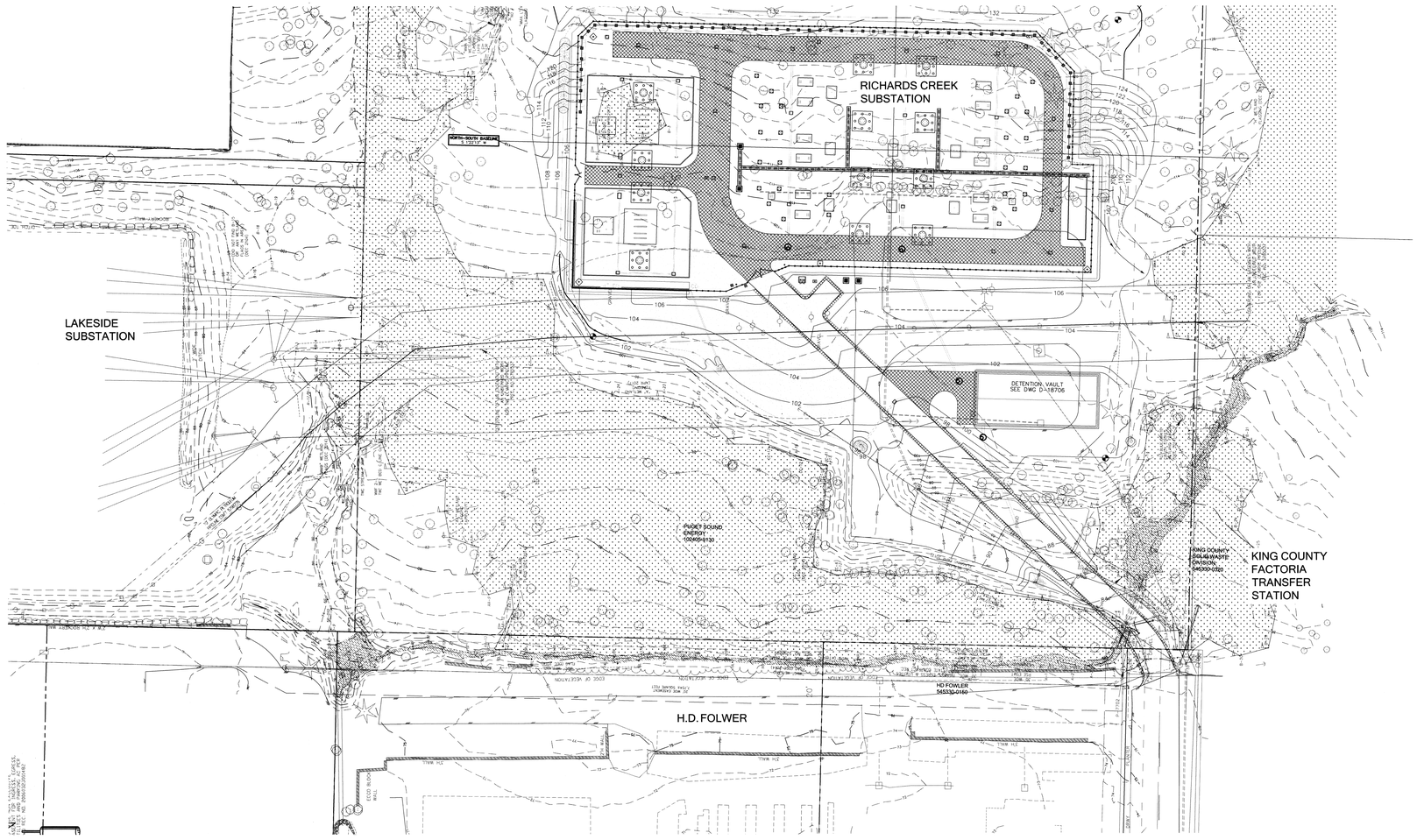
DRAFT LANDSCAPE DETAILS RICHARDS CREEK SUBSTATION

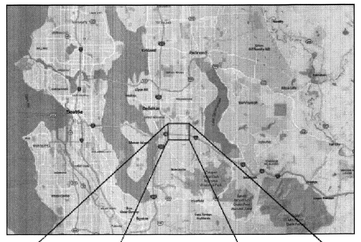
$USER$

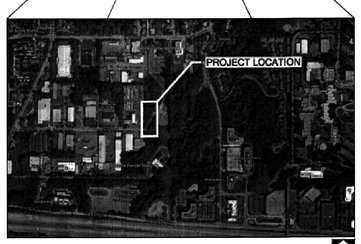
$DATE$

DSD 000168

RICHARDS CREEK SUBSTATION:
STREAM RESTORATION AND CULVERT REPLACEMENT







EXISTING CONDITIONS

MAP LEGEND

- EXISTING TREE
- EXISTING SURVEYED STREAM CHANNEL (OHWM)
- EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- PSE PROPERTY BOUNDARY

NOTES

TOPOGRAPHIC SURVEY PROVIDED BY:
APS SURVEYING AND MAPPING
13221 SE 26TH STREET, SUITE A
BELLEVUE, WA 98005
TEL.425-746-3200

VERTICAL DATUM: CITY OF BELLEVUE
BENCHMARK 104

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2.0 GENERAL NOTES, TESC & QUANTITIES
2.1 CONSTRUCTION SEQUENCE
2.2 EXISTING CONDITIONS
3.0 CHANNEL GRADING PLAN
3.1 TESC & DEMOLITION PLAN
3.2 TESC & DEMOLITION DETAILS
4.0 PROPOSED PLAN
5.0 CULVERT DESIGN
6.0 STATIONING & CROSS-SECTIONS
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50 0 50 100 200
GRAPHIC SCALE
(IN FEET)

COVER SHEET
SCALE 1"=50'

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REVISION DESCRIPTION:	WO NUMBER: 141003252
6/30/2017: 60% CITY OF BELLEVUE SUBMITTAL	

RICHARDS CREEK SUBSTATION

		DATE (M/D/Y)
CAD	LM	06 / 13 / 17
ENGINEER	EM	/ /
REVIEWED	EM	/ /
APPROVED	S. KIM	08 / 30 / 17

PUGET SOUND ENERGY

W-1.0 COVER SHEET

DRAWING NO D-18172 REV NO 0
SHEET: 1 OF 22
FILE NO: 111103
CODE: RIC
CLASS: SITE
CADD NO:

DSD 000169

KING COUNTY STANDARD PLAN NOTES, RECOMMENDED CONSTRUCTION SEQUENCE, AND ADDITIONAL NOTES FROM KING COUNTY 2016 SURFACE WATER DESIGN MANUAL - APPENDIX D.4.1 STANDARD ESC AND SWPPS PLAN NOTES

STANDARD ESC PLAN NOTES

OMITTED TEXT HAS A STRIKE-THROUGH. TEXT ADDED BY THE WATERSHED COMPANY HAS AN UNDERLINE.

THE STANDARD ESC PLAN NOTES MUST BE INCLUDED ON ALL ESC PLANS. AT THE APPLICANT'S DISCRETION, NOTES THAT IN NO WAY APPLY TO THE PROJECT MAY BE OMITTED; HOWEVER, THE REMAINING NOTES MUST NOT BE RENUMBERED. FOR EXAMPLE, IF ESC NOTE #3 WERE OMITTED, THE REMAINING NOTES SHOULD BE NUMBERED 1, 2, 4, 5, 6, ETC.

1. APPROVAL OF THIS EROSION AND SEDIMENTATION CONTROL (ESC) PLAN DOES NOT CONSTITUTE AN APPROVAL OF PERMANENT ROAD OR DRAINAGE DESIGN (E.G., SIZE AND LOCATION OF ROADS, PIPES, RESTRICTORS, CHANNELS, RETENTION FACILITIES, UTILITIES, ETC.).
2. THE IMPLEMENTATION OF THESE ESC PLANS AND THE CONSTRUCTION, MAINTENANCE, REPLACEMENT, AND UPGRADING OF THE ESC FACILITIES IS THE RESPONSIBILITY OF THE APPLICANT/ESC SUPERVISOR UNTIL ALL CONSTRUCTION IS APPROVED.
3. THE BOUNDARIES OF THE CLEARING LIMITS SHOWN ON THIS PLAN SHALL BE CLEARLY FLAGGED BY SURVEY TAPE OF FENCING, IF REQUIRED, PRIOR TO CONSTRUCTION (SWDM APPENDIX D). DURING THE CONSTRUCTION PERIOD, NO DISTURBANCE BEYOND THE CLEARING LIMITS SHALL BE PERMITTED. THE CLEARING LIMITS SHALL BE MAINTAINED BY THE APPLICANT/ESC SUPERVISOR FOR THE DURATION OF CONSTRUCTION.
4. STABILIZED CONSTRUCTION ENTRANCES SHALL BE INSTALLED AT THE BEGINNING OF CONSTRUCTION AND MAINTAINED FOR THE DURATION OF THE PROJECT. ADDITIONAL MEASURES, SUCH AS CONSTRUCTED WHEEL WASH SYSTEMS OR WASH PADS, MAY BE REQUIRED TO ENSURE THAT ALL PAVED AREAS ARE KEPT CLEAN AND TRACK OUT TO ROAD RIGHT OF WAY DOES NOT OCCUR FOR THE DURATION OF THE PROJECT.
5. THE ESC FACILITIES SHOWN ON THIS PLAN MUST BE CONSTRUCTED PRIOR TO OR IN CONJUNCTION WITH ALL CLEARING AND GRADING SO AS TO ENSURE THAT THE TRANSPORT OF SEDIMENT TO SURFACE WATERS, DRAINAGE SYSTEMS, FLOW CONTROL BMP LOCATIONS (EXISTING AND PROPOSED), AND ADJACENT PROPERTIES IS MINIMIZED.
6. THE ESC FACILITIES SHOWN ON THIS PLAN ARE THE MINIMUM REQUIREMENTS FOR ANTICIPATED SITE CONDITIONS. DURING THE CONSTRUCTION PERIOD, THESE ESC FACILITIES SHALL BE UPGRADED AS NEEDED FOR UNEXPECTED STORM EVENTS AND MODIFIED TO ACCOUNT FOR CHANGING SITE CONDITIONS (E.G. ADDITIONAL COVER MEASURES, ADDITIONAL SUMP PUMPS, RELOCATION OF DITCHES AND SILT FENCES, PERIMETER PROTECTION ETC.) AS DIRECTED BY KING COUNTY.
7. THE ESC FACILITIES SHALL BE INSPECTED DAILY BY THE APPLICANT/ESC SUPERVISOR AND MAINTAINED TO ENSURE CONTINUED PROPER FUNCTIONING. WRITTEN RECORDS SHALL BE KEPT OF WEEKLY REVIEWS OF THE ESC FACILITIES.
8. ANY AREAS OF EXPOSED SOILS, INCLUDING ROADWAY EMBANKMENTS, THAT WILL NOT BE DISTURBED FOR TWO CONSECUTIVE DAYS DURING THE WET SEASON OR SEVEN DAYS DURING THE DRY SEASON SHALL BE IMMEDIATELY STABILIZED WITH THE APPROVED ESC METHODS (E.G., SEEDING, MULCHING, PLASTIC COVERING, ETC.).
9. ANY AREA NEEDING ESC MEASURES THAT DO NOT REQUIRE IMMEDIATE ATTENTION SHALL BE ADDRESSED WITHIN SEVEN (7) DAYS.
10. THE ESC FACILITIES ON INACTIVE SITES SHALL BE INSPECTED AND MAINTAINED A MINIMUM OF ONCE A MONTH DURING THE DRY SEASON, BY-MONTHLY DURING THE WET SEASON, OR WITHIN TWENTY FOUR (24) HOURS FOLLOWING A STORM EVENT.
11. AT NO TIME SHALL MORE THAN ONE (1) FOOT OF SEDIMENT BE ALLOWED TO ACCUMULATE WITHIN A CATCH BASIN. ALL CATCH BASINS AND CONVEYANCE LINES SHALL BE CLEANED PRIOR TO PAVING. THE CLEANING OPERATION SHALL NOT FLUSH SEDIMENT-LADEN WATER INTO THE DOWNSTREAM SYSTEM.
12. ~~ANY PERMANENT RETENTION/DETENTION FACILITY USED AS A TEMPORARY SETTLING BASIN SHALL BE MODIFIED WITH THE NECESSARY EROSION CONTROL MEASURES AND SHALL PROVIDE ADEQUATE STORAGE CAPACITY. IF THE FACILITY IS TO FUNCTION ULTIMATELY AS AN INFILTRATION SYSTEM, THE TEMPORARY FACILITY MUST BE ROUGH GRADED SO THAT THE BOTTOM AND SIDES ARE AT LEAST THREE FEET ABOVE THE FINAL GRADE OF THE PERMANENT FACILITY. FLOW CONTROL BMP AREAS (EXISTING OR PROPOSED) SHALL NOT BE USED AS TEMPORARY FACILITIES AND SHALL BE PROTECTED FROM SEDIMENTATION AND INTRUSION.~~
13. COVER MEASURES WILL BE APPLIED IN CONFORMANCE WITH APPENDIX D OF THE KING COUNTY SURFACE WATER DESIGN MANUAL.
14. PRIOR TO THE BEGINNING OF THE WET SEASON (OCT. 1), ALL DISTURBED AREAS SHALL BE REVIEWED TO IDENTIFY WHICH ONES CAN BE SEEDED IN PREPARATION FOR THE WINTER RAINS. DISTURBED AREAS SHALL BE SEEDED WITHIN ONE WEEK OF THE BEGINNING OF THE WET SEASON. A SKETCH MAP OF THOSE AREAS TO BE SEEDED AND THOSE AREAS TO REMAIN UNCOVERED SHALL BE SUBMITTED TO THE DPER INSPECTOR.

ESC PLAN RECOMMENDED CONSTRUCTION SEQUENCE

OMITTED TEXT HAS A STRIKE-THROUGH. TEXT ADDED BY THE WATERSHED COMPANY HAS AN UNDERLINE.

A DETAILED CONSTRUCTION SEQUENCE IS NEEDED TO ENSURE THAT EROSION AND SEDIMENT CONTROL MEASURES ARE APPLIED AT THE APPROPRIATE TIMES. A RECOMMENDED CONSTRUCTION SEQUENCE IS PROVIDED BELOW:

1. HOLD THE PRE-CONSTRUCTION MEETING.
2. POST SIGN WITH NAME AND PHONE NUMBER OF CSWPP/ESC SUPERVISOR (MAY BE CONSOLIDATED WITH THE REQUIRED NOTICE OF CONSTRUCTION SIGN).
3. FLAG OR FENCE CLEARING LIMITS.
4. ~~INSTALL CATCH BASIN PROTECTION, IF REQUIRED. INSTALL FLOW CONTROL BMP AREA PROTECTION, IF REQUIRED.~~
5. GRADE AND INSTALL CONSTRUCTION ENTRANCE(S).
6. INSTALL PERIMETER PROTECTION (SILT FENCE, BRUSH BARRIER, ETC.).
7. ~~CONSTRUCT SEDIMENT PONDS AND TRAPS.~~
8. GRADE AND STABILIZE CONSTRUCTION ROADS.
9. CONSTRUCT SURFACE WATER CONTROLS (INTERCEPTOR DIKES, PIPE SLOPE DRAINS, ETC.) SIMULTANEOUSLY WITH CLEARING AND GRADING FOR PROJECT DEVELOPMENT. CONSTRUCT SWPPPS IN ANTICIPATION OF SCHEDULED CONSTRUCTION ACTIVITY (E.G., CONRETE-RELATED PH MEASURES FOR UTILITY, VAULT OR ROADWAY CONSTRUCTION).
10. MAINTAIN EROSION CONTROL AND SWPPS MEASURES IN ACCORDANCE WITH KING COUNTY STANDARDS AND MANUFACTURER'S RECOMMENDATIONS.
11. RELOCATE EROSION CONTROL AND SWPPS MEASURES, OR INSTALL NEW MEASURES SO THAT AS SITE CONDITIONS CHANGE, THE EROSION AND SEDIMENT CONTROL AND POLLUTANT PROTECTION IS ALWAYS IN ACCORDANCE WITH THE KING COUNTY CONSTRUCTION STORMWATER POLLUTION PREVENTION STANDARDS.
12. COVER ALL AREAS THAT WILL BE UNWORKED FOR MORE THAN SEVEN DAYS DURING THE DRY SEASON OR TWO DAYS DURING THE WET SEASON WITH STRAW, WOOD FIBER MULCH, COMPOST, PLASTIC SHEETING, OR EQUIVALENT.
13. STABILIZE ALL AREAS WITHIN SEVEN DAYS OF REACHING FINAL GRADE.
14. SEED, SOD, STABILIZE, OR COVER ANY AREAS TO REMAIN UNWORKED FOR MORE THAN 30 DAYS.
15. UPON COMPLETION OF THE PROJECT, STABILIZE ALL DISTURBED AREAS AND REMOVE BMPS IF APPROPRIATE.

FROM KING COUNTY 2016 SURFACE WATER DESIGN MANUAL - APPENDIX D.4.2 RECOMMENDED CONSTRUCTION SEQUENCE.

GENERAL CONSTRUCTION SEQUENCE

1. INSTALL ALL BMPS INDICATED IN CONSTRUCTION PLAN SET.
2. GRADE AND INSTALL CONSTRUCTION ENTRANCE(S).
3. GRADE AND STABILIZE ALL ACCESS ROADS.
4. INSTALL TREE PROTECTION FENCING.
5. CLEAR AND GRUB AREAS WITHIN GRADING LIMITS (SHEET 3.0).
6. INSTALL SANDBAGS AND FLOW DIVERSION PIPE(S).
7. CONSTRUCT STREAM ACCORDING TO PROPOSED GRADES (SHEET 4.0).
8. INSTALL CULVERT AND BRING SURROUNDING AREA TO FINAL GRADES.
9. REPAIR ACCESS ROAD PAVING REMOVED FOR CULVERT INSTALLATION.
10. INSTALL LARGE WOODY DEBRIS (SHEETS 3.0, 6.1, AND 6.2).
11. APPLY GRAVEL/ COBBLE/ BOULDER MIX AND TOPSOIL TO BRING SITE TO FINAL GRADES (SHEET 4.0 AND 6.1).
12. APPLY TOPSOIL AND COMPOST.
13. INSTALL PLANTINGS (SHEETS 7.0 - 7.4).
14. APPLY MULCH AND SOIL STABILIZATION MATERIALS.
15. REMOVE ALL BMPS, REFUSE, AND FENCES.

CLEARING, GRADING & TEMPORARY EROSION CONTROL - GENERAL

1. ALL CLEARING AND GRADING WORK SHALL MEET THE REQUIREMENTS AS SET FORTH IN APPLICABLE CITY CODE SECTIONS.
2. TEMPORARY EROSION/SEDIMENT CONTROLS SHALL BE INSTALLED AND OPERATING PRIOR TO ANY GRADING OR CONSTRUCTION-RELATED SOIL DISTURBANCE. THESE CONTROLS MUST BE SATISFACTORILY MAINTAINED UNTIL CONSTRUCTION IS COMPLETE AND ALL EXPOSED SOILS ARE STABILIZED BY HYDROSEEDING OR MULCHING.
3. ADDITIONAL EROSION-CONTROL MEASURES MAY BE REQUIRED BY CITY REPRESENTATIVES DEPENDING ON SITE AND WEATHER CONDITIONS. ANY WORK PERFORMED DURING THE RAINY SEASON, OCTOBER 1 THROUGH APRIL 30, SHALL REQUIRE A PLAN TO LIMIT THE EXTENT OF SOIL EXPOSURE.
4. AT THE DISCRETION OF THE RESPONSIBLE BUILDING OFFICIAL, WORK MAY BE SUSPENDED DURING PERIODS OF INCLEMENT WEATHER TO REDUCE ACTUAL OR POTENTIAL EROSION AND/OR SEDIMENTATION.
5. WHEN WORK IS STOPPED OR COMPLETED IN AN AREA, ADDITIONAL EROSION CONTROL MAY BE REQUIRED, INCLUDING SEEDING OR OTHER MEASURES.
6. ANY WATER RUNOFF FROM THE PROJECT AREA BEING DISCHARGED TO A STORMWATER SYSTEM DURING CONSTRUCTION SHALL NOT EXCEED TURBIDITY VALUES OF 50 NTU'S AND, IN ADDITION, SHALL MEET THE REQUIREMENTS OF THE 1972 CLEAN WATER ACT.
7. LOCATIONS SHOWN OF EXISTING UTILITIES MAY BE INCOMPLETE AND ARE APPROXIMATE. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO VERIFY, CORRECT AND DETERMINE ANY ADDITIONAL LOCATIONS SO AS TO AVOID DAMAGE OR DISTURBANCE.
8. ALL NATIVE VEGETATION IS TO REMAIN UNDISTURBED OUTSIDE OF GRADED AREAS, ACCESS CORRIDORS, AND/OR TO-BE-REPLANTED AREAS.
9. FLOW FROM IMPERVIOUS SURFACES, INCLUDING TRAILS AND ACCESS ROADS, SHALL BE CONNECTED TO A DRAINAGE SYSTEM AS SOON AS POSSIBLE.

CLEARING, GRADING & TEMPORARY EROSION AND SEDIMENTATION - SPECIFIC

1. LOCATING AND DELINEATING THE GRADING LIMITS AND ALL EXISTING TREES AND OTHER BEGETATION TO BE PRESERVED WITHIN THE WORK AREA AS INDICATED ON THE PLAN VIEW DRAWINGS AND AS DIRECTED BY THE STREAM RESTORATION CONSULTANT.
2. INSTALLING CONSTRUCTION ACCESS PAD(S) AT LOCATION(S) IDENTIFIED ON PLAN AND PER APPROPRIATE DETAIL.
3. MAINTAINING A SWEEPER ON-STE AND IMMEDIATELY REMOVING ANY SOIL THAT IS TRACKED ONTO PAVED SURFACES AS A RESULT OF CONSTRUCTION.
4. STABILIZING ALL EXPOSED SOILS BY SUITABLE APPLICATION OF BEST MANAGEMENT PRACTICES (CMPS), INCLUDING, BUT NOT LIMITED TO, PLASTIC COVERING, MULCHING, OR SODE OR OTHER VEGETATION. SEEDING AND STRAW MULCHING (3" DEPTH) OF EXPOSED SOILS IS TO OCCUR WITHIN SEVEN DAYS OF CHANNEL WORK AND RESTORATION FEATURE COMPLETION FRO EACH DISTINCT STREAM SEGMENT OR SEPARATE WORK AREA. FROM OCTOBER 1 THROUGH APRIL 30, NO UNWORKED SOIL SHALL REMAIN EXPOSED FOR MORE THAN 48 HOURS. FROM MAY1 THROUGH SEPTEMBER 30, NO UNWORKED SOIL SHALL REMAIN EXPOSED FOR MORE THAN SEVEN DAYS.
5. PUMP SYSTEM TO TREAT OR INFILTRATE TURBID SEEPAGE WATER BEFORE DISCHARGING BACK INTO THE CREEK.
6. FUELING OF BEHICLES AT LEAST 100 FEET FROM OPEN WATER, AND SPILL KITS FOR THOSE VEHICLES.
7. POSTING A PUBLIC INFORMATION SIGN LISTIGN 24-HOUR EMERGENCY PHONE NUMBERS FOR THE CITY AND THE CONTRACTOR. THE SIGN MUST BE POSTED AT THE PROJECT SITE IN FULL VIEW OF THE PUBLIC AND THE CONTRACTORS, AND IT MUST REMAIN POSTED UNTIL FINAL SIGN OFF BY THE CITY CLEARING AND GRADING INSPECTOR OR EQUIVALENT PARTY.
8. REMOVAL OF ALL TEMPORARY EROSION AND SEDIMENT CONTROL BMPS WITHIN 30 DAYS AFTER FINAL SITE STABILIZATION OR AFTER THE TEMPORARY BMPS ARE NO LONGER NEEDED. TRAPPED SEDIMENT SHALL BE REMOVED OR STABILIZED ON SITE. DISTURBED SOIL AREAS RESULTING FROM BMP REMOVAL SHALL BE PERMANENTLY STABILIZED.

MATERIALS & QUANTITIES

ITEM	QUANTITY	UNIT
SILT AND CONSTRUCTION FENCING	750	LF
EROSION CONTROL WATTLE	1000	LF
SEDIMENT CURTAIN - INSTALLATION, REMOVAL AND MAINTENANCE	0	LF
TEMPORARY BYPASS		
SANDBAG	20	EA
BYPASS PIPE	200	LF
DEWATERING PUMP	1	
FISH EXCLUSION/ CREEK RAMPING	1	LS
LOG INSTALLATION (INCLUDING HARDWARE)		
ROOTWAD	4	EA
BARB LOG	9	EA
FILL		
GRAVEL/ COBBLE/ BOULDER MIX	225	CY
TOPSOIL, TYPE A (IMPORTED COMPOST)	100	CY
MULCH	28	CY
ACCESS ROAD ASPHALT REPAIR		
ASPHALT	600	CF
SUBGRADE (CASE COURSE, UNTREATED, 3/4")	17	CY
BOX CULVERT AND SEDIMENT VAULT	1	EA

MATERIAL SPECIFICATIONS AND DEFINITIONS

ANCHORS: ANCHORS SHALL CONSIST OF MANTA RAY MR-3 EARTH ANCHORS OR EQUIVALENT. ANCHORS TO BE DRIVEN MINIMUM 6 FEET (72 INCHES) INTO GROUND (OR PER MANUFACTURER'S RECOMMENDATIONS) AT AN ANGLE APPROXIMATELY 15 TO 30 FROM VERTICAL AIMED AWAY FROM THE CENTER OF THE CHANNEL AND UPSTREAM. ALL ANCHORS SHALL BE SET AND LOAD TESTED TO APPROXIMATELY 5,000 LBS. IF MR-3 ANCHORS ARE UNABLE TO ACHIEVE SPECIFIED LOAD RATING, THEN A LARGER ANCHOR (MR-2 OR MR-1) SHALL BE SUBSTITUTED THAT MEETS SPECIFIED LOAD RATING. ALTERNATIVELY, IF MR-3 ANCHORS ARE UNABLE TO BE DRIVEN TO DESIRED LEVEL, A SMALLER ANCHOR (MR-4 OR MR-88) SHALL BE USED AND SET TO THE SAME LOAD RATING.

VEGETABLE COMPOST: COMPOST SHALL BE CEDAR GROVE OR EQUAL PRODUCT (TYPE A) CONTAINING 100% COMPOSED VEGETABLE MATTER AND NO VIABLE WEED SEEDS OR PARTS.

WOOD CHIP MULCH: CHIPPED WOODY MATERIAL APPROXIMATELY 1 TO 4 INCHES IN MAXIMUM DIMENSION (NOT SAWDUST OR HOG FUEL). ALSO KNOWN AS ARBORIST CHIPS.

FERTILIZER: THE SLOW RELEASE, GRANULAR FERTILIZER APPLICATIONS SHOULD BEGIN AFTER THE SHRUBS AND GROUNDCOVERS HAVE HAD A YEAR OF GROWTH. EARLY APPLICATION OF FERTILIZER BENEFITS INVASIVE WEEDS TO THE DISADVANTAGE OF THE NEWLY INSTALLED NATIVE PLANTS. FOLLOW MANUFACTURERS' INSTRUCTIONS FOR APPLICATION. KEEP ALL FERTILIZERS IN WEATHER-TIGHT CONTAINERS WHILE ON SITE.

CLEARING, GRADING & TEMPORARY EROSION CONTROL - GENERAL

1. ALL CLEARING AND GRADING WORK SHALL MEET THE REQUIREMENTS AS SET FORTH IN APPLICABLE CITY CODE SECTIONS.
2. A PRECONSTRUCTION MEETING SHALL BE HELD WITH CITY, CONTRACTOR, AND DESIGNER REPRESENTATIVES PRESENT, AND ALL REQUIRED PERMITS MUST BE APPROVED PRIOR TO START OF CONSTRUCTION. CONDUCT WEEKLY PROGRESS MEETINGS WITH CONTRACTOR AND DESIGNER REPRESENTATIVES PRESENT.
3. TEMPORARY EROSION/SEDIMENT CONTROLS SHALL BE INSTALLED AND OPERATING PRIOR TO ANY GRADING OR CONSTRUCTION-RELATED SOIL DISTURBANCE. THESE CONTROLS MUST BE SATISFACTORILY MAINTAINED UNTIL CONSTRUCTION IS COMPLETE AND ALL EXPOSED SOILS ARE STABILIZED BY HYDROSEEDING OR MULCHING WITH STRAW.

NOTE: GRAVEL/COBBLE/BOULDER MIX SHALL CONSIST OF WELL-GRADED, ROUNDED GRAVEL COBBLES, AND SMALL BOULDERS, AND CONFORMING TO THE BELOW SIZE GRADATION BY WEIGHT.

MIX TO BE APPLIED TO SECTION OF STREAM UPSTREAM OF THE PROPOSED CULVERT:

<3/8" (MIN 5% FINES)	10%
3/8 TO 3 INCHES	10%
3 TO 6 INCHES	15%
6 TO 12 INCHES	15%
12 TO 18 INCHES	15%
18 TO 24 INCHES	15%
24 TO 36 INCHES	10%
36 INCHES AND LARGER	10%

MIX TO BE APPLIED TO SECTION OF STREAM DOWNSTREAM OF THE PROPOSED CULVERT:

FINES <0.004" (0.1 mm)	5%
0.004" to 1/4 INCH	10%
1/4 TO 3/4 INCH	15%
3/4 to 1-1/2 INCHES	30%
1-1/2 TO 3 INCHES	25%
3 TO 5 INCHES	15%

NOTES
1. REFER TO DETAILS ON SHEET 6.3.
2. FINAL LOG STRUCTURE PLACEMENT IN FIELD SHALL TAKE PLACE AFTER FOOTING REPAIRS AND SHALL BE DIRECTED BY A STREAM RESTORATION SPECIALIST.
3. ANCHOR LOGS USING EARTH ANCHORS AS FEASIBLE.
4. IF BOULDERS ARE USED MEET ANCHORING REQUIREMENTS AS PROVIDED IN THE DETAILS AND SPECIFICATIONS.

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GENERAL NOTES, TESC & QUANTITIES

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6/30/2017: 60% CITY OF BELLEVUE SUBMITTAL	

RICHARDS CREEK SUBSTATION

		DATE (M/D/Y)
CAD	LM	06 / 13 / 17
ENGINEER	EM	/ /
REVIEWED	EM	/ /
APPROVED	S. KIM	08 / 14 / 17

PUGET SOUND ENERGY

W-2.0 GENERAL NOTES, TESC & QUANTITIES

CLASS: SITE

CADD NO:

DRAWING NO: D-18172

REV NO: 0

SHEET: 2 OF 22

FILE NO: 111103

CODE: RIC

CONSTRUCTION SEQUENCE

GENERAL CONSTRUCTION WORK SEQUENCE:

1. INSTALL ALL TEMPORARY EROSION CONTROL MEASURES, GENERAL AND SITE-SPECIFIC, AS NOTED ON THE PLANS AND SUPPORTING DOCUMENTS OR AS REQUIRED BY VARIOUS PERMITS AND AUTHORIZATIONS. SEE NOTES AND PLANS ON SHEET W-4.1 AND W-4.2.
2. CLEAR AND GRUB WITHIN GRADING LIMITS.
3. CONSTRUCT A TEMPORARY GRAVEL BAG DIVERSION DAM (OR APPROVED ALTERNATE) ACROSS THE STREAM CHANNEL AT OR UPSTREAM OF THE LIMIT OF THE AFFECTED IN-STREAM WORK AREA, TO CREATE A POOL. PLACE FLEXIBLE DIVERSION PIPES TO CARRY FLOW AND ANY FISH IN THE UPSTREAM POOL TO THE INDICATED POINT DOWNSTREAM OF THE WORK AREA. THE DISCHARGE IS TO BE POSITIONED TO MINIMIZE EROSION OR TURBIDITY RESULTING FROM THE DISCHARGE VELOCITY OF THE WATER.
4. CONSTRUCT A SEDIMENT TRAP WITH A SUMP PUMP AT THE DOWNSTREAM LIMIT OF THE AFFECTED WORK AREA TO RETAIN ANY SILT-LADEN WATER THAT MAY COLLECT AS A RESULT OF IMPLEMENTATION ACTIVITIES. COLLECTED SILT-LADEN WATER IS TO BE PUMPED TO UPLAND AREAS FOR DISCHARGE/DISPERSAL BY PERFORATED PIPE AND BIOFILTRATION AND/OR INFILTRATION IN WETLAND AREAS.
5. THE CONTRACTOR SHALL NOTIFY THE STREAM RESTORATION SPECIALIST 3 WORKING DAYS IN ADVANCE OF DEWATERING TO ALLOW FOR FISH REMOVAL. ANY FISH ISOLATED IN THE LOCALIZED IN-STREAM WORK AREA WILL BE REMOVED BY THE STREAM RESTORATION SPECIALIST IN THE WORK AREA. GIVEN THE SIZE AND CHARACTERISTICS OF THE EXISTING STREAM, IT IS EXPECTED THAT STRANDED FISH CAN BE LOCATED AND CAPTURED USING DIPNETS OR SMALL SEINES, FOLLOWED BY ELECTROFISHING. EFFORTS TO CAPTURE AND RELOCATE FISH BY NETTING METHODS ARE TO PRECEDE ELECTROFISHING. CAPTURED FISH ARE TO BE RELEASED IN UNAFFECTED REACHES DOWNSTREAM OF THE PROJECT AREA.
6. EXCAVATE STREAM ACCORDING TO THE GRADING PLAN, PROFILE, AND CROSS-SECTIONS. EXCAVATE THE MAIN CHANNEL (DOWN TO THE ELEVATION OF THE BENCHES). UNDER SUPERVISION OF THE STREAM RESTORATION SPECIALIST, FLAG AND THEN EXCAVATE THE LOW FLOW CHANNEL.
7. REMOVE ACCESS ROAD ASPHALT WITHIN GRADING LIMITS AND EXCAVATE ACCORDING TO SHEETS W-4.0 AND W-4.1.
8. INSTALL CULVERT ACCORDING TO SHEETS W-5.0 AND W-5.1.
9. EXCAVATE DEPRESSIONS IN THE STREAM CHANNEL BOTTOM TO ACCOMMODATE THE PLACEMENT OF THE PROPOSED LOG STRUCTURES. MATERIAL EXCAVATED FROM THE CHANNEL MAY BE RE-USED AS DIRECTED. PLACE LOG STRUCTURES IN GROUPINGS AND ACCORDING TO TYPE AND POSITIONING AS LAID OUT IN DETAIL IN THE PROJECT PLANS.
10. PLACE LOG STRUCTURES ACCORDING TO SHEETS W-3.0, W-6.1, AND W-6.2. INSTALL EARTH ANCHOR SYSTEMS AND PLACE GRAVEL/ COBBLE/ BOULDER MIX.
11. BRING STREAM TO FINAL GRADE WITH GRAVEL/ COBBLE/ BOULDER MIX (SEE SHEETS W-2.0 AND W-6.2 FOR DETAILS).
12. FOLLOWING COMPLETION OF IN-STREAM WORK, ENSURE THAT MULCH, BLANKET AND OTHER EROSION CONTROLS ARE INSTALLED AND IN GOOD CONDITION ALONG STREAMBANKS BORDERING AREAS TO BE PLANTED, AND DOWNSLOPE OF ANY OTHER DISTURBED AREAS.
13. ANY SILT-LADEN WATER COLLECTING IN THE IN-STREAM WORK AREA FOLLOWING CESSATION OF IN-WATER WORK ACTIVITIES IS TO BE ALLOWED TO SETTLE OR DISSIPATE PRIOR TO RECONNECTING THE DE-WATERED WORK AREA TO THE FLOWING STREAM BY REMOVAL OF FIRST THE DOWNSTREAM THEN THE UPSTREAM TEMPORARY GRAVEL BAG DIVERSION DAM AND ASSOCIATED BYPASS PIPING.
14. INSTALL PLANTINGS ACCORDING TO SHEETS W-7.0 - W-7.3.
15. WATER PLANTS AS NEEDED DURING DRY CONDITIONS THROUGHOUT THE FIRST YEAR POST-PLANTING.
16. REMOVE ALL REFUSE, TESC MEASURES AND BMPS.

CONSTRUCTION SEQUENCE

SCALE 1"=20'

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Call: TOLL FREE
1-800-424-5555

REVISION DESCRIPTION:	WO NUMBER: 141003252
6/30/2017: 60% CITY OF BELLEVUE SUBMITTAL	

RICHARDS CREEK SUBSTATION

		DATE (M/D/Y)
CAD	LM	06 / 13 / 17
ENGINEER	EM	/ /
REVIEWED	EM	/ /
APPROVED	S. KIM	08 / 14 / 17

PUGET SOUND ENERGY

W-2.1 CONSTRUCTION SEQUENCE

DRAWING NO: D-18172 REV NO: 0

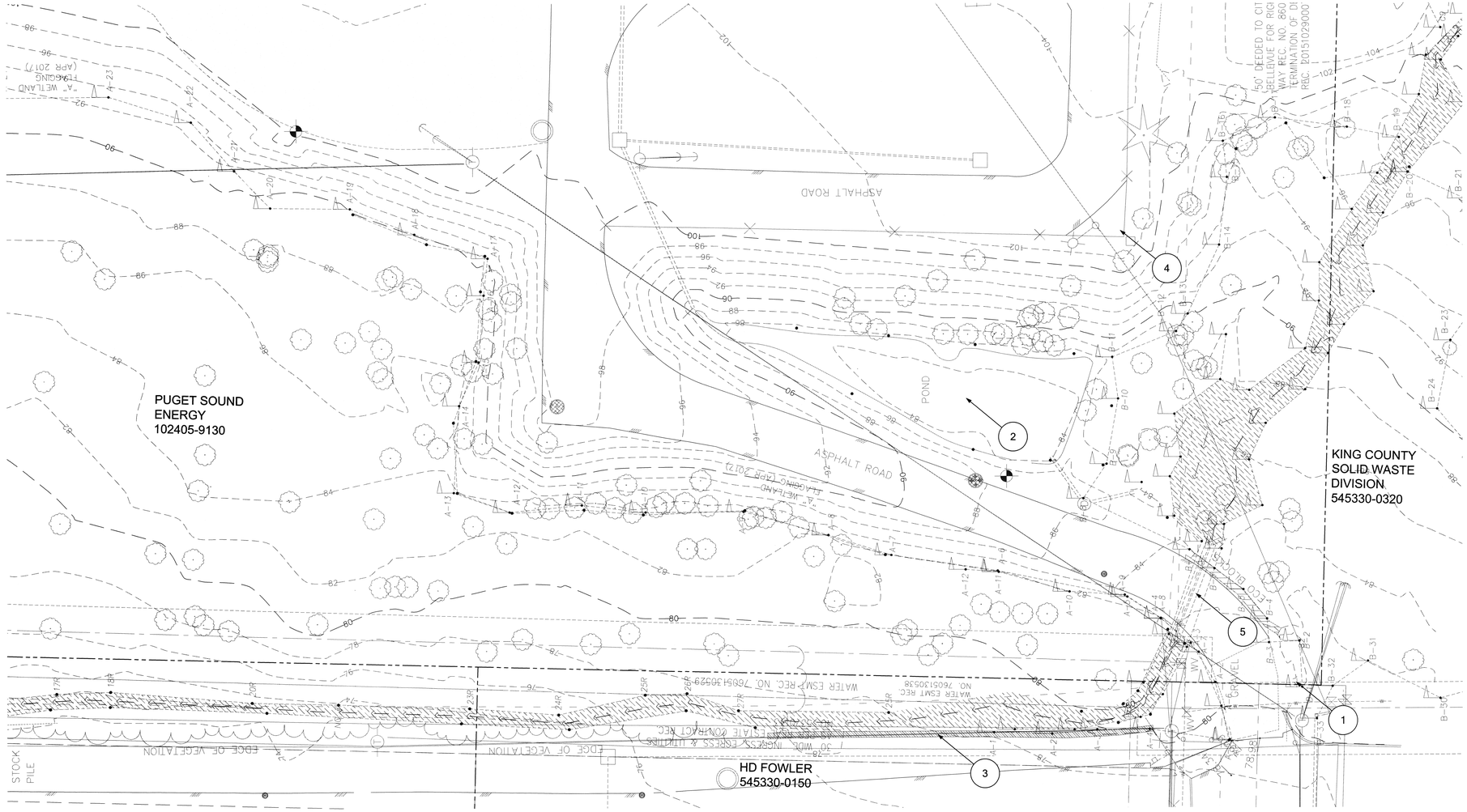
SHEET: 3 OF 22

CLASS: SITE

FILE NO: 111103

CODE: RIC

CADD NO:



LEGEND

- EXISTING TREE
- EXISTING SURVEYED STREAM CHANNEL (OHWM)
- EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- PSE PROPERTY BOUNDARY

1. SECTION OF STREAM DAYLIGHTED FOR 15' LF BEFORE ENTERING INTO STORM DRAIN
2. STORMWATER POND
3. ECO BLOCK RETAINING WALL
4. GRAVEL EQUIPMENT STORAGE LOT
5. 2 - 18" CORRUGATED METAL PIPES

EXISTING CONDITIONS

SCALE 1"=20'

20 0 20 40 80

GRAPHIC SCALE
(IN FEET)

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REVISION DESCRIPTION:	WO NUMBER: 141003252
6/30/2017: 60% CITY OF BELLEVUE SUBMITTAL	

RICHARDS CREEK SUBSTATION

		DATE (M/D/Y)
CAD	LM	06 / 13 / 17
ENGINEER	EM	/ /
REVIEWED	EM	/ /
APPROVED	S. KM	08 / 14 / 17

PUGET SOUND ENERGY

W-2.2 EXISTING CONDITIONS

DRAWING NO: D-18172 REV NO: 0

SHEET: 4 OF 22

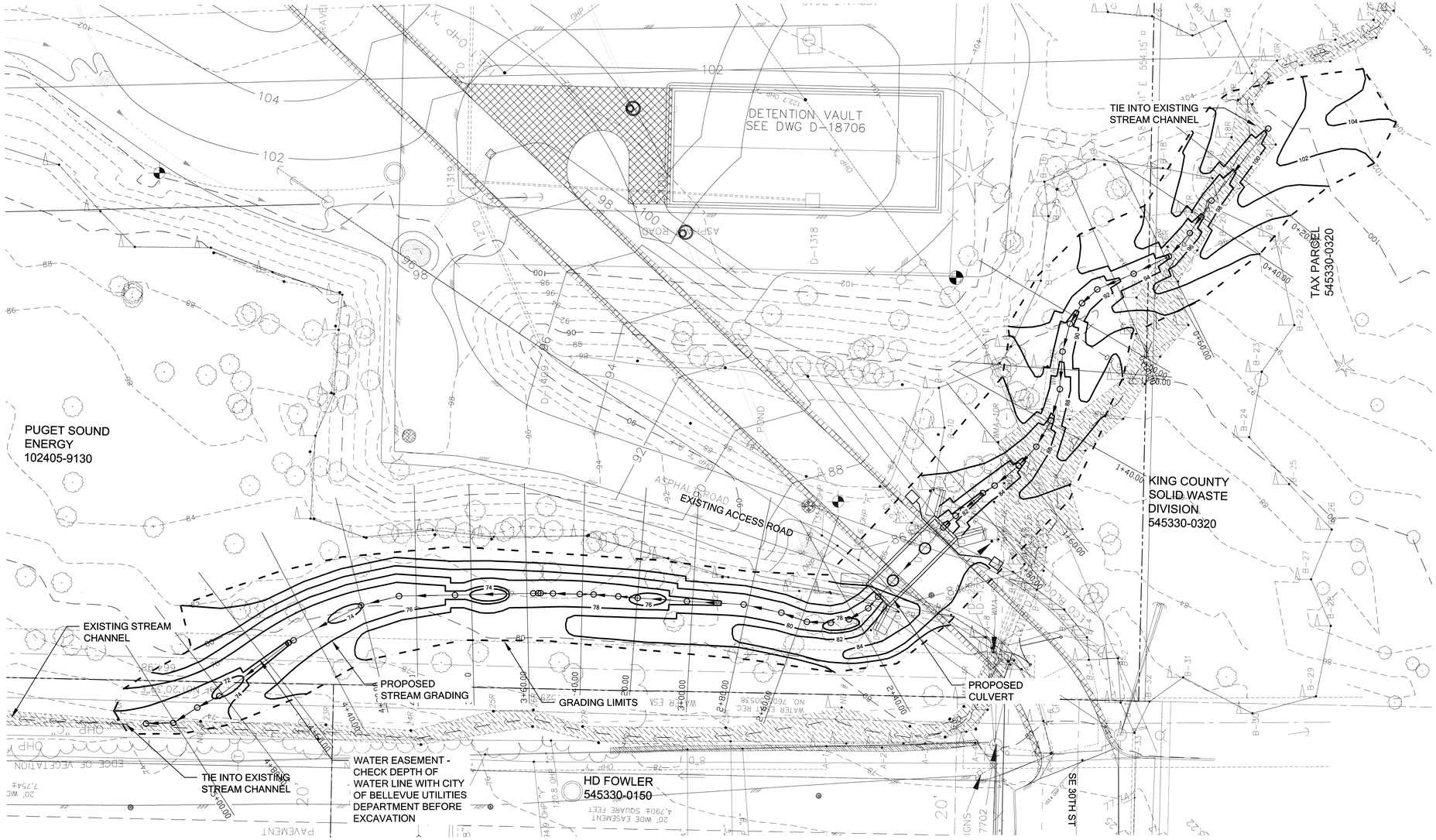
CLASS: SITE

FILE NO: 111103

CODE: RIC

CADD NO:

DSD 000172



LEGEND

- EXISTING CHANNEL
- EXISTING TREE
- EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- PROPOSED CONTOURS
- PSE PROPERTY BOUNDARY
- GRADING LIMITS
- XS STATION (SEE 6.11 - 6.13)

GRADING PLAN

SCALE 1"=20'

GRAPHIC SCALE
(IN FEET)
20 0 20 40 80

CALL BEFORE YOU DIG
Call: TOLL FREE
1-800-424-5555

REVISION DESCRIPTION:	WO NUMBER: 141003252
6/30/2017: 60% CITY OF BELLEVUE SUBMITTAL	

RICHARDS CREEK SUBSTATION

		DATE (M/D/Y)
CAD	LM	06 / 13 / 17
ENGINEER	EM	/ /
REVIEWED	EM	/ /
APPROVED	S. EM	08 / 30 / 17

PUGET SOUND ENERGY

W-3.0 CHANNEL GRADING PLAN

DRAWING NO: D-18172 REV NO: 0

SHEET: 5 OF 22

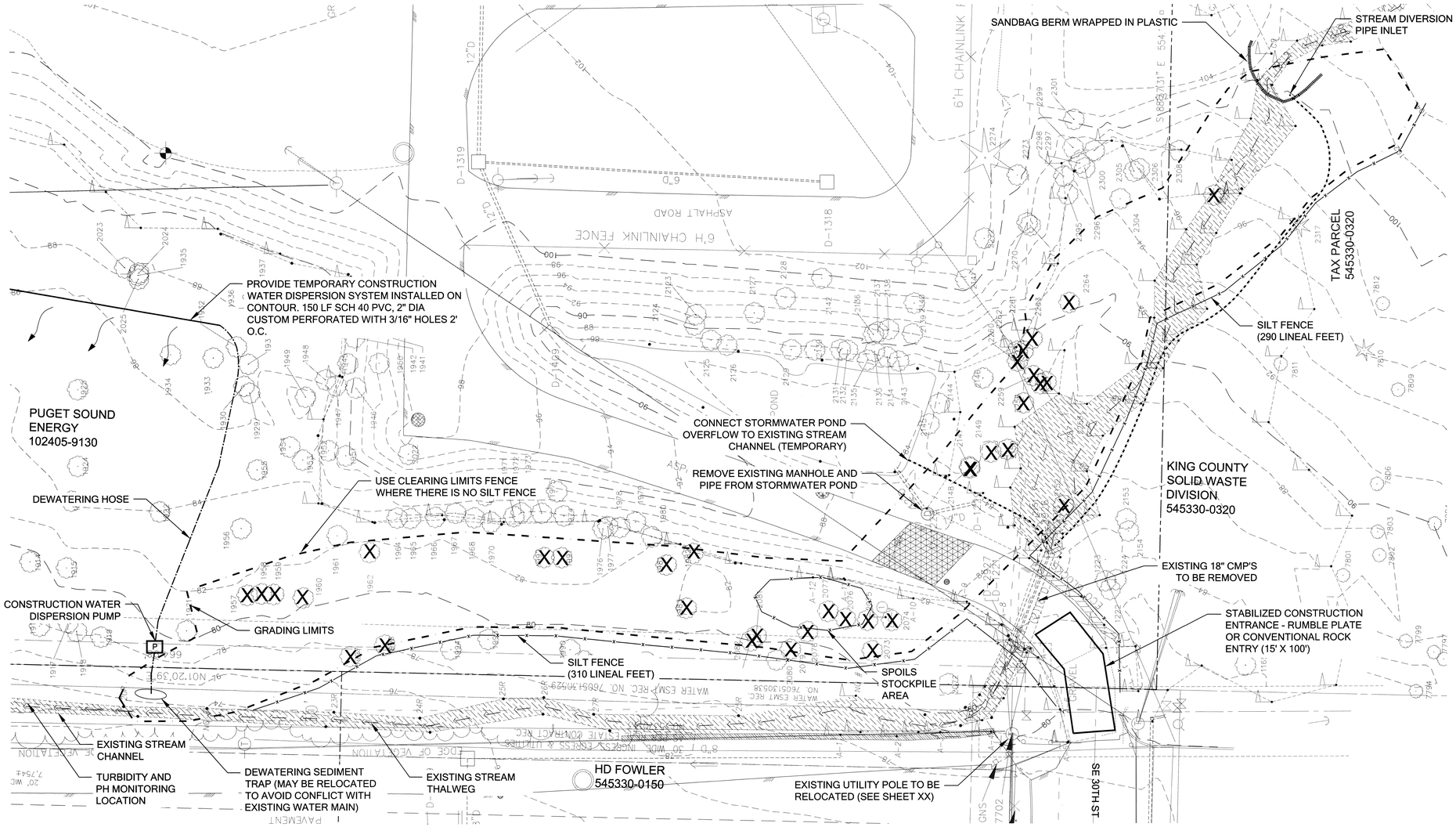
CLASS: SITE

FILE NO: 111103

CODE: RIC

CADD NO:

DSD 000173



LEGEND

- EXISTING CHANNEL
- EXISTING TREE TO BE REMOVED
- GRADING LIMITS
- DIVERSION PIPE (210 LF)
- DEWATERING HOSE AND PUMP
- ASPHALT (TO BE REMOVED)
- SILT FENCE
- SANDBAG BERM

TREE REMOVAL TABLE

REFS.	TREE DESC.	DIA. (INCHES)	REFS.	TREE DESC.	DIA. (INCHES)	REFS.	TREE DESC.	DIA. (INCHES)	REFS.	TREE DESC.	DIA. (INCHES)
1957	ALDER	14									
1958	ALDER	14	1962	POPLAR	12 10	2077	ALDER	9 8	2258	ALDER	9
1959	ALDER	12	1981	ALDER	8	2078	ALDER	10 8 6 5	2260	ALDER	9
1960	ALDER	9 15	1982	ALDER	9 8 7	2079	ALDER	8 7	2261	ALDER	8
						2081	ALDER	10	2262	ALDER	9
			1983	ALDER	18	2082	ALDER	9	2263	ALDER	8
			1991	ALDER	12				2264	ALDER	10 5
			1992	ALDER	13	2147	ALDER	9			
			1996	ALDER	10	2148	ALDER	10	2317	ALDER	9
			1997	ALDER	8	2149	POPLAR	12 6			
						2150	POPLAR	14 12 10			
			2073	ALDER	8 5	2152	POPLAR	CLUSTER 15 TREES 3"-9" (15' DIA.)			
			2074	ALDER	12 11						
			2075	ALDER	(2)8	2256	ALDER	9			
			2076	ALDER	9	2257	ALDER	8			

NOTES

1. DIVERSION SHALL BE FLEXIBLE PIPE DESIGNED TO CONVEY THE 25-YR FLOW DURING THE CONSTRUCTION WINDOW. CONVEYANCE PIPE(S) SHALL BE INSTALLED AT THE STORMWATER POND OUTLET AND DISCHARGE AT THE EXISTING CMP PIPES BENEATH THE ACCESS DRIVE.
2. CONTRACTOR SHALL COMPLY WITH ESC NOTES AND SEQUENCES ON SHEETS 2.0 AND 4.2.

TESC & DEMOLITION PLAN

SCALE 1"=20'

20 0 20 40 80

GRAPHIC SCALE (IN FEET)

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REVISION DESCRIPTION:	WO NUMBER: 141003252
6/30/2017: 60% CITY OF BELLEVUE SUBMITTAL	

RICHARDS CREEK SUBSTATION

		DATE (M/D/Y)
CAD	LM	06 / 13 / 17
ENGINEER	EM	/ /
REVIEWED	EM	/ /
APPROVED	S. KIM	08 / 14 / 17

PUGET SOUND ENERGY

W-3.1 TESC & DEMOLITION PLAN

DRAWING NO: D-18172 REV NO: 0

SHEET: 6 OF 22

CLASS: SITE

FILE NO: 111103

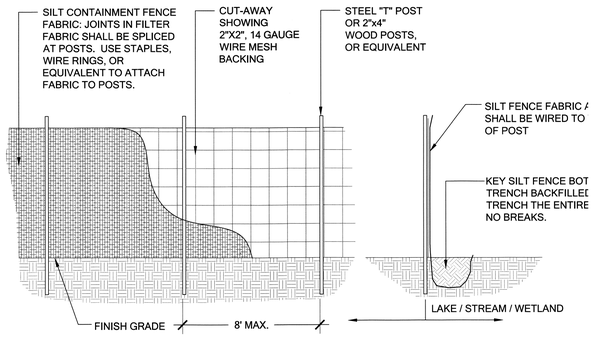
CODE: RIC

CADD NO:

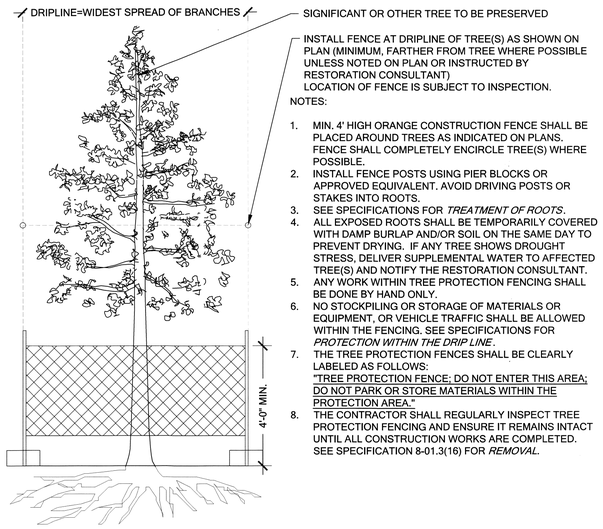
DSD 000174

1. TESC COORDINATION
   a. A Certified Erosion and Sediment Control Lead (CESCL) shall be designated by the contractor as the project's TESC supervisor and shall be responsible for the performance, maintenance, and review of TESC measures and for compliance with all permit conditions related to TESC. The TESC supervisor shall be certified by the Department of Ecology's training requirement.
   b. Contractor's Revised TESC Plans. The TESC measures shown on this plan, in the Stormwater Pollution Prevention Plan (Appendix D of the Specifications), and in Section 8.1 of the Specifications, are the minimum requirements for anticipated site conditions. The contractor may revise the TESC measures should they determine that there is a need to be modified to comply with the permit conditions or if there is a more effective and efficient way to meet the performance objectives for the duration of the project.
   c. Implementing Revised TESC Plans, The Contractor shall consult with the City prior to implementing any changes to ensure compliance with City permits, the contract, and that the changes do not negatively impact property or public safety.
   d. An onsite TESC preconstruction meeting shall be held before any work begins to review implementation of the TESC Plans and Report.
2. INITIAL TESC INSTALLATION
   a. All TESC facilities shown on the Plans shall be installed prior to or in conjunction with all clearing and grading so as to ensure that the sediment-laden water does not enter the City drainage system, surface waters, or wetlands. Adjacent properties shall be protected from sediment-laden runoff. If not specifically shown on the Plans or the TESC Report, installation shall be done in accordance with Appendix D of the King County Surface Water Design Manual, "Erosion and Sediment Control Standards", or as directed by the City.
   b. Clearing limits and tree protection boundaries shown on the Plans shall be clearly flagged by survey tape or fencing prior to construction. No disturbance beyond the clearing limits is allowed.
   c. Stabilized construction entrances shown on the Plans shall be installed at the beginning of construction and maintained for the duration of the project. Onsite roads and paved areas shall be kept clean to minimize turbidity in runoff. Additional measures, such as constructed wheel wash systems or wash pads, if shown on the Plans, are required to ensure sediment is not tracked out to city streets. Any dirt tracked onto city streets shall be swept as needed or as directed by the City of Issaquah. Street sweeping is not considered a TESC measure.
   d. Covering of exposed soils, including roadway embankments, that will not be disturbed for two consecutive days during the wet season (Oct 1 to April 30) or seven days during the dry season (May 1 to Sept 30) shall be done using approved TESC methods (e.g. seeding, mulching, plastic covering, etc.). These time limits may be modified by the City to address specific site and weather conditions.
   e. Collection and treatment of runoff using ditches, swales, or pipes is required to route stormwater to collection points where it is treated prior to infiltration or discharge offsite. When shown on the Plans, temporary storage facilities such as ponds and tanks shall be installed at the onset of construction, regardless of the time of year.
   f. Discharge to the sanitary sewer is allowed upon approval from the City or Sammamish Plateau Water and Sewer District and the King County Industrial Waste Program. Pretreatment prior to discharge is required to meet County or Sewer District standards.
   g. Working in Streams. All in-water work within waters of the state shall be conducted during the HPA-specified fish window (included in Appendix B). Any equipment working within regulated waters shall be equipped with vegetable-based (non-toxic) hydraulic fluids, and appropriate methods shall be employed to divert the stream around the working area or isolate the working area from the stream using barriers.
3. ROUTINE TESC MAINTENANCE
   a. Maintenance over duration of project. All TESC measures shall be maintained by the TESC supervisor for the duration of construction, until final landscaping or other permanent site stabilization is complete
   b. Routine inspections. The TESC facilities shall be inspected by the TESC supervisor daily or more often during rainfall, and maintained to ensure proper functioning. Written documentation is required for discharges above 25 NTUs and shall be readily available at the project site.
   c. Offsite Pumping. The TESC supervisor shall notify the City of Issaquah prior to pumping any discharge offsite or to critical areas.
   d. Inactive Sites. TESC facilities on inactive sites shall be inspected and maintained a minimum of once a month or within 24 hours following a storm event.
   b. Preparation for wet season. Prior to the beginning of the wet season (Oct 1), all disturbed areas shall be reviewed to identify which ones can be seeded or otherwise covered in preparation for the winter rains. If cover measures are not established by Oct 1, additional TESC measures shall be required.
5. TURBIDITY MONITORING
   a. Monitoring Responsibility. The City's Inspector will measure the turbidity of stormwater leaving the site at the designated monitoring point(s) to verify compliance with turbidity discharge limits for stormwater runoff per City permits, Appendix D of the Specifications, and Section 8.1 of the Specifications that are specified below. The Contractor shall monitor turbidity in Issaquah Creek upstream and downstream of the project site to verify compliance with turbidity in the stream per the Ecology Construction Stormwater General Permit and other State and Federal permits.
   b. Monitoring Location. The turbidity monitoring location, where the Inspector will measure turbidity for compliance, is shown on the TESC Plans. For project sites where designating a monitoring point is not feasible (e.g. flat sites or linear utility projects), the monitoring locations will be at the discretion of the Inspector.
   c. 25 NTU Action Level. The TESC Supervisor shall be notified of discharges above 25 NTUs. The TESC Supervisor shall review and modify the TESC measures as needed to keep discharges from the site below 25 NTUs.
   d. 100 NTU Discharge Limit. The contractor is responsible for installing and maintaining TESC measures so that discharge from the project site shall not exceed 100 NTUs at all times up to the 10 year/24 hour storm event. This event is defined as 3.5 inches of rainfall over a 24 hour period, as measured at the City's rain gage. Data from this rain gage is posted on the City's website.
   e. 5 NTU over background in Issaquah Creek. Refer to the Ecology Construction Stormwater General Permit and other State and Federal permits for compliance with State instream water quality standards.
6. OTHER POLLUTION CONTROL MEASURES
   a. Pollution Control. The contractor shall implement all requirements of the TESC Report and Stormwater Pollution Prevention Plan, including storage and handling of hazardous materials, concrete handling and wastewater disposal, spill kits and spill response, and other measures as needed.
   b. Control of Process Water. The contractor shall use the appropriate pollution control measures to ensure that no liquid products or contaminated water such as runoff from concrete slurry (known as process water) enters the storm drainage system, surface waters, or otherwise leaves the project site.
7. FINAL SITE STABILIZATION
   a. Final stabilization. The contractor shall install all TESC needed for final stabilization at completion of finish grading. This shall be done within two consecutive days during the wet season (Oct 1 to April 30), seven days during the dry season (May 1 to Sept 30) or as directed by the City.
   b. Removal of TESC Facilities. The contactor shall remove all TESC facilities, except those that will remain (such as seed and mulch) after final stabilization of the site.
8. ENFORCEMENT
   a. Non-compliance with contract requirements, performance objectives and permits. Failure to provide and maintain approved TESC facilities, discharges that exceed the 100 NTU turbidity limit, or other failures to comply with the contract or permits are considered violations of the contract and may be subject to suspension of work and monetary penalties.
   b. Maintenance of TESC during suspension. If work is ordered to be suspended, the contractor shall continue to control erosion, pollution, and runoff during the shutdown and working days will be continued to be counted.

SILT FENCE MAINTENANCE STANDARDS:
1. ANY DAMAGE SHALL BE REPAIRED IMMEDIATELY.
2. SEDIMENT SHALL BE REMOVED WHEN ACCUMULATION EXCEEDS 6" IN DEPTH.



1 SILT FENCE
Scale: NTS



INSTALL FENCE AT DRIPLINE OF TREE(S) AS SHOWN ON PLAN (MINIMUM, FARTHER FROM TREE WHERE POSSIBLE UNLESS NOTED ON PLAN OR INSTRUCTED BY RESTORATION CONSULTANT)
LOCATION OF FENCE IS SUBJECT TO INSPECTION.

NOTES:
1. MIN. 4' HIGH ORANGE CONSTRUCTION FENCE SHALL BE PLACED AROUND TREES AS INDICATED ON PLANS. FENCE SHALL COMPLETELY ENCIRCLE TREE(S) WHERE POSSIBLE.
2. INSTALL FENCE POSTS USING PIER BLOCKS OR APPROVED EQUIVALENT. AVOID DRIVING POSTS OR STAKES INTO ROOTS.
3. SEE SPECIFICATIONS FOR *TREATMENT OF ROOTS*.
4. ALL EXPOSED ROOTS SHALL BE TEMPORARILY COVERED WITH DAMP BURLAP AND/OR SOIL ON THE SAME DAY TO PREVENT DRYING. IF ANY TREE SHOWS DROUGHT STRESS, DELIVER SUPPLEMENTAL WATER TO AFFECTED TREE(S) AND NOTIFY THE RESTORATION CONSULTANT.
5. ANY WORK WITHIN TREE PROTECTION FENCING SHALL BE DONE BY HAND ONLY.
6. NO STOCKPILING OR STORAGE OF MATERIALS OR EQUIPMENT, OR VEHICLE TRAFFIC SHALL BE ALLOWED WITHIN THE FENCING. SEE SPECIFICATIONS FOR *PROTECTION WITHIN THE DRIP LINE*.
7. THE TREE PROTECTION FENCES SHALL BE CLEARLY LABELED AS FOLLOWS: "TREE PROTECTION FENCE; DO NOT ENTER THIS AREA; DO NOT PARK OR STORE MATERIALS WITHIN THE PROTECTION AREA."
8. THE CONTRACTOR SHALL REGULARLY INSPECT TREE PROTECTION FENCING AND ENSURE IT REMAINS INTACT UNTIL ALL CONSTRUCTION WORKS ARE COMPLETED. SEE SPECIFICATION 8-01.3(16) FOR *REMOVAL*.

2 TREE PROTECTION
Scale: NTS

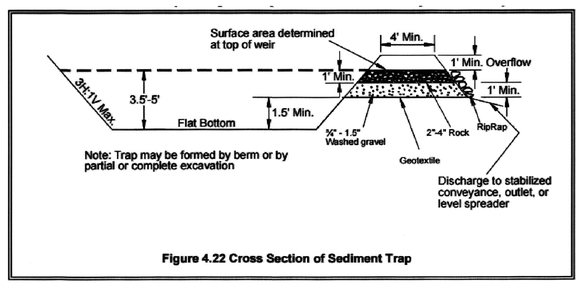


Figure 4.22 Cross Section of Sediment Trap

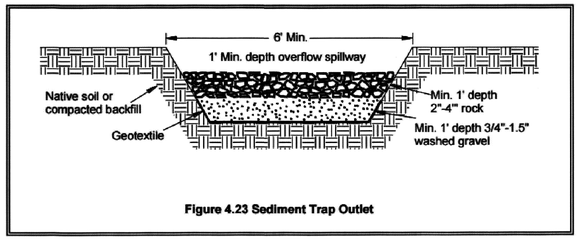


Figure 4.23 Sediment Trap Outlet

3 SEDIMENT TRAP (CITY OF BELLEVUE BMP C240)
Scale: NTS

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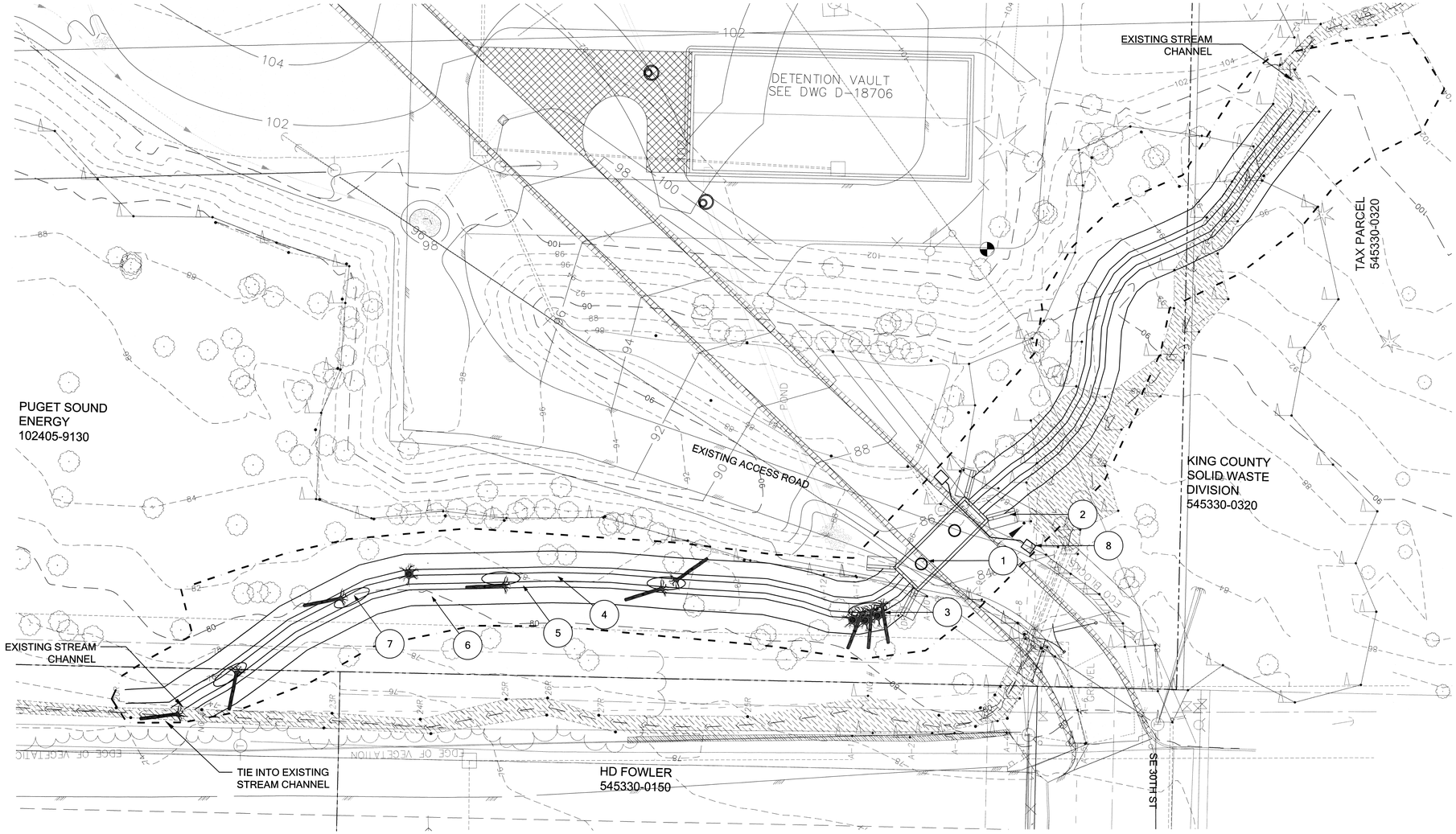
TESC & DEMOLITION NOTES & DETAILS

REVISION DESCRIPTION:	WO NUMBER: 141003252		
6/30/2017: 60% CITY OF BELLEVUE SUBMITTAL			RICHARDS CREEK SUBSTATION
		DATE (M/D/Y)	
CAD	LM	06 / 13 / 17	PUGET SOUND ENERGY — W-3.2 TESC & DEMOLITION DETAILS — DRAWING NO: D-18172 — REV NO: 0
ENGINEER	EM	/ /	SHEET: 7 OF 22
REVIEWED	EM	/ /	CLASS: SITE — FILE NO: 111103
APPROVED	S. KIM	08 / 14 / 17	CADD NO: — CODE: RIC

DSD.000175



LEGEND

- EXISTING CHANNEL
- EXISTING TREE
- EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- PSE PROPERTY BOUNDARY
- GRADING LIMITS

1. BOX CULVERT WITH LID
2. WINGWALLS
3. WOODY DEBRIS
4. LOW-FLOW CHANNEL
5. 2' WIDE STREAM BENCHES
6. 3:1 STREAM BANK
7. POOL
8. UTILITY HANDHOLE BELOW CULVERT

- LOG WITH ATTACHED ROOTS
- KEY MEMBER LOG WITH ATTACHED ROOTS
- UPRIGHT ROOT WAD

NOTES

1. NOT ALL SURVEYED OBJECTS ARE DISPLAYED IN THIS DRAWING
2. EXISTING CHANNEL OUTSIDE CONSTRUCTION LIMITS WILL NOT BE GRADED AND IS ANTICIPATED TO REMAIN OR BECOME WETLAND
3. FUTURE SUBSTATION NOT SHOWN

PROPOSED PLAN

SCALE 1"=20'

20 0 20 40 80

GRAPHIC SCALE
(IN FEET)

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REVISION DESCRIPTION:	WO NUMBER: 141003252
6/30/2017: 60% CITY OF BELLEVUE SUBMITTAL	

RICHARDS CREEK SUBSTATION

		DATE (M/D/Y)
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ENGINEER	EM	/ /
REVIEWED	EM	/ /
APPROVED	S. KIM	08 / 30 / 17

PUGET SOUND ENERGY

W-4.0 PROPOSED PLAN

DRAWING NO: D-18172 REV NO: 0

SHEET: 8 OF 22

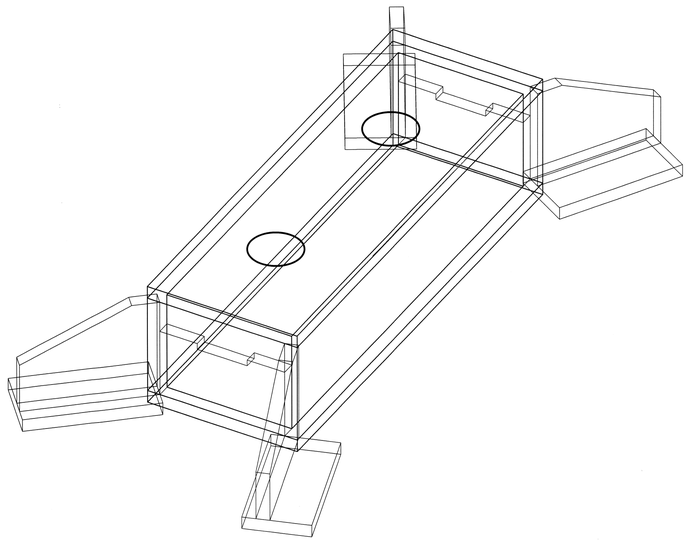
CLASS: SITE

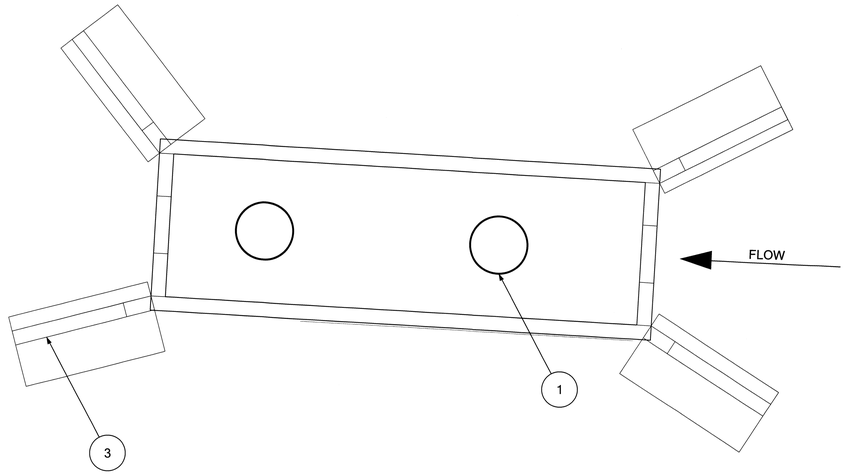
FILE NO: 111103

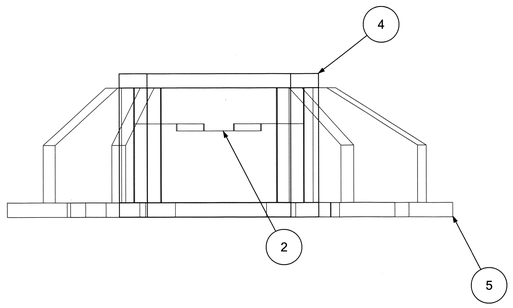
CODE: RIC

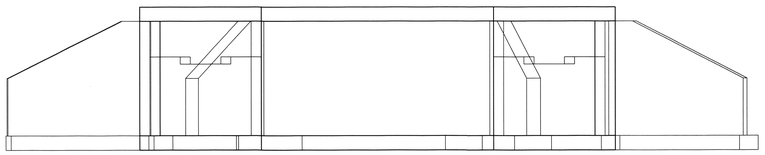
CADD NO:

DSD 000176









REPLACEMENT CULVERT DIMENSIONS - CONCRETE BOX

UPSTREAM SILL INVERT ELEVATION:	80.2'
UPSTREAM NOTCH ELEVATION:	79.7'
DOWNSTREAM SILL INVERT ELEVATION:	79.7'
DOWNSTREAM NOTCH ELEVATION:	79.2'
INTERNAL BOTTOM ELEVATION:	74.7'
INTERNAL DIMENSIONS:	10'W x 35'L x 8'H
WALL THICKNESS:	1.0'
SEDIMENT STORAGE DEPTH:	5'
SEDIMENT STORAGE VOLUME:	56 CY

NOTES

1. CULVERT WILL BE PRECAST CONCRETE AND ASSEMBLED ONSITE DURING CONSTRUCTION.
2. FINAL CULVERT DESIGN TO INCLUDE INTERNAL FLOW AND FISH BYPASS FOR USE DURING SEDIMENT VAULT CLEANOUT.

(1) MANHOLE CLEANOUT ACCESS

(2) LOW-FLOW SILL CUTOUT

(3) WINGWALL

(4) LID

(5) BASE PAD

CULVERT DESIGN

SCALE 1"=5'

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APPROVED	S. EM	08 / 14 / 17

PUGET SOUND ENERGY

W-5.0 CULVERT DESIGN

DRAWING NO: D-18172 | REV NO: 0

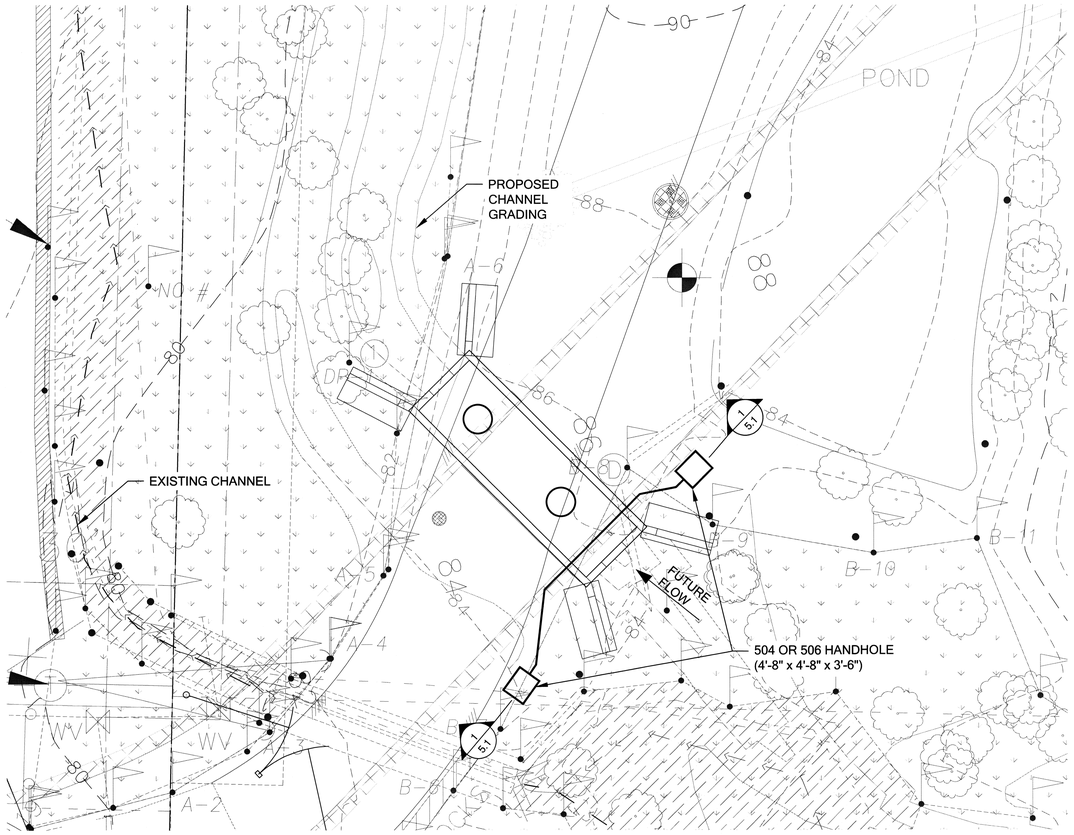
SHEET: 9 OF 22

CLASS: SITE

FILE NO: 111103

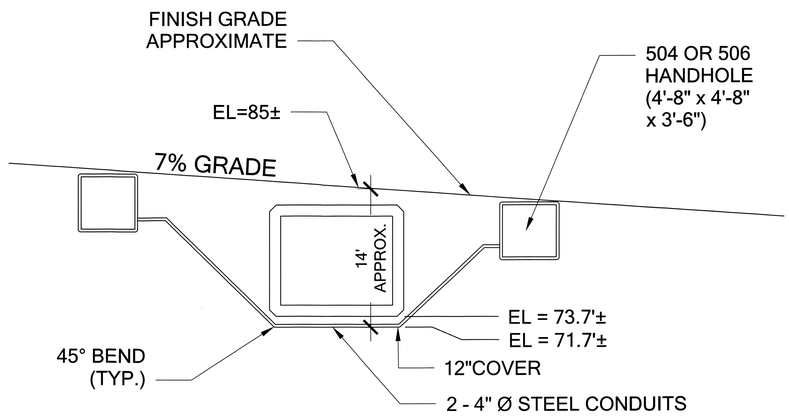
CODE: RIC

CADD NO:



NOTES
1. HANDHOLE AND CONDUIT LOCATIONS ARE APPROXIMATE

NOTE:
SEE PSE PLANS FOR DETAILS AND ELEVATIONS



1 SECTION A-A HANDHOLE DETAIL
Scale: NTS

CULVERT & UTILITY CROSS-SECTION

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1-800-424-5555

REVISION DESCRIPTION:	WO NUMBER: 141003252	
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CAD	LM	06 / 13 / 17
ENGINEER	EM	/ /
REVIEWED	EM	/ /
APPROVED	S. KIM	08 / 14 / 17

RICHARDS CREEK SUBSTATION

PUGET SOUND ENERGY

W-5.1 CULVERT & UTILITY CROSS-SECTION

CLASS: SITE

CADD NO:

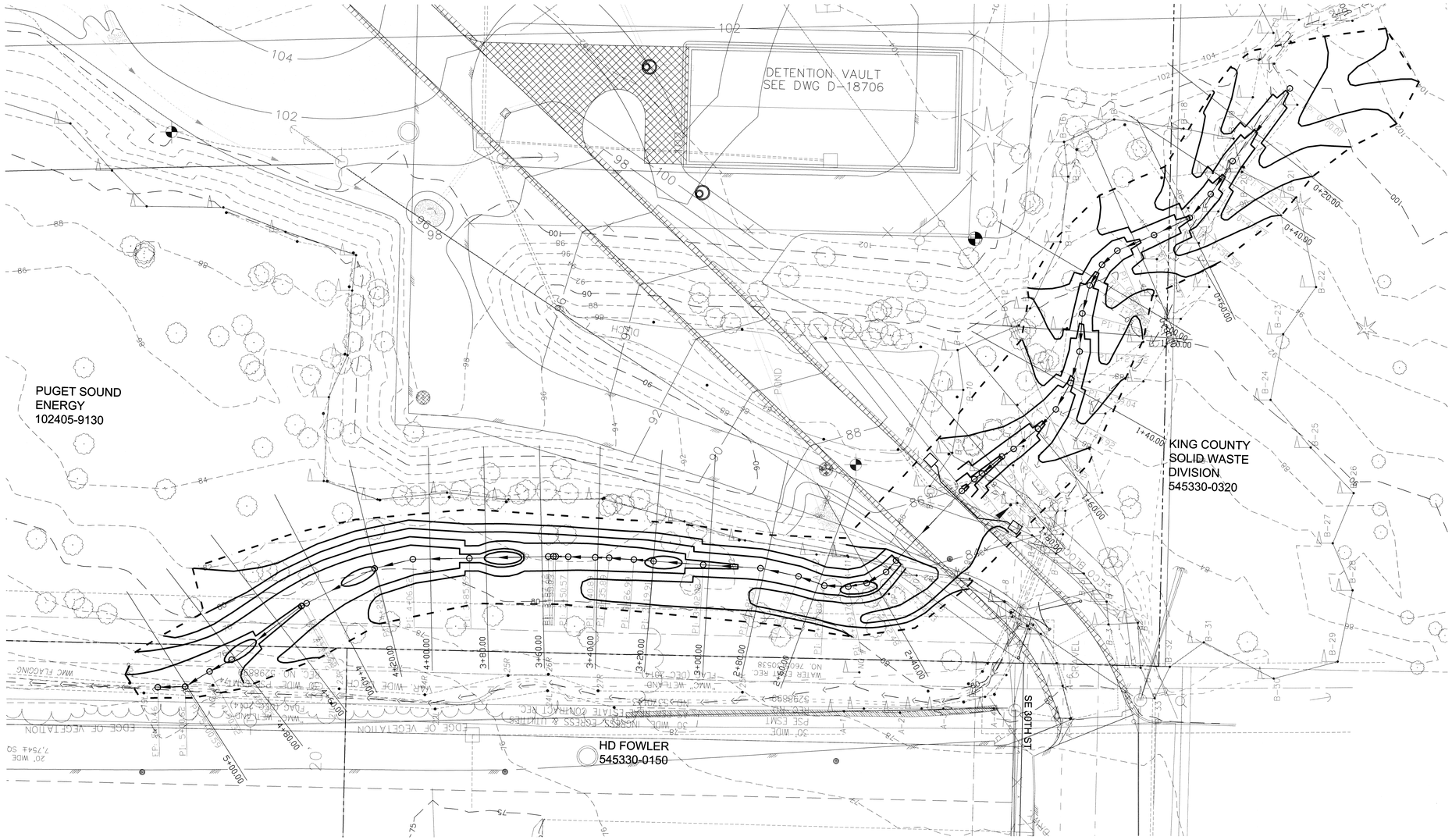
DRAWING NO D-18172 REV NO 0

SHEET: 10 OF 22

FILE NO: 111103

CODE: RIC

DSD 000178



LEGEND

- EXISTING TREE
- EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- PSE PROPERTY BOUNDARY
- GRADING LIMITS
- STREAM CENTERLINE

STATIONING & CROSS-SECTIONS

SCALE 1"=20'

20 0 20 40 80

GRAPHIC SCALE
(IN FEET)

CALL BEFORE YOU DIG
Call: TOLL FREE
1-800-424-5555

REVISION DESCRIPTION:	WO NUMBER: 141003252
6/30/2017: 60% CITY OF BELLEVUE SUBMITTAL	

RICHARDS CREEK SUBSTATION

		DATE (M/D/Y)
CAD	LM	06 / 13 / 17
ENGINEER	EM	/ /
REVIEWED	EM	/ /
APPROVED	S. KIM	08 / 30 / 17

PUGET SOUND ENERGY

W-6.0 STATIONING & CROSS-SECTIONS

DRAWING NO: D-18172 REV NO: 0

SHEET: 11 OF 22

CLASS: SITE

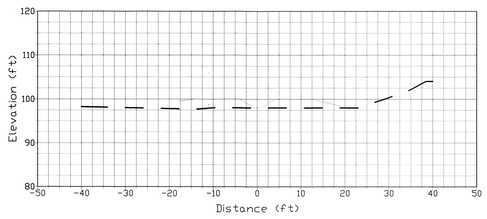
FILE NO: 111103

CODE: RIC

CADD NO:

DSD 000179

0+20.00



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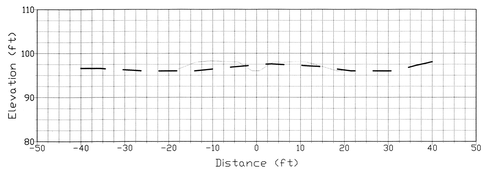

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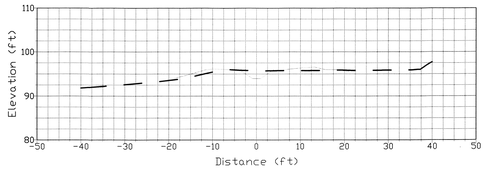

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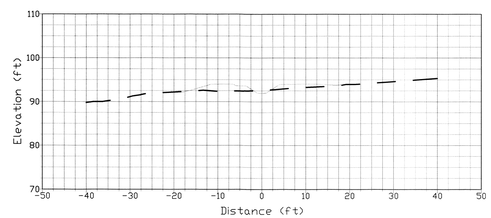

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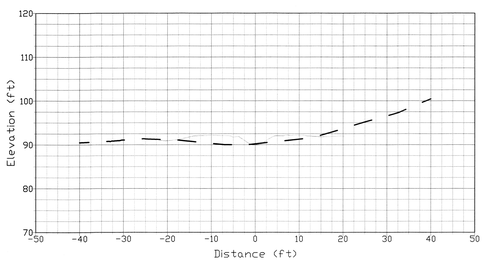

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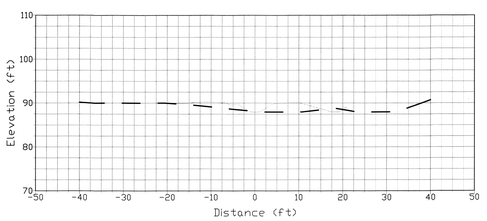

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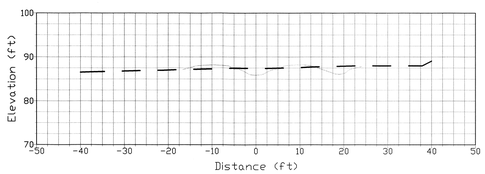

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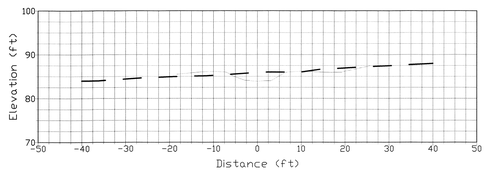

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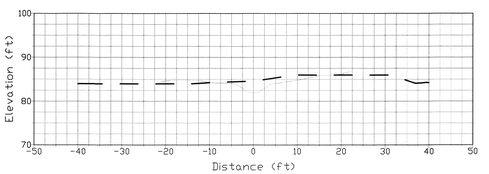


LEGEND

EXISTING GRADE

PROPOSED GRADE

STREAM CROSS-SECTIONS (1 OF 3)

SCALE: AS SHOWN

CALL BEFORE YOU DIG
Call: TOLL FREE
1-800-424-5555

REVISION DESCRIPTION:	WO NUMBER: 141003252
6/30/2017: 60% CITY OF BELLEVUE SUBMITTAL	

RICHARDS CREEK SUBSTATION

		DATE (M/D/Y)
CAD	LM	06 / 13 / 17
ENGINEER	EM	/ /
REVIEWED	EM	/ /
APPROVED	S. KIM	08 / 14 / 17

PUGET SOUND ENERGY

W-6.11 STREAM CROSS-SECTIONS

DRAWING NO: D-18172 | REV NO: 0

SHEET: 12 OF 22

CLASS: SITE

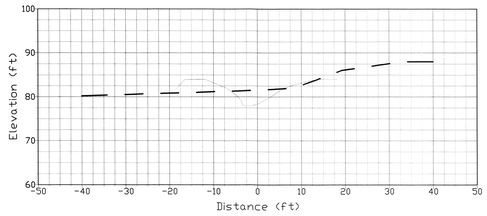
FILE NO: 111103

CODE: RIC

CADD NO:

DSD.000180

2+40.00



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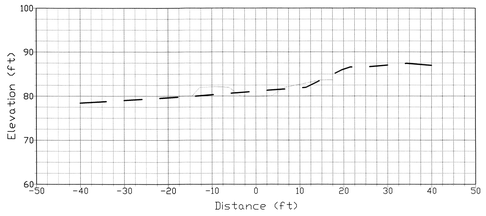

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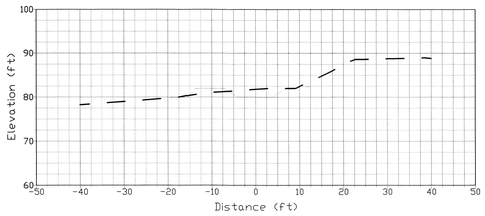
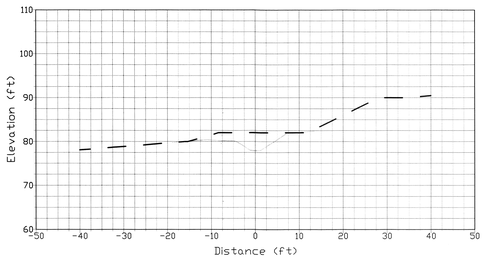


3+00.00



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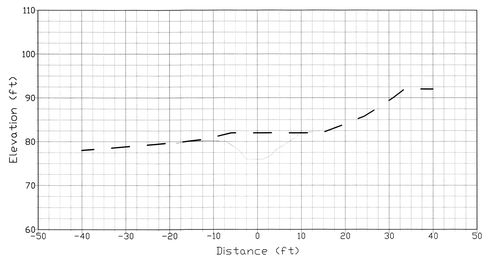

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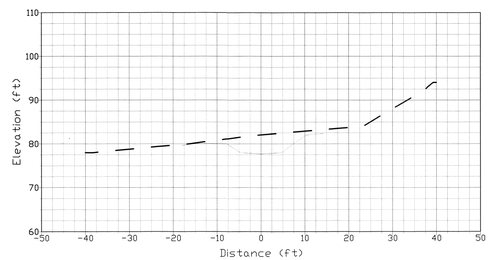

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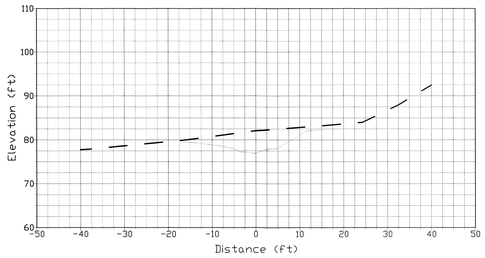

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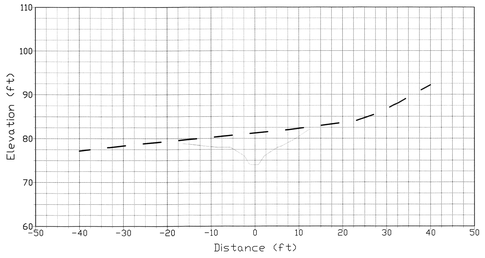

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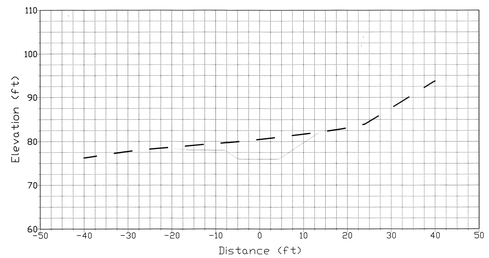


LEGEND

EXISTING GRADE

PROPOSED GRADE

STREAM CROSS-SECTIONS (2 OF 3)

SCALE: AS SHOWN

CALL BEFORE YOU DIG
Call: TOLL FREE
1-800-424-5555

REVISION DESCRIPTION:	WO NUMBER: 141003252
6/30/2017: 60% CITY OF BELLEVUE SUBMITTAL	

RICHARDS CREEK SUBSTATION

		DATE (M/D/Y)
CAD	LM	06 / 13 / 17
ENGINEER	EM	/ /
REVIEWED	EM	/ /
APPROVED	S. KIM	08 / 14 / 17

PUGET SOUND ENERGY

W-6.12 STREAM CROSS-SECTIONS

DRAWING NO: D-18172

REV NO: 0

SHEET: 13 OF 22

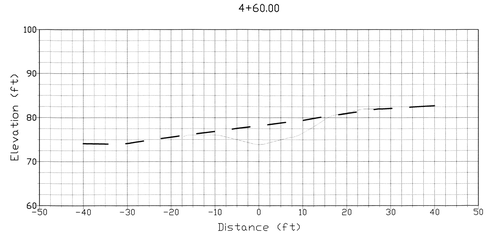
CLASS: SITE

FILE NO: 111103

CODE: RIC

CADD NO:

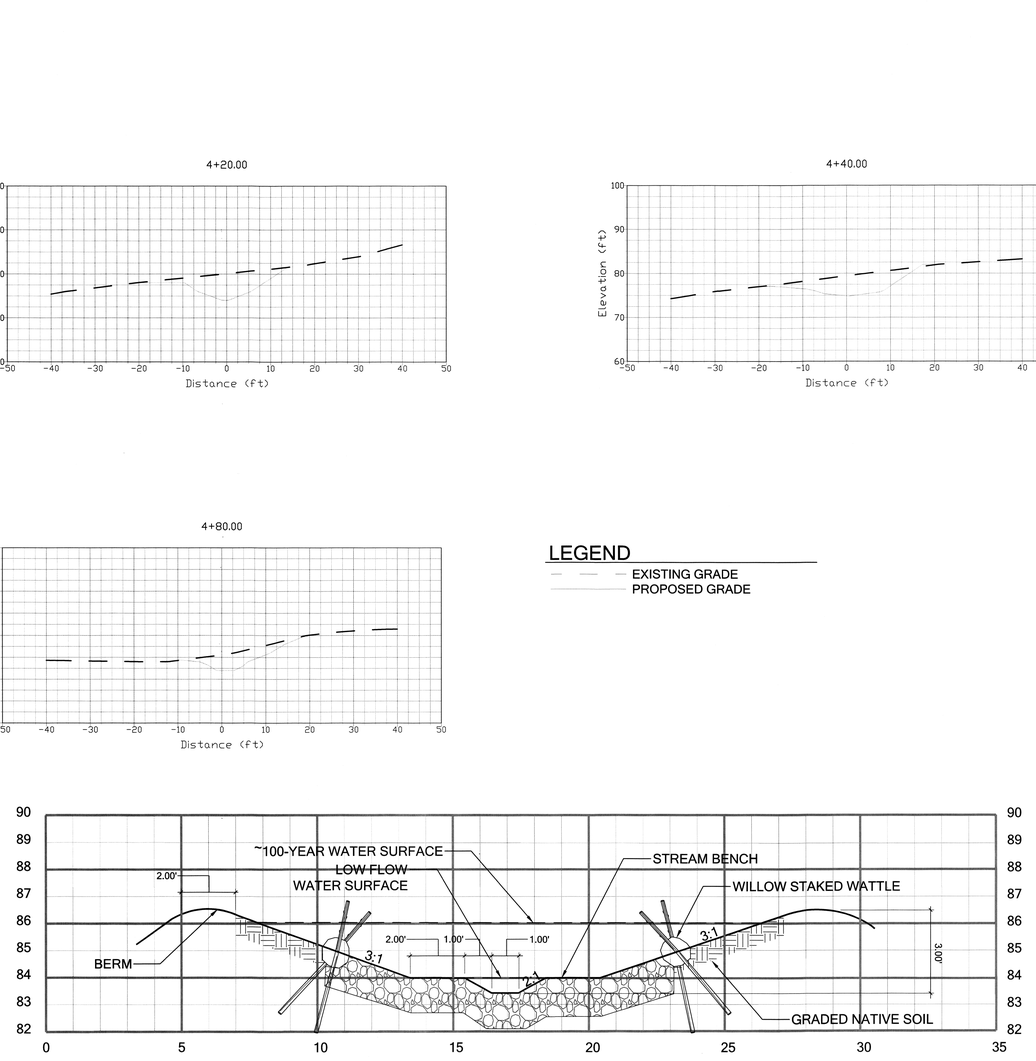
DSD 000181



LEGEND

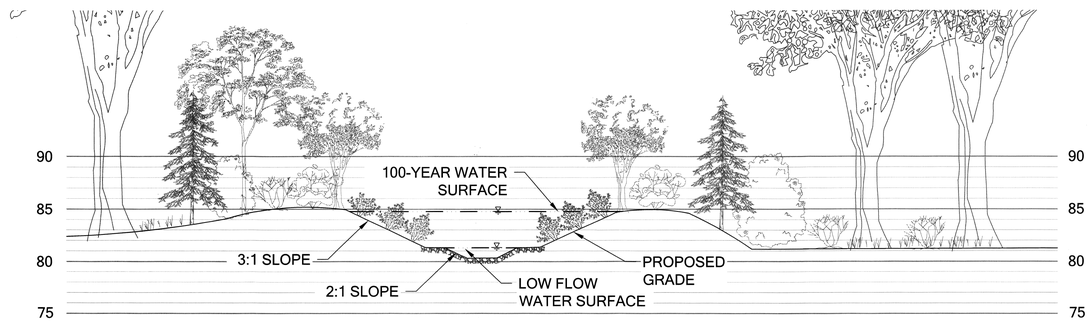
EXISTING GRADE

PROPOSED GRADE



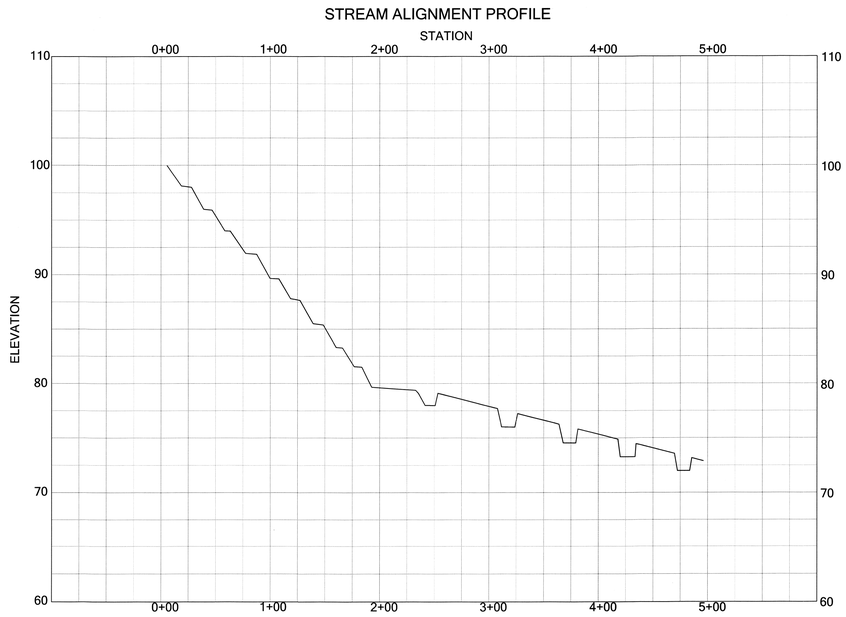
1 STREAM TYPICAL CROSS-SECTION (STA 2+40 - 5+00)

Scale: NTS



2 STREAM TYPICAL CROSS-SECTION WITH PLANTINGS

Scale: NTS



3 STREAM ALIGNMENT PROFILE

NOTE: REFER TO W-6.0 FOR CENTERLINE

Scale: NTS

STREAM CROSS-SECTIONS (3 OF 3) & PROFILE

SCALE NTS

CALL BEFORE YOU DIG
Call: TOLL FREE
1-800-424-5555

REVISION DESCRIPTION:	WO NUMBER: 141003252
6/30/2017: 60% CITY OF BELLEVUE SUBMITTAL	

RICHARDS CREEK SUBSTATION

		DATE (M/D/Y)
CAD	LM	06 / 13 / 17
ENGINEER	EM	/ /
REVIEWED	EM	/ /
APPROVED	S. KIM	08 / 14 / 17

PUGET SOUND ENERGY

W-6.13 STREAM CROSS-SECTIONS

DRAWING NO: D-18172 REV NO: 0

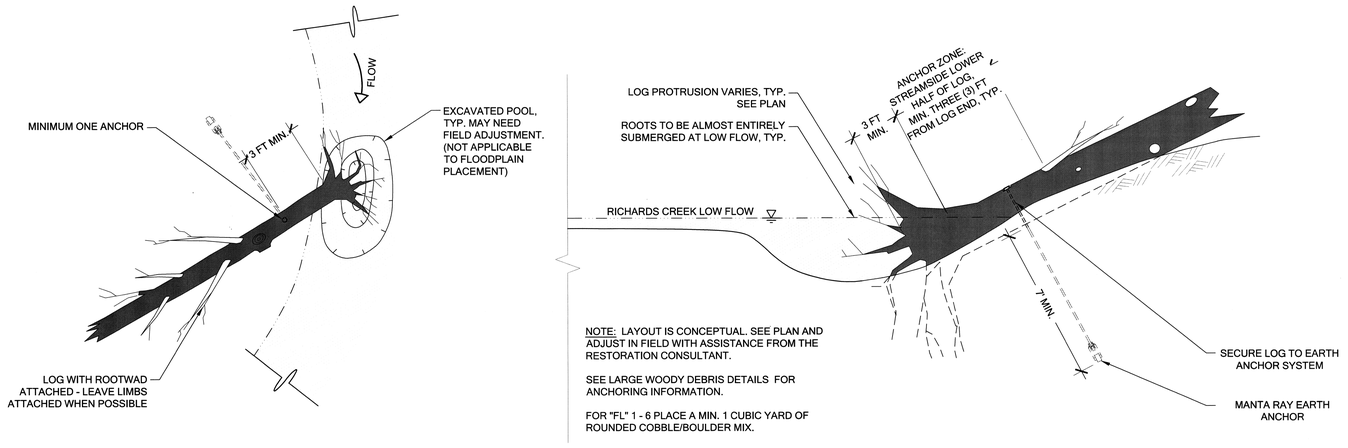
SHEET: 14 OF 22

CLASS: SITE

FILE NO: 111103

CODE: RIC

CADD NO:

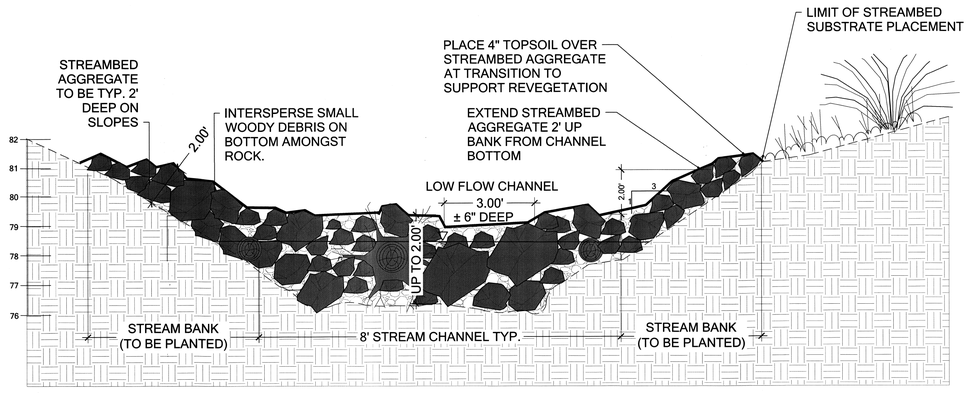


PLAN

SECTION: ON-GRADE FALLEN LOG

1 FALLEN LOG (TYP.)

Scale: NTS



2 ROCK MIXED WITH WOOD CROSS-SECTION (TYP.) - UPSTREAM OF CULVERT (STA 0+00 - 1+80)

Scale: NTS

MATERIALS SPECIFICATIONS

1) ROOT WADS (QTY - 4): SHALL BE NATIVE WESTERN REDCEDAR OR DOUGLAS-FIR, FREE OF ROT, MINIMUM 50% CEDAR, SUPPLIED WITH ATTACHED TRUNKS 4 TO 7 FEET IN LENGTH ABOVE THE GROUND LINE AS THE TREE GREW AND A MINIMUM OF 12 INCHES IN DIAMETER 4 FEET ABOVE THE GROUND LINE. ROOT MASSES SHALL BE FULL AND DENSE TO A MINIMUM OF 4 FEET IN DIAMETER. HEMLOCK, SPRUCE AND DECIDUOUS TREE SPECIES WILL NOT BE ACCEPTED.
2) LOGS WITH ATTACHED ROOTS (QTY - 5): SHALL BE NATIVE WESTERN REDCEDAR OR DOUGLAS-FIR, MINIMUM 50% CEDAR, A MINIMUM OF 10 INCHES IN DIAMETER AT BREAST HEIGHT (DBH). ATTACHED ROOT WADS ARE TO BE FULL AND DENSE TO A MINIMUM OF 6 FEET IN DIAMETER.
3) KEY MEMBER LOGS (QTY - 3): SHALL BE NATIVE WESTERN REDCEDAR OR DOUGLAS-FIR, MINIMUM 50% CEDAR, A MINIMUM OF 18 INCHES IN DIAMETER AT BREAST HEIGHT (DBH). ATTACHED ROOT WADS ARE TO BE FULL AND DENSE TO A MINIMUM OF 4 FEET IN DIAMETER.
4) LOGS MAY BE TRIMMED TO FIT IN-PLACE, BUT ONLY AT THE DIRECTION OF THE STREAM RESTORATION CONSULTANT. HEMLOCK, SPRUCE AND DECIDUOUS TREE SPECIES WILL NOT BE ACCEPTED. ALL ROOT WADS, REGARDLESS OF LENGTH OF LOG ATTACHED, ARE TO BE THOROUGHLY POWER-WASHED FREE OF SOIL AND SEDIMENT AT AN UPLAND LOCATION WHERE ALL OF THE GENERATED RUNOFF CAN INFILTRATE PRIOR TO THE LOGS BEING PLACED WITHIN THE STREAM CHANNEL.

LARGE WOODY DEBRIS DETAILS

CALL BEFORE YOU DIG
Call: TOLL FREE
1-800-424-5555

REVISION DESCRIPTION:	WO NUMBER: 141003252
6/30/2017: 60% CITY OF BELLEVUE SUBMITTAL	

RICHARDS CREEK SUBSTATION

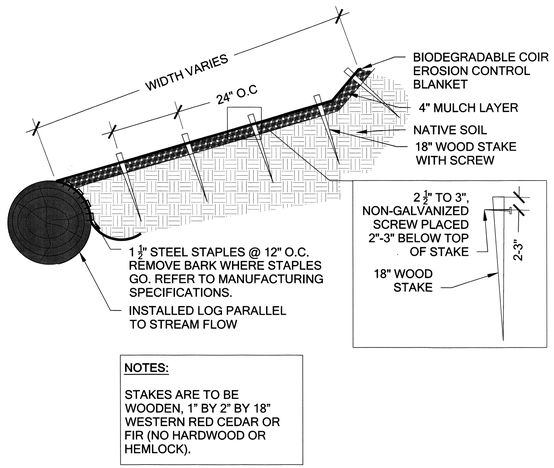
		DATE (M/D/Y)
CAD	LM	06 / 13 / 17
ENGINEER	EM	/ /
REVIEWED	EM	/ /
APPROVED	S. KIM	08 / 14 / 17

PUGET SOUND ENERGY

W-6.21 LARGE WOODY DEBRIS DETAILS

DRAWING NO: D-18172 REV NO: 0
SHEET: 15 OF 22
CLASS: SITE
FILE NO: 111103
CODE: RIC
CADD NO:

DSD 000183

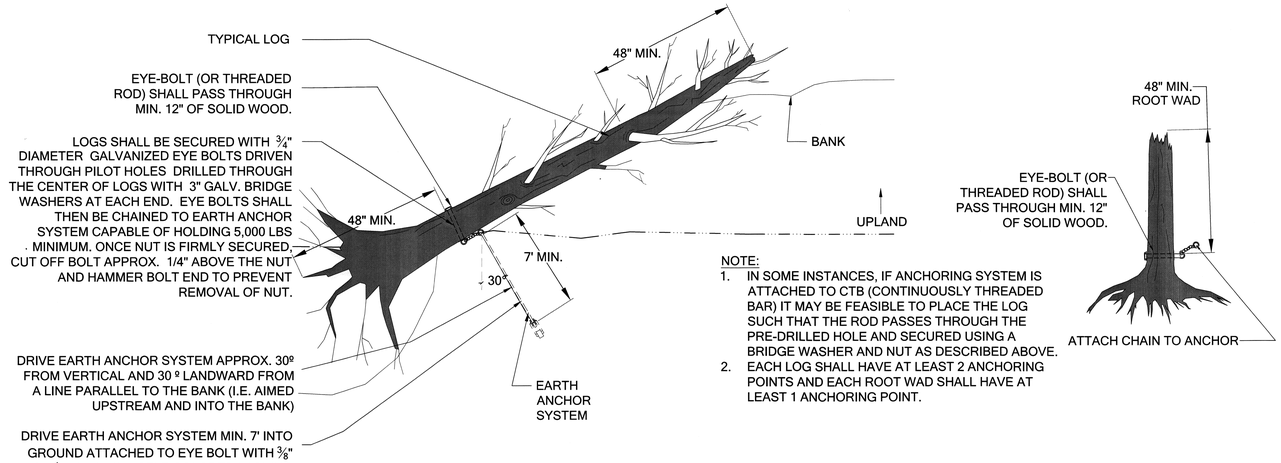


NOTES:

STAKES ARE TO BE WOODEN, 1" BY 2" BY 18" WESTERN RED CEDAR OR FIR (NO HARDWOOD OR HEMLOCK).

1 BIODEGRADABLE EROSION CONTROL BLANKET

Scale: NTS

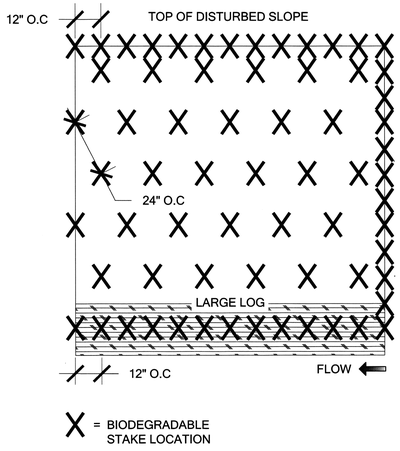


NOTE:

1. IN SOME INSTANCES, IF ANCHORING SYSTEM IS ATTACHED TO CTB (CONTINUOUSLY THREADED BAR) IT MAY BE FEASIBLE TO PLACE THE LOG SUCH THAT THE ROD PASSES THROUGH THE PRE-DRILLED HOLE AND SECURED USING A BRIDGE WASHER AND NUT AS DESCRIBED ABOVE.
2. EACH LOG SHALL HAVE AT LEAST 2 ANCHORING POINTS AND EACH ROOT WAD SHALL HAVE AT LEAST 1 ANCHORING POINT.

3 LOG ANCHORING OPTIONS

Scale: NTS



NOTES:

1. BIODEGRADABLE COIR EROSION CONTROL BLANKET SHALL PROVIDE EROSION PROTECTION FOR 24-36 MONTHS
2. BLANKET SHALL BE CUT LARGER THAN THE INSTALLATION AREA SHOWN ON THE CONTRACT DRAWINGS IN ORDER TO EXTEND BEYOND THE EDGES AND STAKE INTO THE SUBGRADE AS SHOWN.
3. CLEAR ANY WEEDS OR DEBRIS FROM THE INSTALLATION AREA BEFORE INSTALLING THE BLANKET.
4. SECURE THE BLANKET AT THE TOP WITH A ROW OF STAKES PLACED 12" APART ACROSS THE WIDTH OF THE BLANKET.
5. ROLL THE BLANKET ACROSS SLOPE AS DIRECTED BY RESTORATION SPECIALIST
6. THE EDGES OF ALL HORIZONTAL AND VERTICAL SEAMS MUST BE SECURED WITH A MIN. 12" OF OVERLAP, SHINGLE STYLE IN THE DIRECTION OF WATER FLOW. PLACE STAKES MIN. 6" APART ALONG THE OVERLAPPING SEAMS.
7. STAPLE BOTTOM OF COIR TO LARGE LOG OR ROOT WAD WITH STAPLES AT 12" O.C. IN ROWS OF 4 STAPLES.
8. ENDS OF COIR ON UPSTREAM SIDE SHALL BE INSTALLED WITH A VERTICAL ROW OF STAKES 12" O.C.
9. STAKING PATTERN: YIELDS ROUGHLY 8.25 STAKES PER SQUARE YARD.

2 BIODEGRADABLE EROSION CONTROL BLANKET

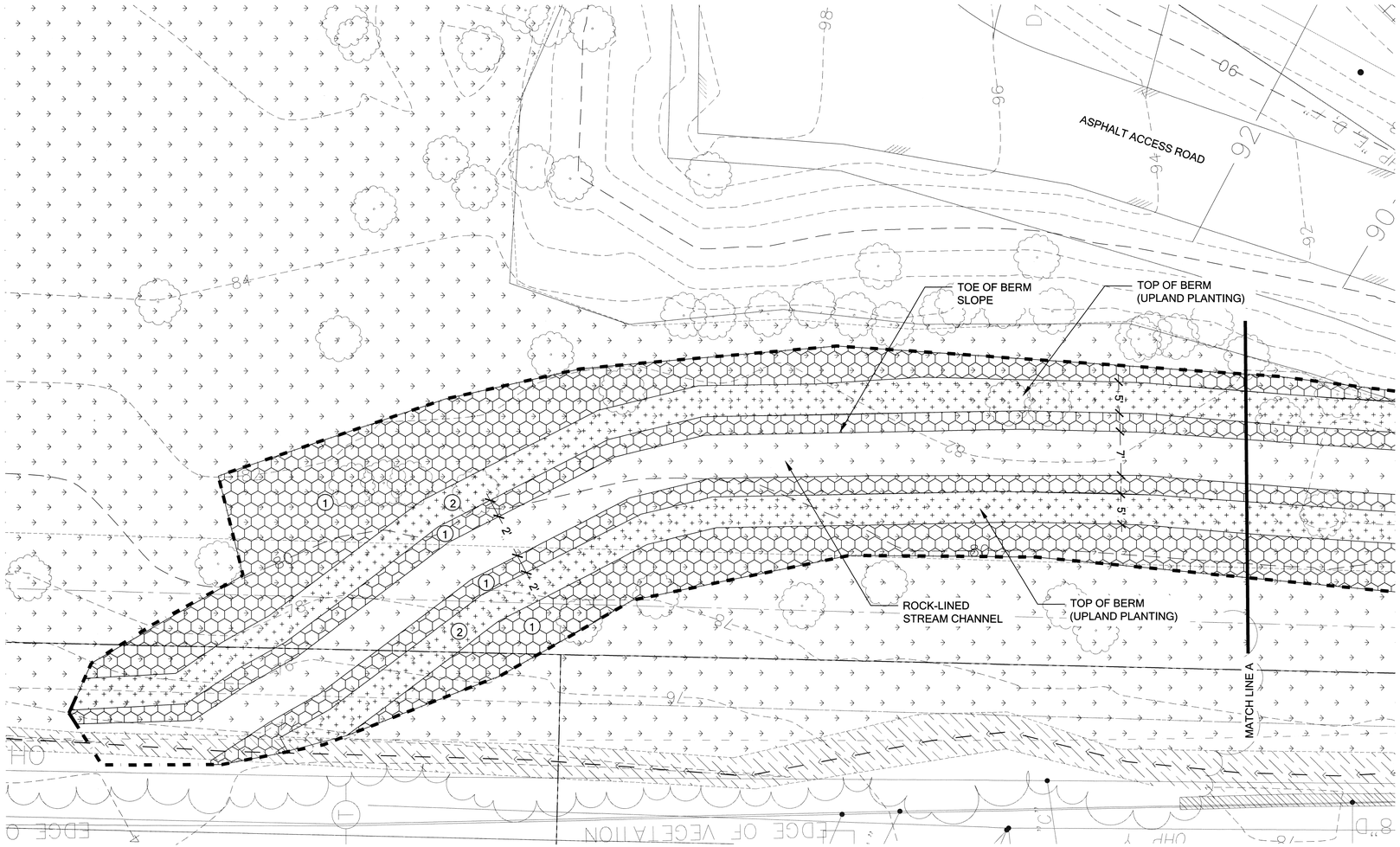
Scale: NTS

CALL BEFORE YOU DIG
Call: TOLL FREE
1-800-424-5555

LARGE WOODY DEBRIS DETAILS

REVISION DESCRIPTION:	WO NUMBER: 141003252		RICHARDS CREEK SUBSTATION		
6/30/2017: 60% CITY OF BELLEVUE SUBMITTAL					
		DATE (M/D/Y)	PUGET SOUND ENERGY	W-6.22 LARGE WOODY DEBRIS ANCHOR DETAILS	DRAWING NO. D-18172 / REV NO 0
CAD	LM	06 / 13 / 17			SHEET: 16 OF 22
ENGINEER	EM	/ /			
REVIEWED	EM	/ /		CLASS: SITE	FILE NO: 111103
APPROVED	S. KIM	08 / 14 / 17	CADD NO:		CODE: RIC

DSD.000184



LEGEND

(1) WETLAND/RIPARIAN PLANTINGS (SEE W-7.3)

(2) UPLAND PLANTINGS (SEE W-7.3)

PLANTING PLAN (1 OF 3)

SCALE 1"=10'

10 0 10 40 80

GRAPHIC SCALE
(IN FEET)

CALL BEFORE YOU DIG
Call: TOLL FREE
1-800-424-5555

REVISION DESCRIPTION:	WO NUMBER: 141003252
6/30/2017: 60% CITY OF BELLEVUE SUBMITTAL	

RICHARDS CREEK SUBSTATION

		DATE (M/D/Y)
CAD	LM	06 / 13 / 17
ENGINEER	EM	/ /
REVIEWED	EM	/ /
APPROVED	S. FIM	08 / 14 / 17

PUGET SOUND ENERGY

W-7.0 PLANTING PLAN (1 OF 3)

CLASS: SITE

CADD NO:

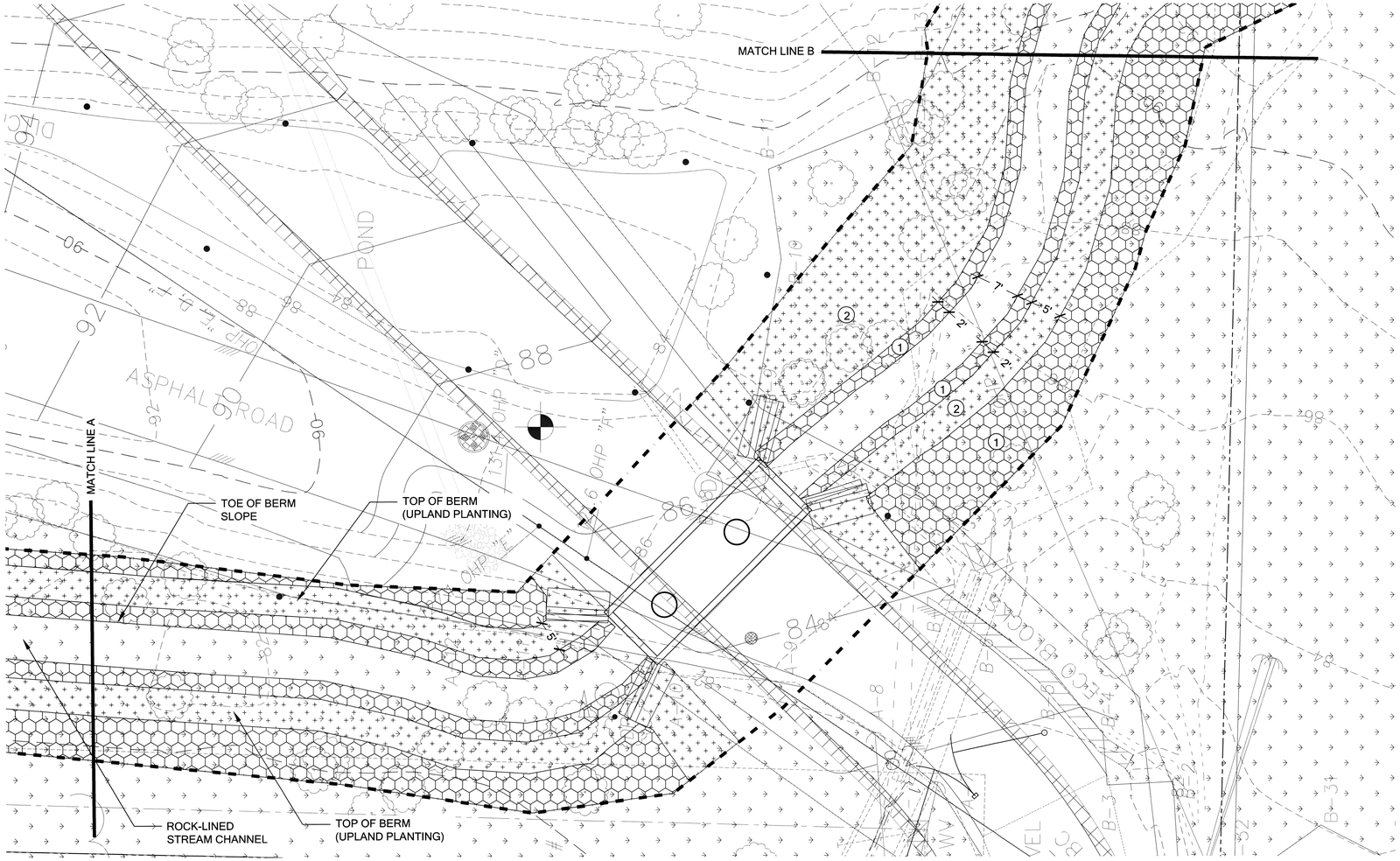
DRAWING NO. D-18172 REV NO 0

SHEET: 17 OF 22

FILE NO: 111103

CODE: RIC

DSD.000185



LEGEND

(1) WETLAND/RIPARIAN PLANTINGS (SEE W-7.3)

(2) UPLAND PLANTINGS (SEE W-7.3)

CALL BEFORE YOU DIG
Call: TOLL FREE
1-800-424-5555

PLANTING PLAN (2 OF 3)

SCALE 1"=10'

10 0 10 40 80
GRAPHIC SCALE
(IN FEET)

REVISION DESCRIPTION:	WO NUMBER: 141003252
6/30/2017: 60% CITY OF BELLEVUE SUBMITTAL	

RICHARDS CREEK SUBSTATION

		DATE (M/D/Y)
CAD	LM	06 / 13 / 17
ENGINEER	EM	/ /
REVIEWED	EM	/ /
APPROVED	S. KIM	08 / 30 / 17

PUGET SOUND ENERGY

W-7.1 PLANTING PLAN (2 OF 3)

DRAWING NO D-18172 REV NO 0

SHEET: 18 OF 22

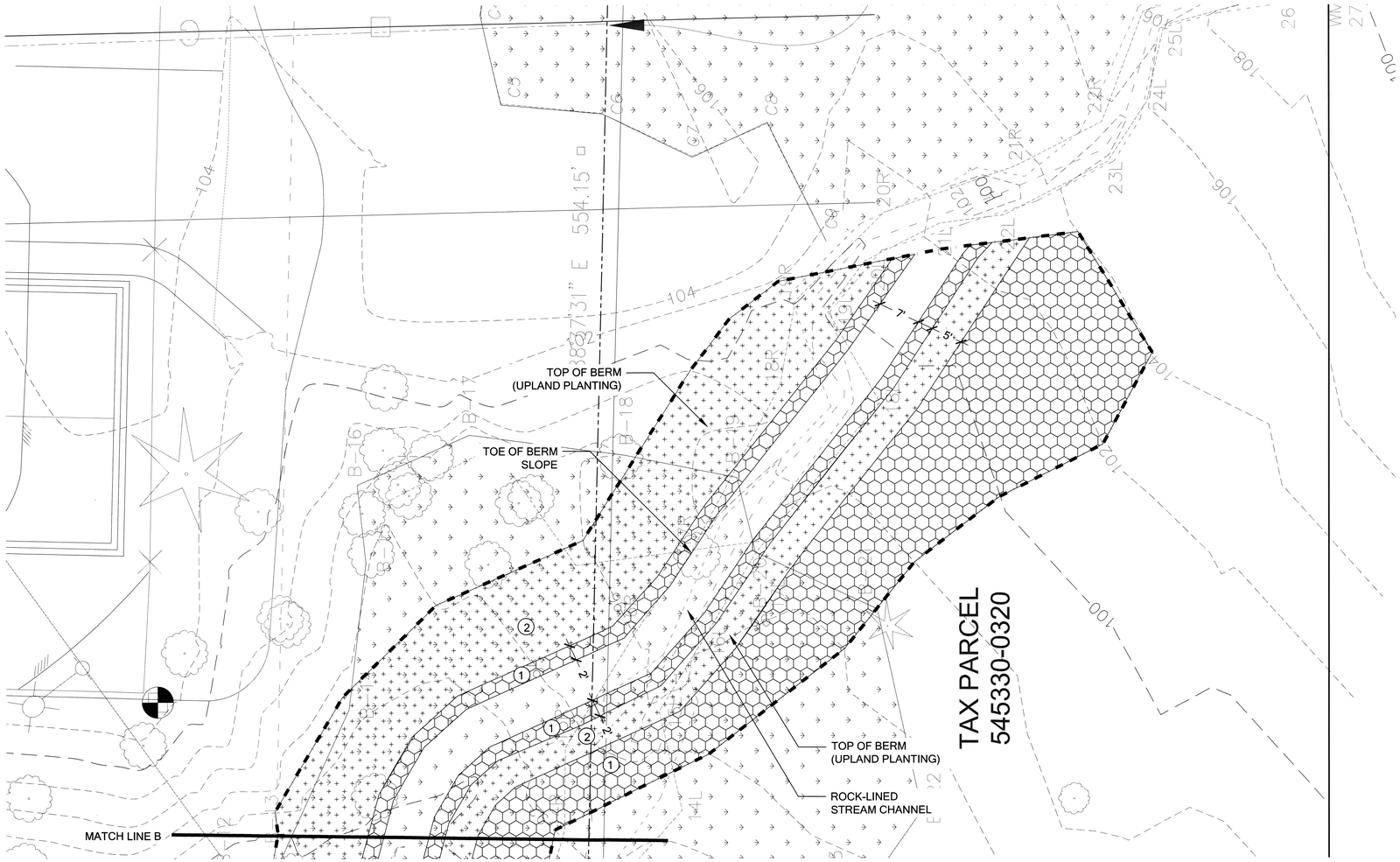
CLASS: SITE

FILE NO: 111103

CODE: RIC

CADD NO:

DSD 000186



LEGEND

(1) WETLAND/RIPARIAN PLANTINGS (SEE W-7.3)

(2) UPLAND PLANTINGS (SEE W-7.3)

CALL BEFORE YOU DIG
Call: TOLL FREE
1-800-424-5555

PLANTING PLAN (3 OF 3)

SCALE 1"=10'

10 0 10 40 80
GRAPHIC SCALE
(IN FEET)

REVISION DESCRIPTION:	WO NUMBER: 141003252
6/30/2017: 60% CITY OF BELLEVUE SUBMITTAL	

RICHARDS CREEK SUBSTATION

		DATE (M/D/Y)
CAD	LM	06 / 13 / 17
ENGINEER	EM	/ /
REVIEWED	EM	/ /
APPROVED	S. KIM	08 / 30 / 17

PUGET SOUND ENERGY

W-7.2 PLANTING PLAN (3 OF 3)

DRAWING NO D-18172 REV NO

SHEET: 19 OF 22

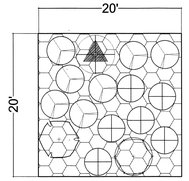
CLASS: SITE

FILE NO: 111103

CODE: RIC

CADD NO:

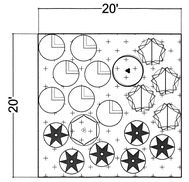
DSD 000187



1 WETLAND/RIPARIAN PLANTINGS
Scale: NTS

	QTY	SPACING	SIZE
TREES (66)			
ALNUS RUBRA / RED ALDER	12	ALL TREES TO BE SPACED PER PLAN	2 GAL.
FRAXINUS LATIFOLIA / OREGON ASH	10		2 GAL.
THUJA PLICATA / WESTERN RED CEDAR	12		2 GAL.
SALIX LUCIDA / PACIFIC WILLOW	12		2 GAL.
PICEA SITCHENSIS / SITKA SPRUCE	10		2 GAL.
SALIX SITCHENSIS / SITKA WILLOW	10		2 GAL.
SHRUBS (600)			
CORNUS SERICEA / RED-OSIER DOGWOOD	150	4' O.C.	1 GAL.
ROSA NUTKANA / NOOTKA ROSE	150		1 GAL.
RUBUS SPECTABILIS / SALMONBERRY	150		1 GAL.
PHYSOCARPUS CAPITATUS/ PACIFIC NINEBARK	150		1 GAL.
GROUNDCOVER (3600) **ALL SPECIES TO BE SPACED TRIANGULARLY*		18" O.C.	
ATHYRIUM FILIX-FEMINA/ LADY FERN (NO INUNDATION)	900		1 GAL
TOLMIEA MENZIESII /PIGGYBACK PLANT (NO INUNDATION)	900		1 GAL
SCIRPUS MICROCARPUS / SMALL FRUITED BULRUSH	900		1 GAL.
CAREX OBNUPTA/ SLOUGH SEDGE (BACKWATER AREAS)	900		1 GAL.

(PLANT BY SPECIES IN ODD GROUPS OF 9-15)



2 UPLAND/BUFFER PLANTS
Scale: NTS

	QTY	SPACING	SIZE
TREES (48)			
PSEUDOTSUGA MENZIESII / DOUGLAS-FIR	8	ALL TREES TO BE SPACED PER PLAN	2 GAL
THUJA PLUCATA / WESTERN RED CEDAR	8		2 GAL
ARBUTUS MENZIESII / PACIFIC MADRONE (PLANT NEXT TO DOUGLAS-FIR)	8		2 GAL
PRUNUS EMARGINATA / BITTER CHEERY	8		2 GAL
SALIX SCOULERIANA / SCOULER'S WILLOW	8		2 GAL
ACER MACROPHYLLUM / BIG LEAF MAPLE (AWAY FROM ACCESS DRIVE)	8		2 GAL
SHRUBS (240)		4' O.C.	
RUBUS SPECTABILIS / SALMONBERRY	40		1 GAL
SYMPHORICARPUS ALBUS / SNOWBERRY	40		1 GAL
OEMLERIA CERASIFORMIS / OSOBERRY	40		1 GAL
MAHONIA NERVOSA / LOW OREGON GRAPE	40		1 GAL
MAHONIA AQUIFOLIUM / TALL OREGON GRAPE	40		1 GAL
ACER CIRCINATUM / VINE MAPLE	40		1 GAL
GROUNDCOVER (3290) **ALL SPECIES TO BE SPACED TRIANGULARLY*		18" O.C.	
POLYSTICHUM MUNITUM / SWORD FERN	1645		1 GAL
BLECHNUM SPICANT / DEER FERN	1645		1 GAL

(PLANT BY SPECIES IN ODD GROUPS OF 9-15)

PLANTING TYPICALS & SCHEDULE

CALL BEFORE YOU DIG
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1-800-424-5555

REVISION DESCRIPTION:	WO NUMBER: 141003252
6/30/2017: 60% CITY OF BELLEVUE SUBMITTAL	

RICHARDS CREEK SUBSTATION

		DATE (M/D/Y)
CAD	LM	06 / 13 / 17
ENGINEER	EM	/ /
REVIEWED	EM	/ /
APPROVED	S. KIM	08 / 14 / 17

PUGET SOUND ENERGY

W-7.3 PLANTING TYPICALS & SCHEDULE

DRAWING NO: D-18172 REV NO: 0
SHEET: 20 OF 22
CLASS: SITE
FILE NO: 111103
CODE: RIC
CADD NO:

PLANT INSTALLATION SPECIFICATIONS

QUALITY ASSURANCE

1. PLANTS SHALL MEET OR EXCEED THE SPECIFICATIONS OF FEDERAL, STATE, AND LOCAL LAWS REQUIRING INSPECTION FOR PLANT DISEASE AND INSECT CONTROL.
2. PLANTS SHALL BE HEALTHY, VIGOROUS, AND WELL-FORMED, WITH WELL DEVELOPED, FIBROUS ROOT SYSTEMS, FREE FROM DEAD BRANCHES OR ROOTS. PLANTS SHALL BE FREE FROM DAMAGE CAUSED BY TEMPERATURE EXTREMES, LACK OR EXCESS OF MOISTURE, INSECTS, DISEASE, AND MECHANICAL INJURY. PLANTS IN LEAF SHALL BE WELL FOLIATED AND OF GOOD COLOR. PLANTS SHALL BE HABITUATED TO THE OUTDOOR ENVIRONMENTAL CONDITIONS INTO WHICH THEY WILL BE PLANTED (HARDENED-OFF).
3. TREES WITH DAMAGED, CROOKED, MULTIPLE OR BROKEN LEADERS WILL BE REJECTED. WOODY PLANTS WITH ABRASIONS OF THE BARK OR SUN SCALD WILL BE REJECTED.
4. NOMENCLATURE: PLANT NAMES SHALL CONFORM TO *FLORA OF THE PACIFIC NORTHWEST* BY HITCHCOCK AND CRONQUIST, UNIVERSITY OF WASHINGTON PRESS, 1973 AND/OR TO *A FIELD GUIDE TO THE COMMON WETLAND PLANTS OF WESTERN WASHINGTON & NORTHWESTERN OREGON*, ED. SARAH SPEAR COOKE, SEATTLE AUDUBON SOCIETY, 1997.

DEFINITIONS

1. PLANTS/PLANT MATERIALS. PLANTS AND PLANT MATERIALS SHALL INCLUDE ANY LIVE PLANT MATERIAL USED ON THE PROJECT. THIS INCLUDES BUT IS NOT LIMITED TO CONTAINER GROWN, B&B OR BAREROOT PLANTS; LIVE STAKES AND FASCINES (WATTLES); TUBERS, CORMS, BULBS, ETC..; SPRIGS, PLUGS, AND LINERS.
2. CONTAINER GROWN. CONTAINER GROWN PLANTS ARE THOSE WHOSE ROOT BALLS ARE ENCLOSED IN A POT OR BAG IN WHICH THAT PLANT GREW.

SUBSTITUTIONS

1. IT IS THE CONTRACTOR'S RESPONSIBILITY TO OBTAIN SPECIFIED MATERIALS IN ADVANCE IF SPECIAL GROWING, MARKETING OR OTHER ARRANGEMENTS MUST BE MADE IN ORDER TO SUPPLY SPECIFIED MATERIALS.
2. SUBSTITUTION OF PLANT MATERIALS NOT ON THE PROJECT LIST WILL NOT BE PERMITTED UNLESS AUTHORIZED IN WRITING BY THE PROJECT LANDSCAPE ARCHITECT.
3. IF PROOF IS SUBMITTED THAT ANY PLANT MATERIAL SPECIFIED IS NOT OBTAINABLE, A PROPOSAL WILL BE CONSIDERED FOR USE OF THE NEAREST EQUIVALENT SIZE OR ALTERNATIVE SPECIES, WITH CORRESPONDING ADJUSTMENT OF CONTRACT PRICE.
4. SUCH PROOF WILL BE SUBSTANTIATED AND SUBMITTED IN WRITING TO THE CONSULTANT AT LEAST 30 DAYS PRIOR TO START OF WORK UNDER THIS SECTION.

INSPECTION

1. PLANTS SHALL BE SUBJECT TO INSPECTION AND APPROVAL BY THE PROJECT LANDSCAPE ARCHITECT FOR CONFORMANCE TO SPECIFICATIONS, EITHER AT TIME OF DELIVERY ON-SITE OR AT THE GROWER'S NURSERY. APPROVAL OF PLANT MATERIALS AT ANY TIME SHALL NOT IMPAIR THE SUBSEQUENT RIGHT OF INSPECTION AND REJECTION DURING PROGRESS OF THE WORK.
2. PLANTS INSPECTED ON SITE AND REJECTED FOR NOT MEETING SPECIFICATIONS MUST BE REMOVED IMMEDIATELY FROM SITE OR RED-TAGGED AND REMOVED AS SOON AS POSSIBLE.
3. THE PROJECT LANDSCAPE ARCHITECT MAY ELECT TO INSPECT PLANT MATERIALS AT THE PLACE OF GROWTH. AFTER INSPECTION AND ACCEPTANCE, THE PROJECT LANDSCAPE ARCHITECT MAY REQUIRE THE INSPECTED PLANTS BE LABELED AND RESERVED FOR PROJECT. SUBSTITUTION OF THESE PLANTS WITH OTHER INDIVIDUALS, EVEN OF THE SAME SPECIES AND SIZE, IS UNACCEPTABLE.

MEASUREMENT OF PLANTS

1. PLANTS SHALL CONFORM TO SIZES SPECIFIED UNLESS SUBSTITUTIONS ARE MADE AS OUTLINED IN THIS CONTRACT.
2. HEIGHT AND SPREAD DIMENSIONS SPECIFIED REFER TO MAIN BODY OF PLANT AND NOT BRANCH OR ROOT TIP TO TIP. PLANT DIMENSIONS SHALL BE MEASURED WHEN THEIR BRANCHES OR ROOTS ARE IN THEIR NORMAL POSITION.
3. WHERE A RANGE OF SIZE IS GIVEN, NO PLANT SHALL BE LESS THAN THE MINIMUM SIZE AND AT LEAST 50% OF THE PLANTS SHALL BE AS LARGE AS THE MEDIAN OF THE SIZE RANGE. (EXAMPLE: IF THE SIZE RANGE IS 12" TO 18", AT LEAST 50% OF PLANTS MUST BE 15" TALL.).

SUBMITTALS

PROPOSED PLANT SOURCES

1. WITHIN 45 DAYS AFTER AWARD OF THE CONTRACT, SUBMIT A COMPLETE LIST OF PLANT MATERIALS PROPOSED TO BE PROVIDED DEMONSTRATING CONFORMANCE WITH THE REQUIREMENTS SPECIFIED. INCLUDE THE NAMES AND ADDRESSES OF ALL GROWERS AND NURSERIES.

PRODUCT CERTIFICATES

4. PLANT MATERIALS LIST - SUBMIT DOCUMENTATION TO CONSULTANT AT LEAST 30 DAYS PRIOR TO START OF WORK UNDER THIS SECTION THAT PLANT MATERIALS HAVE BEEN ORDERED. ARRANGE PROCEDURE FOR INSPECTION OF PLANT MATERIAL WITH CONSULTANT AT TIME OF SUBMISSION.
5. HAVE COPIES OF VENDOR'S OR GROWERS' INVOICES OR PACKING SLIPS FOR ALL PLANTS ON SITE DURING INSTALLATION. INVOICE OR PACKING SLIP SHOULD LIST SPECIES BY SCIENTIFIC NAME, QUANTITY, AND DATE DELIVERED (AND GENETIC ORIGIN IF THAT INFORMATION WAS PREVIOUSLY REQUESTED).

DELIVERY, HANDLING, & STORAGE

NOTIFICATION

CONTRACTOR MUST NOTIFY CONSULTANT 48 HOURS OR MORE IN ADVANCE OF DELIVERIES SO THAT CONSULTANT MAY ARRANGE FOR INSPECTION.

PLANT MATERIALS

1. TRANSPORTATION - DURING SHIPPING, PLANTS SHALL BE PACKED TO PROVIDE PROTECTION AGAINST CLIMATE EXTREMES, BREAKAGE AND DRYING. PROPER VENTILATION AND PREVENTION OF DAMAGE TO BARK, BRANCHES, AND ROOT SYSTEMS MUST BE ENSURED.
2. SCHEDULING AND STORAGE - PLANTS SHALL BE DELIVERED AS CLOSE TO PLANTING AS POSSIBLE. PLANTS IN STORAGE MUST BE PROTECTED AGAINST ANY CONDITION THAT IS DETRIMENTAL TO THEIR CONTINUED HEALTH AND VIGOR.
3. HANDLING - PLANT MATERIALS SHALL NOT BE HANDLED BY THE TRUNK, LIMBS, OR FOLIAGE BUT ONLY BY THE CONTAINER, BALL, BOX, OR OTHER PROTECTIVE STRUCTURE, EXCEPT BAREROOT PLANTS SHALL BE KEPT IN BUNDLES UNTIL PLANTING AND THEN HANDLED CAREFULLY BY THE TRUNK OR STEM.
4. LABELS - PLANTS SHALL HAVE DURABLE, LEGIBLE LABELS STATING CORRECT SCIENTIFIC NAME AND SIZE. TEN PERCENT OF CONTAINER GROWN PLANTS IN INDIVIDUAL POTS SHALL BE LABELED. PLANTS SUPPLIED IN FLATS, RACKS, BOXES, BAGS, OR BUNDLES SHALL HAVE ONE LABEL PER GROUP.

WARRANTY

PLANT WARRANTY

PLANTS MUST BE GUARANTEED TO BE TRUE TO SCIENTIFIC NAME AND SPECIFIED SIZE, AND TO BE HEALTHY AND CAPABLE OF VIGOROUS GROWTH.

REPLACEMENT

1. PLANTS NOT FOUND MEETING ALL OF THE REQUIRED CONDITIONS MUST BE REMOVED FROM SITE AND REPLACED IMMEDIATELY AT THE CONSULTANT'S DISCRETION.
2. PLANTS NOT SURVIVING AFTER ONE YEAR TO BE REPLACED.

PLANT MATERIAL

GENERAL

1. PLANTS SHALL BE NURSERY GROWN IN ACCORDANCE WITH GOOD HORTICULTURAL PRACTICES UNDER CLIMATIC CONDITIONS SIMILAR TO OR MORE SEVERE THAN THOSE OF THE PROJECT SITE.
2. PLANTS SHALL BE TRUE TO SPECIES AND VARIETY OR SUBSPECIES. NO CULTIVARS OR NAMED VARIETIES SHALL BE USED UNLESS SPECIFIED AS SUCH.

QUANTITIES

SEE PLANT LIST ON ACCOMPANYING PLANS AND PLANT SCHEDULES.

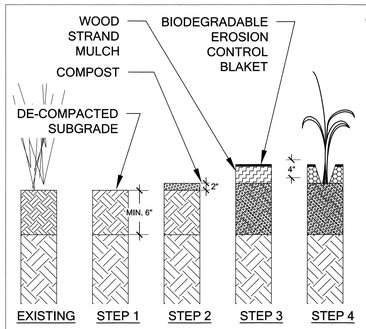
ROOT TREATMENT

1. CONTAINER GROWN PLANTS (INCLUDES PLUGS): PLANT ROOT BALLS MUST HOLD TOGETHER WHEN THE PLANT IS REMOVED FROM THE POT, EXCEPT THAT A SMALL AMOUNT OF LOOSE SOIL MAY BE ON THE TOP OF THE ROOT BALL.
2. PLANTS MUST NOT BE ROOT-BOUND; THERE MUST BE NO CIRCLING ROOTS PRESENT IN ANY PLANT INSPECTED.
3. ROOT BALLS THAT HAVE CRACKED OR BROKEN WHEN REMOVED FROM THE CONTAINER SHALL BE REJECTED.

GENERAL PLANTING SEQUENCE:

1. NATIVE PLANT INSTALLATION SHALL OCCUR DURING FROST-FREE PERIODS ONLY. PREFERRED MONTHS FOR INSTALLATION ARE BETWEEN SEPTEMBER 15TH AND APRIL 15, PRIOR TO HOT, DRY WEATHER. PLANTS MAY ONLY BE INSTALLED DURING HOT WEATHER IF THE APPLICANT AGREES TO IRRIGATION OF THE ENTIRE PLANTING AREA, DELIVERING AT LEAST 2" OF WATER PER WEEK FROM JUNE 1 THROUGH SEPTEMBER 15TH.
2. PROCURE PLANTS IN LEGEND AND ENSURE THAT MATERIAL MEETS THE MINIMUM REQUIREMENTS OUTLINED IN THE PLANT LEGEND AND PLANTING DETAILS.
3. LOCATE ALL EXISTING UTILITIES WITHIN THE LIMIT OF WORK.
4. REMOVE ALL INVASIVE WEEDS WITHIN THE PROJECT AREA, PARTICULARLY ENGLISH IVY. AMEND SOILS WITH COMPOST IF NEEDED.
5. ENSURE THAT NO ADVERSE DRAINAGE CONDITIONS EXIST THAT MAY AFFECT PROPER PLANT GROWTH AND ESTABLISHMENT.
6. LAYOUT PLANT MATERIAL PER PLAN FOR INSPECTION BY THE LANDSCAPE ARCHITECT. PLANT SUBSTITUTIONS WILL NOT BE ALLOWED WITHOUT AGENCY APPROVAL.
7. INSTALL PLANTS PER PLANTING DETAILS.
8. WATER EACH PLANT THOROUGHLY TO REMOVE AIR POCKETS.
9. INSTALL A 4" DEEP, COARSE WOOD-CHIP MULCH RING THROUGHOUT ENTIRE PROJECT AREA.
10. INSTALL A TEMPORARY OR PERMANENT IRRIGATION SYSTEM CAPABLE OF DELIVERING 2" OF WATER PER WEEK TO THE ENTIRE PLANTED AREA. MAINTAIN IRRIGATION SYSTEM IN WORKING CONDITION FOR TWO (2) SUMMERS AFTER INITIAL PLANT INSTALLATION.

THE APPLICANT SHALL MAINTAIN ALL PLANT MATERIAL UNTIL FINAL INSPECTION AND APPROVAL AS SET FORTH IN THE PERMIT CONDITIONS. IF THE OWNER OR APPLICANT CHOOSES TO HIRE A LANDSCAPE CONTRACTOR, THEN ALL PLANTINGS AND WORKMANSHIP SHALL BE GUARANTEED FOR ONE YEAR FOLLOWING FINAL OWNER ACCEPTANCE.



NATIVE PLANTINGS SOIL PREP
SEQUENCE OF WORK - NOT TO SCALE

PLANTING AREA PREPARATION

STEP 1
REMOVE INVASIVE SPECIES. COMPACTED SOILS OUTSIDE OF FORESTED AREAS SHALL BE DE-COMPACTED TO A DEPTH OF 6". CLEARING AND GRUBBING WITHIN ANY NATIVE PLANT ROOT ZONE SHALL BE DONE BY HAND.

STEP 2
PLACE TWO (2) INCHES COMPOST AND AMEND WITH DE-COMPACTED TOPSOIL

STEP 3
INSTALL WOOD STRAND MULCH 4" DEEP. THEN PLACE BIODEGRAABLE EROSION CONTROL BLANKET OVER THE TOP.

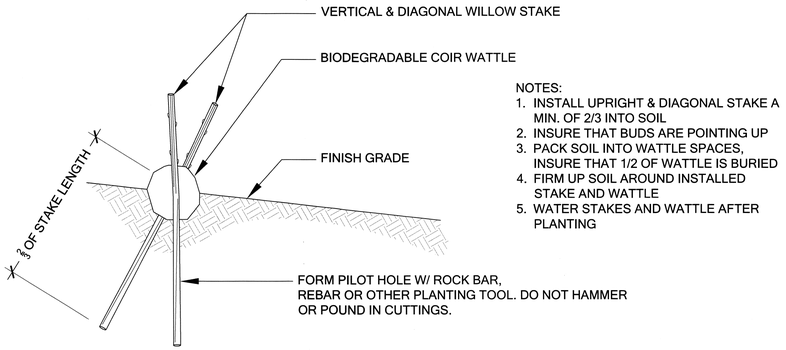
STEP 4
CUT "X" SLITS IN BIODEGRADABLE EROSION CONTROL BLAKET AND INSTALL PLANTS. SEE PLANTING PLAN SHEET W-08.

PLANTING NOTES & DETAILS (1 OF 2)

CALL BEFORE YOU DIG
Call: TOLL FREE
1-800-424-5555

REVISION DESCRIPTION:	WO NUMBER: 141003252		
6/30/2017: 60% CITY OF BELLEVUE SUBMITTAL			RICHARDS CREEK SUBSTATION
		DATE (M/D/Y)	PUGET SOUND ENERGY
CAD	LM	06 / 13 / 17	W-7.4 PLANTING NOTES & DETAILS (1 OF 2)
ENGINEER	EM	/ /	DRAWING NO: D-18172
REVIEWED	EM	/ /	REV NO: 0
APPROVED	S. KIM	08 / 14 / 17	SHEET: 21 OF 22
			CLASS: SITE
			CADD NO:
			FILE NO: 111103
			CODE: RIC

DSD 000189



NOTES:
1. INSTALL UPRIGHT & DIAGONAL STAKE A MIN. OF 2/3 INTO SOIL
2. INSURE THAT BUDS ARE POINTING UP
3. PACK SOIL INTO WATTLE SPACES, INSURE THAT 1/2 OF WATTLE IS BURIED
4. FIRM UP SOIL AROUND INSTALLED STAKE AND WATTLE
5. WATER STAKES AND WATTLE AFTER PLANTING

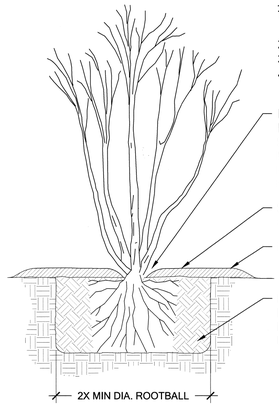
1 WILLOW WATTLE PLANTING

Scale: NTS

NOTES:
1. PLANT GROUNDCOVER AT SPECIFIED DISTANCE ON-CENTER (O.C.) USING TRIANGULAR SPACING, TYP.
2. LOOSEN SIDES AND BOTTOM OF PLANTING PIT AND REMOVE DEBRIS
3. LOOSEN ROOTBOUND PLANTS BEFORE INSTALLING
4. SOAK PIT BEFORE AND AFTER INSTALLING PLANT

2 GROUNDCOVER PLANTING

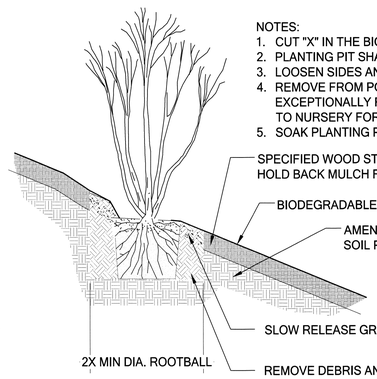
Scale: NTS



NOTES:
1. PLANTING PIT SHALL NOT BE LESS THAN (2) TIMES THE WIDTH OF THE ROOT BALL DIA.
2. LOOSEN SIDES AND BOTTOMS OF PLANTING PIT
3. SOAK PLANTING PIT AFTER PLANTING
4. PLANT AT SPECIFIED DISTANCE ON-CENTER (O.C.) PER PLAN USING TRIANGULAR SPACING, TYP.

3 TREE/SHRUB CONTAINER PLANTING

Scale: NTS



NOTES:
1. CUT "X" IN THE BIODEGRADABLE EROSION CONTROL FABRIC TO MAKE WAY FOR PLANTING.
2. PLANTING PIT SHALL NOT BE LESS THAN (2) TIMES THE WIDTH OF THE ROOT BALL DIA.
3. LOOSEN SIDES AND BOTTOM OF PLANT PIT
4. REMOVE FROM POT & ROUGH-UP ROOT BALL BEFORE INSTALLING. IF PLANT IS EXCEPTIONALLY ROOT-BOUND OR CONTAINS CIRCLING ROOTS, DO NOT PLANT AND RETURN TO NURSERY FOR AN ACCEPTABLE ALTERNATIVE.
5. SOAK PLANTING PIT AFTER PLANTING

4 SLOPE CONTAINER PLANTING

Scale: NTS

PLANTING NOTES & DETAILS (2 of 2)

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1-800-424-5555

REVISION DESCRIPTION:	WO NUMBER: 141003252
6/30/2017: 60% CITY OF BELLEVUE SUBMITTAL	

RICHARDS CREEK SUBSTATION

		DATE (M/D/Y)
CAD	LM	06 / 13 / 17
ENGINEER	EM	/ /
REVIEWED	EM	/ /
APPROVED	S. KIM	08 / 14 / 17

PUGET SOUND ENERGY

W-7.5 PLANTING NOTES & DETAILS (2 OF 2)

CLASS: SITE

CADD NO:

DRAWING NO: D-18172 REV NO: 0

SHEET: 22 OF 22

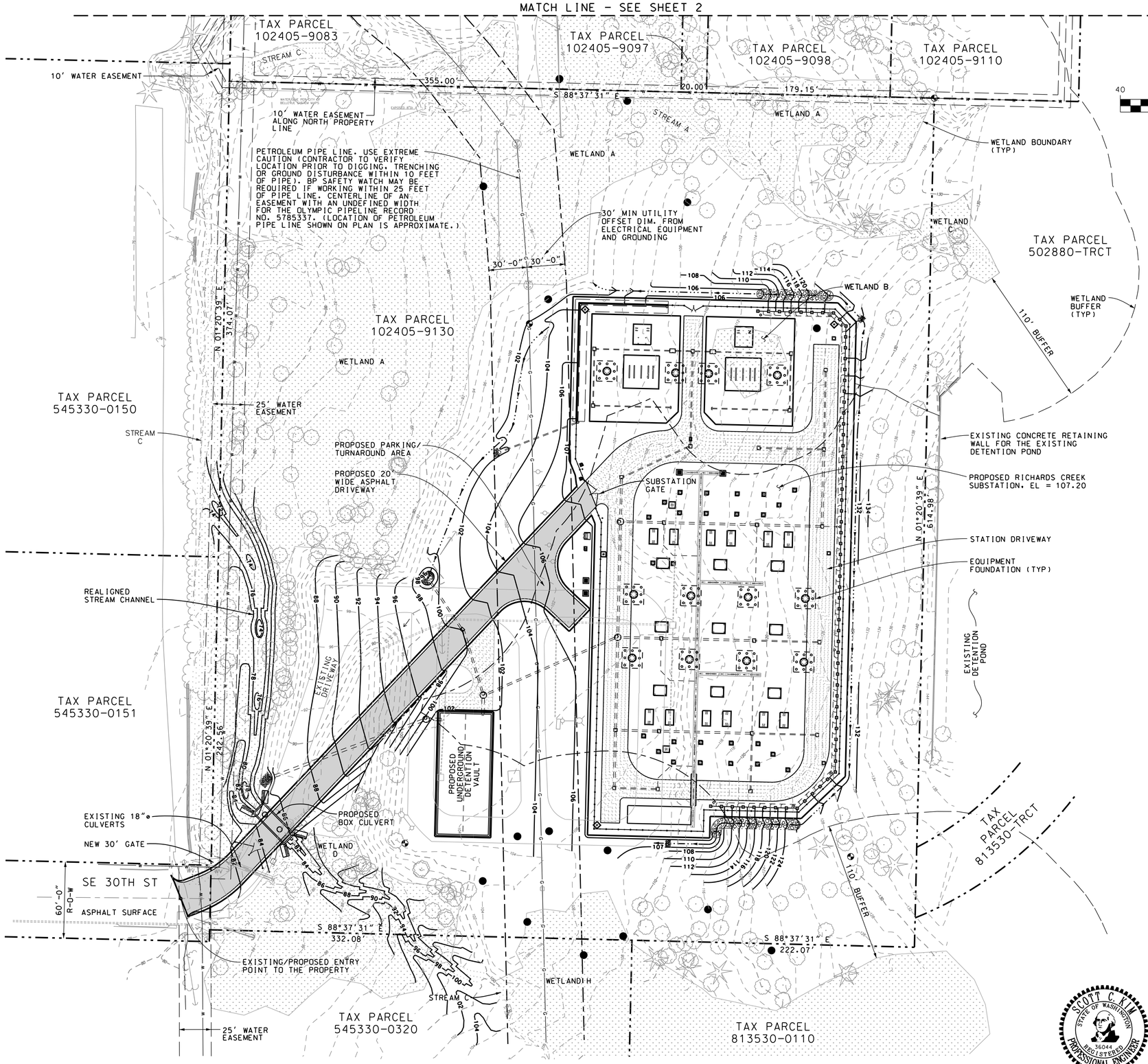
FILE NO: 111103

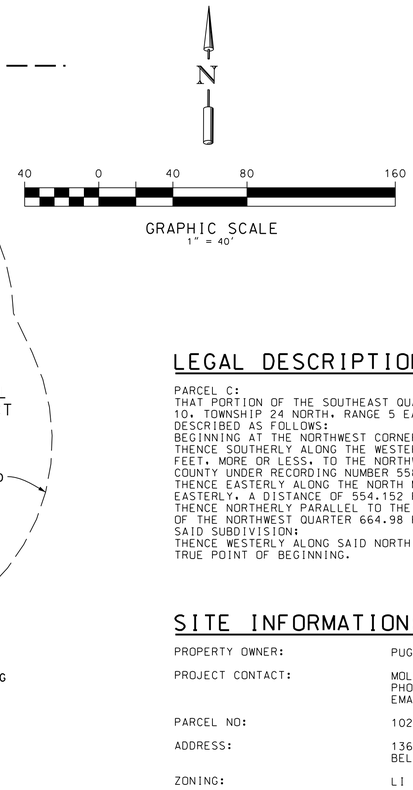
CODE: RIC

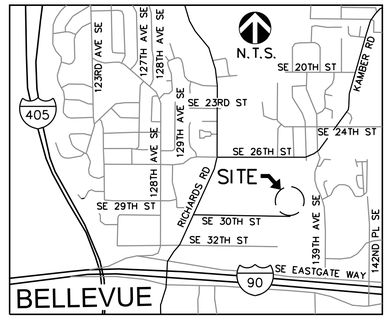
DSD 000190

SECTION 10, TOWNSHIP 24 NORTH, RANGE 5 EAST, W.M.

CITY OF BELLEVUE, KING COUNTY, WASHINGTON







VICINITY MAP

LEGAL DESCRIPTION:

PARCEL C:
THAT PORTION OF THE SOUTHEAST QUARTER OF THE NORTHWEST QUARTER OF SECTION 10, TOWNSHIP 24 NORTH, RANGE 5 EAST, W.M., IN KING COUNTY, WASHINGTON, DESCRIBED AS FOLLOWS:
BEGINNING AT THE NORTHWEST CORNER OF SAID SUBDIVISION;
THENCE SOUTHERLY ALONG THE WESTERLY MARGIN OF SAID SUBDIVISION 664.98 FEET, MORE OR LESS, TO THE NORTHWEST CORNER OF A TRACT CONVEYED TO KING COUNTY UNDER RECORDING NUMBER 5589770;
THENCE EASTERLY ALONG THE NORTH MARGIN OF SAID KING COUNTY TRACT, EXTENDED EASTERLY, A DISTANCE OF 554.152 FEET;
THENCE NORTHERLY PARALLEL TO THE WESTERLY MARGIN OF SAID SOUTHEAST QUARTER OF THE NORTHWEST QUARTER 664.98 FEET, MORE OR LESS, TO THE NORTH MARGIN OF SAID SUBDIVISION;
THENCE WESTERLY ALONG SAID NORTH MARGIN 554.152 FEET, MORE OR LESS, TO THE TRUE POINT OF BEGINNING.

SITE INFORMATION:

PROPERTY OWNER:	PUGET SOUND ENERGY
PROJECT CONTACT:	MOLLY REED PHONE NO.:425-462-3933 EMAIL: MOLLY.REED@PSE.COM
PARCEL NO:	102405-9130
ADDRESS:	13600 SE 30TH ST BELLEVUE, WA 98005
ZONING:	LI (LIGHT INDUSTRIAL)
LANDSCAPE SCREENING:	15' TYPE 1
COB UDEA #:	TBD
COB UTILITY GRID #:	I-11
PROPERTY SIZE:	8.46 ACRES
TOTAL PROJECT SITE AREA:	4.0 ACRES
TOTAL IMPERVIOUS AREA:	1.1 ACRES
TOTAL PERVIOUS AREA:	2.9 ACRES
TREE REMOVAL AND RETENTION:	SEE D-18165, SHEET 1

LEGEND

- PROPERTY LINE
- EXISTING CONTOURS
- PROPOSED CONTOURS
- WETLAND BUFFER
- WETLAND BUFFER BEFORE SITE IMPROVEMENTS
- FENCE
- SOLDIER PILE WALL
- DRAINAGE PIPE
- DRAINAGE DITCH
- CATCH BASIN, TYPE 1
- CATCH BASIN, TYPE 2
- GATE VALVE
- WATER VALVE
- FOUNDATION
- VAULT
- STATION DRIVEWAY (GRAVEL)
- ACCESS DRIVEWAY (ASPHALT)
- TRANSMISSION POLE
- MONUMENT
- CABLE TRENCH
- BOLLARD

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SCOTT C. KIM
STATE OF WASHINGTON
36044
REGISTERED
PROFESSIONAL ENGINEER

REVISION DESCRIPTION:	WO NUMBER: 111019489
REV-2: WETLAND BUFFER UPDATE PER CITY OF BELLEVUE COMMENTS	

		DATE (M/D/Y)
CAD		/ /
ENGINEER		/ /
REVIEWED		/ /
APPROVED		/ /

SITE PLAN B
RICHARDS CREEK SUBSTATION

PUGET SOUND ENERGY
SUBSTATION ENGINEERING DEPARTMENT

DRAWING NO: D-18748
REV NO: 2
SHEET: 1 OF 2
SCALE: 1"= 40'-0"
CLASS: SITE
CADD NO: D-18748_01.dgn
FILE NO:
CODE: RIC

DSD 000191

USER: edahl
9/5/2018
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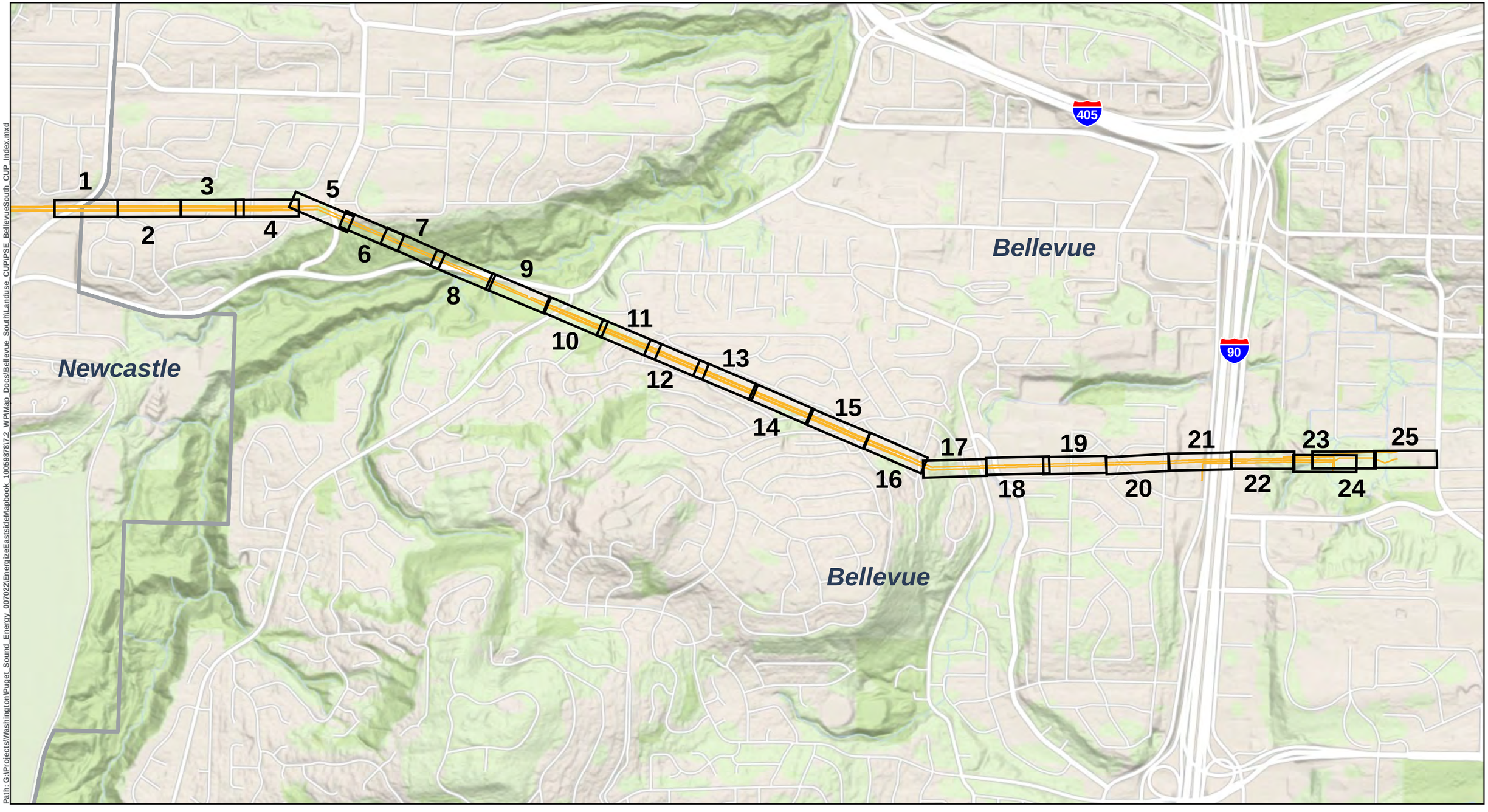

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0 0.25 0.5 Mile

MAP CREATED BY: HDR

SOURCES:
Topo Basemap - ESRI Online,Transmission Line - PSE

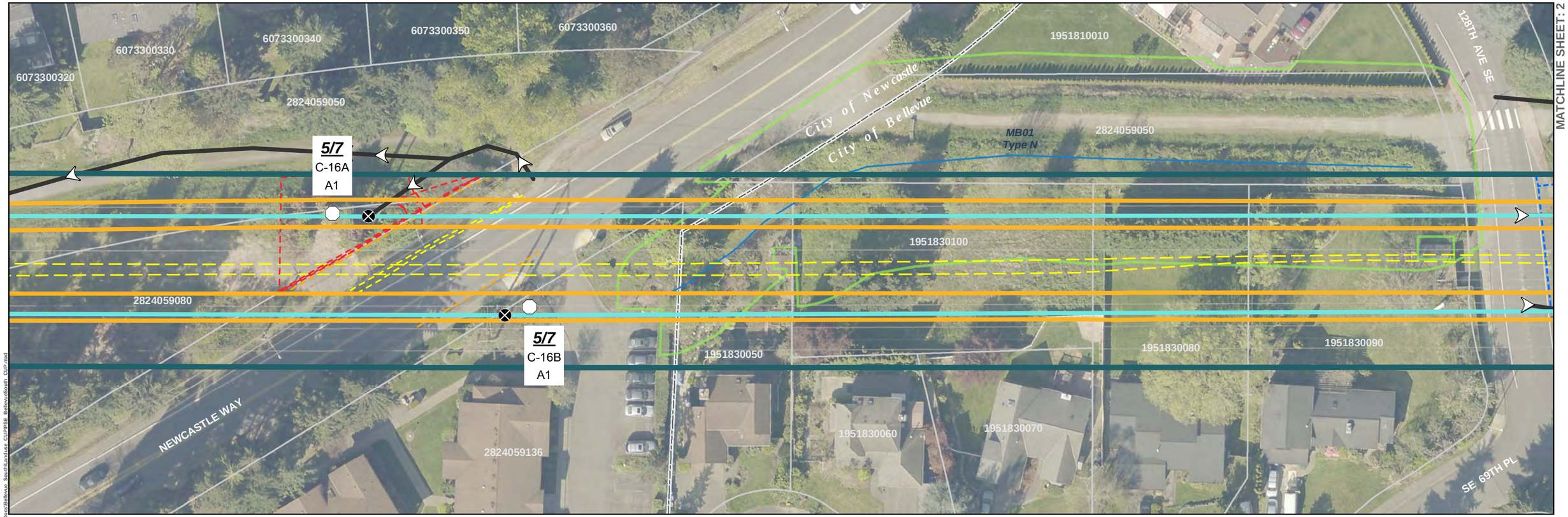
energizeEASTSIDE

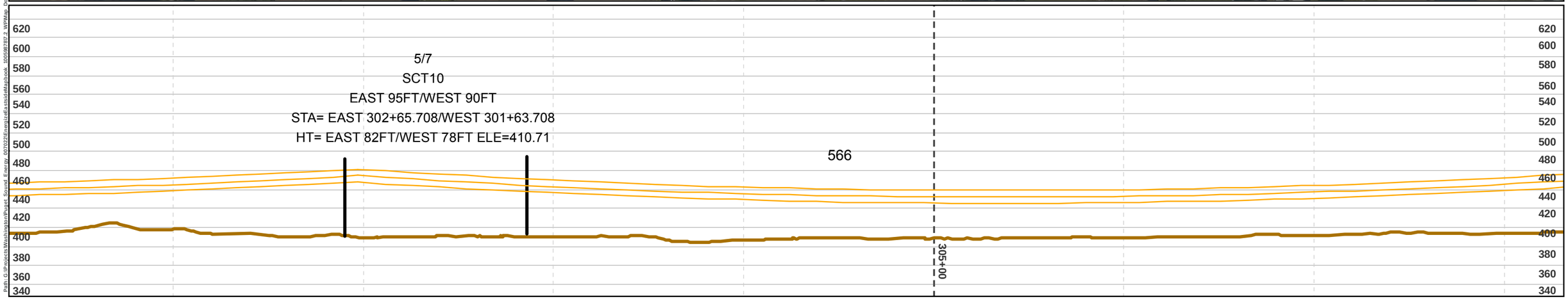
CONDITIONAL USE PERMIT INDEX / CRITICAL AREAS LAND USE PERMIT

SOUTH BELLEVUE

Date: 9/4/2018

DSD 000192





Proposed Pole Location
Existing Pole Location– To Be Removed
Transmission Line - Proposed
Transmission Line - Proposed (Separate Application)
Transmission Line - Existing
5/7 Proposed Pole Number
C-16 A1 Structure Type (See Appx. A) Construction Scenario Key (See Appx. B)

Project Corridor
Potential Stringing Site
Olympic Underground Pipeline (Approx. Location)
Wastewater Utility Line
Water Utility Line
Unknown Underground Utility Line
Underground Gas Utility Line
Underground Phone/TV Utility Line
Underground Power Utility Line
Unknown Underground Utility Line

Stream
Wetland
Wetland and Stream Buffer
Landslide Hazard
Landslide Hazard 50ft Buffer
Steep Slope
Steep Slope 50ft Buffer
Recommended Access - Proposed Pole
Richards Creek Substation Footprint

Parcel
City Jurisdiction Boundary
Profile View
Structure
Conductor
Ground Line
Major Elevation Grid
Major Station Grid
Minor Station Grid

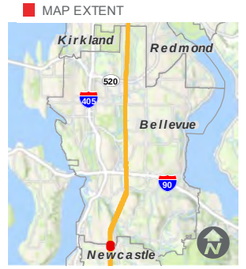
0 25 50 Feet
1 inch = 50 feet

SOURCES: Roads and Parcels - King County (2015), Aerial - King County (2015) Online; Streams, Wetlands and Buffers, Landslide Hazard and Buffers, and Steep Slopes and Buffers from Watershed Company (2016).

Note: See Appendix C for Lakeside and Richards Creek substation site plan

For cartographic purposes only.

MAP EXTENT



SITE PLAN

SOUTH BELLEVUE

BASED ON PSE ENGINEERING DESIGN REVISION K

Date: 9/4/2018

DSD 000193

Path: G:\Projects\Washington\Puget_Sound_Energy_007028\Energize\Eastside\Mapbook_300\MXD\7.2_KVP.mxp Doc:\Bellevue_South\Landuse_CUP\PSE_BellevueSouth_CUP.mxd

MATCHLINE SHEET: 1

MATCHLINE SHEET: 3

1951810130
1951810140
6308000170
6308000180
6308000190
630800TRCT
2824059050
MB01
Category III
6308000370
1951810120
1951810110
1951810100
1951810090
1951810080
1951700740
1951700750
1951700760
1951700770
1951700730
128TH AVE SE

5/8
C-16A
A1

5/9
C-16A
A1

5/8
C-16B
A1

5/9
C-16B
A1

5/8
SCT10
EAST 83FT/WEST 85FT
STA=308+35.09
HT= EAST 72FT/WEST 74FT
ELE=415.09

5/9
SCT10
EAST 92FT/WEST 90FT
STA= EAST 312+81.14/WEST 313+81.14
HT= EAST 80FT/WEST 78FT ELE=424.27

502

310+00

315+00

620
600
580
560
540
520
500
480
460
440
420
400
380
360
340

Proposed Pole Location
Existing Pole Location– To Be Removed
Transmission Line - Proposed
Transmission Line - Proposed (Separate Application)
Transmission Line - Existing
5/7 Proposed Pole Number
C-16 A1 Structure Type (See Appx. A) Construction Scenario Key (See Appx. B)

Project Corridor
Potential Stringing Site
Olympic Underground Pipeline (Approx. Location)
Wastewater Utility Line
Water Utility Line
Unknown Underground Utility Line
Underground Gas Utility Line
Underground Phone/TV Utility Line
Underground Power Utility Line
Unknown Underground Utility Line

Stream
Wetland
Wetland and Stream Buffer
Landslide Hazard
Landslide Hazard 50ft Buffer
Steep Slope
Steep Slope 50ft Buffer
Recommended Access - Proposed Pole
Richards Creek Substation Footprint

Parcel
City Jurisdiction Boundary
Profile View
Structure
Conductor
Ground Line
Major Elevation Grid
Major Station Grid
Minor Station Grid

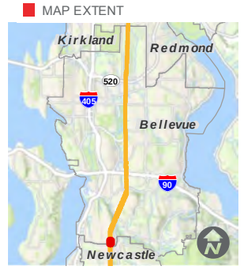
0 25 50 Feet
1 inch = 50 feet

SOURCES: Roads and Parcels - King County (2015), Aerial - King County (2015) Online; Streams, Wetlands and Buffers, Landslide Hazard and Buffers, and Steep Slopes and Buffers from Watershed Company (2016).

Note: See Appendix C for Lakeside and Richards Creek substation site plan

For cartographic purposes only.

MAP EXTENT



SITE PLAN

SOUTH BELLEVUE

BASED ON PSE ENGINEERING DESIGN REVISION K

Date: 9/4/2018

DSD 000194

Path: G:\Projects\Washington\Puget Sound Energy_007029\Energize\Design\GIS\Issued\Mapbook_180628\PSE_2_WP.aprx Date/Time: 9/4/2018 8:39:39 AM

MATCHLINE SHEET: 2

MATCHLINE SHEET: 4

630800TRCT

2824059134

2824059050

6/1
C-16A
A1

2824059123

6308000380

2824059143

6072200470

6308000370

1951700780

1951700790

6/1
C-16B
A1

1951700800

1951700770

1951700010

1951700120

1951700130

1951700140

6072200450

SE 65TH ST

1951700020

1951700110

6/1
SCT10
EAST 98FT/WEST 105FT
STA=320+18.203
HT= EAST 85FT/WEST 92FT
ELE=423.44

700

681

320+00

620 600 580 560 540 520 500 480 460 440 420 400 380 360 340

Path: G:\Projects\Washington\Puget Sound Energy_007029\Energize\Design\Issued\Mapbook_190508\7872_2.WPMap DocName: Bellevue SouthLandUse CUPPSE BellevueSouth CUP.mxd

- Proposed Pole Location
- Existing Pole Location– To Be Removed
- Transmission Line - Proposed
- Transmission Line - Proposed (Separate Application)
- Transmission Line - Existing
- 5/7 — Proposed Pole Number
- C-16 A1 — Structure Type (See Appx. A) / Construction Scenario Key (See Appx. B)
- Project Corridor
- Potential Stringing Site
- Olympic Underground Pipeline (Approx. Location)
- Wastewater Utility Line
- Water Utility Line
- Unknown Underground Utility Line
- Underground Gas Utility Line
- Underground Phone/TV Utility Line
- Underground Power Utility Line
- Unknown Underground Utility Line
- Stream
- Wetland
- Wetland and Stream Buffer
- Landslide Hazard
- Landslide Hazard 50ft Buffer
- Steep Slope
- Steep Slope 50ft Buffer
- Recommended Access - Proposed Pole
- Richards Creek Substation Footprint
- Parcel
- City Jurisdiction Boundary

Profile View

- Structure
- Conductor
- Ground Line
- Major Elevation Grid
- Major Station Grid
- Minor Station Grid

0 25 50 Feet

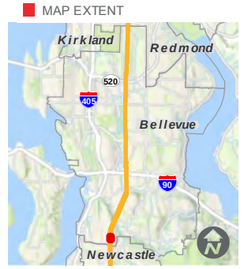
1 inch = 50 feet

SOURCES: Roads and Parcels - King County (2015), Aerial - King County (2015) Online; Streams, Wetlands and Buffers, Landslide Hazard and Buffers, and Steep Slopes and Buffers from Watershed Company (2016).

Note: See Appendix C for Lakeside and Richards Creek substation site plan

For cartographic purposes only.

MAP EXTENT



SITE PLAN

SOUTH BELLEVUE

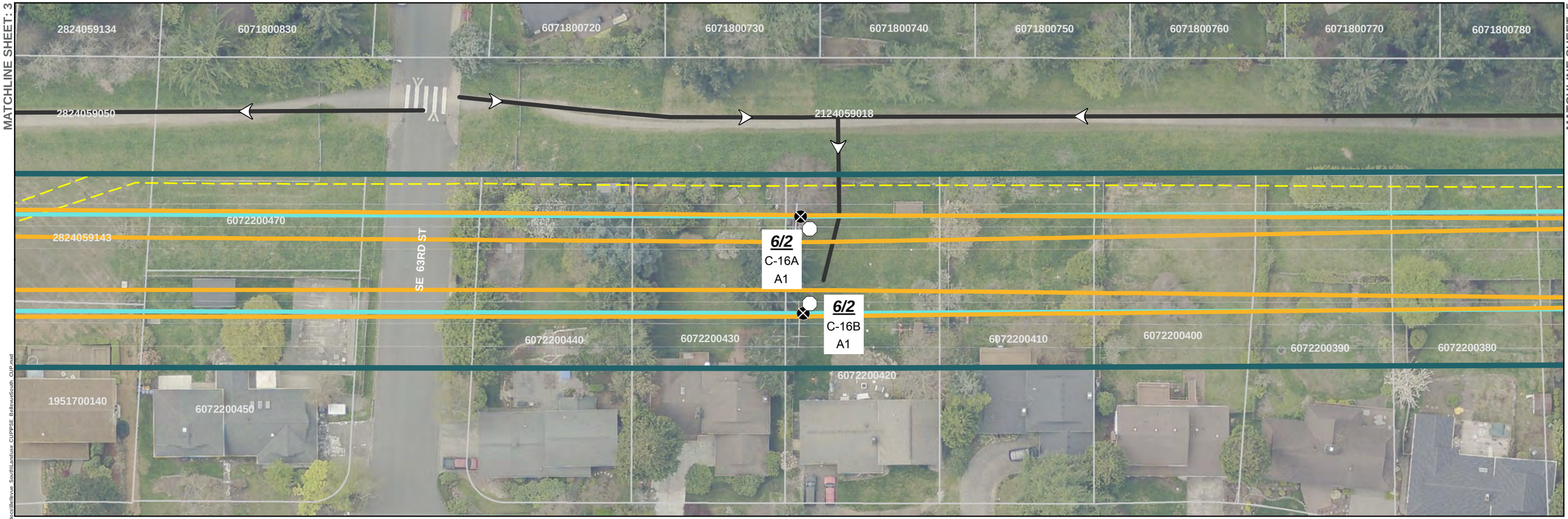
BASED ON PSE ENGINEERING DESIGN REVISION K

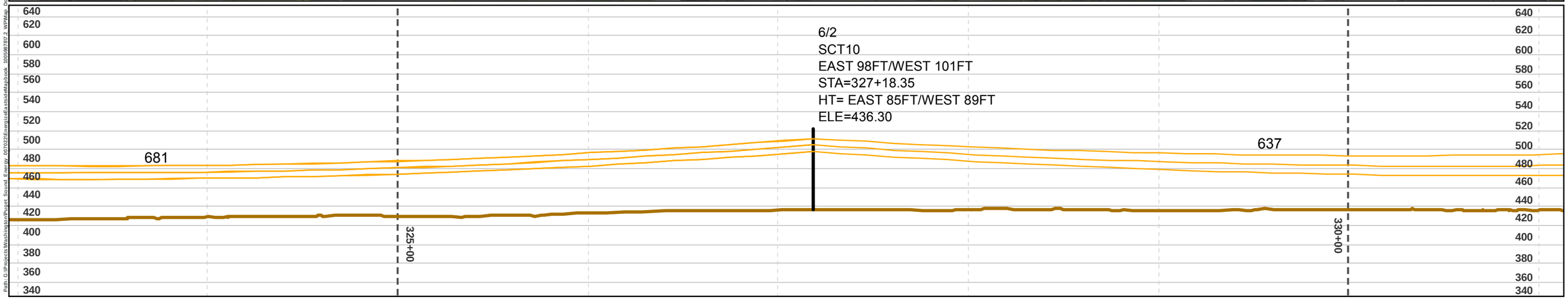
Date: 9/4/2018

DSD 000195

MATCHLINE SHEET: 3

MATCHLINE SHEET: 5





- Proposed Pole Location
- Existing Pole Location– To Be Removed
- Transmission Line - Proposed
- Transmission Line - Proposed (Separate Application)
- Transmission Line - Existing
- 5/7 — Proposed Pole Number
- C-16 — Structure Type (See Appx. A)
- A1 — Construction Scenario Key (See Appx. B)
- Project Corridor
- Potential Stringing Site
- Olympic Underground Pipeline (Approx. Location)
- Wastewater Utility Line
- Water Utility Line
- Unknown Underground Utility Line
- Underground Gas Utility Line
- Underground Phone/TV Utility Line
- Underground Power Utility Line
- Unknown Underground Utility Line
- Stream
- Wetland
- Wetland and Stream Buffer
- Landslide Hazard
- Landslide Hazard 50ft Buffer
- Steep Slope
- Steep Slope 50ft Buffer
- Recommended Access - Proposed Pole
- Richards Creek Substation Footprint
- Parcel
- City Jurisdiction Boundary

Profile View

- Structure
- Conductor
- Ground Line
- Major Elevation Grid
- Major Station Grid
- Minor Station Grid

0 25 50 Feet

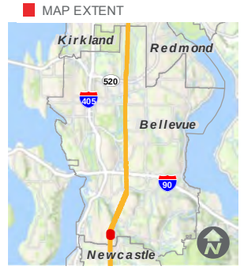
1 inch = 50 feet

SOURCES: Roads and Parcels - King County (2015), Aerial - King County (2015) Online; Streams, Wetlands and Buffers, Landslide Hazard and Buffers, and Steep Slopes and Buffers from Watershed Company (2016).

Note: See Appendix C for Lakeside and Richards Creek substation site plan

For cartographic purposes only.

MAP EXTENT



SITE PLAN

SOUTH BELLEVUE

BASED ON PSE ENGINEERING DESIGN REVISION K

Date: 9/4/2018

DSD 000196

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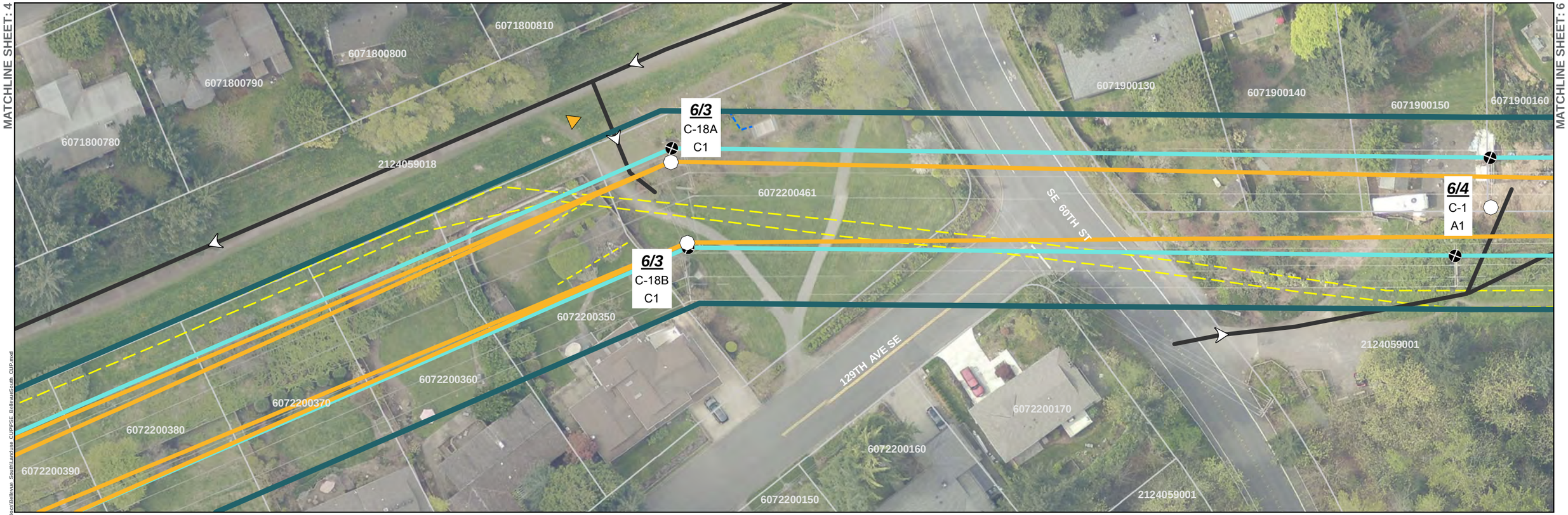
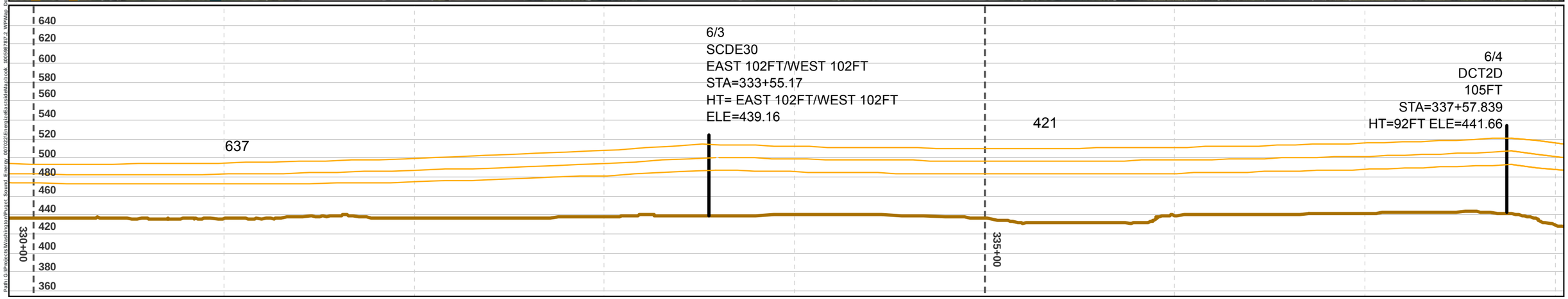
MATCHLINE SHEET: 4

MATCHLINE SHEET: 6





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- Proposed Pole Location
- Existing Pole Location– To Be Removed
- Transmission Line - Proposed
- Transmission Line - Proposed (Separate Application)
- Transmission Line - Existing
- 5/7 — Proposed Pole Number
- C-16 / A1 — Structure Type (See Appx. A) / Construction Scenario Key (See Appx. B)

- Project Corridor
- Potential Stringing Site
- Olympic Underground Pipeline (Approx. Location)
- Wastewater Utility Line
- Water Utility Line
- Unknown Underground Utility Line
- Underground Gas Utility Line
- Underground Phone/TV Utility Line
- Underground Power Utility Line
- Unknown Underground Utility Line

- Stream
- Wetland
- Wetland and Stream Buffer
- Landslide Hazard
- Landslide Hazard 50ft Buffer
- Steep Slope
- Steep Slope 50ft Buffer
- Recommended Access - Proposed Pole
- Richards Creek Substation Footprint

- Parcel
- City Jurisdiction Boundary

Profile View

- Structure
- Conductor
- Ground Line
- Major Elevation Grid
- Major Station Grid
- Minor Station Grid

0 25 50 Feet

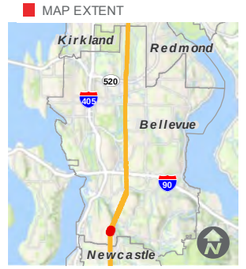
1 inch = 50 feet

SOURCES: Roads and Parcels - King County (2015), Aerial - King County (2015) Online; Streams, Wetlands and Buffers, Landslide Hazard and Buffers, and Steep Slopes and Buffers from Watershed Company (2016).

Note: See Appendix C for Lakeside and Richards Creek substation site plan

For cartographic purposes only.

MAP EXTENT



SITE PLAN

SOUTH BELLEVUE

BASED ON PSE ENGINEERING DESIGN REVISION K

Date: 9/4/2018

DSD 000197

MATCHLINE SHEET: 5

MATCHLINE SHEET: 7

6071900150
6071900160
6071900170
6071900180
6071900190
6071900200
6071900210
6071900220
6071900230

6/4
C-1
A1

6/5
C-1
A1

2124059001

MB02
Category IV

MB03
Category

6/4
DCT2D
105FT
STA=337+57.839
HT=92FT ELE=441.66

6/5
DCT2
110FT
STA=344+16.19
HT=95.00FT ELE=361.16

640

340+00

620
600
580
540
520
500
480
460
440
420
400
380
360
340
320

Proposed Pole Location
Existing Pole Location– To Be Removed
Transmission Line - Proposed
Transmission Line - Proposed (Separate Application)
Transmission Line - Existing
5/7 Proposed Pole Number
C-16 Structure Type (See Appx. A)
A1 Construction Scenario Key (See Appx. B)

Project Corridor
Potential Stringing Site
Olympic Underground Pipeline (Approx. Location)
Wastewater Utility Line
Water Utility Line
Unknown Underground Utility Line
Underground Gas Utility Line
Underground Phone/TV Utility Line
Underground Power Utility Line
Unknown Underground Utility Line

Stream
Wetland
Wetland and Stream Buffer
Landslide Hazard
Landslide Hazard 50ft Buffer
Steep Slope
Steep Slope 50ft Buffer
Recommended Access - Proposed Pole
Richards Creek Substation Footprint

Parcel
City Jurisdiction Boundary
Profile View
Structure
Conductor
Ground Line
Major Elevation Grid
Major Station Grid
Minor Station Grid

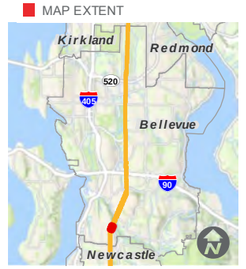
0 25 50 Feet
1 inch = 50 feet

SOURCES: Roads and Parcels - King County (2015), Aerial - King County (2015) Online; Streams, Wetlands and Buffers, Landslide Hazard and Buffers, and Steep Slopes and Buffers from Watershed Company (2016).

Note: See Appendix C for Lakeside and Richards Creek substation site plan

For cartographic purposes only.

MAP EXTENT



SITE PLAN

SOUTH BELLEVUE

BASED ON PSE ENGINEERING DESIGN REVISION K

Date: 9/4/2018

MATCHLINE SHEET: 6

MATCHLINE SHEET: 8

6071900230

6071900220

6071900210

6/5
C-1
A1

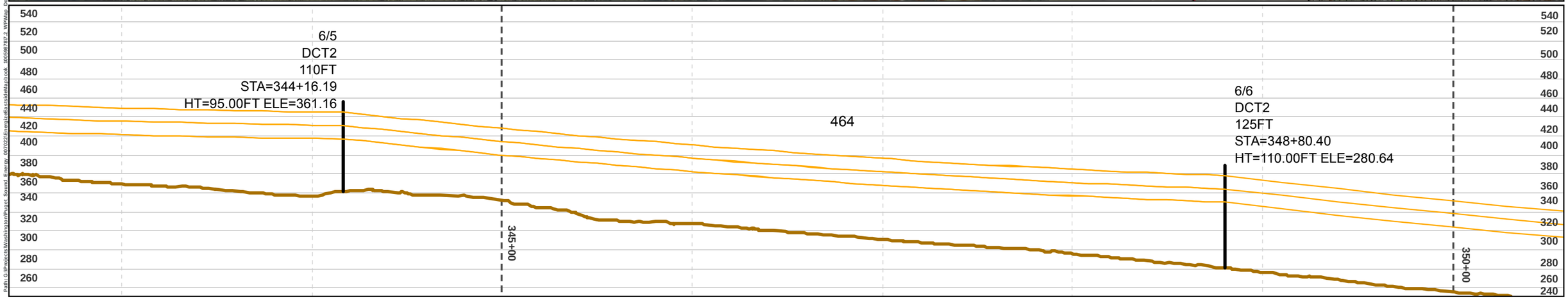
2124059001

6/6
C-1
A1

MB03
Category IV

COAL CREEK PKWY SE

2124059001



- Proposed Pole Location
- Existing Pole Location– To Be Removed
- Transmission Line - Proposed
- Transmission Line - Proposed (Separate Application)
- Transmission Line - Existing
- 5/7 Proposed Pole Number
- C-16 / A1 Structure Type (See Appx. A) / Construction Scenario Key (See Appx. B)
- Project Corridor
- Potential Stringing Site
- Olympic Underground Pipeline (Approx. Location)
- Wastewater Utility Line
- Water Utility Line
- Unknown Underground Utility Line
- Underground Gas Utility Line
- Underground Phone/TV Utility Line
- Underground Power Utility Line
- Unknown Underground Utility Line
- Stream
- Wetland
- Wetland and Stream Buffer
- Landslide Hazard
- Landslide Hazard 50ft Buffer
- Steep Slope
- Steep Slope 50ft Buffer
- Recommended Access - Proposed Pole
- Richards Creek Substation Footprint
- Parcel
- City Jurisdiction Boundary

Profile View

- Structure
- Conductor
- Ground Line
- Major Elevation Grid
- Major Station Grid
- Minor Station Grid

0 25 50 Feet

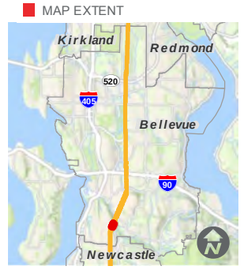
1 inch = 50 feet

SOURCES: Roads and Parcels - King County (2015), Aerial - King County (2015) Online; Streams, Wetlands and Buffers, Landslide Hazard and Buffers, and Steep Slopes and Buffers from Watershed Company (2016).

Note: See Appendix C for Lakeside and Richards Creek substation site plan

For cartographic purposes only.

MAP EXTENT



SITE PLAN

SOUTH BELLEVUE

BASED ON PSE ENGINEERING DESIGN REVISION K

Date: 9/4/2018

DSD 000199

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MATCHLINE SHEET: 7

MATCHLINE SHEET: 9

2124059001

MB03
Type N

MB04
Category IV

MB02
Type F

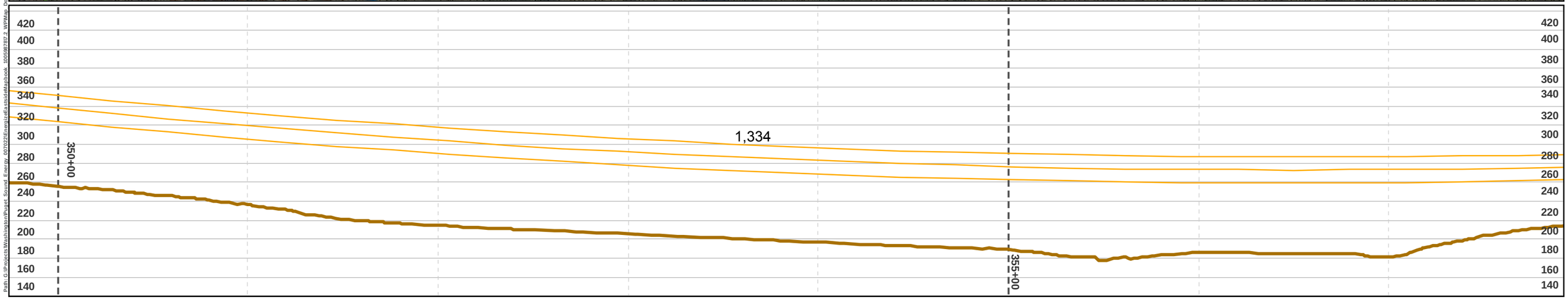
COAL CREEK PKWY SE

JB08
Category III

JB04
Type N

2124059001

JB05 (Coal Creek)
Type F



- Proposed Pole Location
- Existing Pole Location– To Be Removed
- Transmission Line - Proposed
- Transmission Line - Proposed (Separate Application)
- Transmission Line - Existing
- 5/7 Proposed Pole Number
- C-16 Structure Type (See Appx. A)
- A1 Construction Scenario Key (See Appx. B)

- Project Corridor
- Potential Stringing Site
- Olympic Underground Pipeline (Approx. Location)
- Wastewater Utility Line
- Water Utility Line
- Unknown Underground Utility Line
- Underground Gas Utility Line
- Underground Phone/TV Utility Line
- Underground Power Utility Line
- Unknown Underground Utility Line

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- Wetland and Stream Buffer
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- Landslide Hazard 50ft Buffer
- Steep Slope
- Steep Slope 50ft Buffer
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- Richards Creek Substation Footprint

- Parcel
- City Jurisdiction Boundary

Profile View
- Structure
- Conductor
- Ground Line
- Major Elevation Grid
- Major Station Grid
- Minor Station Grid

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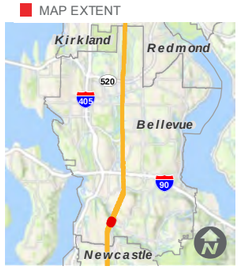
SOURCES: Roads and Parcels - King County (2015), Aerial - King County (2015) Online; Streams, Wetlands and Buffers, Landslide Hazard and Buffers, and Steep Slopes and Buffers from Watershed Company (2016).

Note: See Appendix C for Lakeside and Richards Creek substation site plan

For cartographic purposes only.

MAP EXTENT



SITE PLAN

SOUTH BELLEVUE

BASED ON PSE ENGINEERING DESIGN REVISION K

Date: 9/4/2018

MATCHLINE SHEET: 8

MATCHLINE SHEET: 10

COAL CREEK PKWY SE

E (Somerset)
Category IV

2124059052

A (Somerset)
Category IV

6/7
C-18A
C2

6/7
C-18A
C2

JB08
Category III

2124059071

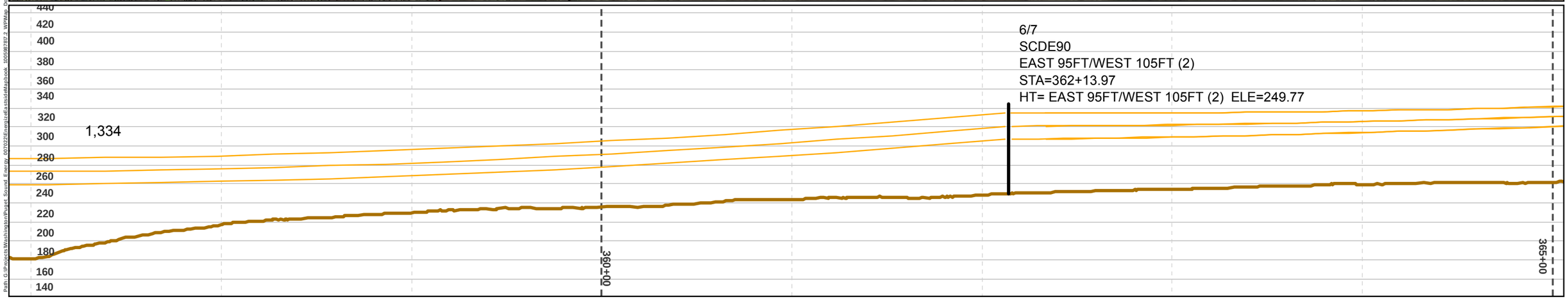
C (Somerset)
Category IV

JB05
Category IV

2124059001

6/7
C-18B
C2

D (Somerset)
Category IV



Path: G:\Projects\Washington\Puget Sound Energy\0070282\Energy\ReEvaluate\Mapbook_180628\PSE_2.MXP Map: DesignReview_SouthBellevue_SouthLandtake_CUPPSE_BellevueSouth_CUP.mxd

- Proposed Pole Location
- Existing Pole Location– To Be Removed
- Transmission Line - Proposed
- Transmission Line - Proposed (Separate Application)
- Transmission Line - Existing
- 5/7 — Proposed Pole Number
- C-16 / A1 — Structure Type (See Appx. A) / Construction Scenario Key (See Appx. B)
- Project Corridor
- Potential Stringing Site
- Olympic Underground Pipeline (Approx. Location)
- Wastewater Utility Line
- Water Utility Line
- Unknown Underground Utility Line
- Underground Gas Utility Line
- Underground Phone/TV Utility Line
- Underground Power Utility Line
- Unknown Underground Utility Line
- Stream
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- Wetland and Stream Buffer
- Landslide Hazard
- Landslide Hazard 50ft Buffer
- Steep Slope
- Steep Slope 50ft Buffer
- Recommended Access - Proposed Pole
- Richards Creek Substation Footprint
- Parcel
- City Jurisdiction Boundary

Profile View

- Structure
- Conductor
- Ground Line
- Major Elevation Grid
- Major Station Grid
- Minor Station Grid

0 25 50 Feet

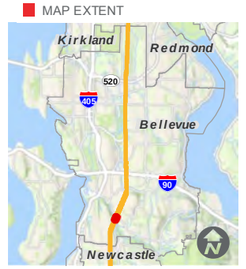
1 inch = 50 feet

SOURCES: Roads and Parcels - King County (2015), Aerial - King County (2015) Online; Streams, Wetlands and Buffers, Landslide Hazard and Buffers, and Steep Slopes and Buffers from Watershed Company (2016).

Note: See Appendix C for Lakeside and Richards Creek substation site plan

For cartographic purposes only.

MAP EXTENT



SITE PLAN

SOUTH BELLEVUE

BASED ON PSE ENGINEERING DESIGN REVISION K

Date: 9/4/2018

DSD 000201

MATCHLINE SHEET: 9

MATCHLINE SHEET: 11

2124059052

2268400270

2268400320

2268400310

2268400300

2268400290

A (Somerset)
Category IV

2124059071

JB04
Category IV

7/1
C-16A
A1

7/2
C-16A
A1

2268400280

7/1
C-16B
A1

7/2
C-16B
A1

2600010670

2124059001

FOREST DR SE

2600010450

2600010460

2600010440

2600010430

500
480
460
440
420
400
380
360
340
320
300
280
260
240

615,920

7/1
SCT10
EAST 101FT/WEST 108FT
STA=368+28.81
HT= EAST 90FT/WEST 95FT
ELE=287.97

445

370+00

7/2
SCT10
EAST 73FT/WEST 80FT
STA=372+74.26
HT= EAST 63FT/WEST 70FT
ELE=331.56

Proposed Pole Location

Existing Pole Location–
To Be Removed

Transmission Line - Proposed

Transmission Line - Proposed
(Separate Application)

Transmission Line - Existing

5/7 Proposed Pole Number

C-16
A1 Structure Type (See Appx. A)
Construction Scenario Key
(See Appx. B)

Project Corridor

Potential Stringing Site

Olympic Underground Pipeline
(Approx. Location)

Wastewater Utility Line

Water Utility Line

Unknown Underground Utility Line

Underground Gas Utility Line

Underground Phone/TV Utility Line

Underground Power Utility Line

Unknown Underground Utility Line

Stream

Wetland

Wetland and Stream Buffer

Landslide Hazard

Landslide Hazard 50ft Buffer

Steep Slope

Steep Slope 50ft Buffer

Recommended Access
- Proposed Pole

Richards Creek Substation Footprint

Parcel

City Jurisdiction Boundary

Profile View

Structure

Conductor

Ground Line

Major Elevation Grid

Major Station Grid

Minor Station Grid

0 25 50 Feet

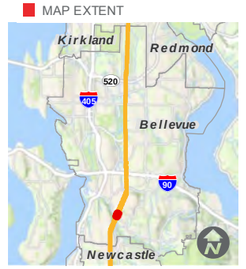
1 inch = 50 feet

SOURCES: Roads and Parcels - King County (2015), Aerial - King County (2015) Online; Streams, Wetlands and Buffers, Landslide Hazard and Buffers, and Steep Slopes and Buffers from Watershed Company (2016).

Note: See Appendix C for Lakeside and Richards Creek substation site plan

For cartographic purposes only.

MAP EXTENT



SITE PLAN

SOUTH BELLEVUE

BASED ON PSE ENGINEERING
DESIGN REVISION K

Date: 9/4/2018

DSD 000202

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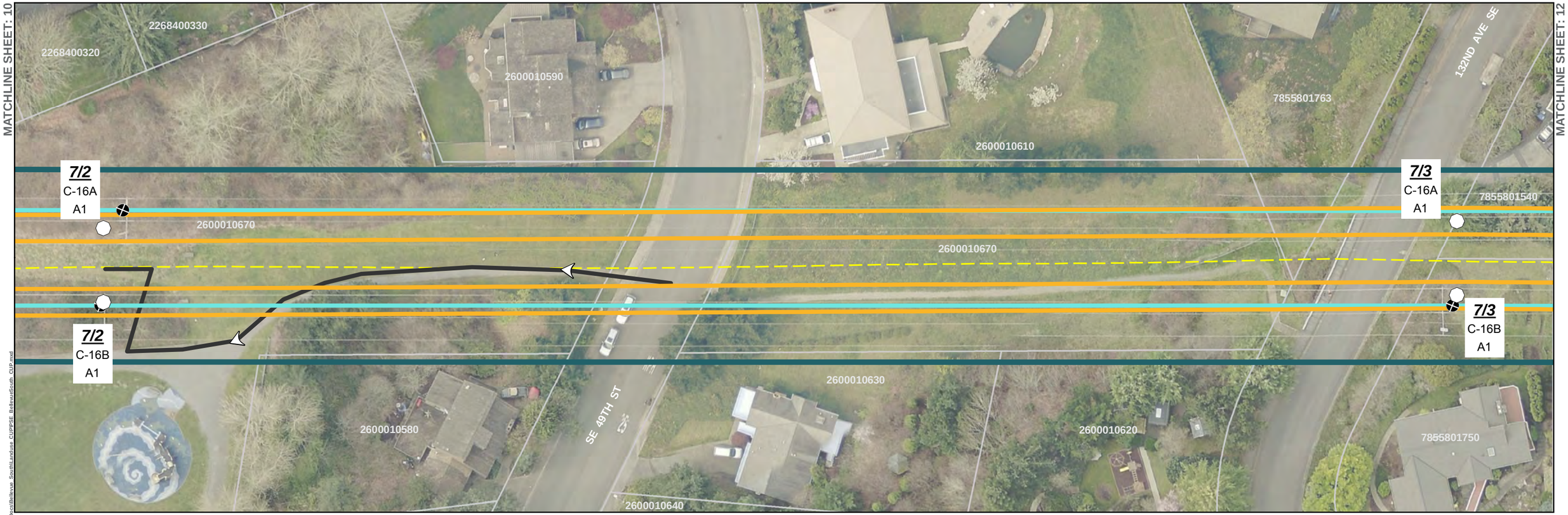
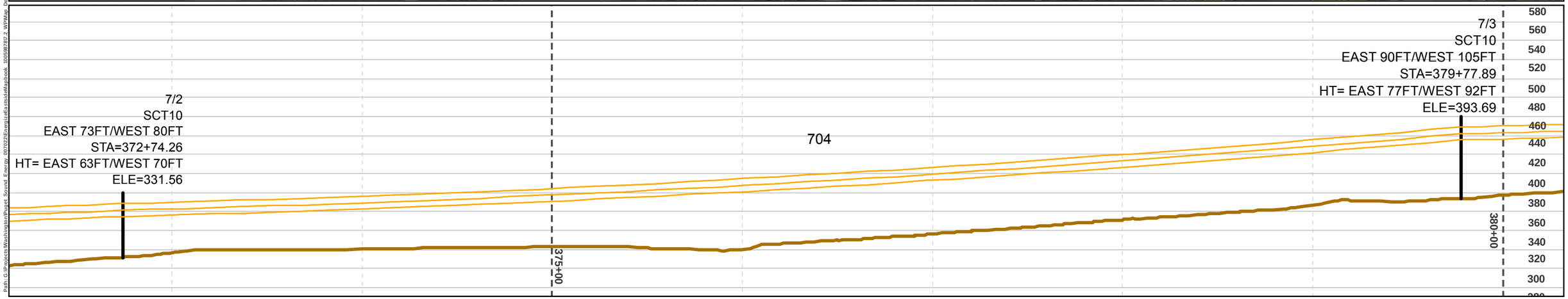




- Proposed Pole Location
- Existing Pole Location– To Be Removed
- Transmission Line - Proposed
- Transmission Line - Proposed (Separate Application)
- Transmission Line - Existing
- 5/7 — Proposed Pole Number
- C-16 / A1 — Structure Type (See Appx. A) / Construction Scenario Key (See Appx. B)

- Project Corridor
- Potential Stringing Site
- Olympic Underground Pipeline (Approx. Location)
- Wastewater Utility Line
- Water Utility Line
- Unknown Underground Utility Line
- Underground Gas Utility Line
- Underground Phone/TV Utility Line
- Underground Power Utility Line
- Unknown Underground Utility Line

- Stream
- Wetland
- Wetland and Stream Buffer
- Landslide Hazard
- Landslide Hazard 50ft Buffer
- Steep Slope
- Steep Slope 50ft Buffer
- Recommended Access - Proposed Pole
- Richards Creek Substation Footprint

- Parcel
- City Jurisdiction Boundary

Profile View

- Structure
- Conductor
- Ground Line
- Major Elevation Grid
- Major Station Grid
- Minor Station Grid

0 25 50 Feet

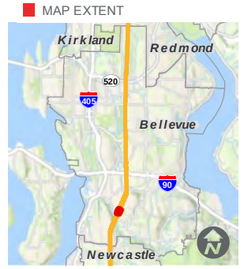
1 inch = 50 feet

SOURCES: Roads and Parcels - King County (2015), Aerial - King County (2015) Online; Streams, Wetlands and Buffers, Landslide Hazard and Buffers, and Steep Slopes and Buffers from Watershed Company (2016).

Note: See Appendix C for Lakeside and Richards Creek substation site plan

For cartographic purposes only.

MAP EXTENT



SITE PLAN

SOUTH BELLEVUE

BASED ON PSE ENGINEERING DESIGN REVISION K

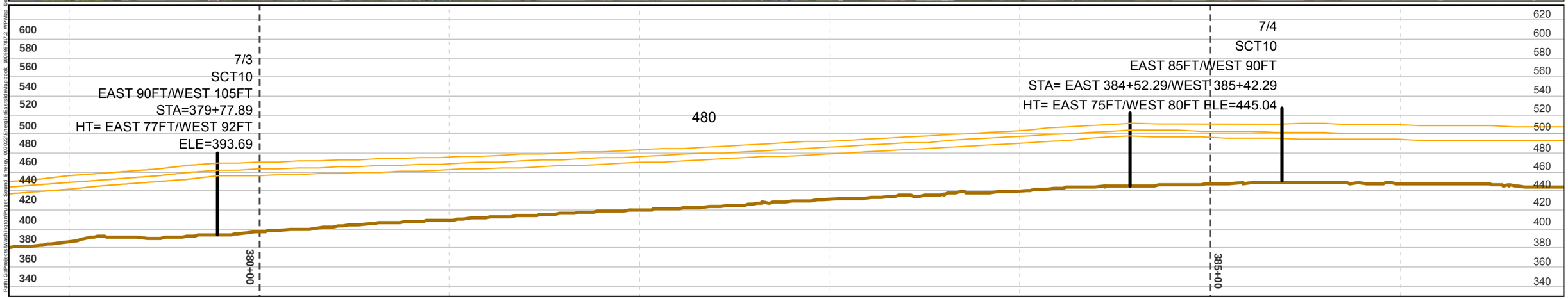
Date: 9/4/2018

DSD 000203

Path: G:\Projects\Washington\Puget Sound Energy\207029\Energy\Delta\Issued\Mapbook 190508\207-2 MXD\Map Book\Bellevue South CUP.mxd

MATCHLINE SHEET: 11

MATCHLINE SHEET: 13



- Proposed Pole Location
- Existing Pole Location– To Be Removed
- Transmission Line - Proposed
- Transmission Line - Proposed (Separate Application)
- Transmission Line - Existing
- 5/7 Proposed Pole Number
- C-16 Structure Type (See Appx. A)
- A1 Construction Scenario Key (See Appx. B)
- Project Corridor
- Potential Stringing Site
- Olympic Underground Pipeline (Approx. Location)
- Wastewater Utility Line
- Water Utility Line
- Unknown Underground Utility Line
- Underground Gas Utility Line
- Underground Phone/TV Utility Line
- Underground Power Utility Line
- Unknown Underground Utility Line
- Stream
- Wetland
- Wetland and Stream Buffer
- Landslide Hazard
- Landslide Hazard 50ft Buffer
- Steep Slope
- Steep Slope 50ft Buffer
- Recommended Access - Proposed Pole
- Richards Creek Substation Footprint
- Parcel
- City Jurisdiction Boundary

Profile View

- Structure
- Conductor
- Ground Line
- Major Elevation Grid
- Major Station Grid
- Minor Station Grid

0 25 50 Feet

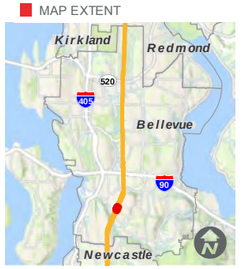
1 inch = 50 feet

SOURCES: Roads and Parcels - King County (2015), Aerial - King County (2015) Online; Streams, Wetlands and Buffers, Landslide Hazard and Buffers, and Steep Slopes and Buffers from Watershed Company (2016).

Note: See Appendix C for Lakeside and Richards Creek substation site plan

For cartographic purposes only.

MAP EXTENT



SITE PLAN

SOUTH BELLEVUE

BASED ON PSE ENGINEERING DESIGN REVISION K

Date: 9/4/2018

DSD 000204

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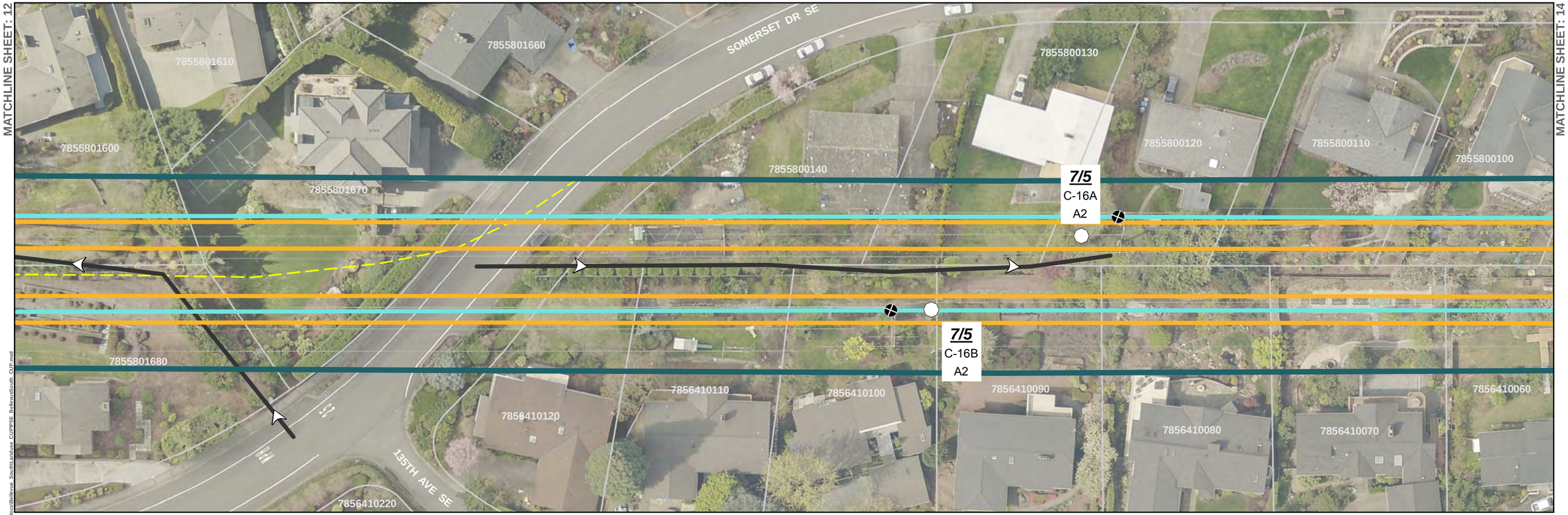
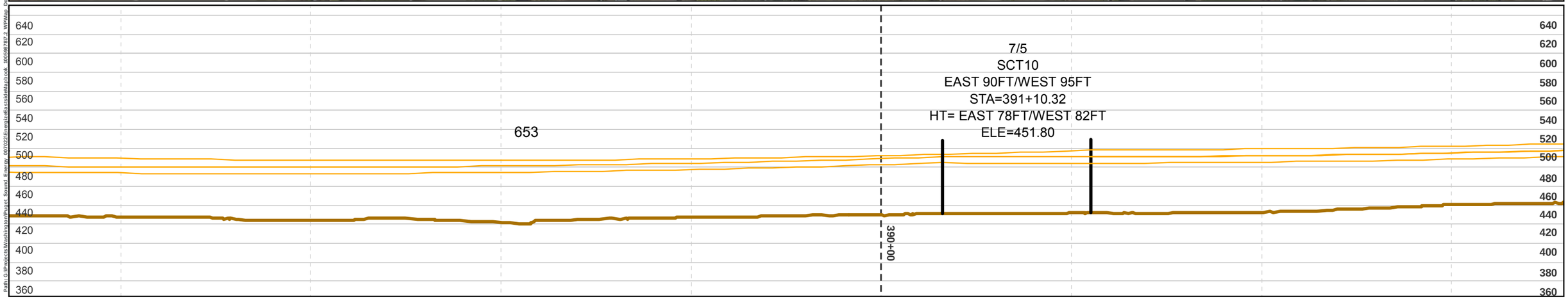
MATCHLINE SHEET: 12

MATCHLINE SHEET: 14





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- Proposed Pole Location
- Existing Pole Location– To Be Removed
- Transmission Line - Proposed
- Transmission Line - Proposed (Separate Application)
- Transmission Line - Existing
- 5/7 — Proposed Pole Number
- C-16 / A1 — Structure Type (See Appx. A) / Construction Scenario Key (See Appx. B)
- Project Corridor
- Potential Stringing Site
- Olympic Underground Pipeline (Approx. Location)
- Wastewater Utility Line
- Water Utility Line
- Unknown Underground Utility Line
- Underground Gas Utility Line
- Underground Phone/TV Utility Line
- Underground Power Utility Line
- Unknown Underground Utility Line
- Stream
- Wetland
- Wetland and Stream Buffer
- Landslide Hazard
- Landslide Hazard 50ft Buffer
- Steep Slope
- Steep Slope 50ft Buffer
- Recommended Access - Proposed Pole
- Richards Creek Substation Footprint
- Parcel
- City Jurisdiction Boundary

Profile View

- Structure
- Conductor
- Ground Line
- Major Elevation Grid
- Major Station Grid
- Minor Station Grid

0 25 50 Feet

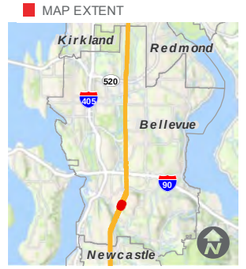
1 inch = 50 feet

SOURCES: Roads and Parcels - King County (2015), Aerial - King County (2015) Online; Streams, Wetlands and Buffers, Landslide Hazard and Buffers, and Steep Slopes and Buffers from Watershed Company (2016).

Note: See Appendix C for Lakeside and Richards Creek substation site plan

For cartographic purposes only.

MAP EXTENT



SITE PLAN

SOUTH BELLEVUE

BASED ON PSE ENGINEERING DESIGN REVISION K

Date: 9/4/2018

DSD 000205

MATCHLINE SHEET: 13

MATCHLINE SHEET: 15

7855800100
7855800090
7855800080
7855800070
7855800060
7855800050
7855800040
7855800030
7855800020
7855800010

7/6
C-16A
A1

7/6
C-16B
A1

7856410060
7856410050
7856410040
7856410030
7856410020
7856410010
7856410440

SOMERSET PL SE

JB02
Category IV

7855801770

7/6
SCT10
EAST 83FT/WEST 95FT
STA=396+30.56
HT= EAST 72FT/WEST 82FT
ELE=478.37

520
591

700 680 660 640 620 600 580 560 540 520 500 480 460 440 420

395+00
400+00

Path: G:\Projects\Washington\Puget_Sound_Energy_007\2018\energy\GIS\Issue\Mapbook_180508\7872_KVPMap_SouthBellevue_SouthLandUse_CUPPSE_BellevueSouth_CUP.mxd

- Proposed Pole Location
- Existing Pole Location– To Be Removed
- Transmission Line - Proposed
- Transmission Line - Proposed (Separate Application)
- Transmission Line - Existing
- 5/7 — Proposed Pole Number
- C-16 / A1 — Structure Type (See Appx. A) / Construction Scenario Key (See Appx. B)
- Project Corridor
- Potential Stringing Site
- Olympic Underground Pipeline (Approx. Location)
- Wastewater Utility Line
- Water Utility Line
- Unknown Underground Utility Line
- Underground Gas Utility Line
- Underground Phone/TV Utility Line
- Underground Power Utility Line
- Unknown Underground Utility Line
- Stream
- Wetland
- Wetland and Stream Buffer
- Landslide Hazard
- Landslide Hazard 50ft Buffer
- Steep Slope
- Steep Slope 50ft Buffer
- Recommended Access - Proposed Pole
- Richards Creek Substation Footprint
- Parcel
- City Jurisdiction Boundary

Profile View
- Structure
- Conductor
- Ground Line
- Major Elevation Grid
- Major Station Grid
- Minor Station Grid

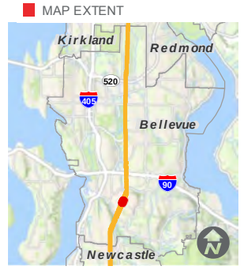
0 25 50 Feet
1 inch = 50 feet

SOURCES: Roads and Parcels - King County (2015), Aerial - King County (2015) Online; Streams, Wetlands and Buffers, Landslide Hazard and Buffers, and Steep Slopes and Buffers from Watershed Company (2016).

Note: See Appendix C for Lakeside and Richards Creek substation site plan

For cartographic purposes only.

MAP EXTENT



SITE PLAN

SOUTH BELLEVUE

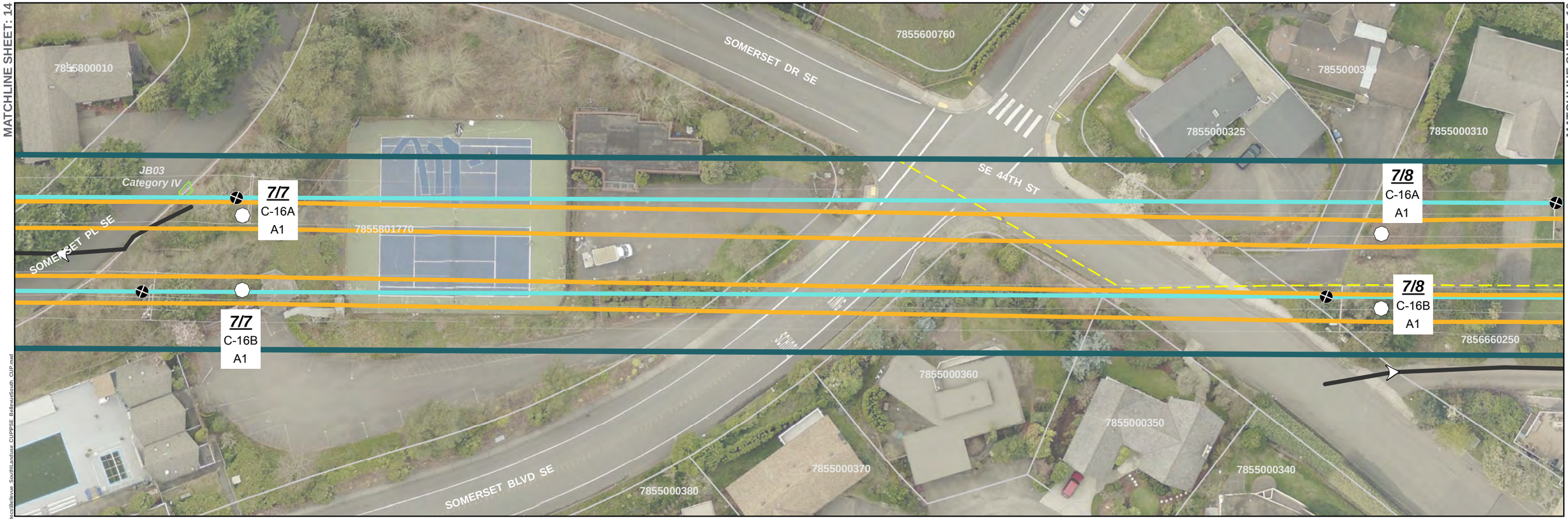
BASED ON PSE ENGINEERING DESIGN REVISION K

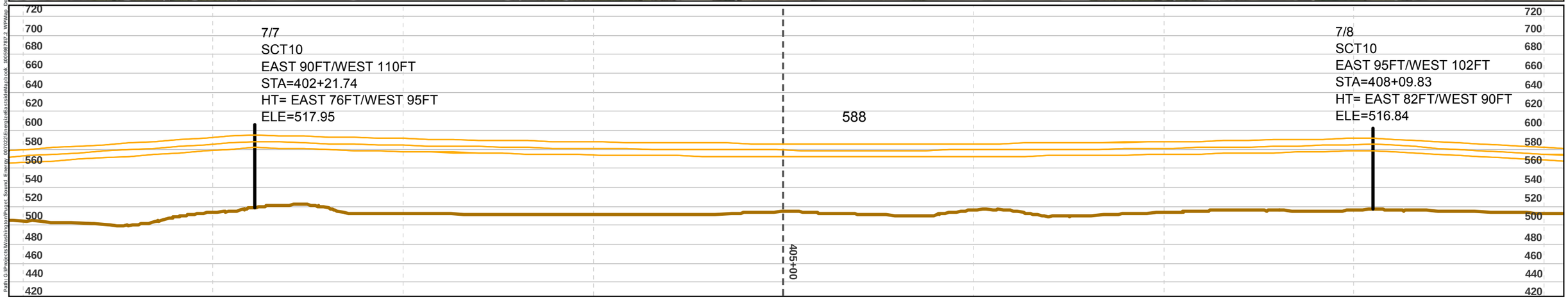
Date: 9/4/2018

DSD 000206

MATCHLINE SHEET: 14

MATCHLINE SHEET: 16





Proposed Pole Location

Existing Pole Location– To Be Removed

Transmission Line - Proposed

Transmission Line - Proposed (Separate Application)

Transmission Line - Existing

5/7 Proposed Pole Number

C-16 A1 Structure Type (See Appx. A) / Construction Scenario Key (See Appx. B)

Project Corridor

Potential Stringing Site

Olympic Underground Pipeline (Approx. Location)

Wastewater Utility Line

Water Utility Line

Unknown Underground Utility Line

Underground Gas Utility Line

Underground Phone/TV Utility Line

Underground Power Utility Line

Unknown Underground Utility Line

Stream

Wetland

Wetland and Stream Buffer

Landslide Hazard

Landslide Hazard 50ft Buffer

Steep Slope

Steep Slope 50ft Buffer

Recommended Access - Proposed Pole

Richards Creek Substation Footprint

Parcel

City Jurisdiction Boundary

Profile View

Structure

Conductor

Ground Line

Major Elevation Grid

Major Station Grid

Minor Station Grid

0 25 50 Feet

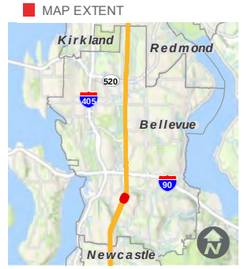
1 inch = 50 feet

SOURCES: Roads and Parcels - King County (2015), Aerial - King County (2015) Online; Streams, Wetlands and Buffers, Landslide Hazard and Buffers, and Steep Slopes and Buffers from Watershed Company (2016).

Note: See Appendix C for Lakeside and Richards Creek substation site plan

For cartographic purposes only.

MAP EXTENT



SITE PLAN

SOUTH BELLEVUE

BASED ON PSE ENGINEERING DESIGN REVISION K

Date: 9/4/2018

DSD 000207

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MATCHLINE SHEET: 15

MATCHLINE SHEET: 17

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7855000280
7855000270
7855000260
7855000250
7855000240
7855000230
7855000010
7856640570
7856640440
7856640450
785664TRCT
7856640430
7856660250
7856660240
7856660230
7856660220
1524059142
SE 43RD ST

8/1
C-16A
A1

8/1
C-16B
A1

8/1
SCT10
EAST 80FT/WEST 86FT
STA=413+15.85
HT= EAST 70FT/WEST 75FT
ELE=493.78

506
475
410+00
415+00

700 680 660 640 620 600 580 560 540 520 500 480 460 440 420

Path: G:\Projects\Washington\Puget Sound Energy\0070282\Energy\GIS\Issue\Mapbook_180508\787-2_MXD\Alignment_Sheets\787-2_Alignment_Sheets_Bellevue_South_CUP.mxd

- Proposed Pole Location
- Existing Pole Location– To Be Removed
- Transmission Line - Proposed
- Transmission Line - Proposed (Separate Application)
- Transmission Line - Existing
- 5/7 Proposed Pole Number
- C-16 A1 Structure Type (See Appx. A) / Construction Scenario Key (See Appx. B)
- Project Corridor
- Potential Stringing Site
- Olympic Underground Pipeline (Approx. Location)
- Wastewater Utility Line
- Water Utility Line
- Unknown Underground Utility Line
- Underground Gas Utility Line
- Underground Phone/TV Utility Line
- Underground Power Utility Line
- Unknown Underground Utility Line
- Stream
- Wetland
- Wetland and Stream Buffer
- Landslide Hazard
- Landslide Hazard 50ft Buffer
- Steep Slope
- Steep Slope 50ft Buffer
- Recommended Access - Proposed Pole
- Richards Creek Substation Footprint
- Parcel
- City Jurisdiction Boundary

Profile View
- Structure
- Conductor
- Ground Line
- Major Elevation Grid
- Major Station Grid
- Minor Station Grid

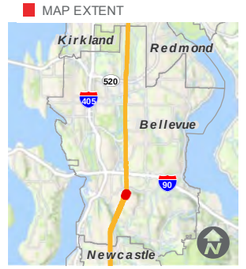
0 25 50 Feet
1 inch = 50 feet

SOURCES: Roads and Parcels - King County (2015), Aerial - King County (2015) Online; Streams, Wetlands and Buffers, Landslide Hazard and Buffers, and Steep Slopes and Buffers from Watershed Company (2016).

Note: See Appendix C for Lakeside and Richards Creek substation site plan

For cartographic purposes only.

MAP EXTENT



SITE PLAN

SOUTH BELLEVUE

BASED ON PSE ENGINEERING DESIGN REVISION K

Date: 9/4/2018

DSD 000208

MATCHLINE SHEET: 16

MATCHLINE SHEET: 18

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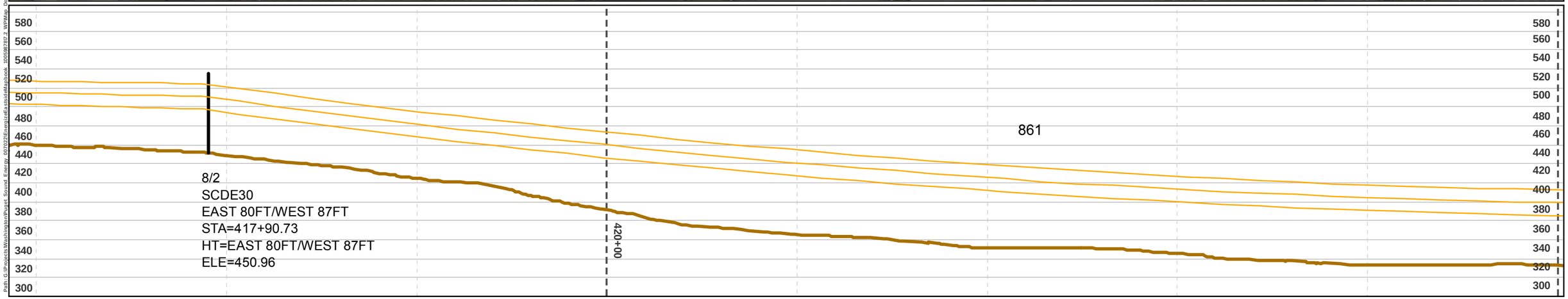
7856420060
7856420040
7855000640
7856420050
1524059141
1524059145
1524059080
7856420080
SE 42ND ST
SE NEWPORT WAY
7856640030
7856640020
7856640010
7856640295
7856640040
7856640570
7856640560
7856640290

8/2
C-18A
C1

8/2
C-18B
C1



- Proposed Pole Location
- Existing Pole Location– To Be Removed
- Transmission Line - Proposed
- Transmission Line - Proposed (Separate Application)
- Transmission Line - Existing
- 5/7 Proposed Pole Number
- C-16 A1 Structure Type (See Appx. A) / Construction Scenario Key (See Appx. B)
- Project Corridor
- Potential Stringing Site
- Olympic Underground Pipeline (Approx. Location)
- Wastewater Utility Line
- Water Utility Line
- Unknown Underground Utility Line
- Underground Gas Utility Line
- Underground Phone/TV Utility Line
- Underground Power Utility Line
- Unknown Underground Utility Line
- Stream
- Wetland
- Wetland and Stream Buffer
- Landslide Hazard
- Landslide Hazard 50ft Buffer
- Steep Slope
- Steep Slope 50ft Buffer
- Recommended Access - Proposed Pole
- Richards Creek Substation Footprint
- Parcel
- City Jurisdiction Boundary

Profile View
- Structure
- Conductor
- Ground Line
- Major Elevation Grid
- Major Station Grid
- Minor Station Grid

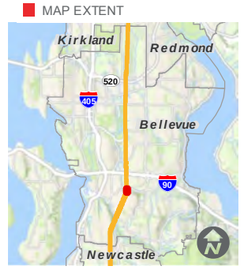
0 25 50 Feet
1 inch = 50 feet

SOURCES: Roads and Parcels - King County (2015), Aerial - King County (2015) Online; Streams, Wetlands and Buffers, Landslide Hazard and Buffers, and Steep Slopes and Buffers from Watershed Company (2016).

Note: See Appendix C for Lakeside and Richards Creek substation site plan

For cartographic purposes only.

MAP EXTENT



SITE PLAN

SOUTH BELLEVUE

BASED ON PSE ENGINEERING DESIGN REVISION K

Date: 9/4/2018

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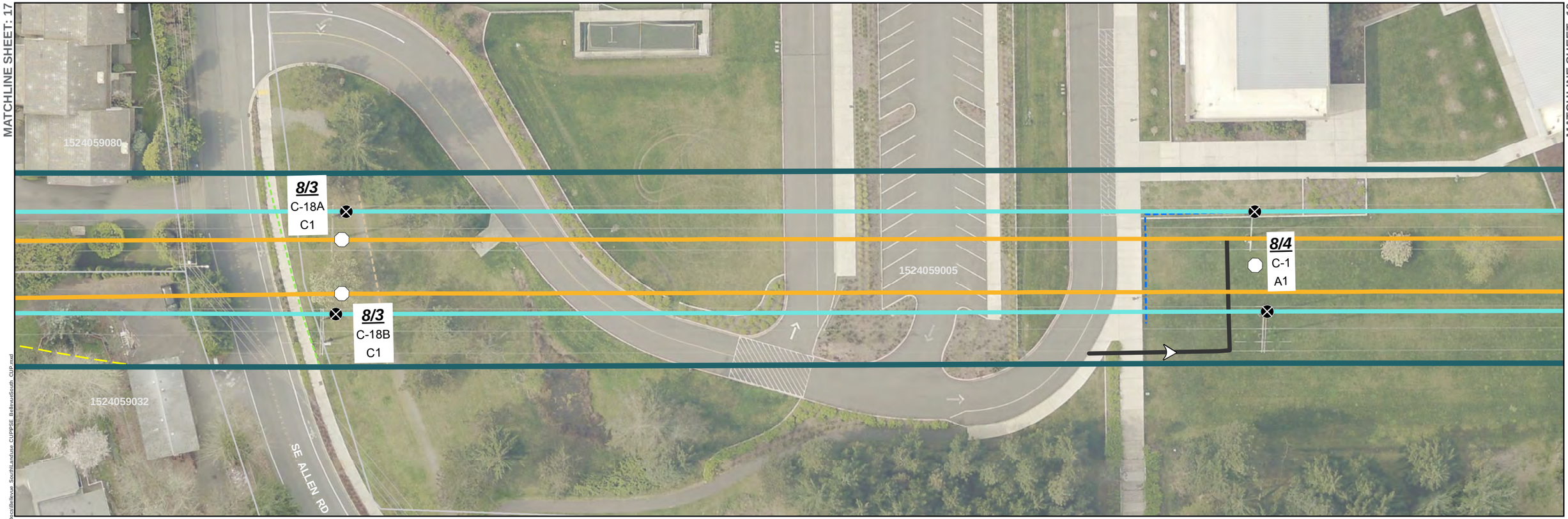
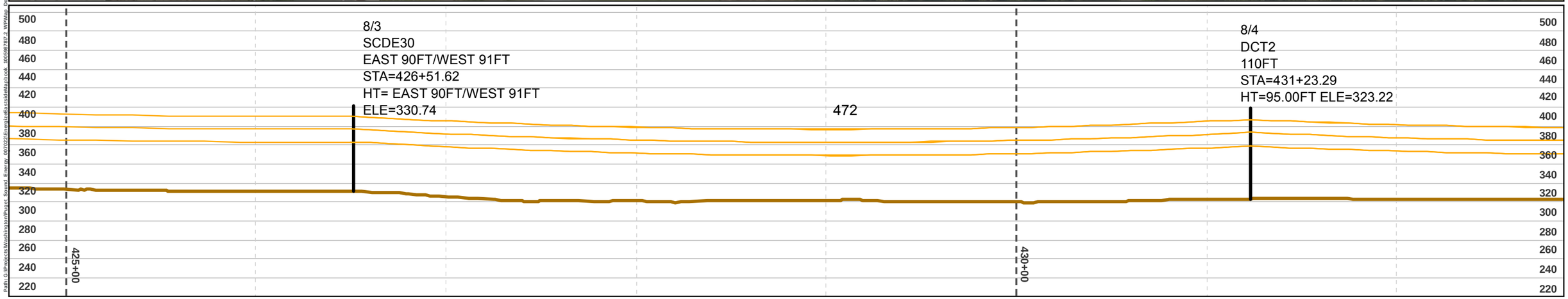
MATCHLINE SHEET: 17

MATCHLINE SHEET: 19





- Proposed Pole Location
- Existing Pole Location– To Be Removed
- Transmission Line - Proposed
- Transmission Line - Proposed (Separate Application)
- Transmission Line - Existing
- 5/7 Proposed Pole Number
- C-16 / A1 Structure Type (See Appx. A) / Construction Scenario Key (See Appx. B)
- Project Corridor
- Potential Stringing Site
- Olympic Underground Pipeline (Approx. Location)
- Wastewater Utility Line
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- Stream
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- Landslide Hazard
- Landslide Hazard 50ft Buffer
- Steep Slope
- Steep Slope 50ft Buffer
- Recommended Access - Proposed Pole
- Richards Creek Substation Footprint
- Parcel
- City Jurisdiction Boundary

Profile View

- Structure
- Conductor
- Ground Line
- Major Elevation Grid
- Major Station Grid
- Minor Station Grid

0 25 50 Feet

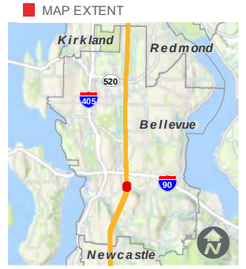
1 inch = 50 feet

SOURCES: Roads and Parcels - King County (2015), Aerial - King County (2015) Online; Streams, Wetlands and Buffers, Landslide Hazard and Buffers, and Steep Slopes and Buffers from Watershed Company (2016).

Note: See Appendix C for Lakeside and Richards Creek substation site plan

For cartographic purposes only.

MAP EXTENT



SITE PLAN

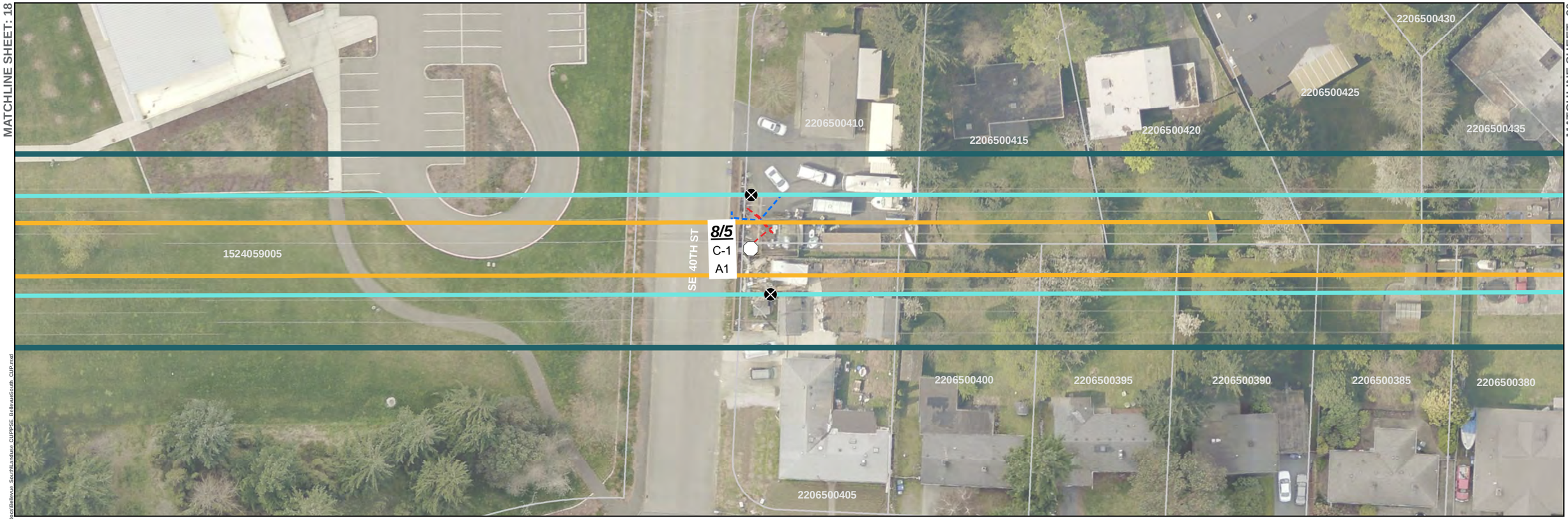
SOUTH BELLEVUE

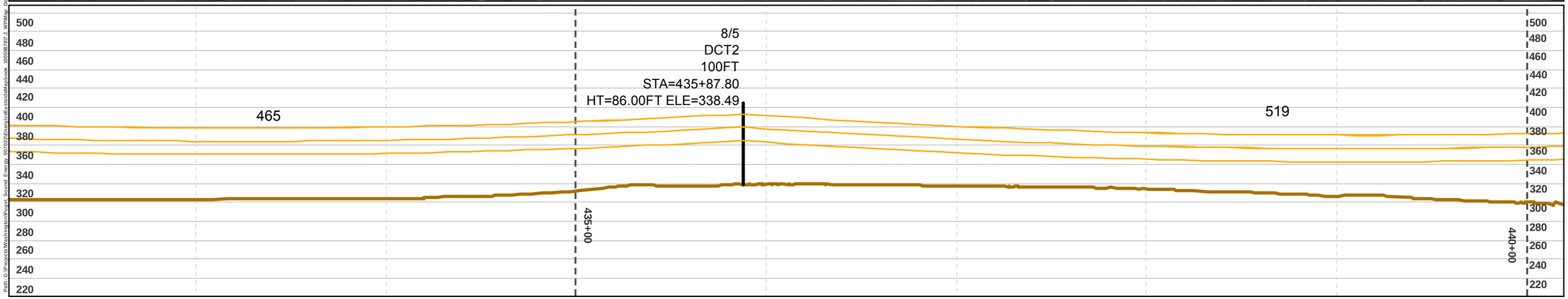
BASED ON PSE ENGINEERING DESIGN REVISION K

Date: 9/4/2018

MATCHLINE SHEET: 18

MATCHLINE SHEET: 20





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- Proposed Pole Location
- Existing Pole Location– To Be Removed
- Transmission Line - Proposed
- Transmission Line - Proposed (Separate Application)
- Transmission Line - Existing
- 5/7 — Proposed Pole Number
- C-16 / A1 — Structure Type (See Appx. A) / Construction Scenario Key (See Appx. B)
- Project Corridor
- Potential Stringing Site
- Olympic Underground Pipeline (Approx. Location)
- Wastewater Utility Line
- Water Utility Line
- Unknown Underground Utility Line
- Underground Gas Utility Line
- Underground Phone/TV Utility Line
- Underground Power Utility Line
- Unknown Underground Utility Line
- Stream
- Wetland
- Wetland and Stream Buffer
- Landslide Hazard
- Landslide Hazard 50ft Buffer
- Steep Slope
- Steep Slope 50ft Buffer
- Recommended Access - Proposed Pole
- Richards Creek Substation Footprint
- Parcel
- City Jurisdiction Boundary

Profile View

- Structure
- Conductor
- Ground Line
- Major Elevation Grid
- Major Station Grid
- Minor Station Grid

0 25 50 Feet

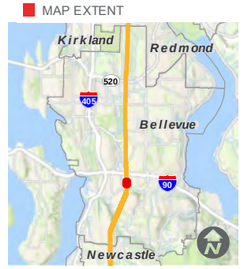
1 inch = 50 feet

SOURCES: Roads and Parcels - King County (2015), Aerial - King County (2015) Online; Streams, Wetlands and Buffers, Landslide Hazard and Buffers, and Steep Slopes and Buffers from Watershed Company (2016).

Note: See Appendix C for Lakeside and Richards Creek substation site plan

For cartographic purposes only.

MAP EXTENT



SITE PLAN

SOUTH BELLEVUE

BASED ON PSE ENGINEERING DESIGN REVISION K

Date: 9/4/2018

DSD 000211

MATCHLINE SHEET: 19

MATCHLINE SHEET: 21

136TH PL SE

136TH AVE SE

SE 38TH ST

SE 37TH ST

2206500435

2206500250

2206500245

2206500240

2206500235

2206500230

2206500225

2206500220

2206500256

2206500375

2206500255

2206500285

2206500025

2206500260

2206500185

2206500190

2206500265

2206500280

2206500030

8/6
C-1
A1

8/7
C-1
A1

8/6
DCT2
110FT
STA=441+06.92
HT=95.00 ELE=315.04

603

8/7
DCT2D
105FT
STA=447+09.99
HT=91 ELE=307.39

445+00

500 480 460 440 420 400 380 360 340 320 300 280 260 240 220

Proposed Pole Location
Existing Pole Location– To Be Removed
Transmission Line - Proposed
Transmission Line - Proposed (Separate Application)
Transmission Line - Existing
5/7 Proposed Pole Number
C-16 Structure Type (See Appx. A)
A1 Construction Scenario Key (See Appx. B)

Project Corridor
Potential Stringing Site
Olympic Underground Pipeline (Approx. Location)
Wastewater Utility Line
Water Utility Line
Unknown Underground Utility Line
Underground Gas Utility Line
Underground Phone/TV Utility Line
Underground Power Utility Line
Unknown Underground Utility Line

Stream
Wetland
Wetland and Stream Buffer
Landslide Hazard
Landslide Hazard 50ft Buffer
Steep Slope
Steep Slope 50ft Buffer
Recommended Access - Proposed Pole
Richards Creek Substation Footprint

Parcel
City Jurisdiction Boundary
Profile View
Structure
Conductor
Ground Line
Major Elevation Grid
Major Station Grid
Minor Station Grid

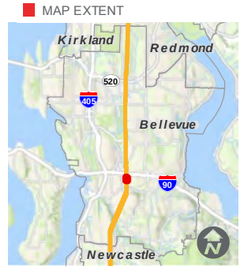
0 25 50 Feet
1 inch = 50 feet

SOURCES: Roads and Parcels - King County (2015), Aerial - King County (2015) Online; Streams, Wetlands and Buffers, Landslide Hazard and Buffers, and Steep Slopes and Buffers from Watershed Company (2016).

Note: See Appendix C for Lakeside and Richards Creek substation site plan

For cartographic purposes only.

MAP EXTENT



SITE PLAN

SOUTH BELLEVUE

BASED ON PSE ENGINEERING DESIGN REVISION K

Date: 9/4/2018

MATCHLINE SHEET: 20

MATCHLINE SHEET: 22

2206500015

3927250020

2206500020

1024059123

2206500025

2206500030

SE 36TH ST

I-90 FWY

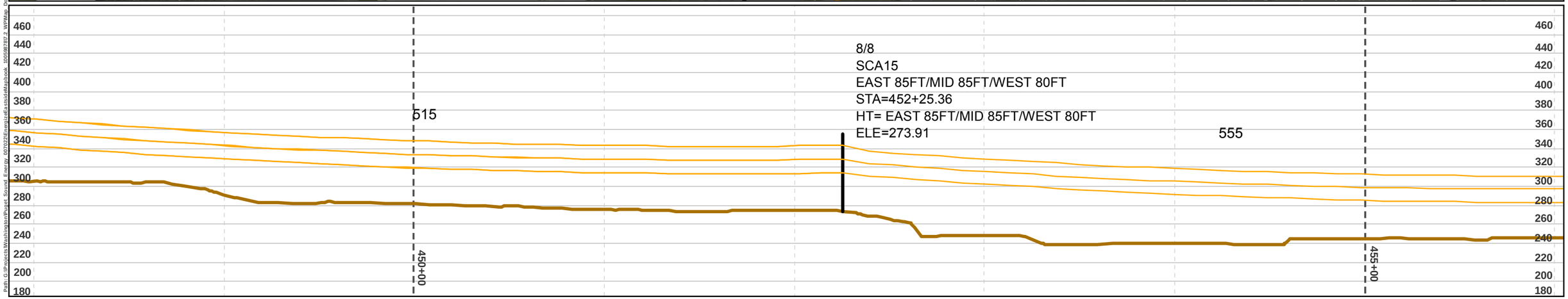
I-90 EXPR RAMP

SE EASTGATE WAY

8/8
C-2A
C1

8/8
C-2B
C1

8/8
C-18A
C1



Proposed Pole Location

Existing Pole Location–
To Be Removed

Transmission Line - Proposed

Transmission Line - Proposed
(Separate Application)

Transmission Line - Existing

5/7 Proposed Pole Number

C-16 Structure Type (See Appx. A)

A1 Construction Scenario Key
(See Appx. B)

Project Corridor

Potential Stringing Site

Olympic Underground Pipeline
(Approx. Location)

Wastewater Utility Line

Water Utility Line

Unknown Underground Utility Line

Underground Gas Utility Line

Underground Phone/TV Utility Line

Underground Power Utility Line

Unknown Underground Utility Line

Stream

Wetland

Wetland and Stream Buffer

Landslide Hazard

Landslide Hazard 50ft Buffer

Steep Slope

Steep Slope 50ft Buffer

Recommended Access
- Proposed Pole

Richards Creek Substation Footprint

Parcel

City Jurisdiction Boundary

Profile View

Structure

Conductor

Ground Line

Major Elevation Grid

Major Station Grid

Minor Station Grid

0 25 50 Feet

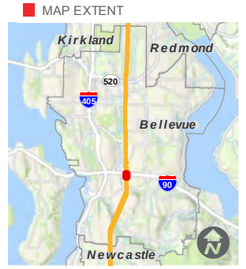
1 inch = 50 feet

SOURCES: Roads and Parcels - King County (2015), Aerial - King County (2015) Online; Streams, Wetlands and Buffers, Landslide Hazard and Buffers, and Steep Slopes and Buffers from Watershed Company (2016).

Note: See Appendix C for Lakeside and Richards Creek substation site plan

For cartographic purposes only.

MAP EXTENT



SITE PLAN

SOUTH BELLEVUE

BASED ON PSE ENGINEERING
DESIGN REVISION K

Date: 9/4/2018

DSD 000213

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MATCHLINE SHEET: 21

MATCHLINE SHEET: 23

SE EASTGATE WAY

SE 32ND ST

1024059101

5453300320

8135300020

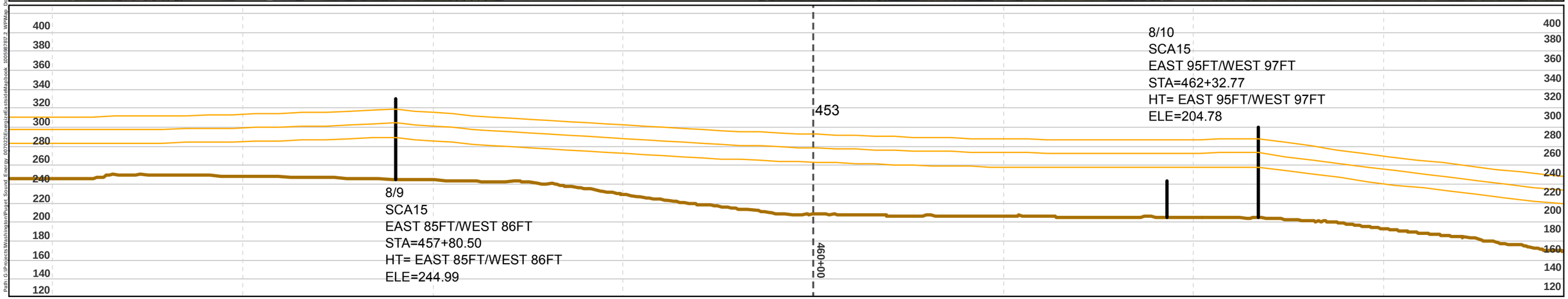
8135300110

8/9
C-2A
C1

8/9
C-1B
C1

8/10
C-2A
C1

8/10
C-1B
C1



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- Proposed Pole Location
- Existing Pole Location– To Be Removed
- Transmission Line - Proposed
- Transmission Line - Proposed (Separate Application)
- Transmission Line - Existing
- 5/7 Proposed Pole Number
- C-16 / A1 Structure Type (See Appx. A) / Construction Scenario Key (See Appx. B)
- Project Corridor
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- Olympic Underground Pipeline (Approx. Location)
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- Underground Gas Utility Line
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- Landslide Hazard 50ft Buffer
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- Recommended Access - Proposed Pole
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- Parcel
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Profile View

- Structure
- Conductor
- Ground Line
- Major Elevation Grid
- Major Station Grid
- Minor Station Grid

0 25 50 Feet

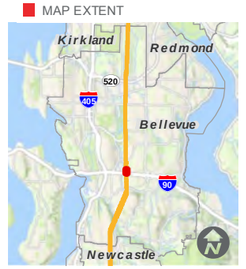
1 inch = 50 feet

SOURCES: Roads and Parcels - King County (2015), Aerial - King County (2015) Online; Streams, Wetlands and Buffers, Landslide Hazard and Buffers, and Steep Slopes and Buffers from Watershed Company (2016).

Note: See Appendix C for Lakeside and Richards Creek substation site plan

For cartographic purposes only.

MAP EXTENT



SITE PLAN

SOUTH BELLEVUE

BASED ON PSE ENGINEERING DESIGN REVISION K

Date: 9/4/2018

DSD 000214

MATCHLINE SHEET: 22

MATCHLINE SHEET: 24

115 KV

115 KV

230 KV

230 KV

115 KV

115 KV

5453300320

SE 32ND ST

C (Richards)
Type F

H (Richards)
Category III

JB02
Type F

8135300110

1024059130

9/1
C-18A
C2

9/1
C-18B
C2

7/8
C-18A
C2

7/9
C-18A
C2

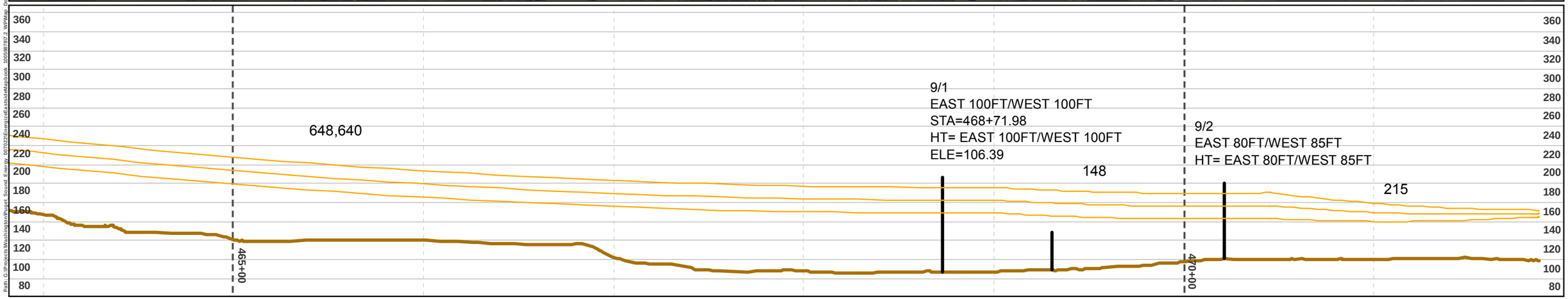
9/2
C-18A
C2

9/2
C-18B
C2

230 KV

230 KV

Richards Creek Substation Footprint: See Site Plan B



- Proposed Pole Location
- Existing Pole Location– To Be Removed
- Transmission Line - Proposed
- Transmission Line - Proposed (Separate Application)
- Transmission Line - Existing
- 5/7 Proposed Pole Number
- C-16 / A1 Structure Type (See Appx. A) / Construction Scenario Key (See Appx. B)
- Project Corridor
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- Landslide Hazard 50ft Buffer
- Steep Slope
- Steep Slope 50ft Buffer
- Recommended Access - Proposed Pole
- Richards Creek Substation Footprint
- Parcel
- City Jurisdiction Boundary

Profile View

- Structure
- Conductor
- Ground Line
- Major Elevation Grid
- Major Station Grid
- Minor Station Grid

0 25 50 Feet

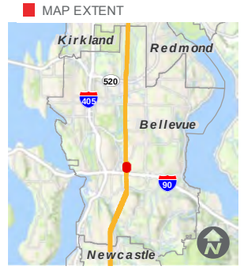
1 inch = 50 feet

SOURCES: Roads and Parcels - King County (2015), Aerial - King County (2015) Online; Streams, Wetlands and Buffers, Landslide Hazard and Buffers, and Steep Slopes and Buffers from Watershed Company (2016).

Note: See Appendix C for Lakeside and Richards Creek substation site plan

For cartographic purposes only.

MAP EXTENT



SITE PLAN

SOUTH BELLEVUE

BASED ON PSE ENGINEERING DESIGN REVISION K

Date: 9/4/2018

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MATCHLINE SHEET: 23

MATCHLINE SHEET: 25

5453300320

115 KV

115 KV

230 KV

9/1
C-18A
C2

9/1
C-18B
C2

7/8
C-18A
C2

115 KV

C (Richards)
Type F

SE 32ND ST

230 KV

1024059130

A (Richards)
Category III

115 KV

7/9
C-18A
C2

H (Richards)
Category III

JB02
Type F

8135300110

9/2
C-18A
C2

230 KV

Richards Creek
Substation Footprint:
See Site Plan B

B (Richards)
Category III

9/1
EAST 100FT/WEST 100FT
STA=468+71.98
HT= EAST 100FT/WEST 100FT
ELE=106.39

148

9/2
EAST 80FT/WEST 85FT
HT= EAST 80FT/WEST 85FT

215

470+00

380
360
340
320
300
280
260
240
220
200
180
160
140
120
100
80

Path: G:\Projects\Washington\Puget_Sound_Energy_007029\Energy\GIS\Issue\Mapbook_20\5387872_2_MXP\Map_Docs\Bellevue_South\Landuse_CUP\PSE_BellevueSouth_CUP.mxd

- Proposed Pole Location
- Existing Pole Location– To Be Removed
- Transmission Line - Proposed
- Transmission Line - Proposed (Separate Application)
- Transmission Line - Existing
- 5/7 Proposed Pole Number
- C-16 / A1 Structure Type (See Appx. A) / Construction Scenario Key (See Appx. B)
- Project Corridor
- Potential Stringing Site
- Olympic Underground Pipeline (Approx. Location)
- Wastewater Utility Line
- Water Utility Line
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- Underground Gas Utility Line
- Underground Phone/TV Utility Line
- Underground Power Utility Line
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- Stream
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- Wetland and Stream Buffer
- Landslide Hazard
- Landslide Hazard 50ft Buffer
- Steep Slope
- Steep Slope 50ft Buffer
- Recommended Access - Proposed Pole
- Richards Creek Substation Footprint
- Parcel
- City Jurisdiction Boundary

Profile View

- Structure
- Conductor
- Ground Line
- Major Elevation Grid
- Major Station Grid
- Minor Station Grid

0 25 50 Feet

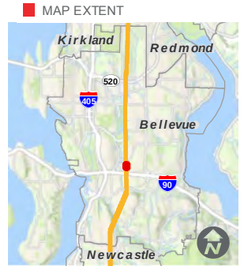
1 inch = 50 feet

SOURCES: Roads and Parcels - King County (2015), Aerial - King County (2015) Online; Streams, Wetlands and Buffers, Landslide Hazard and Buffers, and Steep Slopes and Buffers from Watershed Company (2016).

Note: See Appendix C for Lakeside and Richards Creek substation site plan

For cartographic purposes only.

MAP EXTENT



SITE PLAN

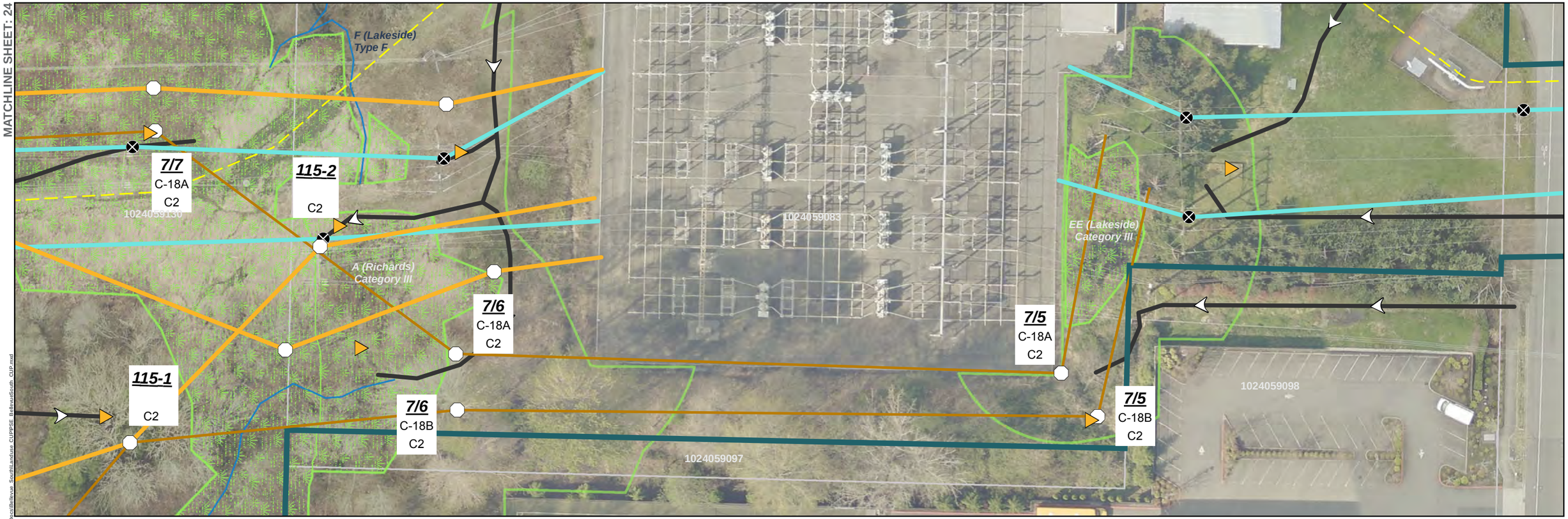
SOUTH BELLEVUE

BASED ON PSE ENGINEERING DESIGN REVISION K

Date: 9/4/2018

DSD 000216

MATCHLINE SHEET: 24



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- Proposed Pole Location
- Existing Pole Location– To Be Removed
- Transmission Line - Proposed
- Transmission Line - Proposed (Separate Application)
- Transmission Line - Existing
- 5/7 — Proposed Pole Number
- C-16 / A1 — Structure Type (See Appx. A) / Construction Scenario Key (See Appx. B)
- Project Corridor
- Potential Stringing Site
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- Parcel
- City Jurisdiction Boundary

Profile View

- Structure
- Conductor
- Ground Line
- Major Elevation Grid
- Major Station Grid
- Minor Station Grid

0 25 50 Feet

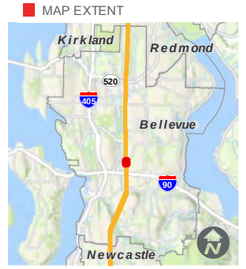
1 inch = 50 feet

SOURCES: Roads and Parcels - King County (2015), Aerial - King County (2015) Online; Streams, Wetlands and Buffers, Landslide Hazard and Buffers, and Steep Slopes and Buffers from Watershed Company (2016).

Note: See Appendix C for Lakeside and Richards Creek substation site plan

For cartographic purposes only.

MAP EXTENT



SITE PLAN

SOUTH BELLEVUE

BASED ON PSE ENGINEERING DESIGN REVISION K

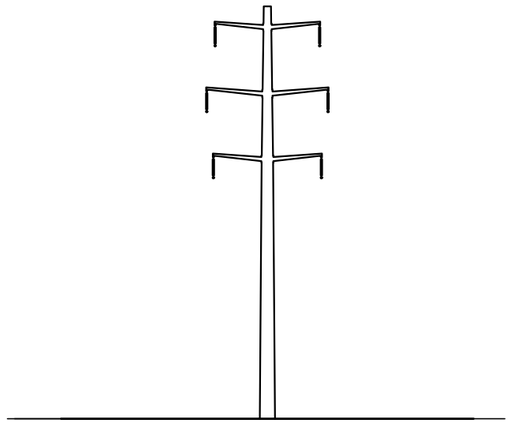
Date: 9/4/2018

DSD 000217

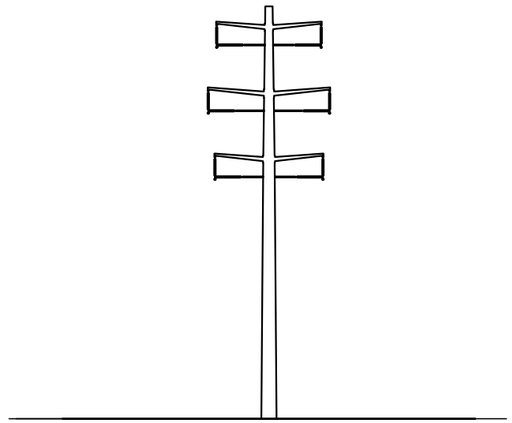
ENERGIZE EASTSIDE 230KV - STRUCTURE TYPES

NOTE: FOR SPECIFIC LOCATIONS AND HEIGHTS, SEE PROFILE SHEETS

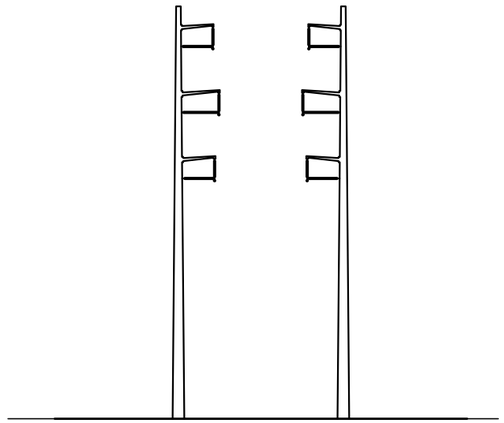
(230kV) C-1



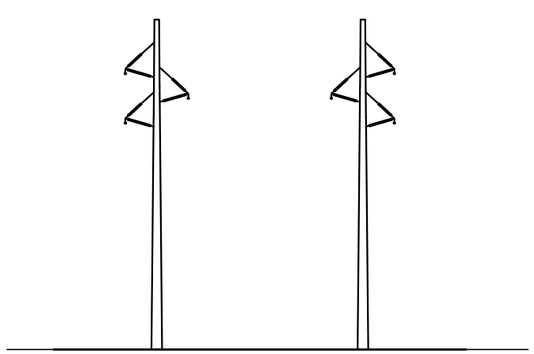
(230kV) C-1B



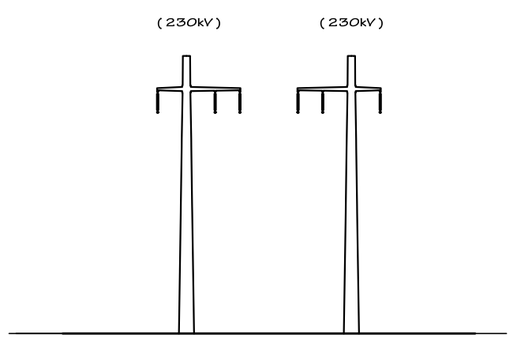
C-2A (230kV) C-2B (230kV)



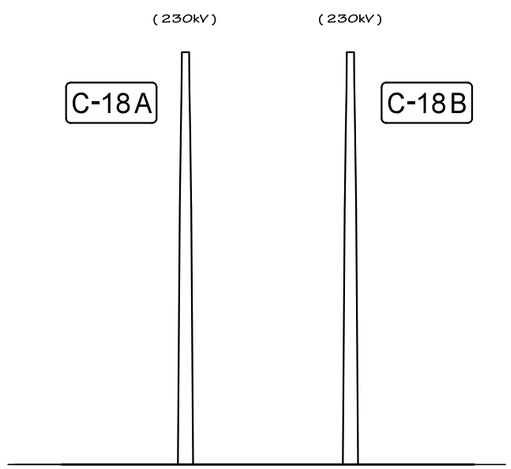
C-16A (230kV) C-16B (230kV)



C-17A (230kV) C-17B (230kV)



(230kV) C-18A (230kV) C-18B



Eastside 230 ROW and structure options.dgn 8/16/2017 2:06:44 PM

Structure Type	Naming Convention	Description
SCDE	C-18 A/B	Single circuit deadend
SCT	C-16 A/B	Single circuit tangent
DCT	C-1	Double circuit tangent (D denotes OHGW overhead groundwire)
DCA	C-1B	Double circuit angle - equiv to a C1 with a post brace to handle bigger angle
SCHDE	C-17 A/B	Single circuit horizontal deadend (only under SCL line)
SCA	C-2 A/B	Single circuit angle

*number after type in table denotes angle

STRUCTURE TYPES

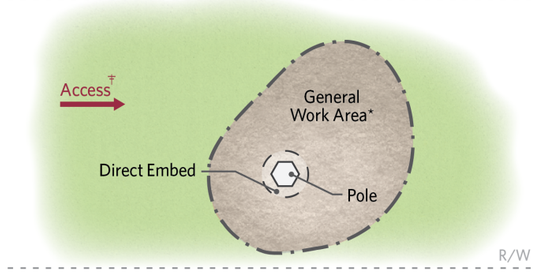
SOUTH BELLEVUE

BASED ON PSE ENGINEERING DESIGN REVISION K

Appendix A

Date: 8/20/2018

Construction Scenario A1



Pole Type
Single Pole

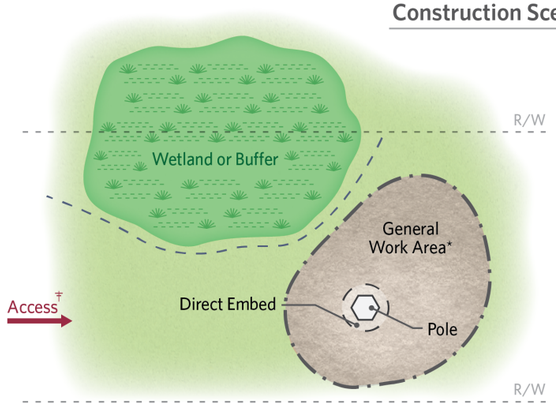
Temporary Work Area
Approx. 2,500 sq. ft.

Installation Type
Direct Embed

Additional Considerations
Place pole in hole and backfill annulus

** Terrain/topography dependent*
† See map sheets

Construction Scenario A2



Pole Type
Single Pole

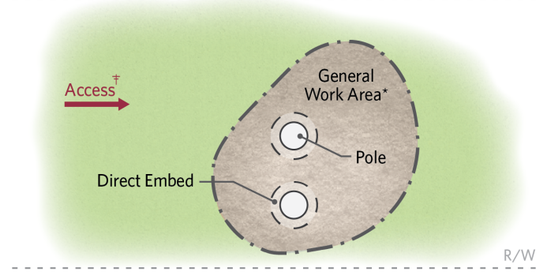
Temporary Work Area
Approx. 2,500 sq. ft.

Installation Type
Direct Embed

Additional Considerations
Establish construction buffer from critical area using appropriate BMPs

** Terrain/topography dependent*
† See map sheets

Construction Scenario B1



Pole Type
H-Frame

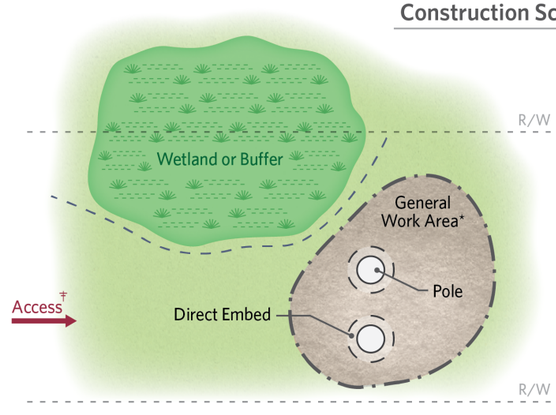
Temporary Work Area
Approx. 2,500 sq. ft.

Installation Type
Direct Embed

Additional Considerations
Place each pole in hole and backfill annulus

** Terrain/topography dependent*
† See map sheets

Construction Scenario B2



Pole Type
H-Frame

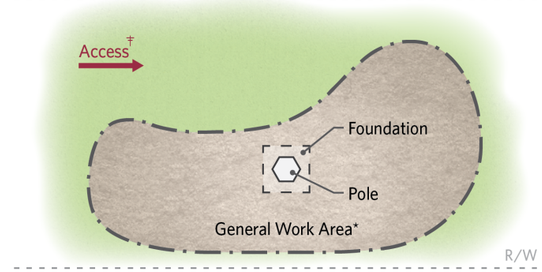
Temporary Work Area
Approx. 2,500 sq. ft.

Installation Type
Direct Embed

Additional Considerations
Establish construction buffer from critical area using appropriate BMPs

** Terrain/topography dependent*
† See map sheets

Construction Scenario C1



Pole Type
Single Pole

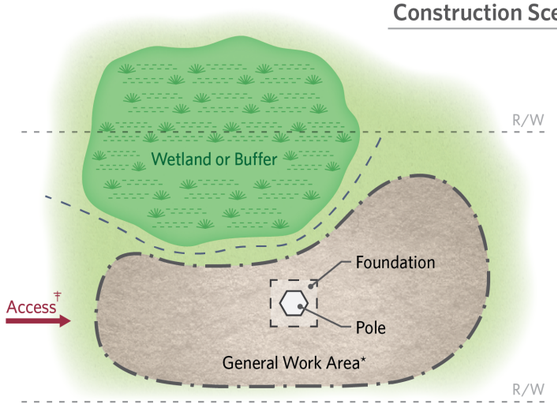
Temporary Work Area
Approx. 5,000 sq. ft.

Installation Type
Foundation

Additional Considerations
Build foundation and install pole

** Terrain/topography dependent*
† See map sheets

Construction Scenario C2



Pole Type
Single Pole

Temporary Work Area
Approx. 5,000 sq. ft.

Installation Type
Foundation

Additional Considerations
Establish construction buffer from critical area using appropriate BMPs

** Terrain/topography dependent*
† See map sheets

Structure Type	Typical Construction Scenario (Not in critical area)	Typical Construction Scenario (In a critical area)
C-1	A1	A2
C-2	C1	C2
C-1B	C1	C2
C-16	A1	A2
C-17	C1	C2
C-18	C1	C2

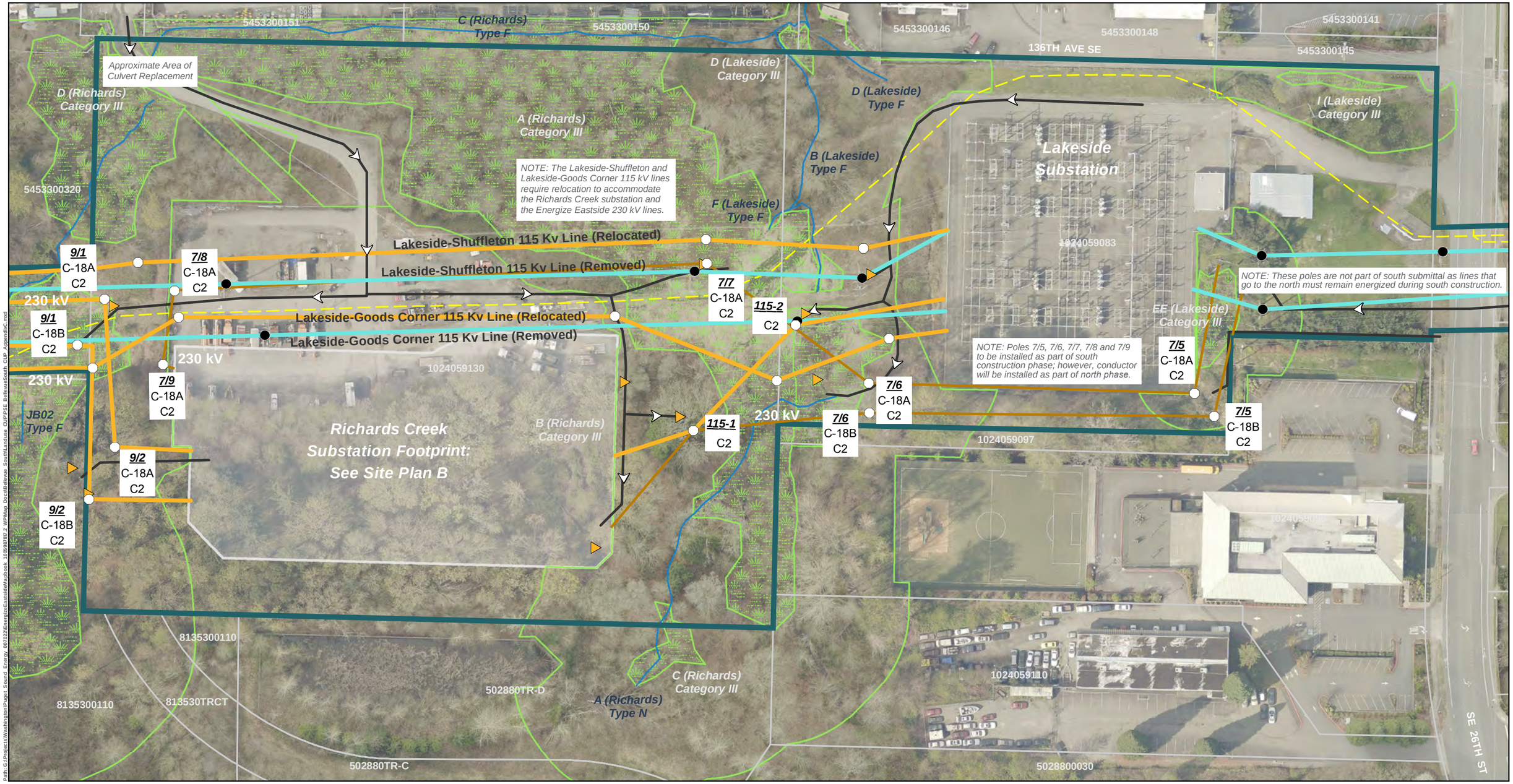
CONSTRUCTION SCENARIOS

SOUTH BELLEVUE

BASED ON PSE ENGINEERING DESIGN REVISION K

Appendix B
Date: 8/20/2018

DSD 000219



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Project Corridor
Proposed Pole Location
Existing Pole Location– To Be Removed
Existing Pole Location
Potential Stringing Site
5/7 Proposed Pole Number
C-16 Structure Type (See Appx. A)
A1 Construction Scenario Key (See Appx. B)

Transmission Line - Proposed
Transmission Line - Existing
Transmission Line - Proposed (Separate Application)
Recommended Access- Proposed Pole
Olympic Underground Pipeline (Approx. Location)
Underground Power Utility Line
Underground Water & Wastewater Utility Line

Stream
Wetland
Wetland and Stream Buffer
Landslide Hazard
Landslide Hazard 50ft Buffer
Steep Slope
Steep Slope 50ft Buffer

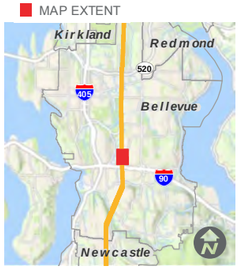
Parcel
City Jurisdiction Boundary
Richards Creek Substation Footprint

0 25 50 Feet
1 inch = 90 feet

SOURCES: Roads and Parcels - King County (2015), Aerial - King County (2015) Online; Streams, Wetlands and Buffers, Landslide Hazard and Buffers, and Steep Slopes and Buffers from Watershed Company (2016).

For cartographic purposes only.

MAP EXTENT



LAKESIDE AND RICHARDS CREEK
SUBSTATION SITE PLAN
SOUTH BELLEVUE

BASED ON PSE ENGINEERING DESIGN REVISION K

Appendix C
3/20/2018

Attachment: B
Alternative Siting Analysis

Alternative Siting Analysis

South Bellevue Segment

LUC 20.20.225.D

September 2017

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1.0 INTRODUCTION

1.1 PROJECT SUMMARY

Puget Sound Energy, Inc. (PSE) proposes the construction of a new substation in Bellevue (the "Richards Creek substation") and the upgrade of 18 miles of two existing 115 kV transmission lines with 230 kV lines (collectively the "Energize Eastside Project" or the "Project"). The new substation and upgraded lines are needed to address electrical system deficiencies identified during federally-required planning studies. Combined with aggressive conservation, the Project significantly improves electric reliability for Eastside communities, including the City of Bellevue (City), and will supply the additional electrical capacity needed for current and anticipated growth.

The existing system is not robust enough to maintain reliable service if the entire facility is taken out of service at one time. Therefore, the Energize Eastside Project will be constructed in two phases. This will allow PSE to keep the existing 115 kV facilities partially in service during construction, which will allow PSE to maintain reliable service to all customers during construction. This approach best ensures that PSE continues to deliver reliable electricity to all of PSE's customers during construction. The first phase (the "South Bellevue Segment") is the focus of this application and includes the following components:

- ***Construction of the Richards Creek substation, a new 230 kV to 115 kV substation in Bellevue.*** The Richards Creek substation will be constructed directly south of PSE's existing Lakeside Switching Station. Situated on parcel 1024059083, the 8.46 acre substation site is currently used as a PSE pole storage yard.

- ***Upgrading 3.3 miles (Bellevue Portion) of existing 115 kV lines with 230 kV lines between the Lakeside and Talbot Hill substations.*** This requires replacing existing wood H-frame poles with steel monopoles. After deliberate review and extensive stakeholder input, PSE proposes to undertake this work in the City's existing transmission line corridor rather than siting a new corridor through Eastside communities. Within the existing utility corridor, the proposed pole locations for the rebuilt lines will generally be in the same locations as the existing poles. Selective tree removal will also be required within the managed corridor to meet federal vegetation management requirements and PSE standards. Use of the existing corridor (which has housed transmission lines since the 1920s and 30s) minimizes environmental impacts and impacts to adjacent uses to the fullest extent feasible.

The Alternative Siting Analysis that follows summarizes the years of study (including dozens of technical studies and two-phases of review under the State Environmental Policy Act (SEPA)) required to reach a decision point on how to best meet growing demand and ensure PSE's compliance with federal performance standards.

1.2 ALTERNATIVE SITING ANALYSIS PURPOSE AND OBJECTIVES (LUC 20.20.255.D)

PSE proposes the Energize Eastside Project--the upgrading of 115 kV transmission lines to 230 kV lines in an existing transmission line corridor and the construction of the Richards Creek substation. In the Bellevue Comprehensive Plan, PSE's proposed route is on a "sensitive site." See Map UT-7. For new or expanded utility facilities on sensitive sites, an Alternative Siting Analysis is required in conjunction with the Conditional Use Permit process. *See* LUC 20.20.255.D.

Under the City's land use code, an Alternative Siting Analysis must: 1) identify, describe and map three alternative site options; 2) analyze whether each alternative site is feasible; 3) describe the technologies considered and how the proposed facilities will improve system reliability; and 4) describe community outreach related to the new or expanded facilities. *See* LUC 20.20.255.D. Where proposed sites are located within a Neighborhood Business or Residential Land Use District, the applicant must 1) describe whether the proposed location is a consequence of demands from customers within the district and 2) describe whether operational need requires locating the proposed facility in the district. *Id.* Using the location selection hierarchy, the applicant must then identify the preferred site alternative. *Id.* Finally, where the preferred site is in a Residential Land Use District, the applicant must demonstrate that the siting causes fewer site compatibility impacts than a nonresidential siting. *Id*.

2.0 ALTERNATIVES ANALYSIS

After extensive study, PSE determined that the most effective solution to meet increased electricity demand and to comply with federal performance requirements is the addition of a 230 kV/115 kV substation in the center of the Eastside load area -- the Richards Creek substation -- and the upgrading of 115 kV transmission lines with 230 kV transmission lines constructed between the Sammamish (Redmond) and Talbot Hill (Renton) substations.[1] These facility upgrades, combined with continued aggressive conservation measures, is the Energize Eastside Project.[2] As confirmed by the City's independent consultants, this Project will improve

[1] The existing transmission lines were last upgraded in the 1960s and are located in PSE's Sammamish – Lakeside – Talbot Hill transmission line corridor, which was established in the late 1920s and early 1930s.

[2] Notably, the City's Phase 2 DEIS concluded that "Under the No Action Alternative, PSE would continue to manage its system in largely the same manner as at present. This includes

reliability for Eastside communities and supply the needed electrical capacity for growth and development on the Eastside.

Siting of electrical transmission infrastructure through urbanized areas presents unique challenges. Finding the best way to route a transmission line is complex, as dozens of elements of both the natural and built environments need to be considered. This is especially true here as the proposed Project traverses the City from north to south.

The Project will be constructed in two phases, with the southern phase of the transmission line traversing 3.3 miles of the City. As a linear project, it necessarily travels through many land use districts. To limit the need to construct new facilities (and the associated environmental impacts), when looking at the entirety of the Energize Eastside Project, all transmission line route alternatives start at PSE's Sammamish substation in Redmond and end at the Talbot Hill substation in Renton. PSE considered various routing options for the entire line, including five route options in the South Bellevue Segment.

2.1 ROUTING ANALYSIS METHODOLOGY (LUC 20.20.255.D.1-2)

PSE determined that the best approach to route selection would be to use a modern tool that employed a graphical information system (GIS)-based Linear Routing Tool (LRT) to conduct a broad evaluation of possible transmission line routes.

To further evaluate the Transformer plus Transmission Line solution, PSE contracted Tetra Tech, a consulting and engineering firm, who has developed an LRT. Details of the LRT assessment can be found in the Eastside 230 kV Project Constraint and Opportunity Study for Linear Site Selection (December 2013) (Attachment C). The LRT is a tool developed by Tetra Tech based on commercially-available geospatial technology and Tetra Tech's linear routing experience. It is a collaborative process that combines powerful analytical software with project experience, system planning, engineering, land use and local knowledge considerations. The LRT's innovative geospatial tool identifies the most suitable route alternatives based on modeled environmental and infrastructure factors and constraints.

maintenance programs to reduce the likelihood of equipment failure, and stockpiling additional equipment so that in the event of a failure, repairs could be made as quickly as possible. *Implementation of the No Action Alternative would not meet PSE's objectives for the proposed project, which are to maintain a reliable electrical system and to address a deficiency in transmission capacity on the Eastside. Implementation of the No Action Alternative would increase the risk to the Eastside of power outages or system damage during peak power events*." Phase 2 DEIS at 2-3.

PSE and Tetra Tech began this process by identifying an approximately 255 square mile study area (Attachment A, Figure 1) that encompasses the Sammamish substation in the north and Talbot Hill substation in the south. The study area was bounded on the west by the eastern shore of Lake Washington and extending far enough east to include the BPA corridor near Soaring Eagle Regional Park (located north east of the City of Sammamish). Any new transmission line route had to connect to a new one of the potential 230 kV to 115 kV transformation sites (substation) within this area in order to solve the problem. For the study, three possible substation sites were identified.

The LRT combined GIS data layers and created an output file called the suitability grid, which represents a summation of all the constraints and opportunities for every point (grid cell) across the entire study area. The LRT processed and combined the data layers to model preferred corridors across the suitability grid, while still connecting the corridors to one of the transformation site (i.e., substation) options within the study area. The LRT analyzed more than 200 route and substation alternatives. From these, the preferred corridors identified by the LRT were used to develop route alternatives.

2.2 ALTERNATIVE SITES ANALYZED (LUC 20.20.255.D.1-2)

LUC 20.20.255D.1. Alternative Sites Analyzed. Prior to submittal of the application for Conditional Use Permit required pursuant to subsection C of this section, the applicant shall identify not less than three alternative site options to meet the system needs for the proposed new or expanding electrical utility facility. At least one of the alternative sites identified by the applicant shall be located in the land use district to be primarily served by the proposed electrical utility facility.

.

LUC 20.20.255D.2b. Map the location of the sites identified in subsection D.1 of this section and depict the proximity of the sites to Neighborhood Business Land Use Districts, Residential Land Use Districts, and Transition Areas.

As set forth in detail below, this Alternative Siting Analysis addresses the requirements of LUC 20.20.255.D for the South Bellevue Segment. First, using nomenclature developed during the 2014 community advisory group process, PSE discusses three siting alternatives considered for the South Bellevue Segment:

1) Willow 1 route (Figure 2, entirely within the existing corridor),
2) Willow 2 route (Figure 3), and
3) Oak 1 route (Figure 4).

The Willow 1, Willow 2, and Oak 1 routes are all feasible; however, based on the information obtained through the EIS process and extensive public outreach, PSE will proceed with the

Willow 1 route to limit environmental impacts and new impacts to adjacent uses. In addition, pipeline safety experts concluded that the Willow 1 route gives PSE the greatest assurance that the Energize Eastside Project will operate safely in the same corridor as BP's Olympic Pipeline.

2.3 ALTERNATIVE SITE DESCRIPTIONS

LUC 20.20.255D.2.a. Describe the sites identified in subsection D.1 of this section and the land use districts within which the sites are located.
[...]

LUC 20.20.255D.2.c. Describe which of the sites analyzed are considered practical or feasible alternatives by the applicant, and which of the sites analyzed are not considered practical or feasible, together with supporting information that justifies that conclusions reached. For sites located within a Neighborhood Business Land Use District, Residential Land Use District, and/or Transition Area (including the Bel-Red Office/Residential Transition (BR-ORT), the applicant shall:

i. Describe whether the electrical utility facility location is a consequence of needs or demands from customers located within the district area; and
ii. Describe whether the operational needs of the applicant require location of the electrical utility facility in the district or area.

The Energize Eastside Project serves all of the potentially impacted land uses as in general, all land uses require electricity. The Energize Eastside Project will provide an upgraded, reliable transmission system serving the Eastside generally and adjacent uses specifically. The Project is needed because cumulatively, demand on the Eastside is increasing, including in areas along the South Bellevue Segment. The transmission line component of the project must run between the Sammamish and Talbot Hill substations. It must also connect with the proposed Richards Creek substation. The location of the substation is not dependent on being sited in a specific district; however, it does need to be situated in a location that the most reliable operation. Based on operational best practices, the ideal location for the new 230 kV substation is located in close proximity to PSE's existing 115 kV Lakeside substation. In addition, operationally, the transmission line must transverse through the City of Bellevue from the north to the south, making it impossible to completely avoid areas of residential zoning. The existing corridor (Willow 1) provides the shortest distance through the city and therefore, crosses the least amount of residential zoning.

As required under LUC 20.20.255.D.1 and LUC 20.20.255.D.2.c.i-.ii, all siting alternatives are located in land use districts served by the South Bellevue Segment. The City of Bellevue's and

the Eastside's growing demand for power is a primary driver of the need for the Energize Eastside Project.

This conclusion was confirmed by the City's independent experts. Utility System Efficiencies, Inc. (USE) was engaged by the City in December, 2014 to conduct an independent technical analysis of the purpose, need, and timing of the Energize Eastside Project. In April 2015, USE published a report summarizing its findings. *See* Independent Technical Analysis of Energize Eastside for the City of Bellevue, WA (April 28, 2015) ("USE Report"). The USE Report answered the following questions:

> **IS THE EE PROJECT NEEDED TO ADDRESS THE RELIABILITY OF THE ELECTRIC GRID ON THE EASTSIDE? Yes.**
>
> Although the new 2014 forecast resulted in an 11 MW decrease in the Eastside area's 2017/18 winter forecast, the reduced loading still resulted in several overloaded transmission elements in winter 2017/2018, which drive the project need. ...
>
> Although the corrective action plan (CAP) required in the 2017/18 winter to avoid facility overload doesn't require dropping load (turning off customers' power), by winter 2019/20 approximately 63,200 customers are at risk of losing power. …
>
> **IS THE PROJECT NEEDED TO ADDRESS REGIONAL GRID POWER FLOWS, SPECIFICALLY POWER FLOWS ON THE NORTHERN INTERTIE (TO AND FROM CANADA)? The project is necessary to address local need.**
>
> The Optional Technical Analysis examined this issue by reducing the Northern Intertie flow to zero (no transfers to Canada). Although this scenario is not actually possible due to extant treaties, it was modeled to provide data on the drivers for the EE project, to examine if regional requirements might be driving the need. The results showed that in winter 2017/18, even with the Northern Intertie adjusted to zero flow, the Talbot Hill 230/115 kV transformer #2 would still be overloaded by several contingencies (several different outage scenarios). Again, the projected overloads indicate a project need at the local level to meet reliability regulations.

Use Report at 5-6.

The USE Report went on to confirm PSE's conclusion that, applying federal electrical system planning requirements, transformers serving uses adjacent to the South Bellevue Segment will experience overloads (i.e., reduced reliability) in foreseeable planning scenarios. USE Report at 52 (containing tables summarizing PSE's forecasting results that show overloads at the Talbot and Lakeside substations).

In addition to the USE Report, in 2012, Bellevue retained Exponent to perform an electrical system reliability assessment. Exponents report stated "As a minimum, the following capacity additions have been identified as being needed within the next 5 to 10-year time frame:

- Upgrade of existing 115 kV lines to 230 kV
- Addition of transformer banks to support expected growth in various areas of the City (Downtown, Bel-Red, and Somerset/Eastgate)
- Addition of new 115 kV lines to reinforce the overall electric system."

City of Bellevue Electrical Reliability Study, Phase 2 Report at 140. In sum, following construction, uses adjacent to the proposed transmission line will benefit from improved reliability now, and into the future.

As described above, numerous route alternatives were developed and evaluated in the public review processes described in Section 4.0 of this document.[3] Three of the options for the South Bellevue Segment are described below (LUC 20.20.255.D.1). *See* Attachment A (mapping PSE's proposed alternatives). These include the two existing transmission line corridors and a new corridor. The two existing corridors include Seattle City Light's Eastside 230 kV corridor and PSE's Sammamish-Lakeside-Talbot Hill 115 kV corridor. The third alignment was developed during the LRT work and provides for an alternative located west of the SCL and PSE transmission line corridors. These corridors were chosen as potential alternatives based on the public outreach processes.

2.3.1 Willow 1, Existing PSE 115 kV Transmission Line Corridor

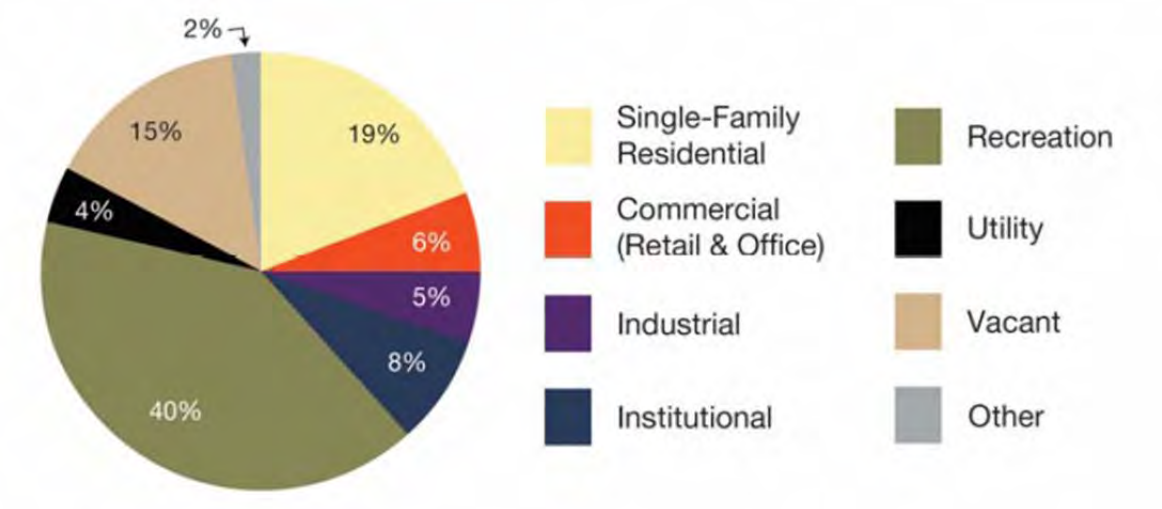
"Willow 1" was one of the original two routes recommended by the community advisory group in 2014. The route utilizes the existing Sammamish-Lakeside-Talbot Hills 115 kV corridor (Attachment A, Figure 2). The corridor was established in the late 1920s and early 1930s. In the 1960s, the line was upgraded from 55 kV to 115 kV, which included replacement of original poles with the existing H-frame poles. As noted in Section 2, PSE identified in the early 1990s

[3] In addition to the three routes evaluated herein, the City's Phase 2 DEIS analyzes two additional routing options in the South Bellevue Segment. *See* Attachment B (comparing environmental impacts of each of the four South Bellevue Segment alternatives). This additional analysis is excluded from the ASA as they go above and beyond what is required under LUC 20.20.255.D, however, the review of the Phase 2 DEIS may also be useful in ensuring PSE's compliance with LUC 20.20.255.D.

that the lines within the same corridor would need to be upgraded to the next higher transmission voltage (230 kV). This 230 kV upgrade has been included in Bellevue Comprehensive Plans since the adoption of the Growth Management Act in 1990. The route crosses through the following land use districts in the South Bellevue Segment: LI, OLB, R-1, R-3.5, R-5, and R-15. *See* LUC 20.20.255.D.2.a. In sum, Willow 1 would be located in six different zoning districts in the City including commercial, industrial, multi-family residential, and single family residential districts. Consistent with the City's Phase 2 DEIS, PSE considers this route to be feasible. *See* LUC 20.20.255.D.2.c.

As described in the City's Phase 2 DEIS:

> Existing land uses are predominantly recreation, single-family residential, and vacant lands (see the chart below for the percentage of the total study area in the Willow 1 route that each land use represents). Approximately 212 parcels are immediately adjacent to the existing corridor. Unique land uses include Tyee Middle School, Forest Hill, King County Solid Waste Division, the I-90 crossing, Somerset Recreation Club, and Sunset Park.



> The route goes through the neighborhoods of Eastgate, Somerset, and Newport Hills. The Eastgate Subarea is characterized by the I-90 business corridor with commercial offices, high-tech industries, and commercial shopping centers. Outside of the commercial center of Eastgate is single-family housing. The Somerset Subarea is a community of hilltop single-family homes. The Newport Hills Subarea is made up of single-family and multi-family neighborhoods with a core commercial district in the center of the community. Several parks (including Sunset Park and Coal Creek Park), a government building, and a school (Tyee Middle School) are along the Willow 1 route.

> The Bellevue Comprehensive Plan designates community business and light industrial in Eastgate, while the Somerset and Newport Hills communities would remain as single-family developments, with a commercial center in Newport Hills. The subarea plan policies of Eastgate, Somerset, and Newport Hills support growth in similar land use patterns as those that currently exist.
>
> There are 180 single-family and 10 multi-family residences within this option.

Phase 2 DEIS at 3.1-15. Approximately 19% of the Willow 1 route would impact Single Family uses. *Id.* All of these residences currently have two 115 kV transmission lines as an adjacent use. The use of an existing corridor does not impose a new transmission line on new areas, does not require the acquisition of new easements, and is specifically identified on Bellevue's Comprehensive Plan UT-7 map as being expanded to 230 kV.

PSE has selected the Willow 1 route as its preferred alternative. All of the proposed routes, including Willow 1, traverse residential land use districts. By constructing the proposed transmission line facilities in the existing 115 kV transmission line corridor, site compatibility impacts are limited by this alternative. *See* LUC 20.20.255.2.d. By using the existing corridor, PSE minimizes tree removal and management within the corridor (see Attachment B) as compared to establishing a new corridor and can better assess and limit potential interactions with a co-located petroleum and natural gas pipeline (*AC Interference Analysis – 230 KV Transmission Line Collocation with Olympic Pipelines OPL16 & OPL20*; DNV-GL 2016). It also avoids the creation of new impacts to adjacent uses, including residential uses. As properties adjacent to the transmission line corridor already have utility facilities in their viewsheds and neighborhoods, Willow 1 significantly limits new impacts.

2.3.2 Willow 2

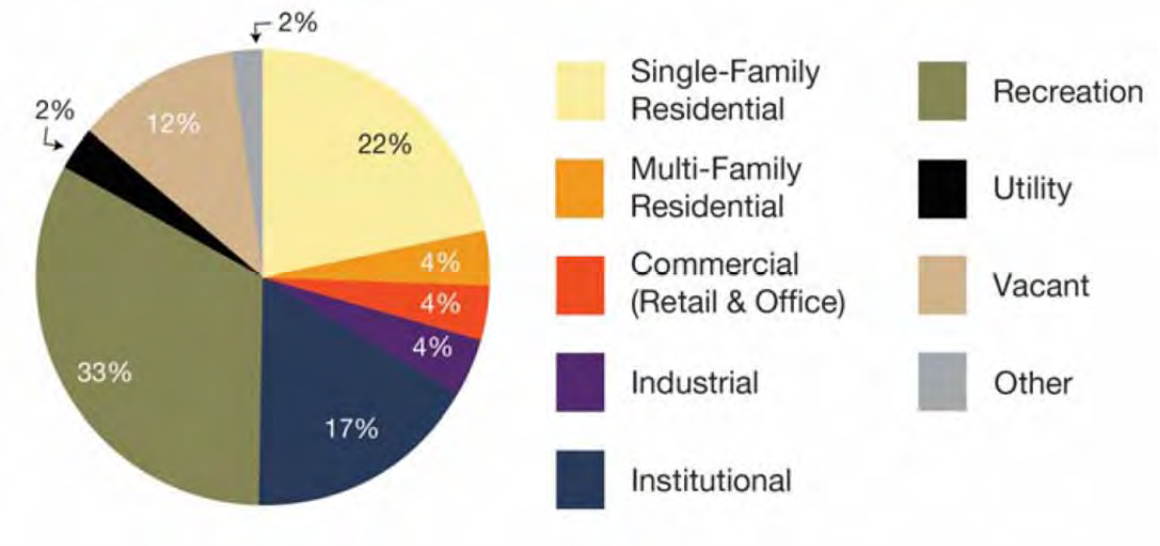
"Willow 2" is a result of one of the original two routes recommended by the community advisory group in 2014. This route was developed to address comments heard during the community advisory group process, primarily to address topographic and visual concerns in the Somerset area. It has also been evaluated as part of the City's SEPA review process. Willow 2 uses PSE's existing Sammamish-Lakeside-Talbot Hill 115 kV corridor; in addition to moving lines to SE Newport Way, Factoria Boulevard SE, and Coal Creek Parkway SE (Attachment A, Figure 3). More specifically, from the new Richards Creek 230 kV substation south to SE Newport Way, the existing two 115 kV lines would be removed and the replaced with two 230 kV lines. In addition, the Somerset substation would need to be rebuilt in order to connect to the 230 kV system.

South of where the existing transmission corridor crosses SE Newport Way, the two existing 115 kV lines would be removed and replaced with a single 230 kV line. From the same crossing at SE Newport Way, the existing double circuit distribution (12.5 kV) and communication lines could be relocated underground because PSE would build a 230 kV line along the road. This new 230 kV line would continue to Factoria Blvd. SE where it would join the existing 115 kV line along Factoria Blvd. SE. The section between SE Newport Way and Coal Creek Parkway SE would be rebuilt to a double circuit line on steel poles. The existing 115 kV line between Coal Creek Parkway SE and PSE's Somerset substation, located at the intersection of Coal Creek Parkway SE and Forest Drive SE, would be rebuilt as a 230 kV line, where it would rejoin with the Sammamish-Lakeside-Talbot Hill corridor.

The Willow 2 route crosses through the following land use districts in the South Bellevue Segment: R-1, R-3.5, R-5, R-15, R-20, R-30, OLB, and LI. See LUC 20.20.255.D.2.a. In sum, Willow 2 would be located in a total of eight different zoning districts in the City of Bellevue.

As described in the City's Phase 2 DEIS:

> Existing land uses mostly include recreation, single-family residential homes, and institutional (see the chart below for the percentage of the total study area in the Willow 2 route that each land use represents). Approximately 309 parcels are immediately adjacent to the corridor (existing and new). Unique land uses include Newport Children's School, Holy Cross Lutheran Church, Newport Covenant Church, King County Solid Waste Division Factoria Transfer Station, Sunset Park, and the I-90 crossing.
>
> The Willow 2 route would go through the same neighborhoods of Eastgate, Somerset, and Newport Hills as in the Willow 1 route. However, at SE Newport Way, the option route would also follow SE Newport Way on the border of Factoria, heading south at Coal Creek Parkway SE. The Factoria/Somerset border is characterized by single-family residential developments and small commercial spaces. Several parks (including Sunset Park and Coal Creek Park), government buildings, and schools (Newport Children's School, and Tyee Middle School) are along the Willow 2 route.



The subarea plan policies of each of the subareas within the Willow 2 route support growth in similar land use patterns as those that currently exist.

There are 257 single-family and 221 multi-family residences within this option. Approximately 26% of the Willow 2 route would impact Single and Multi-Family uses.

Consistent with the City's Phase 2 DEIS, PSE considers this route to be feasible. See LUC 20.20.255.D.2.c. PSE ultimately eliminated this route from consideration, however, because from a safety perspective, the Willow 1 route has the lowest potential AC interaction with the petroleum pipelines that share the corridor. Additionally, the Willow 1 route requires the fewest number of trees to be removed in order to comply with NERC standards and uses an existing transmission line corridor.

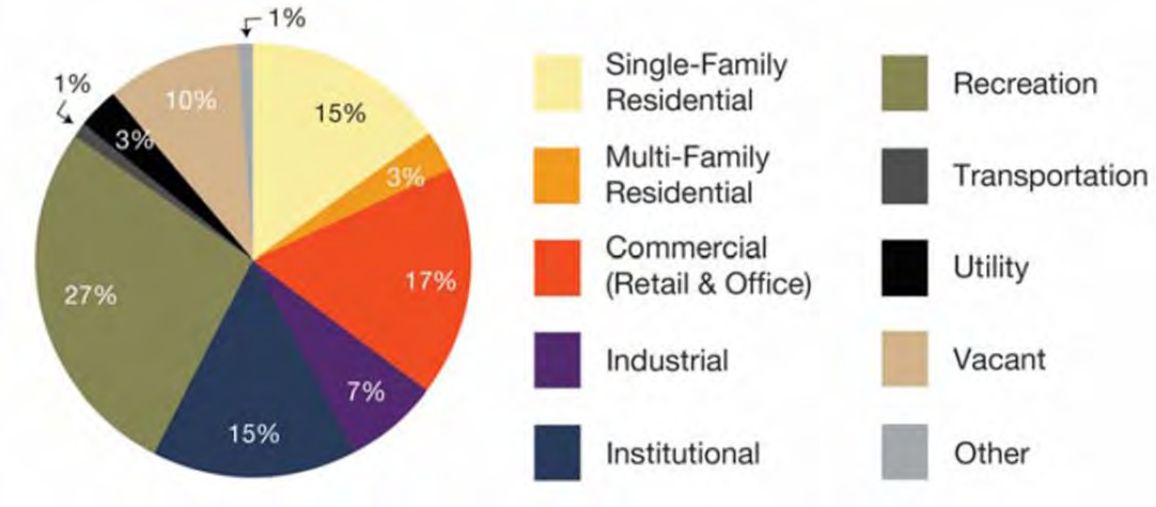
2.3.3 Oak 1

"Oak 1" was also one of the original two routes recommended by the community advisory group in 2014. It has also been evaluated as part of the City's SEPA review process. Oak 1 utilizes portions of the PSE's existing Sammamish-Lakeside-Talbot Hills 115 kV corridor (Attachment A, Figure 4). This alternative departs from the existing corridor just south of PSE's existing Lakeside substation (the proposed Richards Creek substation), which is located on the parcel south of the Lakeside substation, currently used as a pole storage yard. From the Pole Yard, the route heads west along SE 30th Street and then continues south along Factoria Blvd. SE and Coal Creek Parkway, where it converges back with the existing 115 kV corridor. Oak 1 entails maintaining the existing 115 kV transmission lines in the existing corridor through the Somerset area and replacing the existing single 115 kV transmission line circuit with new double circuit 230 kV/115 kV lines on the alignment described above. The new 230 kV route crosses

through the following land use districts in the South Bellevue Segment: R-1, R-2.5, R-3.5, R-5, R-20, R-30, O, CB, PO, F-1, F-2, and LI. *See* LUC 20.20.255.D.2.a. In sum, Oak 1 would be located in a total of twelve different zoning districts in the City of Bellevue, including commercial, industrial, mixed use, multi-family residential, and single-family residential districts.

As described in the City's Phase 2 DEIS:

> Existing land uses along Oak 1 mostly include recreation, commercial, and single-family residential homes (see the chart below for the percentage of the total study area in the Oak 1 Option that each land use represents). Approximately 318 parcels are immediately adjacent to the corridor (existing and new). Unique land uses include Sunset Park, King County Solid Waste Division Factoria Transfer Station, the I-90 crossing, Coal Creek Park, Tyee Middle School, Forest Hill Neighborhood Park, a large industrial/commercial area on Factoria Blvd SE, KidsQuest Children's Museum, Bellevue Fire Station 4, St. Margaret's Episcopal Church, Newport High School, Newport Covenant Church, and the Factoria Police Station.



> The option goes through the neighborhoods of Eastgate, Factoria, northwest Somerset, and Newport Hills. The Eastgate Subarea is characterized by the I- 90 business corridor with commercial offices, high-tech industries, and commercial shopping centers. Factoria is characterized by single-family residential developments and small commercial spaces. The northwest Somerset area is a single-family residential development on a hilltop. The Newport Hills Subarea is made up of single-family and multi-family neighborhoods with a core commercial district in the center of the community. Several parks (including Sunset Park and Coal Creek Park), government buildings, and schools (Newport High School and Tyee Middle School) are along the Oak 1 Option.

> The subarea plan policies of each of the subareas within the Oak 1 Option support growth in similar land use patterns as those that currently exist.
>
> There are 212 single-family and 287 multi-family residences within this option.
>
> Phase 2 DEIS at 3.1-13. Approximately 18% of the Oak 1 route would impact Single and Multi-Family uses.

Consistent with the City's Phase 2 DEIS, PSE considers this route to be feasible. *See* LUC 20.20.255.D.2.c. PSE ultimately eliminated this route from consideration, however, because from a safety perspective, the Willow 1 route has the lowest potential AC interaction with the petroleum pipelines that share the corridor. Additionally, the Willow 1 route requires the fewest number of trees to be removed in order to comply with NERC standards and uses an existing transmission line corridor. The use of an existing corridor does not impose a new transmission line on new areas, does not require the acquisition of new easements, and is specifically identified on Bellevue's Comprehensive Plan UT-7 map as being expanded to 230 kV.

2.3.4 Substation Alternatives

The substation yard needs to be large enough to accommodate a new 230 kV-115 kV transformer and associated electrical equipment such as circuit breakers, electrical bus, and connections to the new transmission lines. It is expected that the substation's fenced yard will be approximately 2 acres. The main function of the substation is to step down the 230 kV voltage (bulk power) from the new transmission lines to 115 kV needed for use by the local distribution system. All substation locations are considered to be feasible. LUC 20.20.255.D.2.c.

Three 230-115 kV substation sites were considered for the Energize Eastside Project - referred to as Westminster, Vernell, and Richards Creek. These sites were selected for consideration because they are all owned by PSE; meet the objectives to site the 230 kV transformer at a central location between the existing 230 kV power sources at Sammamish substation in Redmond and Talbot substation in Renton; accommodate the necessary improvements to serve the required 230 kV transmission lines to bring power to the centralized transformer; and distribute power to the existing network of 115 kV transmission lines.. Of the three substation sites, only Richards Creek is located within the Southern Phase; however, since the primary objective of the Energize Eastside Project is to install a new transformation source in the central Bellevue area, their inclusion is relevant.

2.3.4.1 Westminster

The Westminster substation site is on property owned by PSE and located at 13649 NE 24th Street in the City of Bellevue (Parcel 2725059166) in the Bridle Trails Subarea (Attachment A, Figure 5). Currently, the approximately 6 acre site is undeveloped and primarily forested. The north half of the property is zoned for Professional Office (PO) with the southern half zoned Office (O) Surrounding properties to the north and west are zoned as Single-Family Residential Estate (R-1). The properties located to the east is zoned General Commercial (GC) with the properties located south of SR-520 being zoned Bel-Red General Commercial (BR-GC). The Westminster site is mapped as a "sensitive site" in the City's Comprehensive Plan (Map UT-7). When considering use of the existing corridor, it was determined that since the Westminster site was farther away from the Lakeside 115 kV station, there was no benefit in using the Westminster site over the Richards Creek site. In addition, to make the Westminster site work, additional 115 kV lines would be required between the site and the 115 kV lines located 140th Avenue NE.

2.3.4.2 Vernell

The Vernell substation site comprises two properties located at 2380 116th Avenue NE (Parcels: 2825059278 (1.32 acres) and 5268300010 (0.66 acres) in the Bel-Red Subarea (Attachment A, Figure 6). The site is zoned BR-MO (Bel-Red Medical Office) as are the properties located to the south and the west. The site currently contains an office building, parking areas and a sport court. The site is adjacent to SR-520 to the north and the former BNSF rail corridor the east. The property located to the east across the rail corridor is zone Bel-Red General Commercial (BR-GC). The Vernell site is mapped as a "sensitive site" in the City's Comprehensive Plan (Map UT-7). The existing 115 kV Sammamish to Lakeside transmission line corridor would not be an option for this substation site. Therefore, since the use of the existing corridor provides a number of benefits, Vernell was not selected as either Westminster or Richards Creek are along the existing PSE corridor and using Vernell would require additional transmission lines between the site and the existing transmission line corridor.

2.3.4.3 Richards Creek

The Richards Creek site is PSE's selected substation site. It is located adjacent to and south of the PSE's existing Lakeside substation at 13600 SE 30th Street (parcel 1024059130) (Attachment A, Figure 7). The 8.46 acre property is zoned Light Industrial (LI) as are the properties to the north, west, and south. Properties locate east of the site are zoned Office and Limited Business (OLB) and Multifamily Residential (R-10).

The central portion of the site is currently used as a pole storage yard. It is partially fenced and has a flat storage area consisting of paved driveways and gravel.

The Richards Creek substation is essentially an expansion of the Lakeside substation, which is mapped as a "non-sensitive" site in the City's Comprehensive Plan (Map UT-7). Normal practice is to have the 230 kV station co-located with the adjoining 115 kV station; however, due to topographic and environmental considerations located south of the Lakeside substation, expanding the station in that direction would be challenging. Therefore, placing the two stations on separate parcels was determined to be the most effective approach. Since the two yards have separate access points, they are required to have different names for operational and emergency purposes.

2.4 SELECTED SITE AND ROUTE

LUC 20.20.522D.2.d. Identify a preferred site from the alternative locations considered for the proposed new or expanding electrical utility facility. The following location selection hierarchy shall be considered during identification of the preferred site alternative: (i) nonresidential land use districts not providing transition, (ii) nonresidential Transition Areas (including the Bel-Red Office/Residential Transition (BR-ORT), and (iii) residential areas. The applicant may identify a preferred site alternative in a Residential Land Use District or Transition Area (including the Bel-Red Office/Residential Transition (BR-ORT) upon demonstration that the location has fewer site compatibility impacts than a nonresidential land use district location.

After years of study and extensive community dialogue, PSE selected the Richards Creek substation site and the Willow 1 transmission line corridor as the location for the Energize Eastside Project. Because PSE's project requires reconstruction of miles of transmission lines through the City, all routes evaluated by PSE traverse residential uses. As such, PSE cannot avoid residential uses by selecting a site reflective of the City's selection hierarchy. *See* LUC 20.20.255.D.2.d. The Willow 1 route, however, minimizes compatibility impacts by using an existing utility corridor that has been in operation since the 1920s and 1930s. By doing so, it does not require acquisition of additional easements, it removes the fewest number of trees, and it prioritizes safety by having the lowest potential AC interaction with the two petroleum pipelines that share the corridor. Moreover, the Phase 2 DEIS identified that Willow 1 impacts 309 fewer residences than the Oak 1 route and 288 fewer residences than the Willow 2 route.

Willow 1 is more consistent with the City's selection hierarchy which seeks to limit impacts to residences. When considering the location selection hierarchy (LUC 20.20.225.2.d.), there is no possible way to route a transmission line, between the Richards Creek substation and the Bellevue/Newcastle city border, entirely within nonresidential land use districts not providing transition or non-residential Transition Areas. This is a result of city zoning that does not provide any congruent nonresidential north-south corridors. However, Willow 1 crosses or has adjacency to the least amount of residential and residential transition area. The Willow 1 route was originally established in the late 1920s and early 1930s when little to no development in the

area had occurred. The residential areas that exist today have developed around the transmission line corridor. Additionally, the proposed upgrade of the existing 115 kV lines to 230 kV has been incorporated in the City's comprehensive plan since the early 1990s; therefore, using the Willow 1 route is the most compliant with the Comprehensive Plan.

In sum, as Willow 1 upgrades an existing transmission line and follows the existing route, this alternative creates the fewest new impacts (including compatibility impacts) as compared to the Oak 1 route. *See* LUC 20.20.255.D.2.d. These are the key factors that make Willow 1 the preferred alternative for Energize Eastside.

2.4.1 Other Rejected Transmission Line Options

The 2015 Solutions Study and 2014 Solutions Report concluded that the preferred solution to solve the Eastside's transmission deficiencies was aggressive conservation combined with construction of a new 230/115 kV transformer and the development of 230 kV transmission lines to connect existing facilities. Transmission line alternatives evaluated, but rejected, by PSE included the use of the Seattle City Light 230 kV corridor, underwater transmission lines (Phase 1 DEIS), the undergrounding of transmission lines, as well as numerous overhead alternatives. These are discussed below.

2.4.1.1 Seattle City Light 230 kV Corridor

Seattle City Light (SCL) operates a dual 230 kV transmission line through the Energize Eastside Project area. The use of these transmission lines/corridor was evaluated in the Phase 1 DEIS. The SCL corridor traverses approximately 7.3 miles within the city of Bellevue, with about 3 miles in the south phase (excluding the lines necessary to connect to the Richards Creek substation). To connect the SCL lines to the 230 kV Richards Creek substation, two new 230 kV lines would need to be constructed, which would require establishing a new transmission corridor. The exact length of that alignment has not been determined, but the proximity of the Richards Creek and Sammamish substations to the SCL lines suggests that each connection would be approximately 1 mile.

PSE explored the idea of using the SCL lines as an option; however, the SCL facility is not under PSE ownership, and SCL stated that it needs these lines to serve its customers (Gentile et al., 2014). For the foregoing reasons (lack of sufficient capacity, need for new transmission line facilities that will provide sufficient capacity for less than 10 years, and lack of permission from SCL), PSE does not consider this alternative to be feasible. See LUC 20.20.255.D.2.c.

2.4.1.2 Lake Washington Submarine Cable Alternative

The option of using a submerged or underwater transmission line in Lake Washington was also included in the Phase 1 Draft EIS. Additional detail about constructing a submarine cable in

Lake Washington is included in the Eastside 230 kV Project Lake Washington Submarine Cable Alternative Feasibility Report (Power Engineers, 2015). A submerged line would be prohibited by shoreline regulations in two of the communities north of the proposed Richards Creek substation (Beaux Arts Village and Hunts Point), because new utility corridors are prohibited in the aquatic environments of these communities.

South of the Richards Creek substation site, the City of Renton shoreline regulations (RMC 4-10-095) prohibit utilities in some shoreline environments, but it appears technically feasible to avoid prohibited environments if this option were chosen. However, this option would also require the construction of approximately 5 miles of new transmission corridors from the Talbot Hill substation to Lake Washington, and from Lake Washington to the Richards Creek substation, in order to avoid impacts to 8 miles along the existing corridor. As described in the Phase 1 Draft EIS, development of new corridors is expected to have higher environmental impacts than use of existing corridors, including permanent displacement of existing uses, vegetation removal, visual impacts, and construction duration. As such, this alternative was not seen as a reasonable alternative to using the existing corridor as proposed by PSE. For these reasons, an underwater line in Lake Washington was not carried forward as a viable alternative.

2.4.1.3 Underground Alternative

The option of placing the new 230 kV transmission lines entirely underground was evaluated in the Phase 1 Draft EIS. Underground transmission lines involve several technical and economic challenges that would necessitate acquiring a new or expanded right-of-way, including greater restrictions on surface vegetation and uses than are present in PSE's existing 115 kV right-of-way. Factors contributing to the need for additional right-of-way include the need for heat dissipation from each conductor, and the need for separation from the Olympic Pipeline, which is collocated in much of PSE's existing 115 kV corridor, in order to prevent corrosion of the pipeline. For heat dissipation, underground transmission lines must be placed approximately 12 to 15 feet apart and 3 feet below the surface (Power Engineers, 2014), which means there can be no trees or large shrubs planted over them. The potential for the electrical line to cause unacceptable corrosion of the pipeline is greater if the electrical line is underground than for overhead lines because soils are more conductive than air. Large access vaults are also required every quarter mile, and must remain unobstructed by surface structures.

While PSE has an easement for their overhead lines, placing a transmission line underground would require permission from both the Olympic Pipe Line Company and each property owner along the route. Gaining such permission would likely require extensive legal action that would delay the project and thus not meet the project objectives regarding timing. A study of potential undergrounding of the transmission lines prepared for PSE by Power Engineers (2014) states

that installation adjacent to the pipeline is technically viable, but that the Olympic Pipe Line Company has stated to PSE that they will not consent to other underground facilities being installed longitudinally in their easements. PSE would therefore have to place its transmission lines outside the Olympic Pipeline easement which is, in some places, nearly as wide as the PSE corridor. Even in places where the pipeline easement is substantially narrower than PSE's corridor, PSE generally does not have enough easement area to provide the necessary separation without the pipeline being relocated. As such, an underground line would require a new corridor to avoid colocation with the Olympic Pipeline (Power Engineers, 2014). This would need to be in a street or on other public or private property that PSE would have to obtain rights to use.

The construction costs for an overhead transmission line are about $3 million to $4 million per mile; versus $20 million to $28 million per mile to construct the line underground (PSE, 2016). When a new line is constructed overhead, project costs are distributed evenly between PSE's 1.1 million customers and paid for overtime. If a transmission line were to be constructed underground, PSE can't justify asking customers across its entire service territory to pay the significant cost increases. As a result, per state-approved tariff rules, the requesting party, often the local jurisdiction, must ultimately decide whether to make this investment. The requesting party is then responsible for paying the difference between overhead and underground costs.

Given the high cost of acquiring and developing an entirely new underground corridor, and the likely delays it would entail, this option was not considered reasonable as an alternative for the entire corridor, although it is considered as an option for mitigation in limited areas, should one or more jurisdictions determine that it was necessary to avoid significant impacts. Impacts generally associated with the undergrounding of the transmission lines are addressed in the Phase 1 Draft EIS (in the analysis of Option C).

3.0 TECHNOLOGIES CONSIDERED AND RELIABILITY NEED (LUC 20.20.255.D.3)

LUC 20.20.255D.3.a: Describe the range of technologies considered for the proposed electrical utility facility.

PSE studied a range of potential solutions to resolve the Eastside transmission deficiencies; these included additional conservation, additional generation, demand response (DR), distributed generation (DG), energy storage, expansion of existing transmission substations, transmission line upgrades, and new transmission lines. PSE's analysis of alternative technologies is documented in detail in PSE's Solutions Report (2014), Pre-Screening Study (Feb. 2014), Underground Feasibility Study (2014), Supplemental Eastside Solutions Study

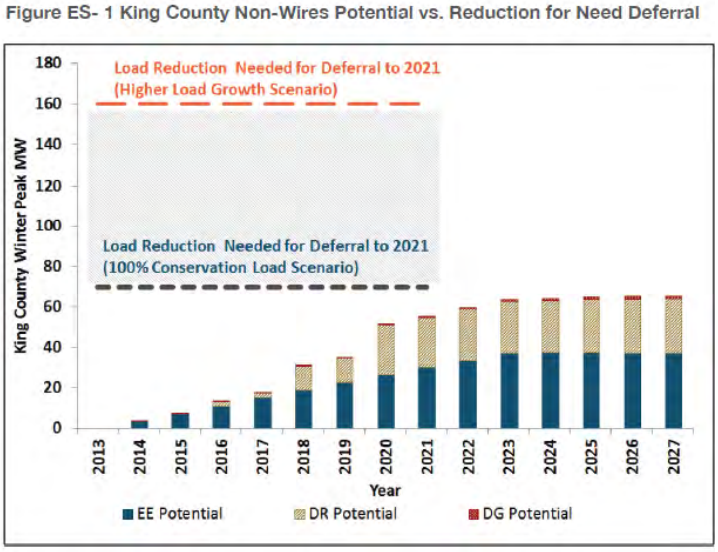
Report (2015) ("Solutions Study"), the Lake Washington Submarine Cable Alternative Feasibility Study (June 2015), and Eastside System Energy Storage Alternatives Screening Study (*Strategen*, 2015). All of these studies can be accessed at https://energizeeastside.com/documents. Non-wire technology solutions are also evaluated in detail in the Phase 1 DEIS (available at http://www.energizeeastsideeis.org/library.html).

The following section summarizes PSE's analysis with respect to each alternative technology.

3.1 INCREASING CONSERVATION

PSE retained Energy and Environmental Economics, Inc. (E3) to conduct a Non-wires Alternatives Screening Study. E3 included energy efficiency, demand response and distributed generation measures in its evaluation of cost-effective non-wires potential in the Eastside area. The study concluded that the cost-effective non-wires potential for the Eastside is not large enough to provide sufficient load reduction to allow even a 4-year deferral of Eastside transmission upgrade needs (see Figure 8).

Figure 8: King County Non-wires Potential vs. Reduction for Needed Deferral



3.2 CONSTRUCTION OF NEW GENERATION FACILITIES

PSE studied both conventional generation and distributed generation (DG) in its 2015 Solutions Study. To be effective, this alternative would require at least 300 MW of generation located in the Eastside. Locating conventional generation of this size on the Eastside has major siting and environmental challenges, as a facility with necessary capacity would require a site of approximately 12 to 15 acres and would have significant supporting infrastructure, noise, emissions, and permitting challenges. For DG to meaningfully impact the identified needs, DG must be installed in the right locations, available when needed and be of significant magnitude. Locating 300 MW or more of distributed renewable generation within the Eastside area by the winter of 2017/2018 or summer of 2018 was not practical and highly impactful to the environment and surrounding communities. Additionally, the Cities' Phase 1 DEIS determined that this alternative did not meet SEPA requirements to provide a reasonable alternative that could feasibly attain or approximate a proposal's objectives at a lower environmental cost or decreased level of environmental degradation (WAC 197-11-440(5)(b)). Phase 2 DEIS at 2-56.

3.3 ENERGY STORAGE AND BATTERY ALTERNATIVES

PSE contracted with Strategen to perform an Eastside System Energy Storage Alternatives Screening Study, which concluded that an energy storage system with power and energy storage ratings comparable to PSE's identified need has not yet been installed anywhere in the world. In addition, Strategen determined that the existing Eastside transmission system does not have sufficient capacity to charge energy storage systems to a level sufficient to meet PSE's operating standards.

Chemical (battery) storage was determined to be potentially the most appropriate and commercially-viable technology for application within the Eastside. Chemical storage technology is rapidly advancing, but the only system of comparable size to what PSE requires is a 100 MW/400 MWh lithium-ion ESS recently procured by Southern California Edison ("SCE"), which is not expected to be operational until 2021. The largest currently deployed and commissioned chemical storage project (by power rating) in the United States is SDG&E's Expedited Energy Storage Project in Escondido, CA, a 37.5 MW/150 MWh lithium ion battery SCE's Tehachapi Wind Energy Storage ESS, an 8 MW/32 MWh lithium ion battery. Confidential interviews with various vendors indicate that the technology and capability exists for batteries to be deployed for this application and at this magnitude exists. However, since no similarly-sized system has ever actually been built or commissioned, it is difficult to estimate the time necessary for development, procurement, construction and deployment. Procurement of battery cells in particular may result in long lead times, especially for the two larger systems contemplated would constitute a significant portion of the global market for batteries.

Based upon the results of the study, Strategen concluded that the existing Eastside transmission system does not have sufficient capacity to charge a large chemical battery to a level sufficient to meet PSE's operating standards. Specifically, the Eastside system has significant constraints during off-peak periods that could prevent an energy storage system from maintaining sufficient charge to eliminate or sufficiently reduce normal overloads over multiple days. In other words, an energy storage system is not capable of meeting Energize Eastside's need, nor does an example of this scale of energy storage exist anywhere in the world. Strategen further estimated that deferring the Eastside transmission system upgrade until 2021 would cost ratepayers approximately $1.44 billion.

3.5 THE ENERGIZE EASTSIDE PROJECT ENSURES A LONG-TERM SOLUTION TO NEAR-TERM RELIABILITY DEFICITS

LUC 20.20.255.D.3.b. Describe how the proposed electricity utility facility provides reliability to customers served.

The Energize Eastside Project is needed to meet local demand growth in the eastside of King County, including Bellevue, Redmond, Kirkland, Renton, Newcastle and Issaquah. It is PSE's responsibility to plan and operate the electrical system while complying with federal standards and guidelines.

Electricity is currently delivered to the Eastside area[4] through two 230 kV/115 kV bulk electric substations – the Sammamish substation in Redmond and the Talbot Hill substation in Renton – and distributed to neighborhood distribution substations using 115 kV transmission lines. No 230 - 115 kV transformer upgrades have been made and the primary 115 kV lines connecting the Sammamish and Talbot Hill substations (the backbones of the Eastside electrical system) have not been upgraded since the 1960s. Since then, the Eastside population has grown from approximately 50,000 to nearly 400,000. This growth is expected to continue. The Puget Sound Regional Council estimates that the Eastside population will likely grow by another third and employment will grow by more than three-quarters over the next 25 years.

The Eastside's rapid growth is also documented in the City's Phase 1 and Phase 2 DEISs:

> Based on U.S. Census and Puget Sound Regional Council population forecast data, PSE's analysis concluded that the population in PSE's service area on the Eastside is projected to grow by approximately 1.2 percent per year over the next 10 years and employment is expected to grow by 2.1 percent per year, resulting in additional electrical demand (Gentile et al., 2015). If electrical load growth occurs as PSE has projected, PSE's system would likely experience loads on the Eastside that would place the local and regional system at risk of damage if no system modifications are made.

Phase 1 DEIS at 2-13.

As required by federal regulations, PSE performs annual electric transmission planning studies to determine if there are potential system performance violations (transformer and line overloads) under various operational and forecasted electrical use scenarios. These exercises are generally referred to as reliability assessments.

The need for additional 230 kV to 115 kV transmission transformer capacity and 230 kV support in the Eastside was identified in the 1993 reliability assessment, and has been included in PSE's Electrical Facilities Plan for King County ("Plan") since that time.[5] It was first determined

[4] For the purpose of this project, the Eastside is defined as the area between Renton and Redmond, bounded by Lake Washington to the west and Lake Sammamish to the east.

[5] As explained in the Plan, "[t]he 230 kV sources for the 115 kV system in northeast King County are primarily the Sammamish and Talbot Hill substation. The loads on the 230-115 kV transformers in these stations will be high enough to require new sources of transformation." Additionally, the "Lakeside 230 kV Substation project [now the Energize Eastside Project] will rebuild two existing 115 kV lines to 230 kV between Sammamish and Lakeside [where PSE proposes the construction of the Richards Creek substation], and between Lakeside and Talbot Hill."

during PSE's 2009 annual reliability assessment, that if one of the Talbot Hill Substation transformers failed, it would significantly impair reliability on the Eastside. Replacement of a failed 230 kV transformer can take weeks, or even months, to complete depending on the level of failure and other site specific parameters. Since 2009, other reliability deficits have been identified. These include concerns over the projected future loading on the Talbot Hill Substation and increasing use of Corrective Action Plans (CAPs) to manage outage risks to customers in this portion of the PSE system.

In total, since 2009, five separate studies[6] (Attachment C) performed by four separate parties have confirmed the need to address Eastside transmission capacity:

- Electrical Reliability Study by Exponent, 2012 (City of Bellevue)
- Eastside Needs Assessment Report by Quanta Services, 2013 (PSE)
- Supplemental Eastside Needs Assessment Report by Quanta Services, 2015 (PSE)
- Independent Technical Analysis by Utility Systems Efficiencies, Inc., 2015 (City of Bellevue)
- Review Memo by Stantec Consulting Services Inc., 2015 (EIS consultant).[7]

The studies performed by PSE in 2013 and 2015 confirmed that the Eastside's existing grid will not meet federal reliability requirements by the winter of 2017/2018 and the summer of 2018 without the addition of 230 kV to 115 kV transformer capacity in the Eastside area.

3.6 ELECTRICAL UTILITY FACILITY COMPONENTS

LUC 20.20.255.D.3c. Describe components of the proposed electrical utility facility that relate to system reliability.

PSE's proposal is to install and operate a new 230 kV to 115 kV electrical transformer in the center of the Eastside load area. The ideal location for the new transformer is in close proximity to PSE's existing Lakeside 115 kV substation, which provides the connection to the existing 115 kV electrical system that serves the surrounding distribution substations. The new 230 kV to 115 kV transformer is the principal component that will allow the Eastside electrical system to reliably operate and meet Federal Planning standards. To operate the new transformer it must be served by approximately 18 miles of new high-capacity electric transmission lines (230 kV) extending from Redmond in the north and Renton to the south. The transformer would be

[6] These studies provide evidence relevant to the City's review under LUC 20.20.255.E.4 and LUC 20.20.255.D.3.b & c.

[7] The City's consultants evaluation concluded as follows: "...PSE['s] needs assessment was overall very thorough and applied methods considered to be the industry standard for planning of this nature. Based on the information that the needs assessment contains, I concur with the conclusion that there is a transmission capacity deficiency in PSE's system on the Eastside that requires attention in the near future." (DeClerck, Review Memo by Stantec Consulting Services Inc., July 31, 2015).

placed at a new substation site near the center of the Eastside, referred to as the Richards Creek substation. Electrical power would be transmitted to the new substation and the voltage lowered, or "stepped down" (transformed), from 230 kV to 115 kV for distribution to local customers. In sum, and as confirmed by independent experts, all of the proposed Project components will benefit all Bellevue customers by improving reliability of the entire electrical system on the Eastside.

3.7 TECHNOLOGY BEST SUITED TO MITIGATE IMPACTS TO SURROUNDING PROPERTIES

LUC 20.20.255.D.3d. Describe how the proposed facility includes technology best suited to mitigate impacts on surrounding properties.

As proposed, the Energize Eastside Project uses the existing transmission line corridor that was originally established in the late 1920s and early 1930s. By building within the existing corridor, new environmental impacts are avoided. As part of the Energize Eastside Project, PSE has also aggressively sought to mitigate impacts by reducing pole height and moving pole locations where feasible and requested by a stakeholder. Post-construction and consistent with the City's code, PSE will fully mitigate all vegetation impacts by replanting both on and off-site. PSE is also in the process of obtaining input on pole color to limit contrast with the skyline or adjacent uses.

The Richards Creek substation location itself also gives PSE a significant mitigation opportunity. PSE is planning to replace and upgrade a culvert beneath a driveway that provides access to its existing pole yard site and proposed Richards Creek Substation. A pair of aging and undersized culverts (two side-by-side, 18-inch diameter corrugated metal pipe culverts) have proven inadequate to carry the combined flow and sediment loading along the stream. Construction associated with proposed culvert replacement and stream realignment will result in temporary disturbance to the stream, wetlands, and associated buffers, but will also result in net habitat benefits following project implementation. Significantly, fish passage will be greatly improved following the culvert replacement.

4.0 COMMUNITY OUTREACH CONDUCTED

LUC 20.20.255.D.4: Upon submittal of the Conditional Use Permit application required pursuant to subsection C of this section, the applicant shall provide a description of all methods of community outreach or involvement conducted by the applicant prior to selecting a preferred site for the proposed electrical utility facility.

The Energize Eastside Project was designed specifically to address system reliability deficits identified in multiple PSE and independent review studies. Overall, the Eastside's electrical grid will become less reliable in the near-term during times of peak demand without an upgrade in transmission facilities from 115 kV to 230 kV. Both elements of the South Bellevue Segment (Richards Creek Substation and the associated 3.3 miles of 230 kV transmission line upgrade) are designed to implement this change and improve reliability.

4.1 PSE HAS FULLY ENGAGED THE PUBLIC IN EVALUATING ENERGIZE EASTSIDE PROJECT ALTERNATIVES

Since launching the Energize Eastside Project in December 2013 and consistent with LUC 20.20.255.D.4, PSE has engaged the Eastside community in a robust public involvement process. This process has included mailings, public meetings and direct outreach efforts to ensure that stakeholders are informed about the project and have had plentiful and diverse opportunities to participate. PSE's public involvement process, especially with regards to routing, goes well beyond environmental review and permitting requirements, including a year-long route selection process with a Community Advisory Group (CAG).

To date, public outreach, and involvement has included:

- **22** CAG-related meetings, including **6** public open houses, **2** question and answer sessions, and **2** online open houses at key project milestones
- **500+** briefings with individuals, neighborhoods, cities and other stakeholder groups
- More than **2,900** comments and questions received
- **30+** email updates to more than **1,500** subscribers
- **8** project newsletters to **55,000+** households
- Ongoing outreach to **500+** property owners, including door-to-door and individual meetings
- Participation in **16** EIS-related public meetings

In addition, PSE's Energize Eastside website (https://energizeeastside.com) provides project updates and functions as a repository for project materials, including maps, technical studies, the CAG Final Report, fact sheets, newsletters, meeting summaries and other materials. An overview of the public engagement process is provided in the following sections.

4.1.1 PHASE 1: PUBLIC ROUTE DISCUSSION (2014)

To analyze and narrow the potential route alternatives to a reasonable number to study in detail and remove routes with considerable constraints, PSE engaged the CAG in 2014 to consider community values when evaluating the route options. The advisory group was comprised of

representatives from various interests within the study area, including potentially affected neighborhood organizations, cities, schools, social service organizations, major commercial users, economic development groups, and other interests. The advisory group spent a year learning about the Eastside's electrical system, participating in meetings and workshops and evaluating 18 route options identified by PSE using a Linear Routing Tool (see Section 2.2 for discussion).. The advisory group looked at the factors used to develop different route options, narrowed the route options based on values and constraints, and prepared route option recommendations for further consideration.

In addition to the CAG, PSE involved the community through public meetings, neighborhood meetings, briefings and comments, which provided Eastside residents opportunities to share their community values and ask initial questions about the project. The details about the advisory group process can be found in the Community Advisory Group Final Report (2015) (Attachment D).

4.1.2 PHASE 2: FIELDWORK AND ENVIRONMENTAL REVIEW (2015 – 2018)

In 2015, PSE began collecting field information necessary for design and environmental review. PSE kept stakeholders informed about these fieldwork activities to ensure residents knew when crews were expected to perform surveys near their homes and businesses.

In 2015, the City began its review under the State Environmental Policy Act (discussed in greater detail below). The City of Bellevue is leading the EIS process in cooperation with Newcastle, Kirkland, Redmond and Renton.

PSE has provided supplemental EIS notifications about major milestones and comment periods to keep stakeholders informed and to support community engagement in addition to those provided by the City of Bellevue and other jurisdictions. PSE has also participated in eight scoping meetings and eight draft EIS hearings over the two-phased EIS process where input on EIS alternative solutions and route options was solicited from the public.

4.1.3 PHASE 3: PROPERTY-OWNER CONSULTATIONS (2016 – TODAY)

As project design progressed, PSE began reaching out to individual property owners to share information and answer questions. In spring 2016, the project team visited neighborhoods along the existing corridor and Factoria area to talk with residents and business owners about the project. This door-to-door outreach was conducted to help inform customers about the project status and to address questions and concerns from property and business owners.

In September 2016, PSE began meeting with property owners and tenants along the existing corridor to discuss property-specific design and tree replacement plans. We shared our current

design for that specific property, including pole locations and how we plan to access those locations during construction. These conversations have helped us refine our project design and better understand customer interests and concerns.

In May 2017, PSE began meeting with property owners to begin developing property-specific landscaping and tree replacement plans with property owners. We are currently reaching out to affected property owners about these efforts.

Input received through the CAG process, neighborhood and stakeholder briefings, the Environmental Impact Statement process, one-on-one property owner meetings, and the nearly 3,000 comments and questions received to date has helped to shape the Energize Eastside Project and PSE's decision making.

4.2 STATE ENVIRONMENTAL POLICY ACT REVIEW

The City rigorously evaluated the Energize Eastside Project, including the South Bellevue Segment, under the State Environmental Policy Act (SEPA). In conjunction with the cities of Redmond, Kirkland, Renton, and Newcastle, the City published a Phase 1 and Phase 2 Draft Environmental Impact Statement (DEIS). These documents can be found online at http://www.energizeeastsideeis.org/.

The Phase 1 DEIS contained a programmatic review of project alternatives including analysis of the feasibility of an overhead transmission line (such as the one currently proposed), use of the Seattle City Light transmission system, the construction of underwater transmission lines, and an integrated resource approach (i.e., employing non-transmission line technologies such as additional aggressive conservation and demand response technologies, new distributed generation facilities, and/or energy storage systems). *See Phase 1 DEIS*, Ch. 2. A thorough analysis of all project alternatives relative to defined project objectives (e.g., meeting demand growth and being environmentally acceptable to impacted cities), resulted in a narrowing of reasonable alternatives to an overhead transmission solution.

The Phase 2 DEIS contains the City's focused review of overhead transmission line route alternatives and impacts. It contains a detailed analysis of six route segments and seven route options within those segments. The Phase 2 DEIS analyzes four different routing options in the South Bellevue Segment. *See* Attachment B (comparing environmental impacts of each of the four South Bellevue Segment alternatives). Ultimately, PSE deviated from its originally preferred route in South Bellevue and chose to move forward with a plan to build its proposed system upgrades in the existing transmission line corridor. This route is the least impactful (particularly because it minimizes *new* environmental impacts) and prioritizes safety by limiting the potential for interactions with Olympic's petroleum pipelines.

5.0 CONCLUSION

PSE has selected the Richards Creek substation site and the Willow 1 transmission line corridor as the site for the Energize Eastside Project. The substation site is owned by PSE and is located in an industrial area adjacent to the existing PSE Lakeside 115 kV substation. The Willow 1 route uses an existing transmission line corridor that has been in operation since late 1920s and early 1930s. By using this substation site and corridor, additional easements or properties are not required. Even though the existing vegetation within the corridor is managed, which includes trimming and periodic removal, conversion of the existing transmission lines from 115 kV to 230 kV requires removal of taller growing tree species in order to meet federal vegetation management standards (NERC FAC-003). By using the existing corridor, the fewest number of trees will need to be removed. The use of the Willow 1 route combined with optimized transmission line design and 230/230 kV operation, allows for the lowest potential AC interaction with the two petroleum pipelines that share the corridor. These are the key factors that make Richards Creek substation site and the Willow 1 transmission line route the preferred alternative for Energize Eastside.

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ATTACHMENT A
Figures

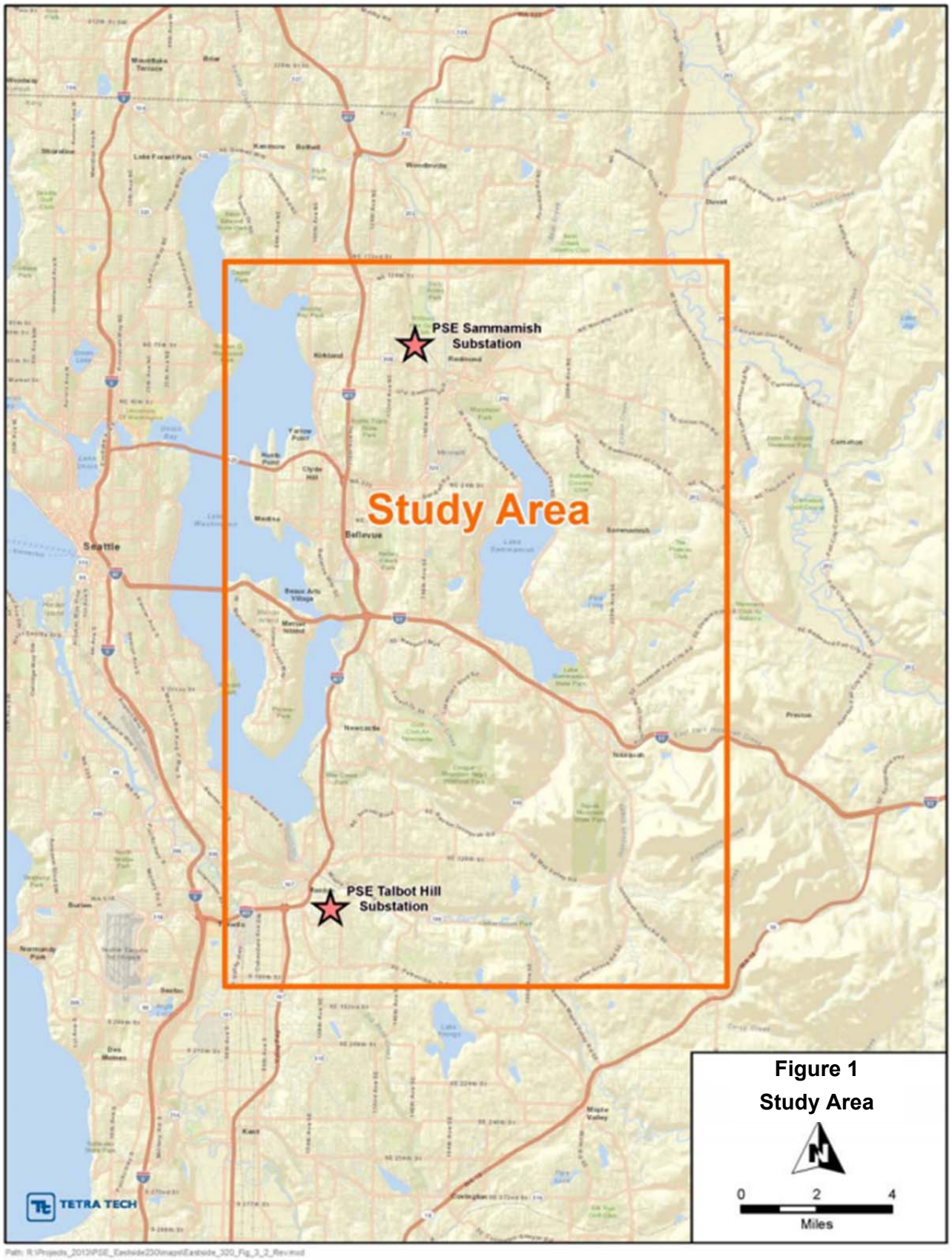
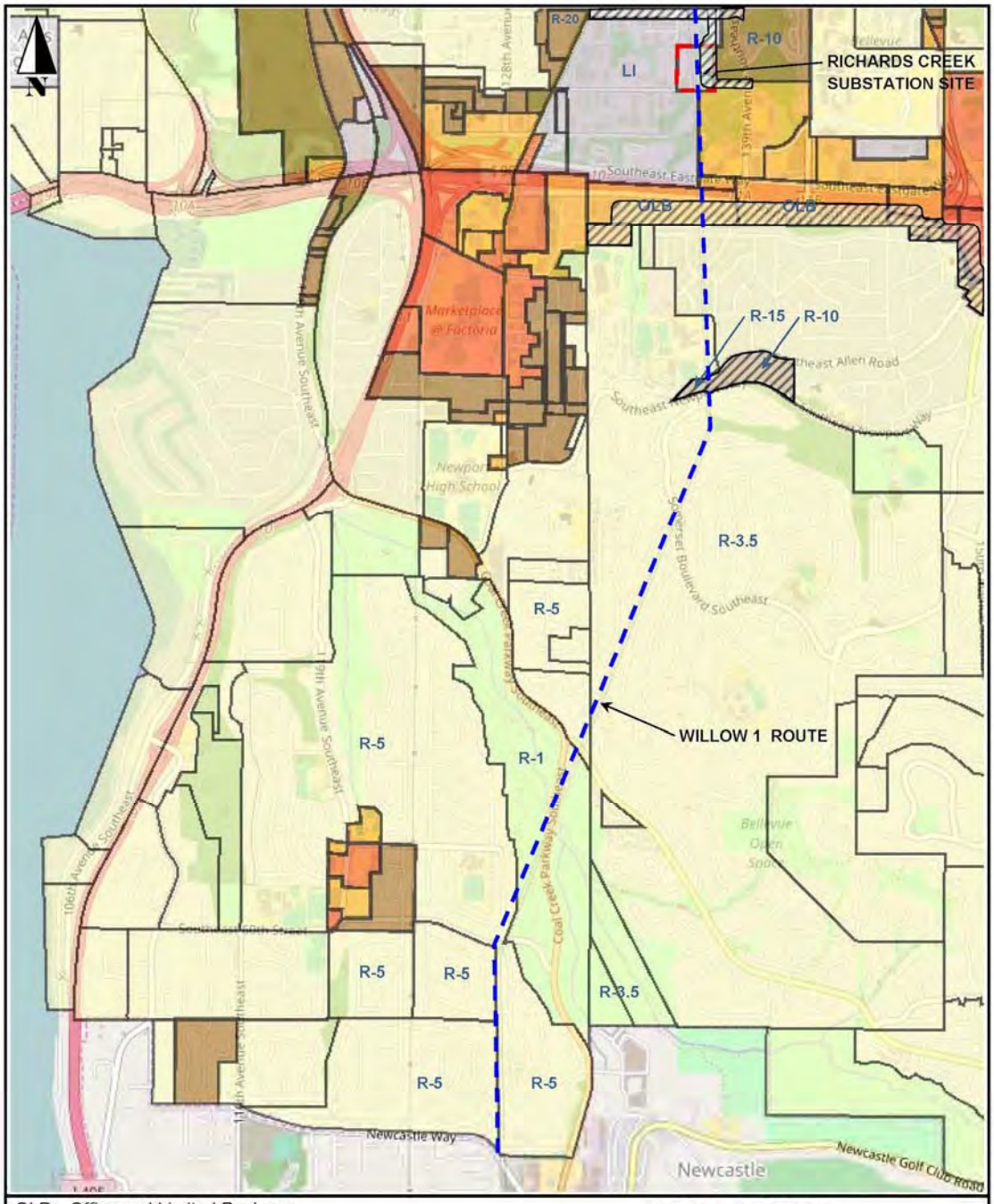


Figure 1
Study Area

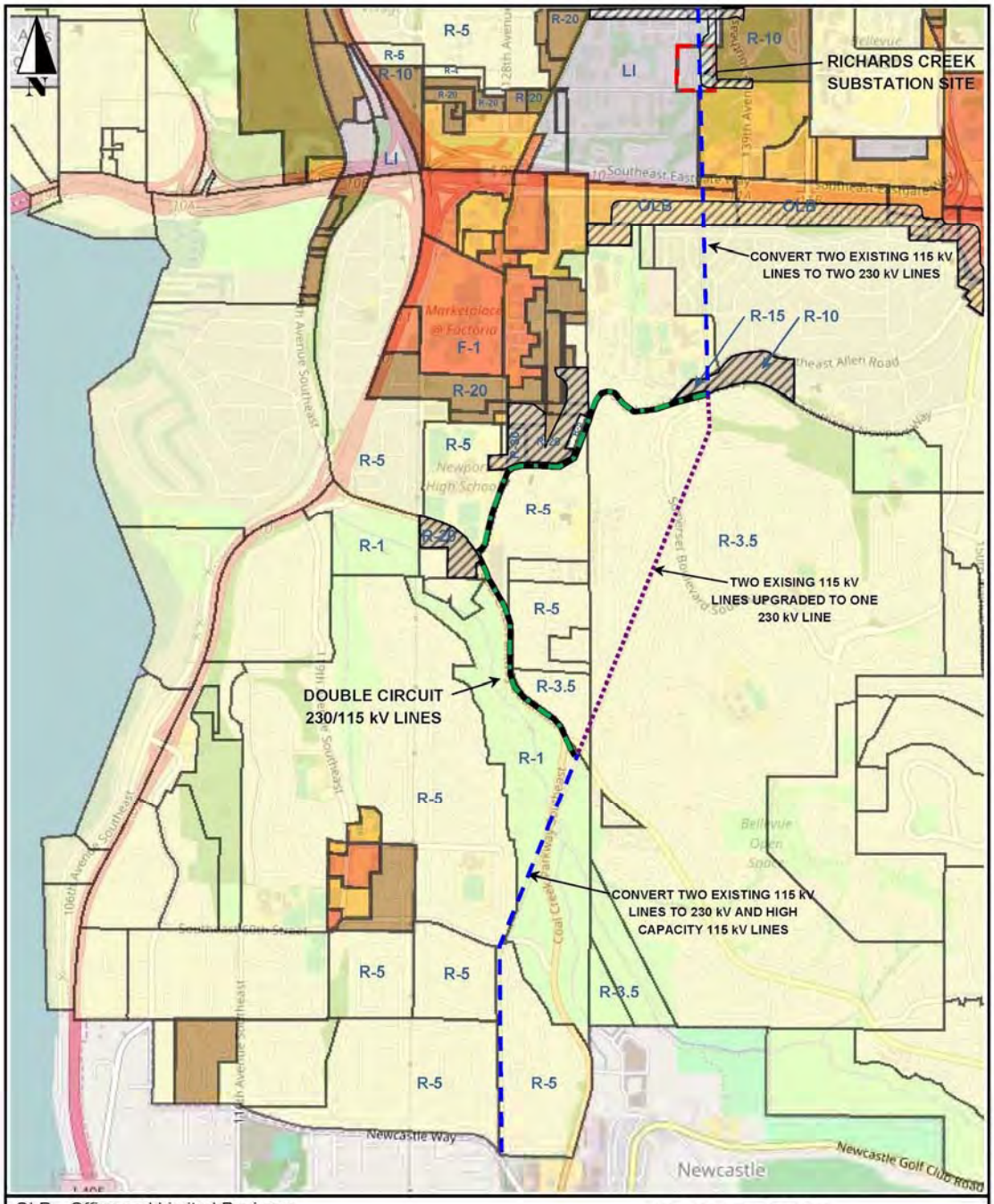


OLB—Office and Limited Business
LI — Light Industrial
R-1 through 7.5—Single Family Residential
R-10 through 15—Multi Family Residential
Transition Area (crossed by route)

FIGURE 2 ZONING

WILLOW 1—SOUTH PHASE

(Bellevue/Newcastle Line to Richards Creek)

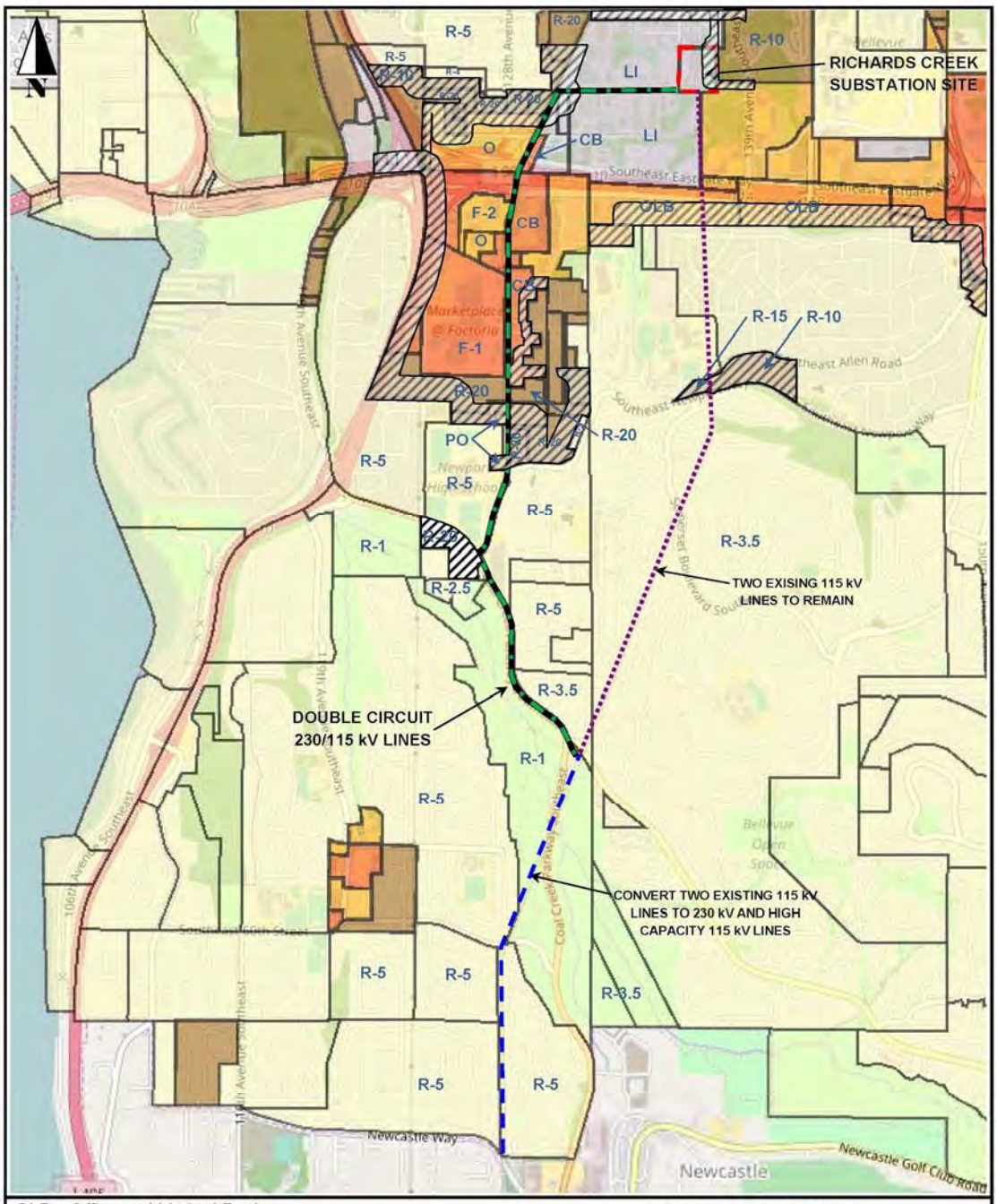


OLB—Office and Limited Business
LI — Light Industrial
R-1 through 7.5—Single Family Residential
R-10 through 15—Multi Family Residential
Transition Area (crossed by route)

FIGURE 3 ZONING

WILLOW 2—SOUTH PHASE

(Bellevue/Newcastle Line to Richards Creek)

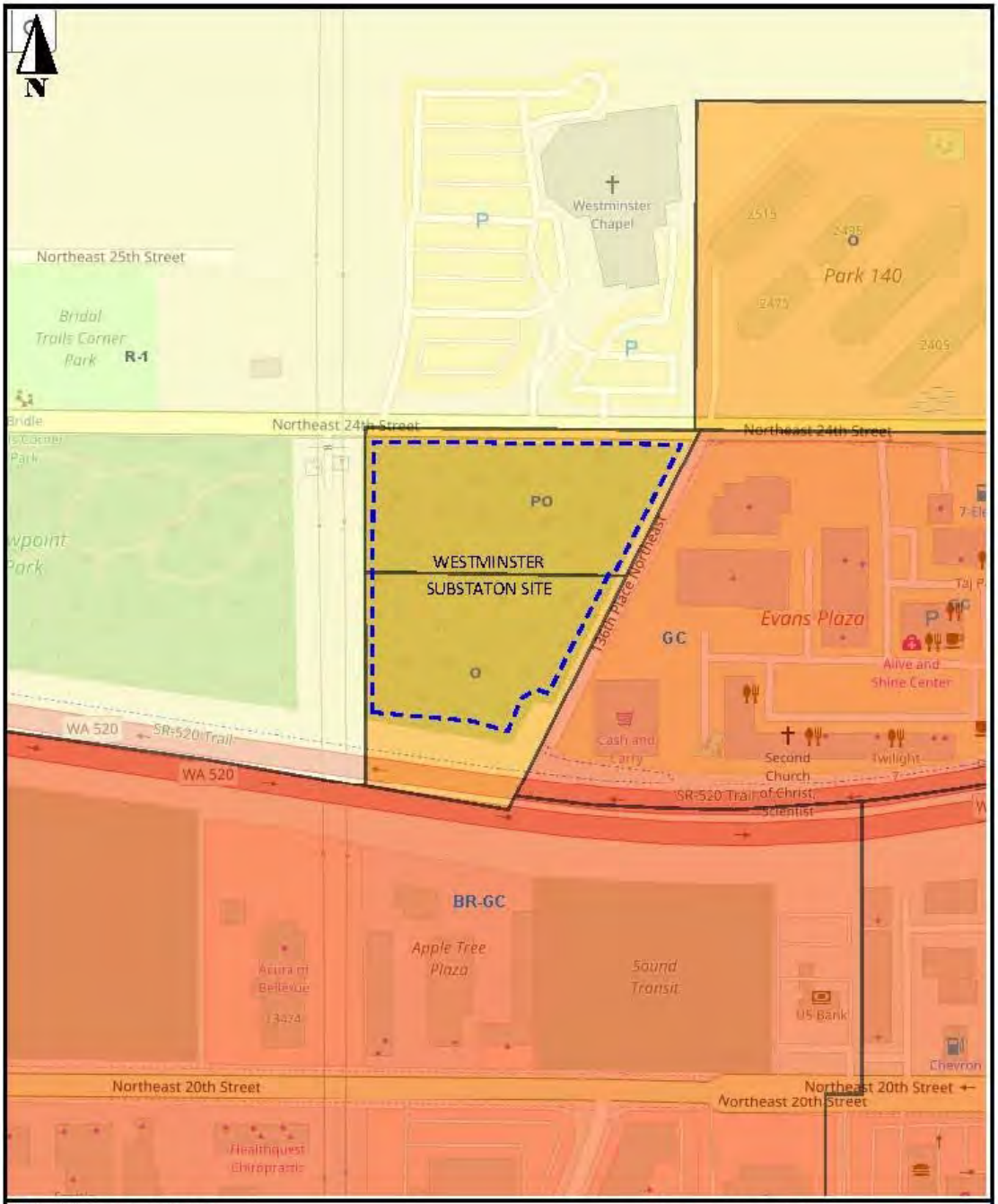


OLB—Office and Limited Business
LI — Light Industrial
R-1 through 7.5—Single Family Residential
R-10 through 15—Multi Family Residential
Transition Area (crossed by route)

FIGURE 4 ZONING

OAK 1—SOUTH PHASE

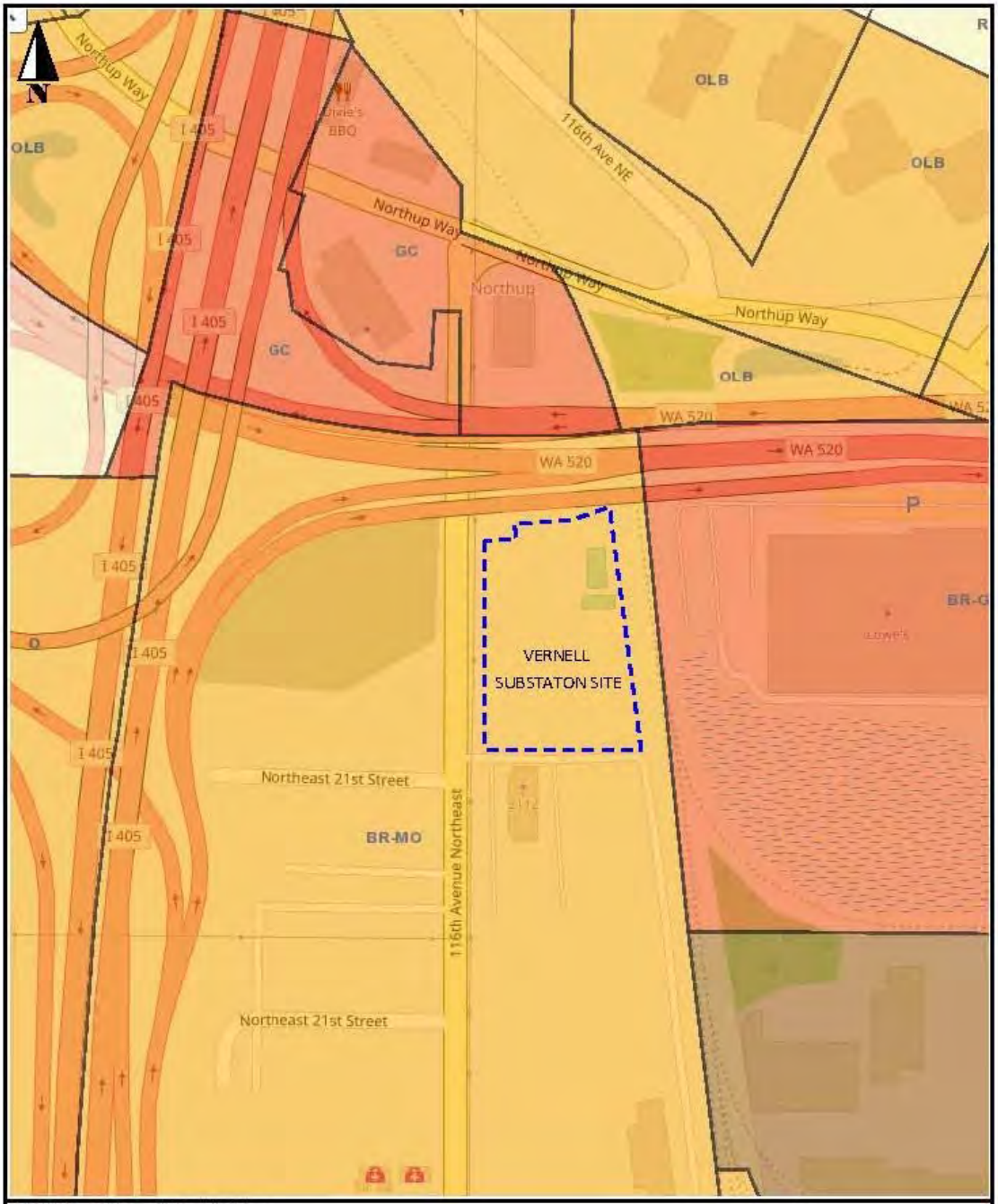
(Bellevue/Newcastle Line to Richards Creek)



PO—Professional Office
O-Office
BR-GC—Bel-Red General Commercial
GC—General Commercial
R-1—Single Family Residential Estate

FIGURE 5 ZONING

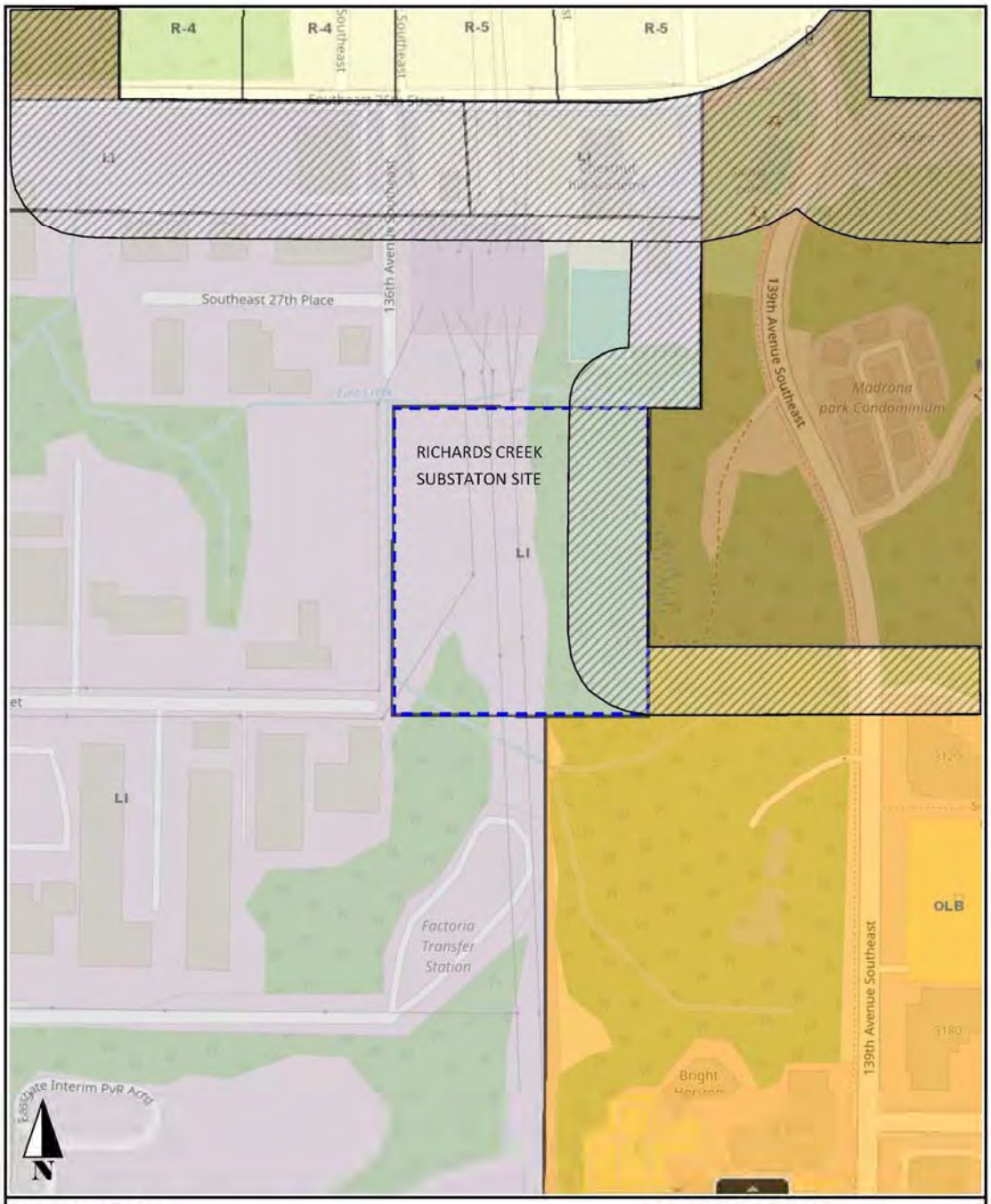
WESTMINSTER SUBSTATION SITE



BR-MO—Bel-Red Medial Office
BR-GC—Bel-Red General Commercial
GC—General Commercial
O—Office
OLB—Office and Limited Business

FIGURE 6 ZONING

VERNELL SUBSTATION SITE



LI—Light Industrial
OLB—Office and Limited Business
R-4, 5, 10—Single-Family Residential
Transition Area

FIGURE 7 ZONING

RICHARDS CREEK SUBSTATION SITE

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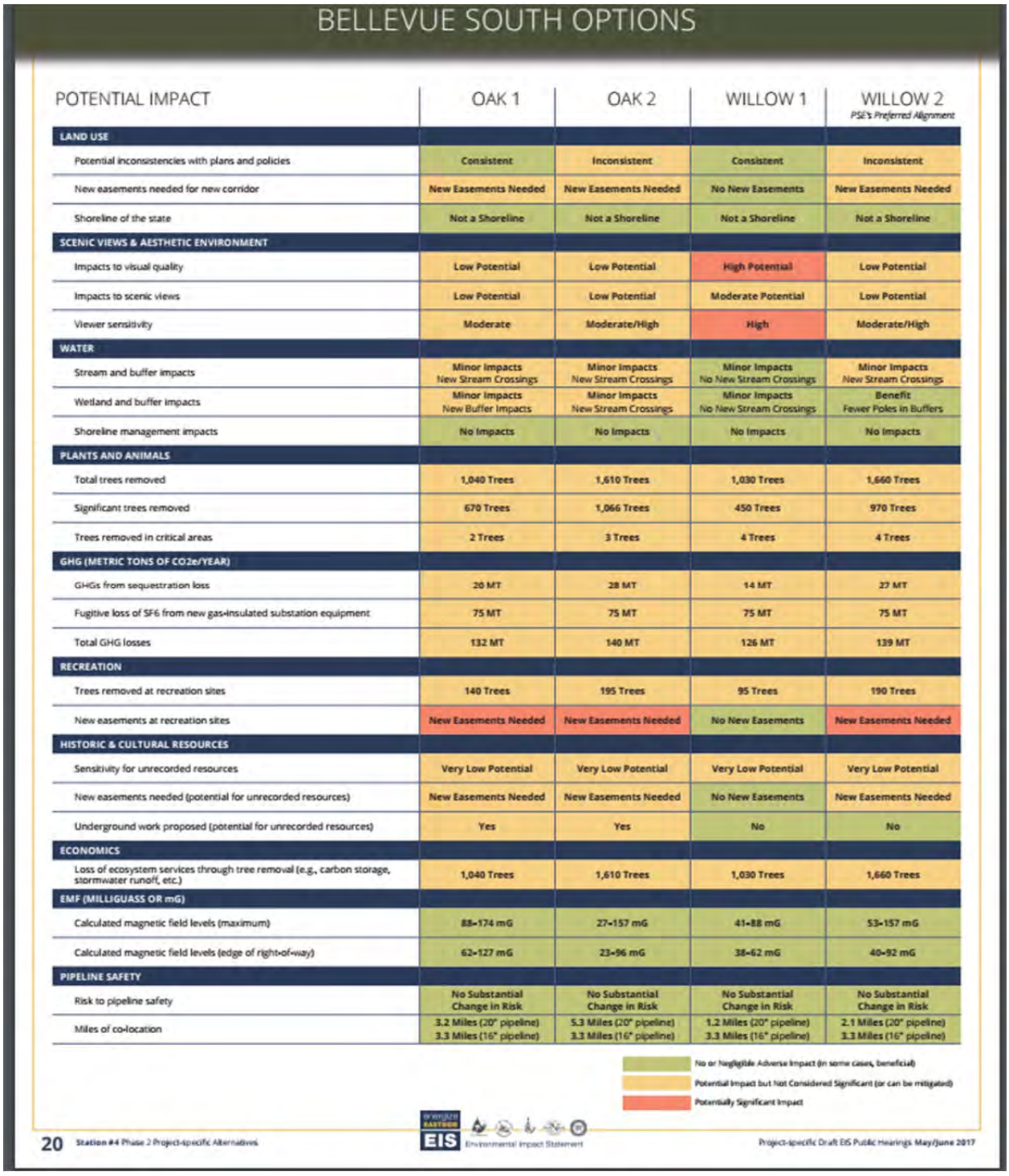
ATTACHMENT B
Phase 2 DEIS Impact Table

Potential Impact Table from Phase 2 DEIS



BELLEVUE SOUTH OPTIONS

POTENTIAL IMPACT	OAK 1	OAK 2	WILLOW 1	WILLOW 2 *PSE's Preferred Alignment*
LAND USE				
Potential inconsistencies with plans and policies	Consistent	Inconsistent	Consistent	Inconsistent
New easements needed for new corridor	New Easements Needed	New Easements Needed	No New Easements	New Easements Needed
Shoreline of the state	Not a Shoreline	Not a Shoreline	Not a Shoreline	Not a Shoreline
SCENIC VIEWS & AESTHETIC ENVIRONMENT				
Impacts to visual quality	Low Potential	Low Potential	High Potential	Low Potential
Impacts to scenic views	Low Potential	Low Potential	Moderate Potential	Low Potential
Viewer sensitivity	Moderate	Moderate/High	High	Moderate/High
WATER				
Stream and buffer impacts	Minor Impacts New Stream Crossings	Minor Impacts New Stream Crossings	Minor Impacts No New Stream Crossings	Minor Impacts New Stream Crossings
Wetland and buffer impacts	Minor Impacts New Buffer Impacts	Minor Impacts New Stream Crossings	Minor Impacts No New Stream Crossings	Benefit Fewer Poles in Buffers
Shoreline management impacts	No Impacts	No Impacts	No Impacts	No Impacts
PLANTS AND ANIMALS				
Total trees removed	1,040 Trees	1,610 Trees	1,030 Trees	1,660 Trees
Significant trees removed	670 Trees	1,066 Trees	450 Trees	970 Trees
Trees removed in critical areas	2 Trees	3 Trees	4 Trees	4 Trees
GHG (METRIC TONS OF CO2e/YEAR)				
GHGs from sequestration loss	20 MT	28 MT	14 MT	27 MT
Fugitive loss of SF6 from new gas-insulated substation equipment	75 MT	75 MT	75 MT	75 MT
Total GHG losses	132 MT	140 MT	126 MT	139 MT
RECREATION				
Trees removed at recreation sites	140 Trees	195 Trees	95 Trees	190 Trees
New easements at recreation sites	New Easements Needed	New Easements Needed	No New Easements	New Easements Needed
HISTORIC & CULTURAL RESOURCES				
Sensitivity for unrecorded resources	Very Low Potential	Very Low Potential	Very Low Potential	Very Low Potential
New easements needed (potential for unrecorded resources)	New Easements Needed	New Easements Needed	No New Easements	New Easements Needed
Underground work proposed (potential for unrecorded resources)	Yes	Yes	No	No
ECONOMICS				
Loss of ecosystem services through tree removal (e.g., carbon storage, stormwater runoff, etc.)	1,040 Trees	1,610 Trees	1,030 Trees	1,660 Trees
EMF (MILLIGUASS OR mG)				
Calculated magnetic field levels (maximum)	88–174 mG	27–157 mG	41–88 mG	53–157 mG
Calculated magnetic field levels (edge of right-of-way)	62–127 mG	23–96 mG	38–62 mG	40–92 mG
PIPELINE SAFETY				
Risk to pipeline safety	No Substantial Change in Risk	No Substantial Change in Risk	No Substantial Change in Risk	No Substantial Change in Risk
Miles of co-location	3.2 Miles (20" pipeline) 3.3 Miles (16" pipeline)	5.3 Miles (20" pipeline) 3.3 Miles (16" pipeline)	1.2 Miles (20" pipeline) 3.3 Miles (16" pipeline)	2.1 Miles (20" pipeline) 3.3 Miles (16" pipeline)

No or Negligible Adverse Impact (in some cases, beneficial)
Potential Impact but Not Considered Significant (or can be mitigated)
Potentially Significant Impact

20 Station #4 Phase 2 Project-specific Alternatives

EIS Environmental Impact Statement

Project-specific Draft EIS Public Hearings May/June 2017

ATTACHMENT C
Supporting Studies

Eastside 230 kV Project
Constraint and Opportunity Study
for Linear Site Selection

Prepared for

Puget Sound Energy

Prepared by

Tetra Tech, Inc.
19801 North Creek Parkway
Bothell, WA 98011

December 2013

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1. Executive Summary

PSE's System Planning evaluated a variety of options for addressing the Eastside's growing energy needs including conservation, local generation, and infrastructure improvements (e.g., transmission lines and substations). They found that even with aggressive conservation efforts, demand will outstrip supply in a few years. Additionally, local generation would be difficult to execute in a timely manner and ultimately would not meet long-term needs.

Based on PSE's technical evaluation of potential solutions, the most effective way to ensure the Eastside's power system will meet growing demand is to add a new 230 kV transmission line to connect PSE's Sammamish (Redmond) and Talbot Hill substations (Renton). With these endpoints in mind, PSE contracted with Tetra Tech, Inc. to employ a geographic information system (GIS)-based Linear Routing Tool (LRT) to conduct a broad evaluation of possible transmission line routes.

The LRT is a tool developed by Tetra Tech based on commercially available geospatial technology and Tetra Tech's linear routing experience (see Appendix A). It is a collaborative process that combines powerful analytical software with project experience, system planning, engineering, land use and local knowledge considerations. The LRT is an innovative geospatial tool that identifies the most suitable route alternatives based on modeled environmental and infrastructure factors. PSE and Tetra Tech began this process by identifying a study area of approximately 255 square miles that encompasses the Sammamish Substation in the north and the Talbot Hill Substation in the south. The study area is bounded on the west by the eastern shore of Lake Washington and extends eastward to include the BPA corridor near Soaring Eagle Regional Park (located northeast of the City of Sammamish). Any new transmission line route must connect to a new 230 kV to 115 kV transformation site within this area in order to solve the problem. Potential transformation sites within the study area include Lakeside, Westminster, and Vernell substations, which are all located in the City of Bellevue.

Tetra Tech staff collected existing available data and GIS files for land ownership, land use, public and private rights-of-way (ROW), wildlife, vegetation, threatened and endangered (T&E) species, environmentally critical areas, topography, historical resources, and other factors that would influence the location of the proposed transmission line, such as structure locations. The data collection process was designed to provide geospatial information on

criteria that could represent credible baseline opportunities and/or constraints for the location of an above-ground transmission line.

A team of LRT experts, system planners, engineers, land use planners and environmental professionals (Project Team) individually weighted various data layers of the model to reflect the varying degree of constraints or opportunities for each data set. The team assigned values to the data layers using a progressive scale of values ranging from the greatest constraint, such as endangered species, residences and safety hazards, to the greatest opportunity, such as existing PSE transmission lines.

The LRT combined these data layers and created an output file called the suitability grid, which represents a summation of all the constraints and opportunities for every point (grid cell) across the entire study area. The LRT modeled preferred corridors across the suitability grid that pass through the transformation site options within the study area. These preferred corridors were used to develop alternative routes. To provide for more flexibility in the route analysis, each route was partitioned at the crossing points of routes to create unique segments. Each unique LRT segment was validated using professional engineering judgment and available ancillary resources such as aerial photographs, to help assess whether they were feasible options. Once the segments were generated and validated, a composite score was calculated for each segment from the underlying suitability grid. A deterministic model was then used that considered more than 500 combinations of segments and transformation sites. If parallel segments (i.e., typically less than a block apart) were identified during the model evaluation, LRT scores were compared to determine which segment would be used to develop routes.

The LRT scores were used to eliminate from further consideration routes that were not considered viable options. Approximately the top five percent of the positive routes were then mapped to facilitate further discussion and evaluation.

The mapping exercise revealed that there are four general subareas, which when combined, formed a "ladder" of route alternatives. The "leg" components of the ladder comprised the north-south running routes connecting Sammamish, Talbot Hill, and one of the new transformation substations. Moving east to west between the "legs" could be accomplished by using one of the three cross-over segments or "rungs." The only exception to this being an additional north-south segment situated in the central part of the study area, south of I-90. To simplify future discussion, each of the fourteen legs and rungs were given a unique identifier (Figure 1-1). All of the mapped segment combinations can be used to develop a route that meets the goal of connecting the Sammamish with the Talbot Hill substation,

while connecting to any one of the three intermediary substations. Further route refinement will continue during the on-the-ground data collection phase and public process, culminating in the selection of a preferred route.

Table 1-1. Route Segment Composition

Vernell 248	Vernell 249	Westminster 217	Lakeside 155	Lakeside 160	Lakeside 166
A	A	A	A	A	A
B	B	C	C	C	C
F	F	D	E	E	E
H	H	F	G2	G2	J
K1	L	H	G1	I	M
K2	N	L	H	K1	N
M		N	L	L	
N			N	N	

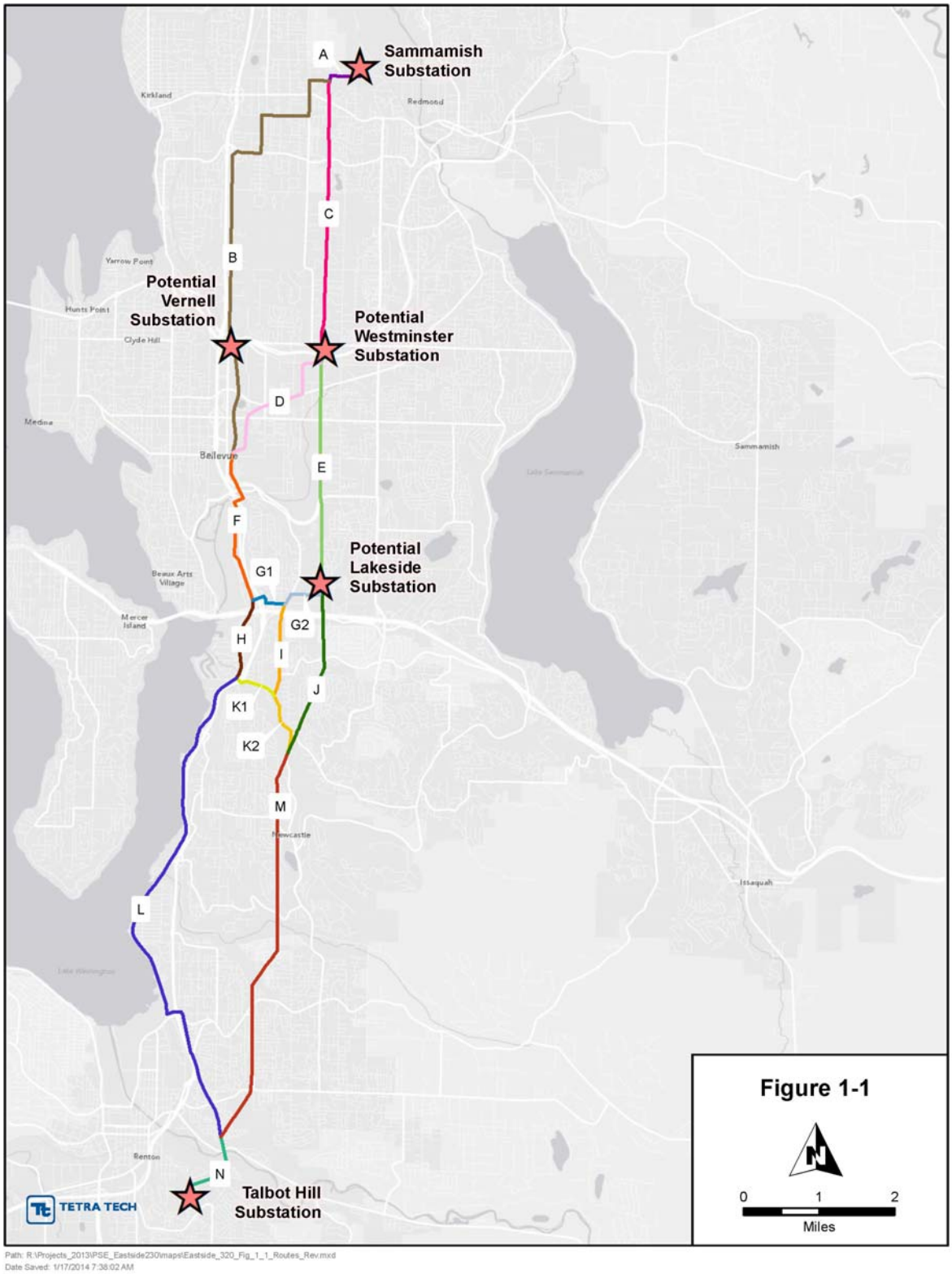

Figure 1-1. General Corridor for Eastside 230 kV Project

2. Overview

PSE System Planning conducted a needs assessment reviewing population trends, electric load growth, economic development patterns, conservation programs, energy efficiency improvements, and other key trends pertaining to power demand. Studies reveal that different parts of the transmission system will overload, or be close to overloading, within the 10-year study period (2012-2022) and more specifically, by 2017.

PSE's System Planning evaluated a variety of options for addressing the Eastside's growing energy needs including conservation, local generation, and infrastructure improvements (e.g., transmission lines and substations). They found that even with aggressive conservation efforts, demand will outstrip supply in a few years. Additionally, local generation would be difficult to execute in a timely manner and ultimately would not meet long-term needs.

System Planning's review determined that system infrastructure improvements must be made to resolve the deficiency issue. These system infrastructure improvements will address the following issues:

- Overload of PSE electrical facilities in the Eastside Area;
- Small margin of error to manage risks from inherent load forecast uncertainties;
- Increasing use and expansion of Corrective Action Plans;
- Emerging regional impacts identified by the ColumbiaGrid.

To meet the objectives above, PSE had to first identify 230 kV sources and then identify potential transformation sites (to convert 230 kV to 115 kV for distribution) between those sources. The new transformation site will be a 230 kV to 115 kV substation. The next step was to determine a study area between the source endpoints and evaluate the possible routes to make this connection using a 230 kV transmission line (Figure 2-1).

Seeking an objective fact-based evaluation, PSE contracted with Tetra Tech, Inc. to employ a geographic information system (GIS)-based Linear Routing Tool (LRT) to conduct a broad evaluation of possible transmission line routes. The LRT is a collaborative process that combines powerful analytical software with project experience, system planning, engineering, land use and local knowledge considerations. The LRT is an innovative geospatial tool that identifies the most suitable route alternatives based on modeled

environmental and infrastructure factors that are available in GIS format. The purpose of this study was to do a high-level review of significant and well known factors that affect route siting using available data in GIS format, to develop possible routes for further study.

The first steps of the LRT process were to define elements that were positive or negative for siting the proposed 230 kV transmission line and to collect the related data. These elements were defined as constraints and opportunities. GIS available data was collected for land ownership, land use, public and private rights-of-way (ROW), wildlife, vegetation, threatened and endangered (T&E) species, environmentally critical areas, topography, historical resources, and other factors that would influence the location of the proposed transmission line, such as structure locations.

With the GIS data compiled, a team of LRT experts, system planners, engineers, land use planners and environmental professionals (Project Team) individually weighted various data layers of the model to reflect the varying degree of constraints or opportunities for each data set. The LRT combined these data layers to create a suitability grid, summarizing all the constraints and opportunities for every point (grid cell) across the entire study area. This grid was used to develop suitable corridors and routes, and in turn those routes were broken down into segments. These segments were individually weighted so that more than 500 routes could be put together and mathematically considered.

The result of all this evaluation and modeling was that the top recommended segments could be combined to form five possible route options for further evaluation through public input, stakeholder review, further land use/zoning and environmental requirements review, and real estate review.

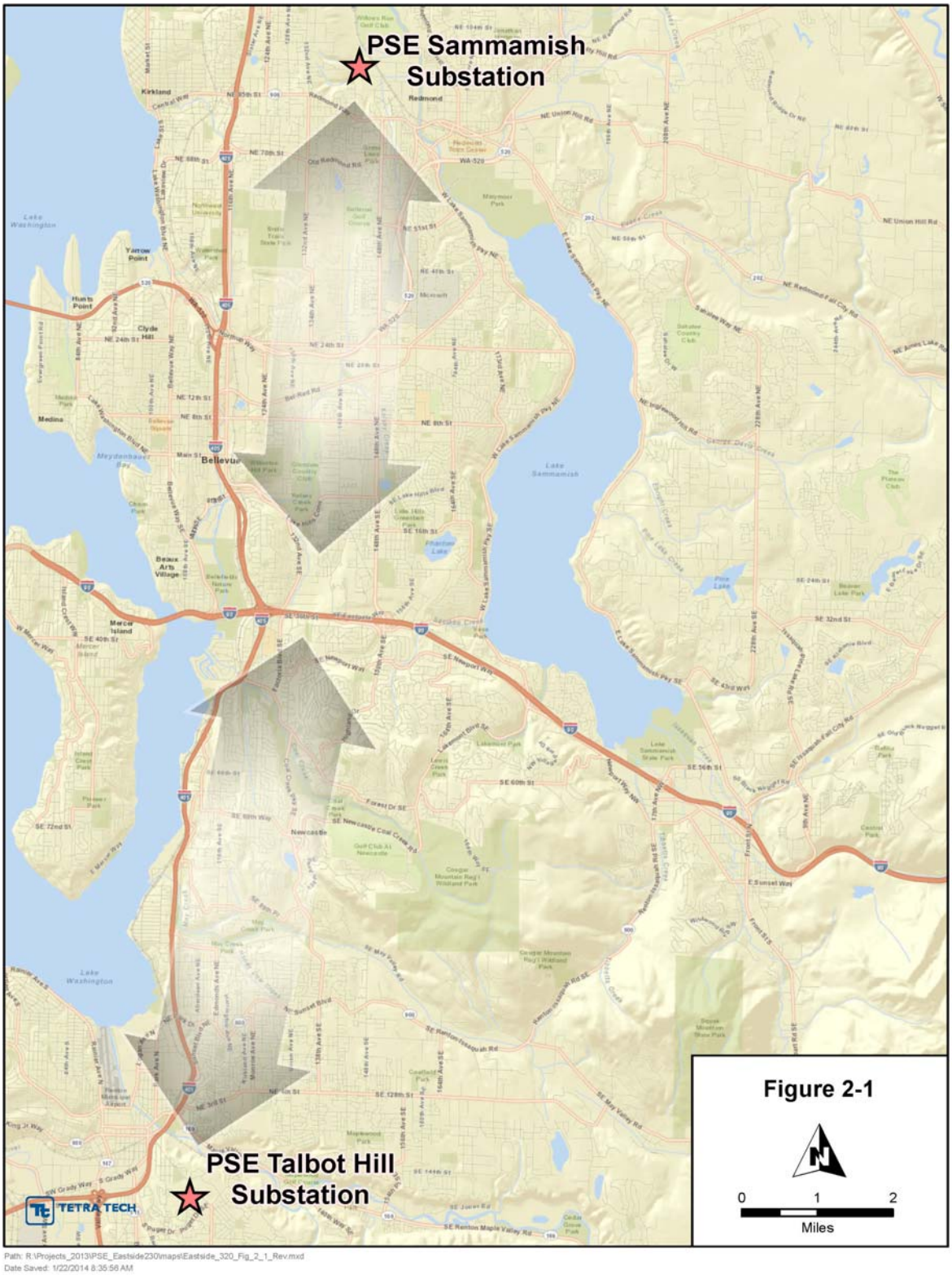

Figure 2-1. General Corridor for Eastside 230 kV Project

3. Process

The development of possible transmission line routes followed a six-step process that culminated in a set of alternatives that could be further evaluated. The steps included:

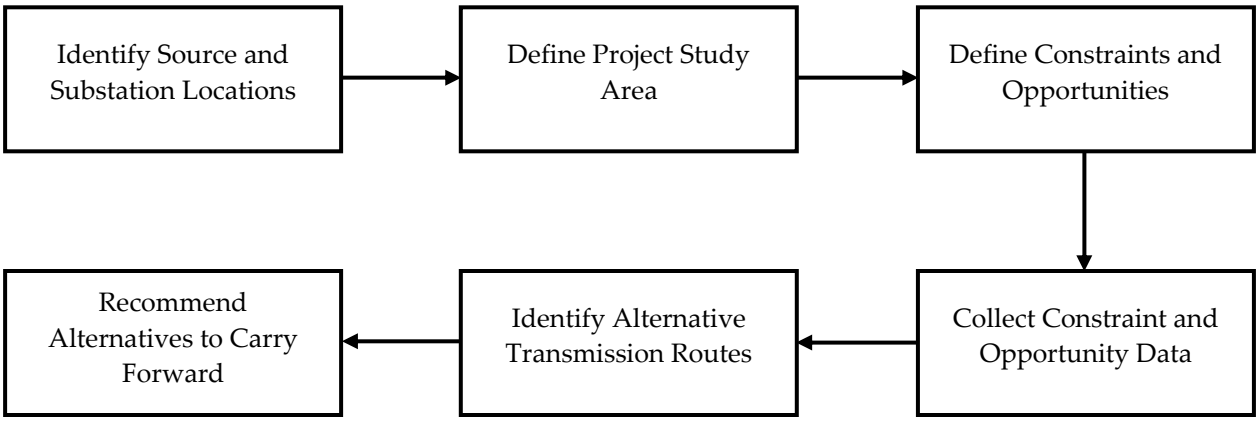

Figure 3-1. Route Development Process

3.1 IDENTIFY 230 KV SOURCE AND SUBSTATION LOCATIONS

At the beginning of the routing effort, the Sammamish and Talbot Hill Substations were defined as the 230 kV source for the project. Potential intermediate transformation (new 230 kV to 115 kV substation) sites between the Sammamish and Talbot Hill Substations were identified by PSE and used to help define the study area. The potential new transformation sites included PSE-owned property at the future Vernell and Westminster substations, and the existing Lakeside Substation. In addition, a new site referred to as Woodridge was considered based on its location. Ultimately the Lakeside, Westminster, and Vernell sites were selected as they meet the necessary minimum dimensions and are owned by PSE.

3.2 DEFINE PROJECT STUDY AREA

The next step was to establish a study area that was defined as a boundary that generally encompassed the 230 kV source substations locations and the potential routes to connect them. Therefore, the study area encompasses the Sammamish Substation in the north, the Talbot Hill Substation in the south, the eastern shore of Lake Washington in the west, and eastward to near Soaring Eagle Regional Park in King County, east of the City of Sammamish. Figure 3-2 shows the extent of the study area used during the constraint and opportunity analysis.

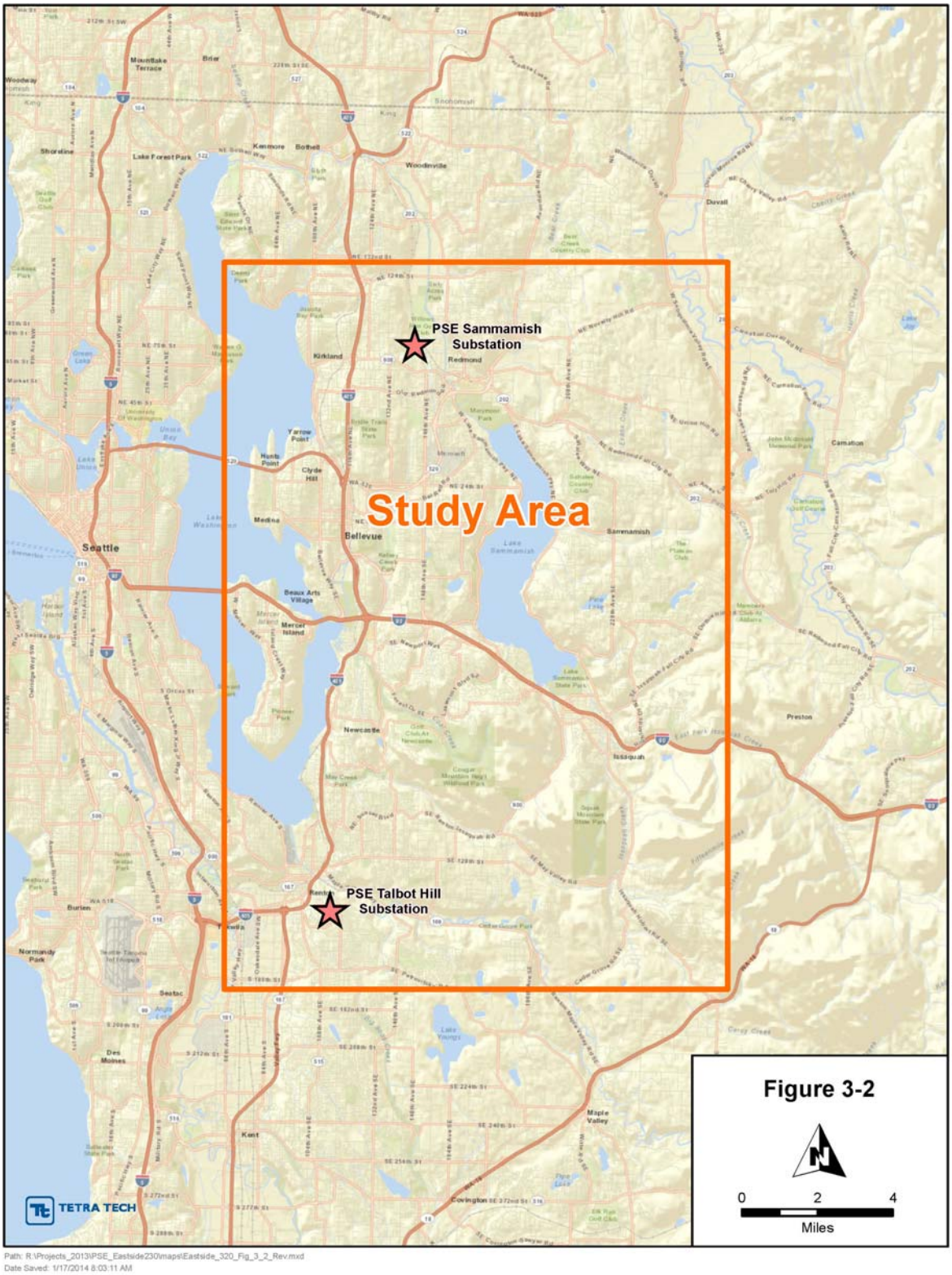

Figure 3-2. Study Area

Once the boundaries of the study area were established, the Project Team identified and delineated constraints and opportunities to siting the transmission line. Constraints are defined as resources or conditions that potentially limit project siting because of regulations or engineering requirements associated with facility construction and operation. Opportunities are defined as resources or conditions that can accommodate facility permitting, construction, or operation. The following sections describe the GIS data sets that were collected to analyze these constraints and opportunities, describe the key categories of constraint and opportunity factors in the study area based on GIS data sets, and summarize how the GIS data were processed in preparation for route development.

3.3 AVAILABLE GIS DATA BASES USED FOR CONSTRAINTS AND OPPORTUNITY ANALYSIS

Based on the defined study area, Tetra Tech collected readily available GIS data sets to use in the LRT model. Data collection was based on the constraint and opportunity factors used in the analysis. The data used in routing were subjected to a defined process of preparation and analysis before being used in the LRT as described below. Preparation of data began with the compilation of multiple layers into a geodatabase. Data layers were then quality checked and evaluated for project usefulness, including reliability and accuracy based on available maps. If the data passed the quality check, the data then went through several additional geoprocessing steps in order to be ready to input into the LRT. Where appropriate, buffer areas were added to the data based on how the feature would impact the transmission line route. These buffers were necessary to ensure line routes would not go over the top of structures, down the center of vehicular travel lanes, as well as allowing for adequate area to physically accommodate a 230 kV line. Buffers added to specific data layers are described in Section 3.6 Existing Conditions and in Table 3-1, below.

Data for the constraint and opportunity analysis were obtained from a variety of county, state, and federal GIS database sources (see Table 3-1). These GIS databases included the Washington Department of Natural Resources (WDNR), Department of Fish and Wildlife (WDFW), Department of Transportation (WSDOT), and State Parks and Recreation Commission (WSPRC); the US Fish and Wildlife Service (USFWS); the King County Assessor's Office, Department of Development and Environmental Services (DDES), and Department of Natural Resources (DNR); and Tetra Tech. This information was supplemented by the review of aerial photography and local knowledge. The following discussion outlines specific data sets collected for this project and their sources.

Table 3-1. Analysis Attributes and Data Sources

Attribute	Data Source
Existing and Proposed Linear Corridors	
PSE transmission corridors	PSE
PSE 55 kV corridor	PSE
BPA transmission corridors	PSE
Natural gas pipeline	Photo interp. and King County
Highways and roads	King County
Arterial road corridors	Interp. of King County roads
Railroads	ESRI Streetmap, King County, Sound Transit
Abandoned rail corridor	Photo interp. and King County parcels
Land Ownership, Land Use and Special Designated Uses	
Land Ownership	
Rights-of-way	King County
Parcels	King County Assessor
Transfer of development rights	King County Assessor
BNSF Railroad parcel boundaries (active)	King County
Land Use/Future Land Use	
Structures	King County
Coal mine	King County
Renton municipal airport	Photo interp. and King County parcels
Airports clear zone	Photo interp. and analysis
Residential	King County
Special Land Use Designation	
Parks	King County
Recreational trails	King County
Scenic byways	WSDOT
Soils, Topography, and Geology	
Unspanable slope 20 to < 40%	King County LiDAR and analysis
Unspanable slope >= 40%	King County LiDAR and analysis
Slopes 20%+	King County LiDAR and analysis
Slopes 40%+	King County LiDAR and analysis
Landslide potential	WDNR
Elevation – LiDAR	King County
Water Resources	
Lakes	King County
Floodways and floodplains	King County
Wetland Resources	
Wetlands – large	USFWS, National Wetlands Inventory

Attribute	Data Source
Wetlands – SAO	King County
Wildlife	
Chinook salmon streams	USFWS
Waterfowl areas	WDFW
Great blue heron rookeries	WDFW
Bald eagle management areas	WDFW
Natural Heritage locations	WADNR
Historic Resources	
Historic register and districts	WADAHP
Historic property inventory - named	WADAHP
Heritage barns	WADAHP

Various King County agencies maintain extensive GIS databases on natural and built environment conditions within the county. Tetra Tech purchased several King County GIS data sets on DVD for use in the analysis. Many of these GIS data sets were used directly in the analysis, or processed to derive new data to represent constraints and opportunities, including the following:

- Airpark
- Airport clear zone
- Arterial road corridors
- Water pipeline corridors
- BPA substation
- Railroads and railroad corridors
- Public right-of-way
- Parcels
- Structures (based on address points)
- Residential areas
- Coal mine
- Parks
- Recreational trails
- Streams and rivers
- Lakes
- Floodways and floodplains

- Wetlands – SAO
- Historic points
- Contours
- Unspanable slope 20 to < 40%
- Unspanable slope >= 40%
- Slopes 20%+

For the purpose of this process, only data sets that were readily available and in GIS form were used. Constraints of opportunities that were not easily identified in an available GIS data set (such as cultural resources, real estate issues, electric distribution lines, or non-high pressure natural gas pipelines) were not considered for the purposes of this study, but will be evaluated in future steps.

3.4 PRIMARY GIS CATEGORIES CONSIDERED FOR CONSTRAINTS AND OPPORTUNITIES

Study area conditions applicable to the key categories of constraints and opportunities are described below, along with a description of how the data were preprocessed for analysis.

3.4.1 Utilities

3.4.1.1 Transmission

The existing PSE 115 kV corridor runs between the Sammamish substation, the Lakeside substation, and the Talbot Hill substation (Figure 3-3). Transmission line corridors owned by BPA run along the north, east and south boundaries of the study area.

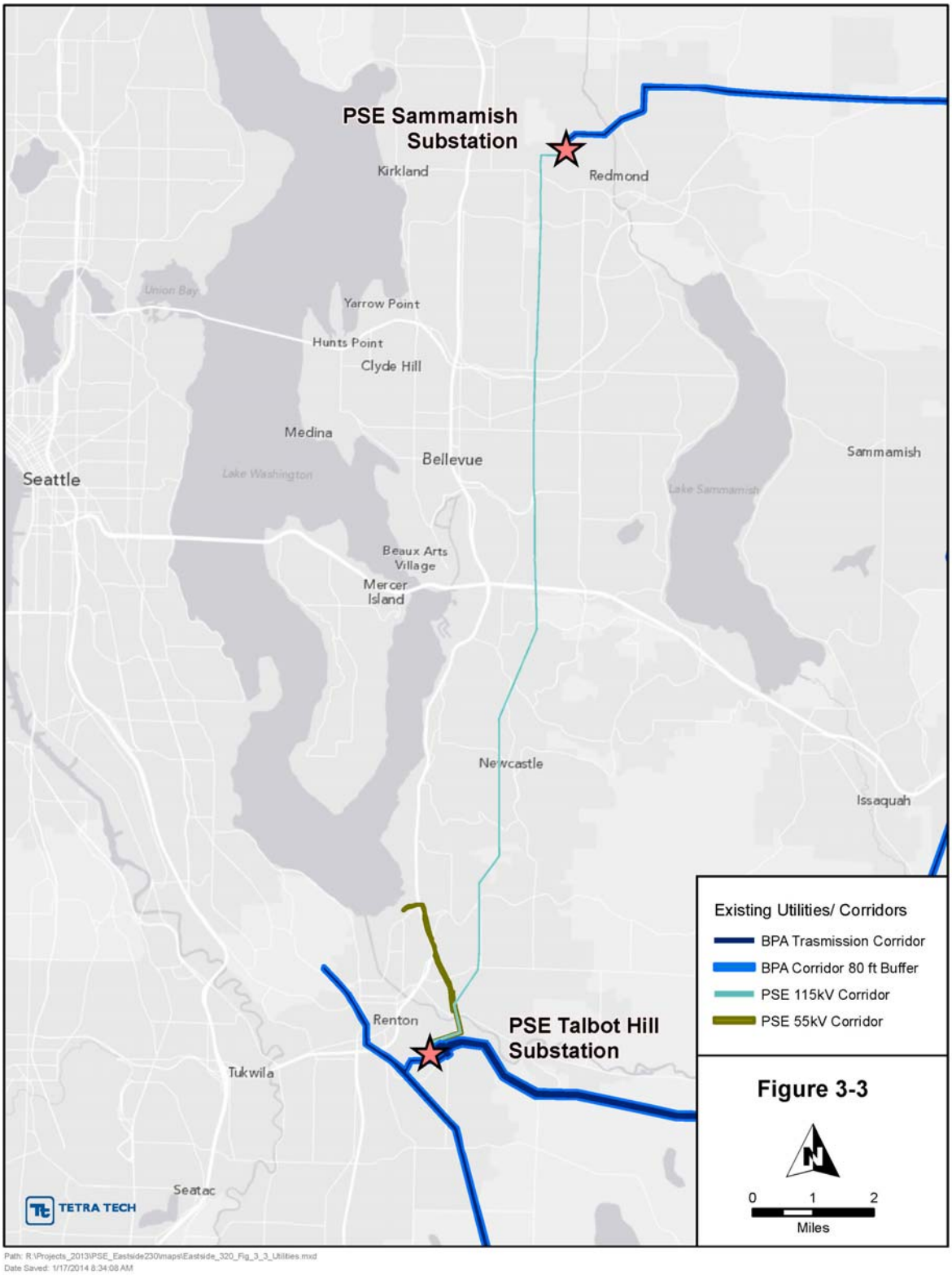

Figure 3-3. Utilities

PSE provided the locations of existing transmission corridors between the Sammamish and Talbot Hill Substations. PSE 115 kV and 55 kV transmission corridor systems were considered opportunities in the analysis. PSE's transmission system is primarily operated at 115 kV; however, a remnant 55 kV corridor still exists in the southern portion of the study area. This corridor can be upgraded to a higher voltage without a change in land use, so it was considered an opportunity. In order to accommodate the space requirements for the proposed 230 kV line, a buffer was applied to the 55 kV line corridor before including it in the analysis.

Based on past experience, BPA does not allow additional third party transmission lines within their corridors; therefore, existing BPA transmission corridors were considered a constraint. However, an 80 ft corridor (minimal area required for a transmission line) was created adjacent to BPA corridors and used in the analysis as an opportunity, since paralleling existing corridors is typically considered favorable during the permitting process.

3.4.1.2 High Pressure Natural Gas Pipeline (Northwest Pipeline)

High-pressure natural gas pipelines run along some arterial roads in the study area. The north-south trending sections potentially provide the most benefit, such as along 148th Ave. NE between NE 70th St. and Bel-Red Rd.; however, these sections are only small opportunities and do not contribute significantly to the siting analysis.

3.4.1.3 Fuel Pipeline (Olympic)

The Olympic Pipeline (fuel products) corridor is co-located with PSE's existing 115 kV corridor (between Sammamish and Talbot Hill) for most of its length in the study area. As a result, it was not included in the analysis so that the existing 115 kV corridor would not be double counted as an opportunity.

3.4.2 Transportation

3.4.2.1 Roads

The major vehicular routes through the study area are Interstate Highway 405 (I-405), I-90 and Washington State Route (SR) 520. Nineteen miles of I-405 runs north-south through the west side of the study area; I-90 runs east-west through roughly the center of the study area; and SR 520 meanders roughly east-west through the northern third of the study area (Figure 3-4). I-405 runs through the study area from Kirkland, through Bellevue, along the east side of Lake Washington, and finally through Renton in the south. I-90 runs across the north end of Mercer Island in the west, through Eastgate (Bellevue), past the southern tip of Lake Sammamish and finally through Issaquah and High Point in the east. SR 520 starts in Hunts

Point alongside Lake Washington, passes through Clyde Hill and Bellevue, and then terminates in Redmond along the northern edge of Marymoor Park. Based on past experience, the Interstate travel routes are considered impedances, as installation of transmission lines within those corridors has not been allowed. Additionally, in some locations spanning of such travel routes is restricted by WSDOT. Throughout the study area, there are several smaller state highways with similar restrictions. However, the study area is dominated with arterial roads, which are typically considered opportunities for transmission line routing. Arterial roads are often paralleled by existing transmission lines or distribution lines that can be overbuilt with transmission line, thereby affording a viable passage route through areas that have existing development.

To prepare arterial road corridors for analysis, King County's Transportation Network layer was buffered by 45 ft on either side of the road centerline. This provided the area necessary to place a 230 kV line along the roadways. A second buffer of 20 ft on both sides of the road centerline was then removed from the 45 ft buffer to create the polygons that roughly represent the buildable opportunity while excluding the paved surface. This approach was used to create an opportunity for routing along paved roadways.

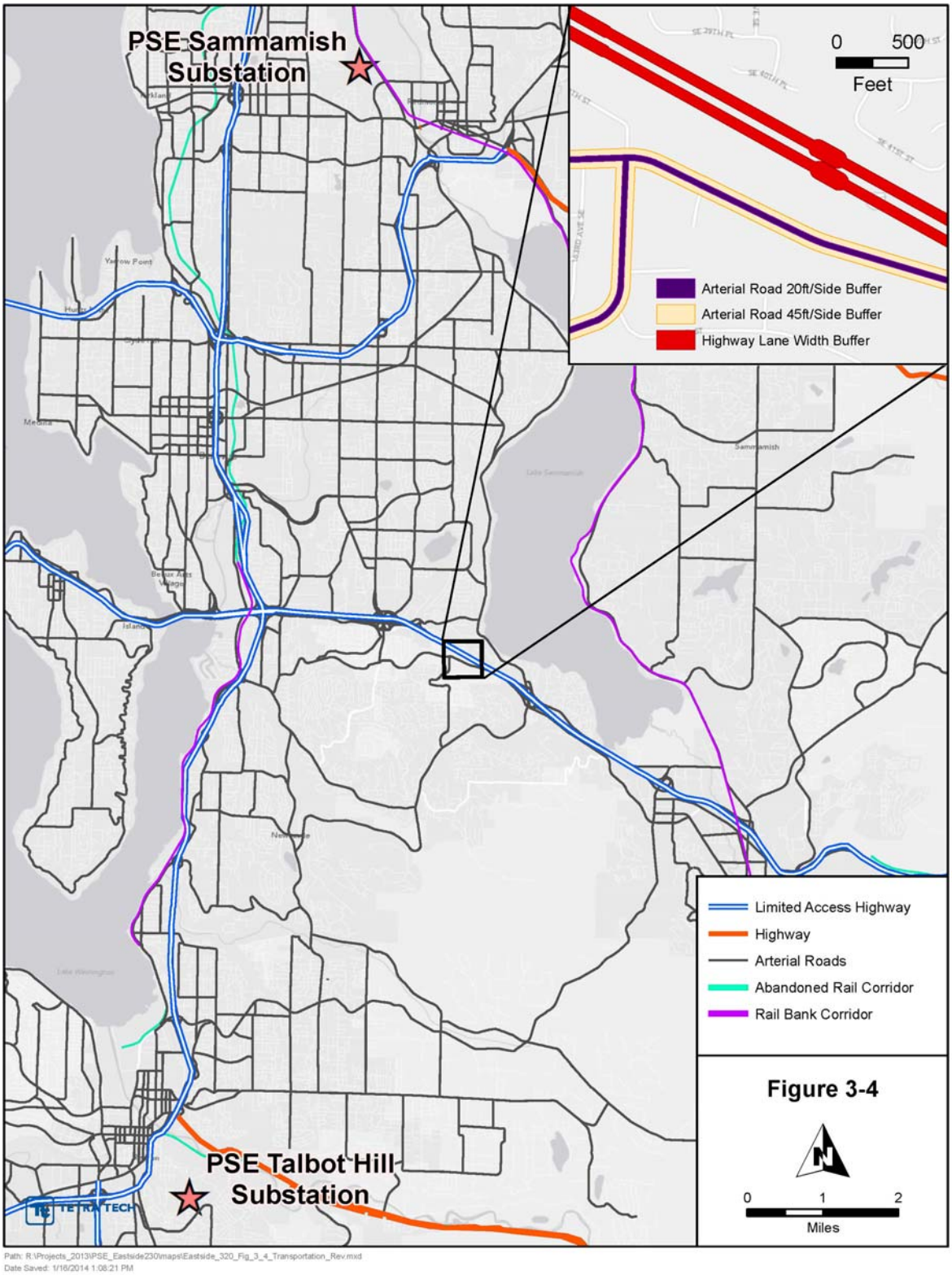

Figure 3-4. Transportation

3.4.2.2 Railroads

The Eastside Rail Corridor, which was formerly the BNSF railroad line, runs parallel to I-405 and Lake Washington in the western part of the study area. Although portions of this corridor have been mapped as "parks" lands, PSE has purchased easement rights along the majority of the corridor. This corridor offers routing opportunities for the proposed line because it is considered abandoned throughout the study area, and it runs in a north-south direction. There are some segments, such as along the southeastern edge of Lake Washington, that are also considered "rail banked," however, since this was considered only a minor impedance, the combined values of abandoned plus rail banked still leave this corridor as a relatively strong opportunity. Rail banks constitute rail corridors that can be converted to trails and other uses, while still preserving the ability to revert back to rail use under certain conditions.

Where active rail corridors existed, a 50-foot buffer was applied to provide an adjacent area of opportunity that would parallel them. For abandoned rail corridors, no buffer was applied because the corridor itself provided the opportunity.

3.4.3 Slope and Slope Stability

3.4.3.1 Slope

The topography of the study area is composed of mostly flat terrain and rolling hills separated by small valleys. The most significant topographic features running east-west are the incised drainages created by the rivers draining into Lake Washington. These include the Cedar River, May Creek, Coal Creek, and Richards Creek.

PSE design standards and experience indicate that transmission line construction on slopes greater than 20 percent is difficult, requiring special engineering measures, while slopes greater than 40 percent should be avoided. Areas with slopes greater than or equal to 20 percent were calculated from the elevation model. All slope areas greater than or equal to 20 percent were not included in the steep slope layer if at least 200 ft per slope was not present to site the transmission line. The remaining high-slope areas are wider than the standard structure span for the project, and were therefore considered "unspanable." The same process was done for slopes greater than or equal to 40 percent (Figure 3-5). If an area with a steep slope can be spanned within standard design limitations, then the slope is not considered an impediment to a specific route. Figure 3-6 explains graphically how the final result was attained.

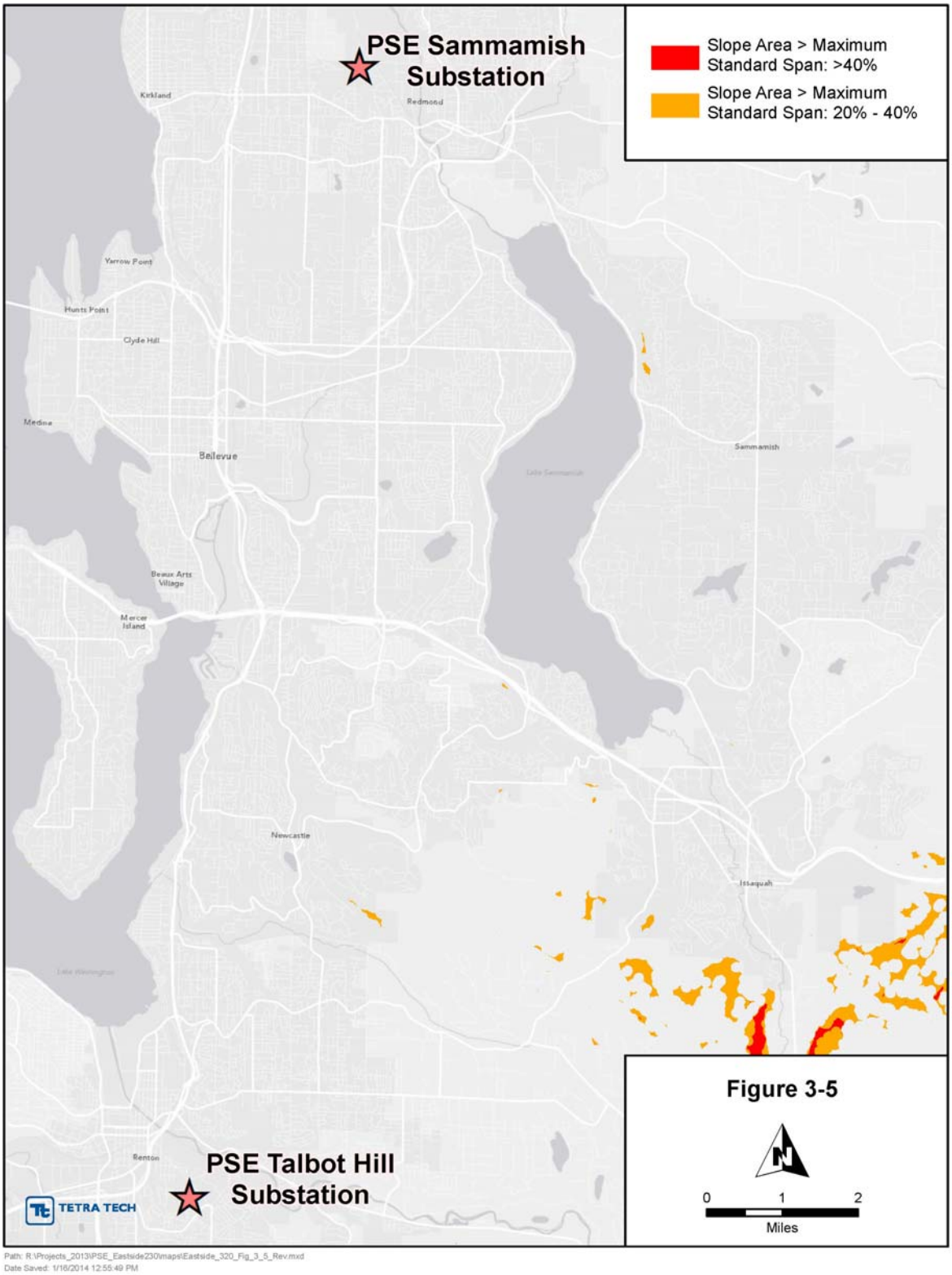

Figure 3-5. Unspanable Slope

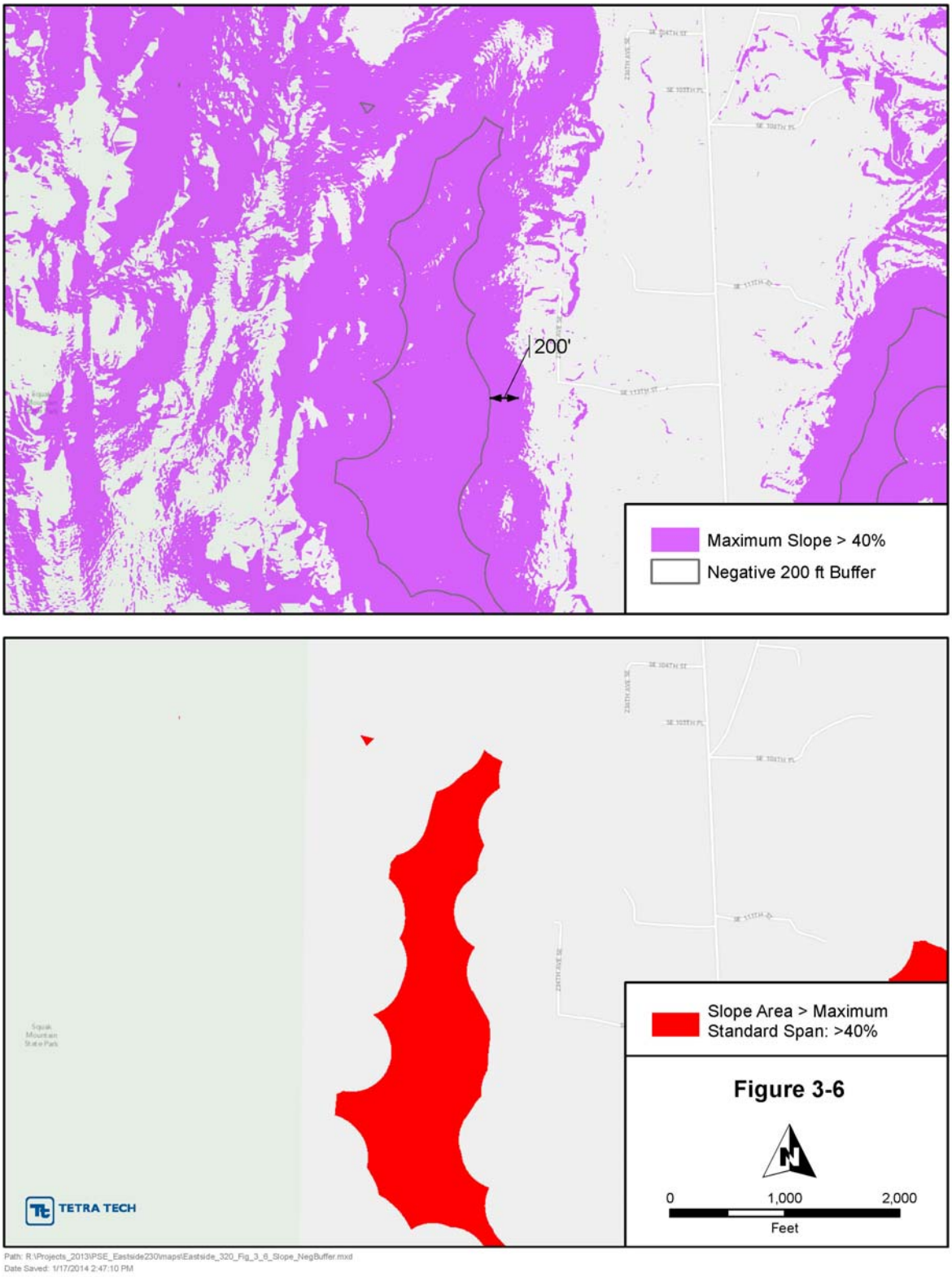

Figure 3-6. How Unspanable Slope Is Derived

3.4.3.2 Slope Stability

Figure 3-7 shows the various levels of slope stability. As shown, the large majority of land has stable slopes, including the existing PSE corridor. Areas of high instability occur mostly along valley walls. To reduce potential impacts, GIS mapped unstable slopes were avoided to the extent possible. This factor is important, especially during construction.

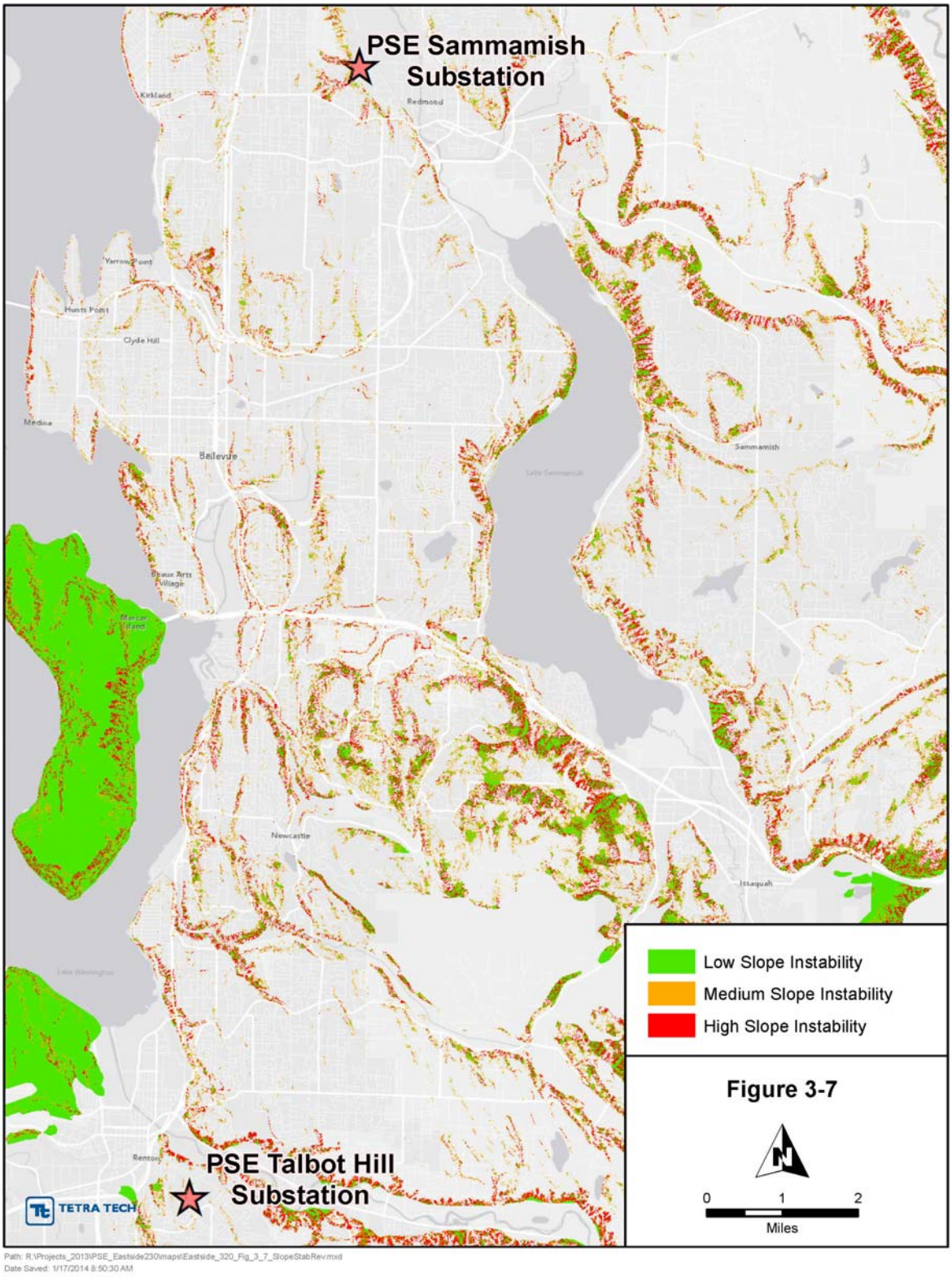

Figure 3-7. Slope Stability

3.4.4 Habitat

3.4.4.1 Waterfowl, Heron Rookeries and Bald Eagle Management Zones

Locations of priority habitat features were acquired from the WDFW GIS database. The identified priority habitat features in the study area are waterfowl areas, great blue heron rookeries, and bald eagle management zones. WDFW has identified priority waterfowl areas at the north and south ends of Lake Sammamish, Phantom Lake, Juanita Bay (part of Lake Washington), and several smaller lakes in the region that are classified as "Lakes With Waterfowl Use." The transmission line alternatives under consideration do not cross any of these GIS features.

Great blue heron rookeries are scarce within the study area. The nearest GIS mapped rookery to any alternative is 0.3 miles away in the Mercer Slough Nature Park.

Bald eagle management zones are designated by WDFW according to current conservation guidelines, and their locations were used unaltered in the analysis. Development of any transmission line within a bald eagle management zone will be subject to review and regulation by WDFW.

3.4.4.2 Fish and Wildlife Species

Streams in the Puget Sound region that provide Chinook salmon habitat are protected under the federal Endangered Species Act (ESA) and are considered a constraint to be avoided or spanned (Figure 3-8). Data for streams with known Chinook salmon use were acquired from the U.S. Fish and Wildlife Service (USFWS) GIS database. These mapped streams can be typically be avoided or spanned.

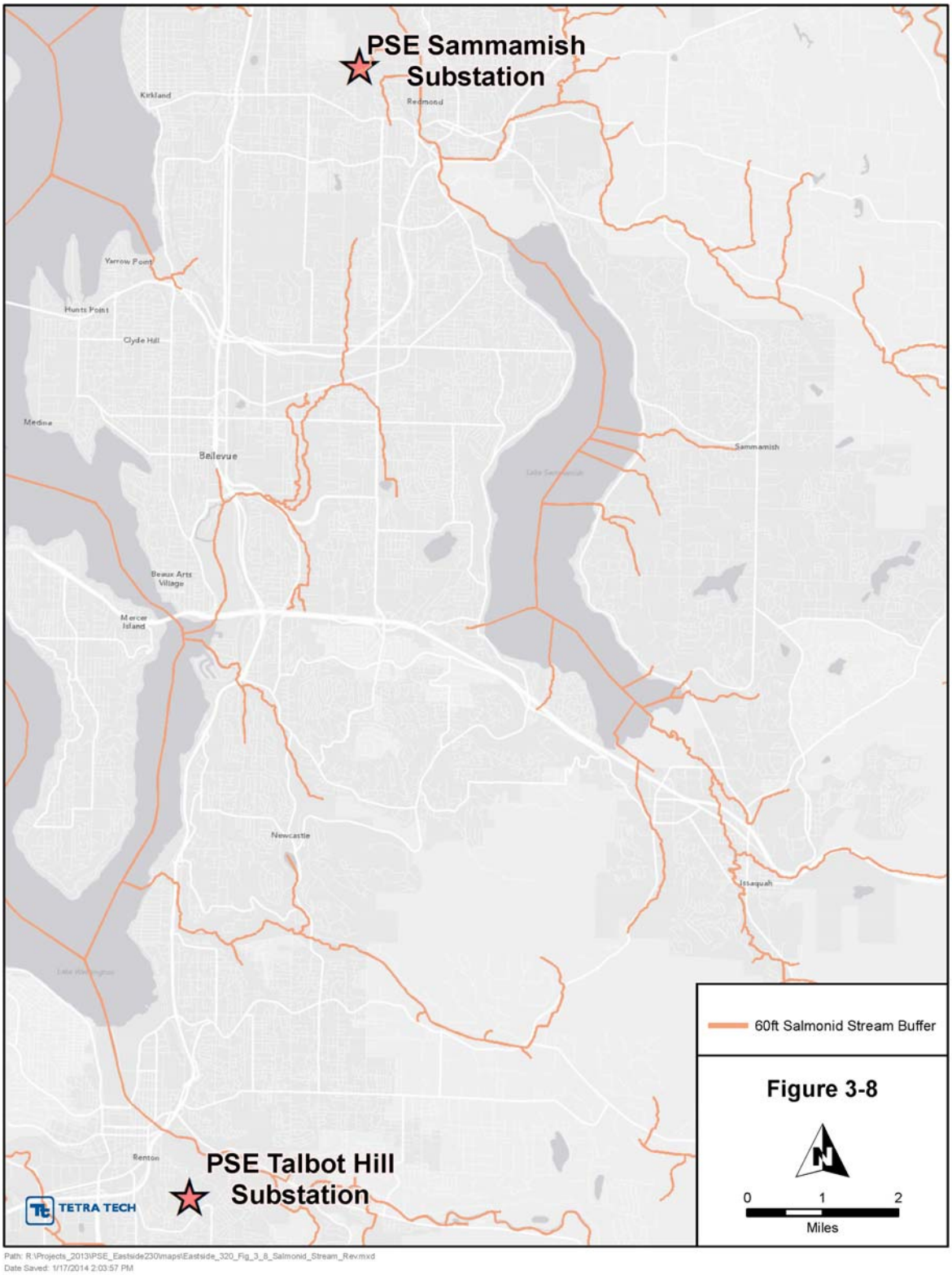

Figure 3-8. Salmonid Streams

3.4.5 Land Ownership

The optimum location of the transmission line is across land that allows for sufficient access, such as an easement owned by PSE, as this facilitates performance of maintenance and vegetation management in accordance with applicable clearance and safety requirements. As shown on Figure 3-9, private ownership is the predominant land owner type in the study area and would be a constraint if the transmission line had to traverse it. However, it is expected that most of the line can be constructed along existing road/utility corridors or overbuilt at existing overhead electrical line structure locations on PSE easement where the setting already includes both vertical and horizontal linear transmission facilities.

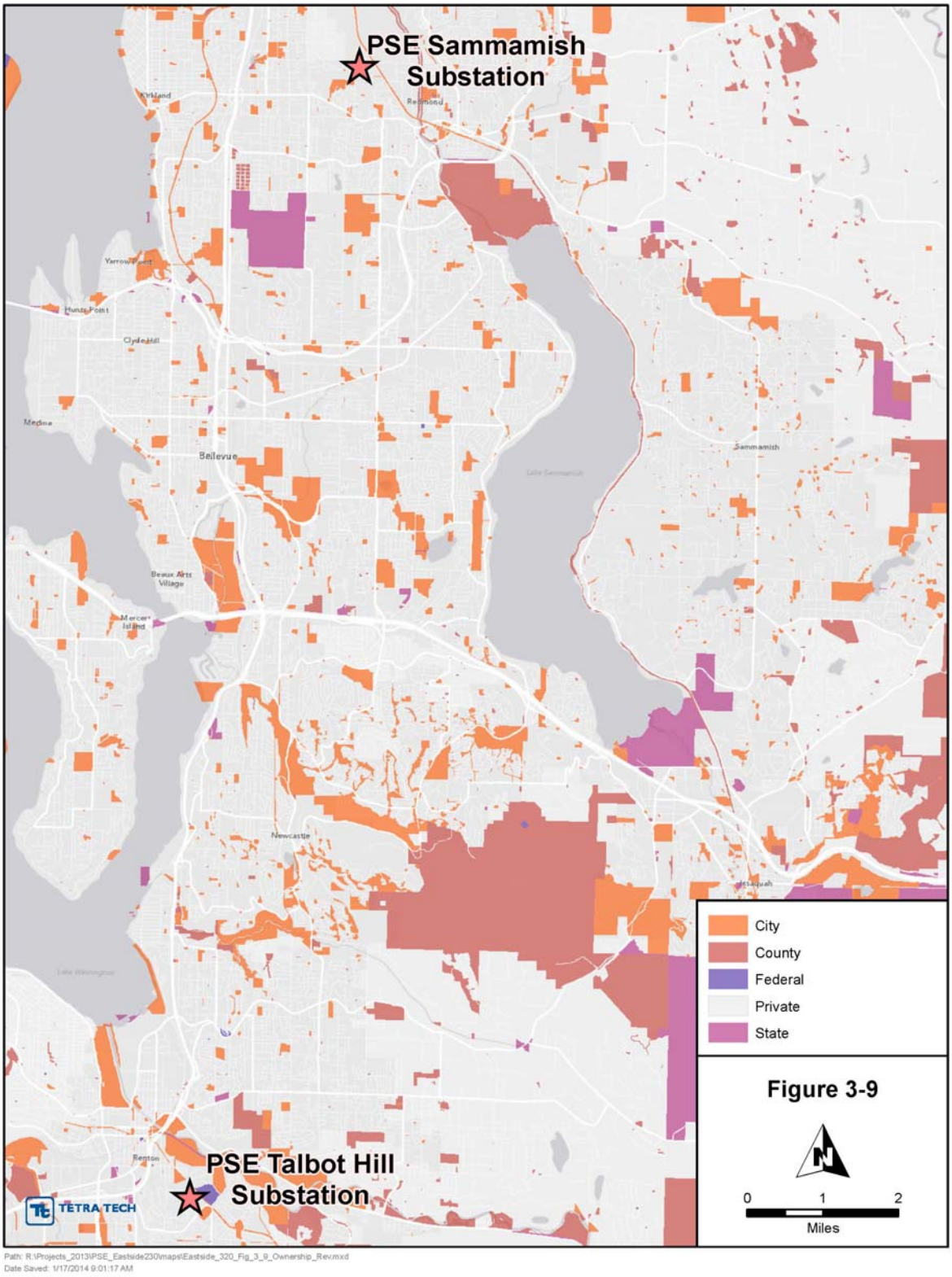

Figure 3-9. Land Ownership

3.4.6 Zoning/Land Use

Zoning and land use patterns were considered for purposes of this study based on two available GIS databases, a GIS database on current zoning (setting forth envisioned land use patterns such as agricultural, residential, commercial, etc.), and the tax assessors database based on current type of land use (commercial, residential, etc.). According to the zoning database, most of the land in the study area is zoned residential (Figure 3-10). More specific zoning and land use patterns and land use policy considerations will be evaluated in the next step of the process.

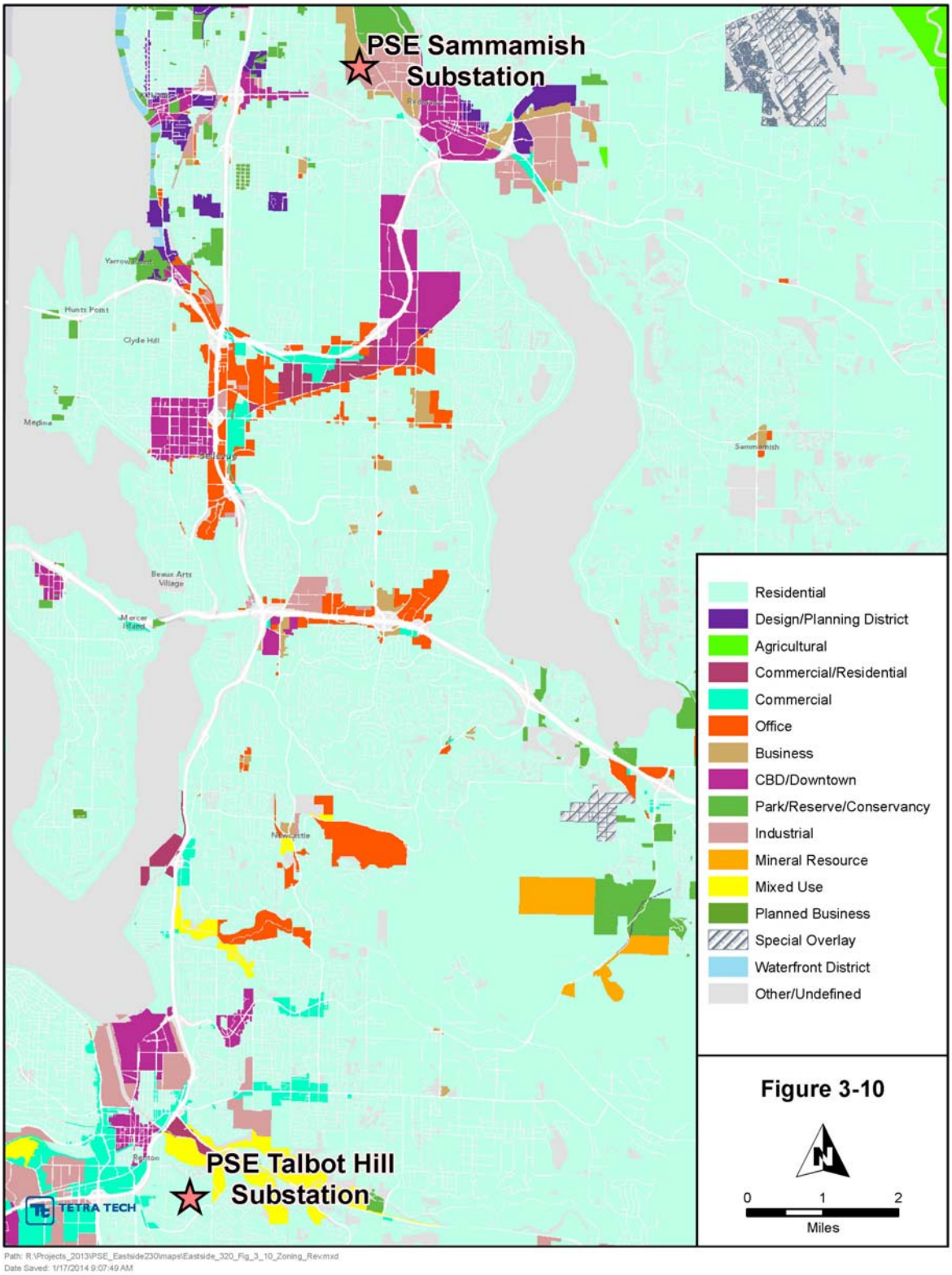

Figure 3-10. Zoning

3.4.7 Structures

Address point locations obtained from the tax assessor's GIS database were used as a proxy for occupied structure locations. In order to provide adequate avoidance, residential points were buffered by 100 feet, commercial locations were buffered by 160 feet, and trailers were buffered by 60 feet (Figure 3-11). Structure buffer density is high in the study area; therefore, buffers that overlapped onto roadways and existing corridors were removed as the structures would not be located in those areas (Figure 3-12). Additionally, without this modification, the address point layer density was too great to facilitate creation of viable routes.

Figure 3-11. Structure Buffer Process

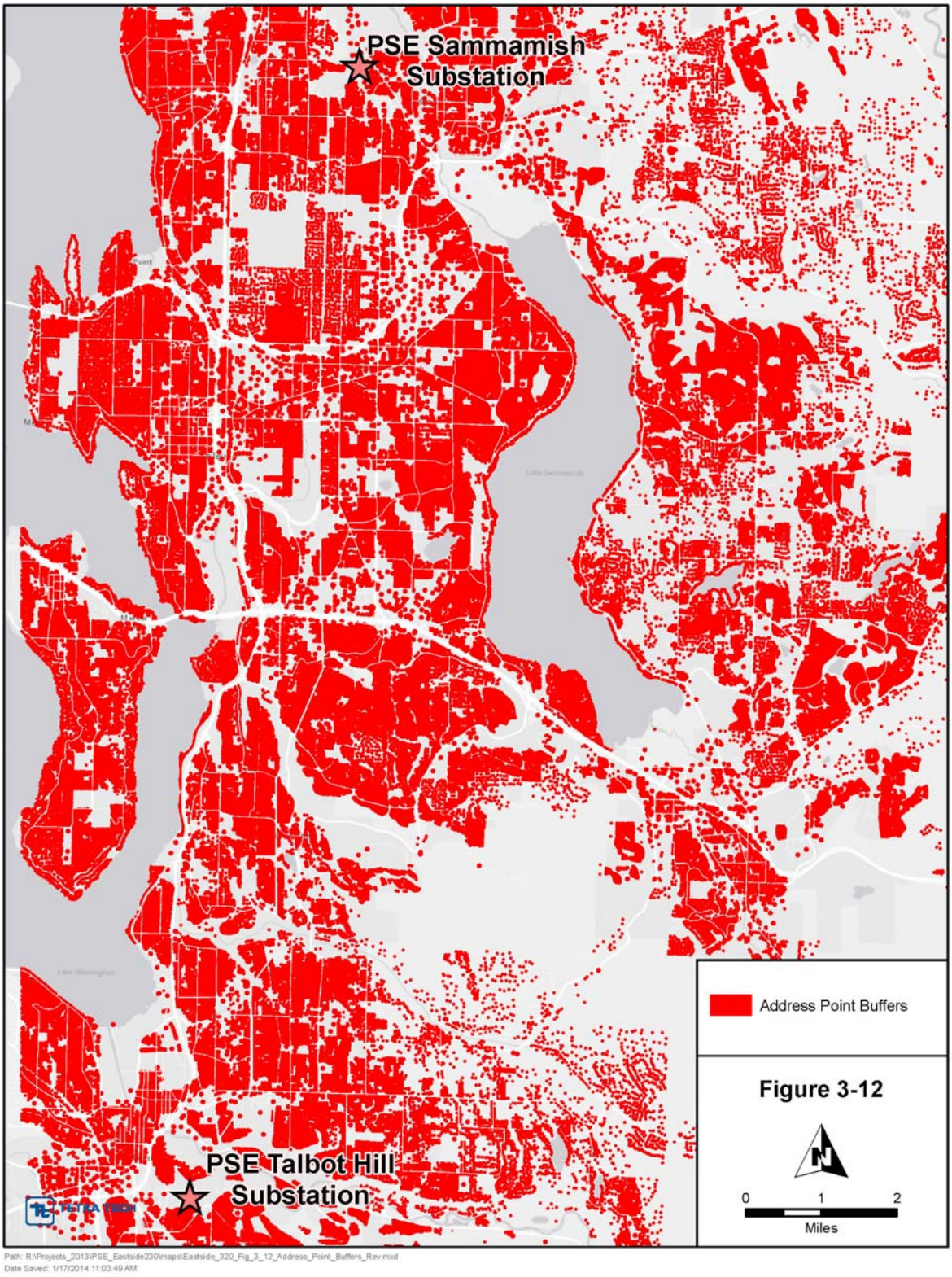

Figure 3-12. Buffered Address Locations

3.4.8 Parks and Recreation

The study area includes public lands designated as parks and recreational trails (Figure 3-13) using a GIS database from King County. While these lands can sometimes represent constraints for transmission line routing (with exception to the Eastside Rail Corridor, as described in section 3.5.2.2 above), they are relatively scarce and widely distributed, and therefore easily avoided.

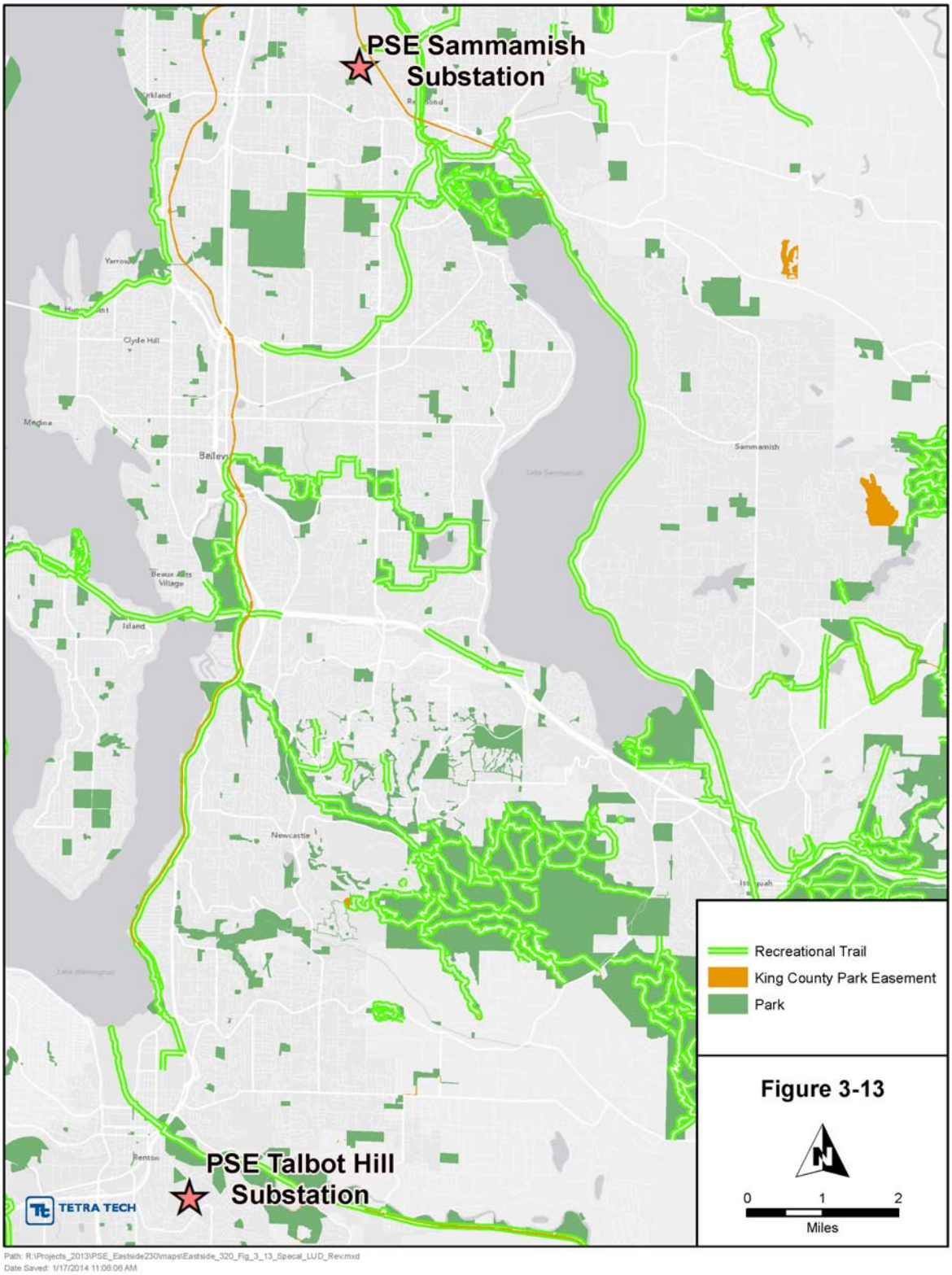

Figure 3-13. Special Land Use Designations

3.4.9 Historic Sites

Historic sites represent constraints, but also tend to be spaced well apart and can be easily avoided (Figure 3-14). For purposes of this analysis, data for Historic Parcels and Points were acquired from the King County GIS database. Cultural site data are classified as sensitive by the Department of Archaeology and Historic Preservation and therefore, were not included in the analysis. A review of cultural and historic sites will be undertaken during further route development, which is the next step of the process.

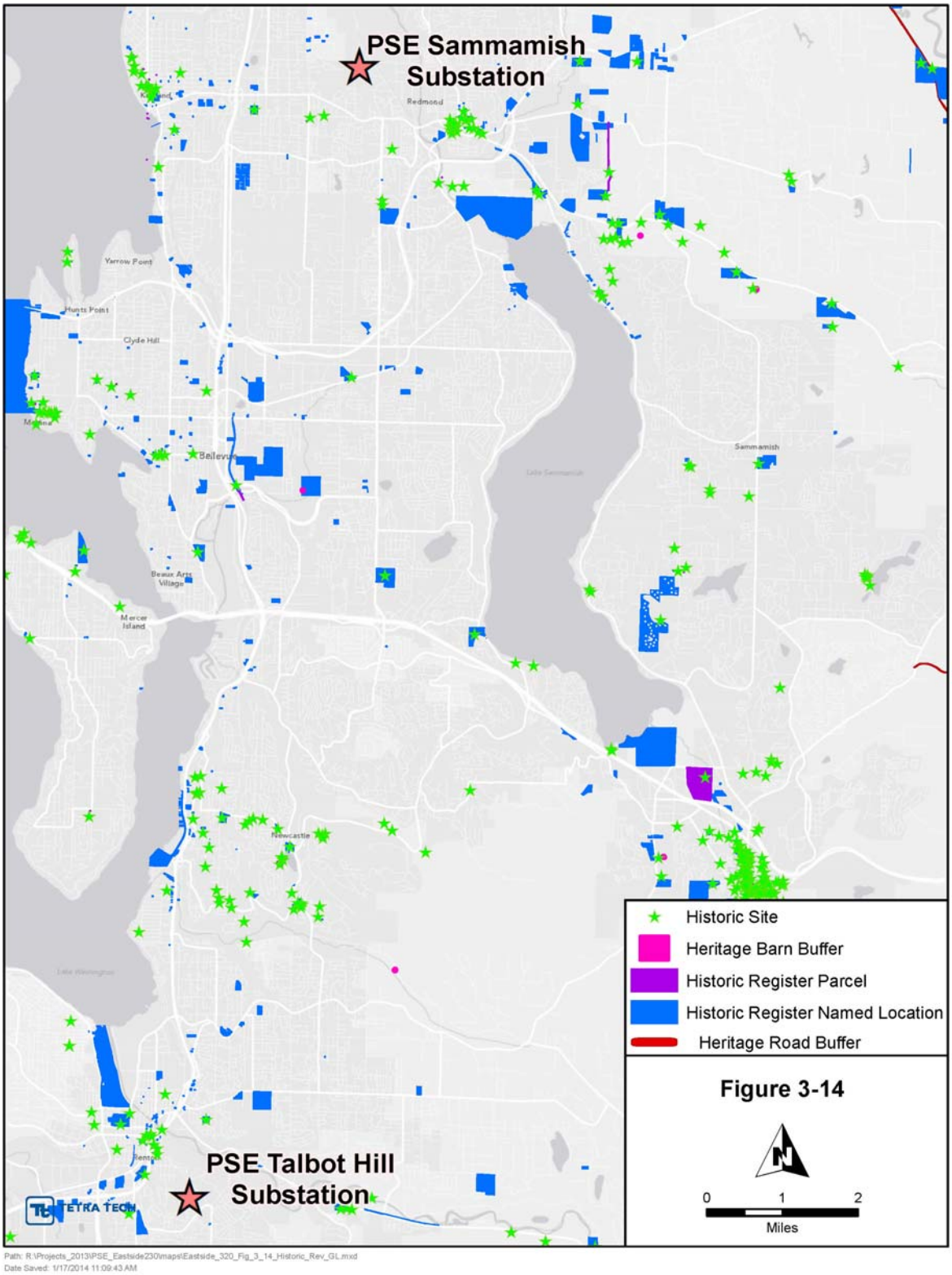

Figure 3-14. Historic Parcels and Points

3.4.10 Visual Resources

There is no GIS data available to effectively represent visual resource considerations in the routing analysis. Nonetheless, using existing corridors or ROW already occupied by existing lines can help minimize new visual impacts.

3.4.11 Waterbodies and Wetlands

There are a number of existing wetlands in the study area that could present constraints to routing a transmission line (Figure 3-15). Large wetlands can be routed around and therefore do not pose a serious problem. The wetlands in the project area occur mostly in river/stream floodways and floodplains, and around shallow lakes. Wetland locations were collected from the National Wetlands Inventory and King County.

Locations of water bodies, such as rivers, streams and lakes were collected from King County, as were the floodways and floodplains. These features can be spanned, except for Lake Sammamish, Lake Washington, Phantom Lake, Larson Lake, and Lake Boren, which can be routed around.

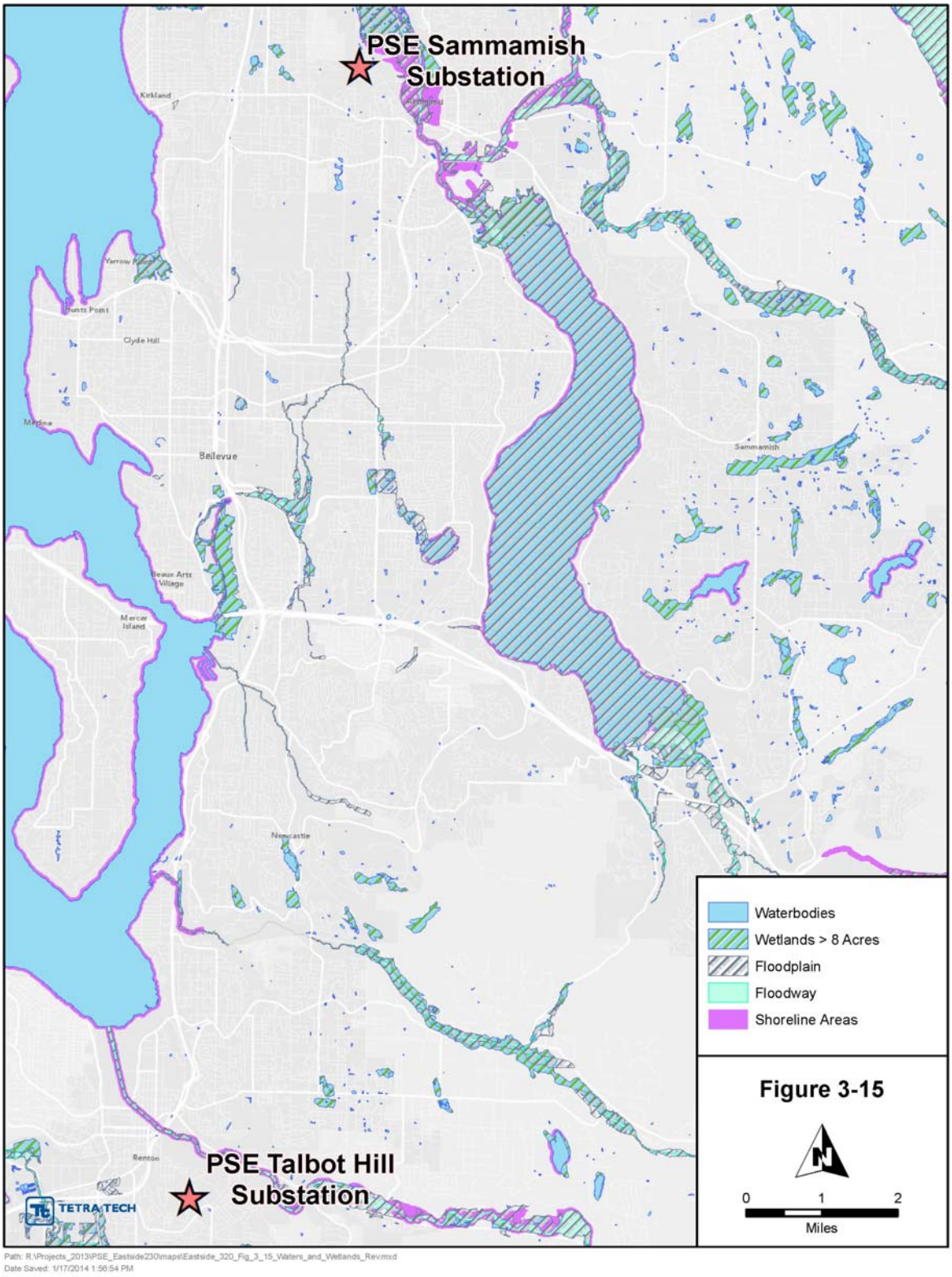

Figure 3-15. Water and Wetlands

3.4.12 Plants and Vegetation

The selected route must be compatible with PSE's vegetation management obligations, as well as applicable local, state, and federal species designated for enhanced protection. However, for the purposes of this study, only GIS mapped special habitat areas were considered. Washington Natural Heritage Program (WNHP) GIS data indicate that several rare, endangered or sensitive plant species occur in the study area. There is *Boschniakia hookeri* (S3) in Bridle Trails State Park, a *Pseudotsuga menziesii - Arbutus menziesii / Gaultheria Shalloon* Forest (S2) between Squak Mountain and Tiger Mountain, and a Forested Sphagnum Bog PTN (S1). S1 is the most sensitive of these categories, and the bog is over 4 miles east southeast of the Talbot Hill substation, and therefore does not influence the analysis. The S2 forest is over 8 miles east of the Talbot Hill substation, and not pertinent to the analysis. The S3 *Boschniakia hookeri* is 0.6 mile from a route segment; however, it is a small patch and easily avoided. In addition, King County and the local municipalities all have regulations regarding wildlife habitat conservation areas, as well as plant, significant tree, and vegetation disturbance in their jurisdictions that will be evaluated in the next step.

3.5 LRT ANALYSIS OF GIS MAPPED CONSTRAINTS AND OPPORTUNITIES

Following definition of the project study area, collection and processing of GIS data, and assessment constraints and opportunities, the LRT was used to identify transmission corridor options for further evaluation. Refinements to the corridors identified by the LRT were made after considering electric system feasibility and reviewing aerial photography, street maps, U.S. Geological Survey (USGS) topographic maps, and readily available knowledge of local conditions. Other criteria, such as engineering and construction feasibility, were also considered to a certain extent. Route distance minimization is built into the LRT as a standard parameter for route development. The respective steps in the transmission line route selection process are discussed below.

To select the best route options from the large number of possible routes, relevant attributes were evaluated simultaneously. Each of the environmental and engineering data sets identified in Table 3-1 were used to determine preliminary routes. Other criteria, such as total distance, engineering, and construction feasibility were also incorporated.

To enable this process, all of the datasets had to be normalized according to anticipated or potential constraints or opportunities associated with construction or operation of the proposed substation and transmission line(s). For that reason, the Project Team assigned values to each resource according to its relative contribution as an opportunity or constraint.

Tetra Tech staff collected existing available GIS files for land ownership, existing and future land use, public and private ROW, wildlife, vegetation, threatened and endangered (T&E) species, wetlands, topography, historical resources, and other factors that would influence the location of the proposed transmission line. The data collection process was designed to provide geospatial information on criteria that could represent either opportunities or constraints for the location of a transmission line.

Using the team's professional, multi-discipline expertise, the various data layers were individually weighted to reflect the varying degree of constraint or opportunity for each data set. The team's resource and LRT experts assigned values to the data layers (resources) using a progressive scale of values ranging from the most negative or adverse constraint, such as endangered species and residences, to the most positive or greatest opportunity, such as existing PSE ROW. Certain features were considered exclusion areas that could not be crossed under any circumstances because of regulatory, environmental, or engineering limitations. A matrix populated with these resources and their associated values was used as input to the LRT to identify potential transmission line routes. The GIS constraints and opportunities are listed in Appendix B.

The LRT combined these resource layer values and created an output file called the suitability grid, which represents a summation of all the constraints and opportunities for every point (grid cell) across the entire study area. Each grid cell was 10 feet by 10 feet in size, allowing for the model to look at the study area in relative detail. For each grid cell, the scores for each of the attribute layers were summed. The suitability grid can be likened to a landscape of opportunities and constraints that the corridor must traverse. The areas of greatest opportunity are the easiest to cross (valleys), while the areas of highest constraint (hills) are more difficult. The LRT generated multiple corridors across the suitability grid from PSE's Sammamish substation to PSE's Talbot Hill substation connecting via the potential transformation sites. An example of this output is shown in Figure 3-16. This figure depicts the optimal feasible route from the Sammamish to the Vernell substation, and from the Vernell to the Talbot Hill substation. Because all feasible routes include a transformation site between the Sammamish and Talbot Hill substations, all routes were modeled from the Sammamish substation to a potential intermediate transformation site, and then from that site to the Talbot Hill substation.

Multiple corridors, with varying degrees of opportunities and constraints were generated and used to develop alternative routes. To simplify analysis, each route was partitioned at the crossing points of routes to create unique segments. Each LRT segment was validated using professional judgment and ancillary resources such as aerial photographs, to help ensure they were realistic options. Once the segments were generated and validated, a composite score was calculated for each segment from the underlying suitability grid. The composite score for each segment was put into a deterministic model that considered over five hundred combinations of segments and substation sites. If parallel segments (i.e., typically less than a block apart) were identified during the model evaluation, LRT scores were compared to determine which segment would be used to develop routes.

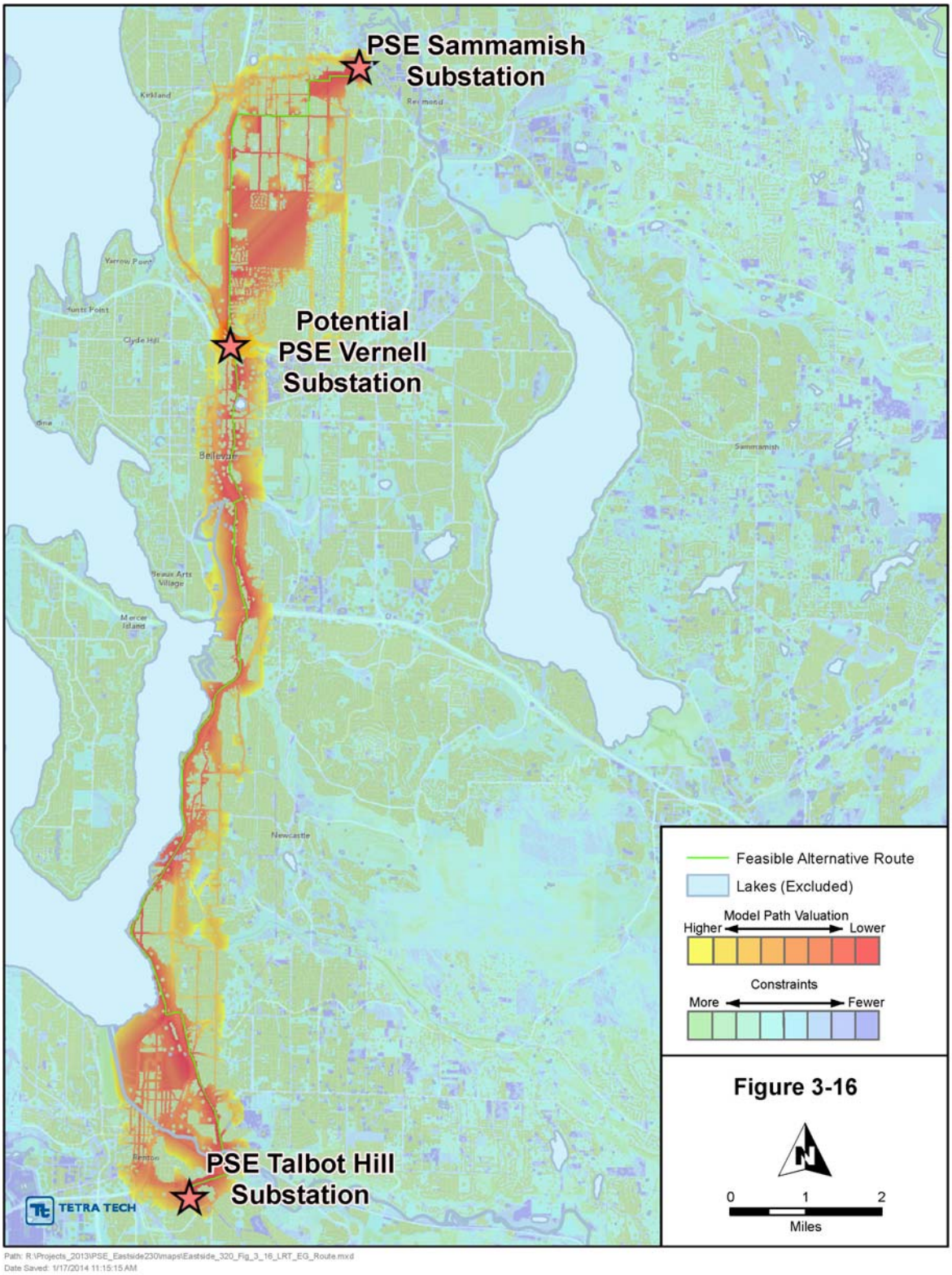

Figure 3-16. LRT Constraints and Opportunities, Corridor Grid and Route Alternatives

3.6 SELECTION OF ALTERNATIVES TO CARRY FORWARD

Because the Corridor Grid shows variations in the degree of opportunity and constraint, it is used to define route alternatives. Multiple corridors, with varying degrees of opportunities and constraints, were generated and used to develop alternative routes. To simplify analysis, each route was partitioned at the crossing points of routes to create unique segments. Each segment was then analyzed by the Project Team. This process has been used to help identify route options on many linear projects, further refining the professional judgment of the analysts over time. The analysis process also includes review of ancillary resources, such as aerial photographs, that add new and objectively verifiable information to the data sets that generated the corridor grid and route segments. By applying professional judgment to the data sets and ancillary resources, each LRT segment was validated to help ensure that they were feasible options. Once the segments had been identified, the constraint value score was calculated for each one. A constraint value model was developed that considered over 500 segment/route/substation site combinations. If parallel segments (i.e., typically less than a block apart) were identified during the model evaluation, LRT constraint values were used to compare and determine which segment would be used to develop routes.

A deterministic model was used to evaluate the LRT scores for each of the segment/route/site combinations. Negatively scored routes were eliminated from further consideration as they were not considered viable options. The top five percent of the positive routes were then mapped to assist further discussion and evaluation, with the segment combinations for these routes provided in Table 3-2, below. The mapping exercise revealed that there were four general subareas, which when combined, formed a "ladder" of route alternatives. The "leg" components of the ladder comprised the north-south running routes connecting the Sammamish, Talbot Hill, and one of the new transformation substations. Moving east to west between the "legs" could be accomplished by using one of the three cross-over segments or "rungs." The only exception to this being an additional north-south segment situated in the central part of the study area, south of I-90. To simplify future discussion, each of the fourteen legs and rungs were given a unique identifier (Figure 3-17).

Table 3-2. Route Segment Composition

Vernell 248	Vernell 249	Westminster 217	Lakeside 155	Lakeside 160	Lakeside 166
A	A	A	A	A	A
B	B	C	C	C	C
F	F	D	E	E	E
H	H	F	G2	G2	J
K1	L	H	G1	I	M
K2	N	L	H	K1	N
M		N	L	L	
N			N	N	

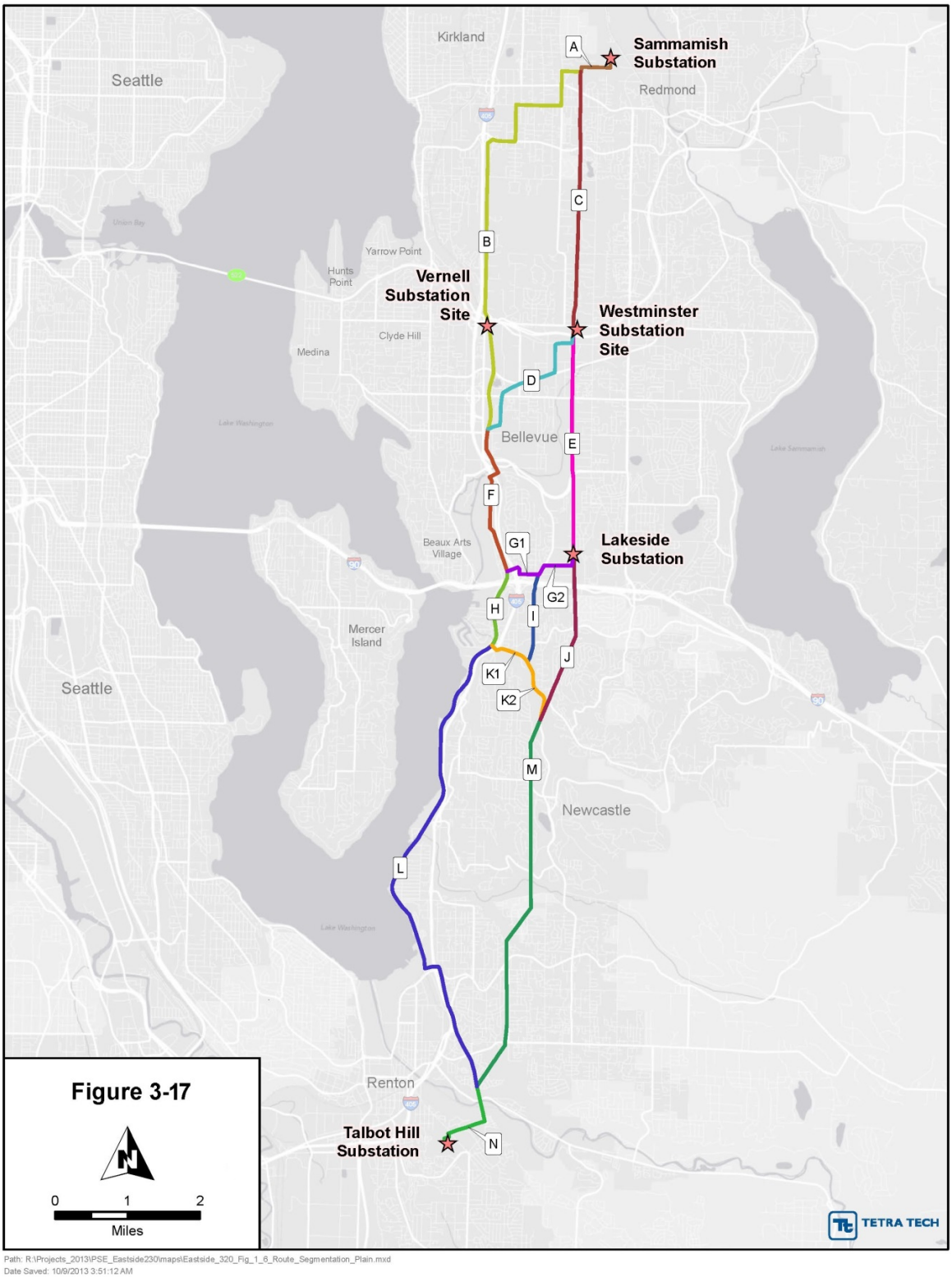

Figure 3-17. Route Alternatives with Unique Identifiers

4. Conclusion and Next Step: Viable Segments and Recommended Routes

Collection and synthesis of the GIS data sets identified throughout this report, analyzed by linear route selection professionals using the processes discussed above, supports the determination that all of the mapped segment combinations shown in Figure 3-17 can be used to develop a route capable of connecting the Sammamish Substation with the Talbot Hill Substation, while connecting to any one of the three new 230 kV intermediary substations.

Additional data collection and evaluation will be conducted in order to further refine the assessment of route segments, which will support a determination that the most viable route is one that is technically feasible and practicable for permitting, construction, and maintenance over time. Following a public review and input process, PSE will select the preferred route, which will then be subjected to project-specific land use and environmental review in support of permits to construct the new transmission facility.

5. Report Limitations

This assessment was developed in conjunction with Puget Sound Energy in an effort to assist in the selection of a feasible 230 kV transmission line route from the Sammamish Substation to the Talbot Hill Substation. The report was developed to describe the evaluation and selection processes. The need for future analysis may also be warranted if specific issues are identified that were outside the intended scope of this assessment.

As with any project that involves an evaluation of environmental and permitting factors, there is a certain degree of dependence upon available information that may not be readily verifiable without the implementation of thorough field programs. Data collected and used within this report were derived primarily from examination of records in the public domain and input from the project team's knowledge about the project area. The passage of time, manifestation of latent conditions, or occurrence of future events may require further study, as well as reevaluation of the findings, observations, and conclusions in the report.

APPENDIX A- Tetra Tech Routing Experience

Tetra Tech, founded in 1966, has provided siting and permitting services for AC and DC electric transmission lines for approximately 40 years in locations from California to Maine, including our current work on the longest contiguous electric transmission project in the nation, the Gateway West Transmission Project.

Listed below is a table of transmission siting projects in the West that Tetra Tech is currently supporting or has supported recently.

Client	Project	Location
Puget Sound Energy	Berrydale to Lake Holm (Krain Corner)	King County
Puget Sound Energy	Eastside 230 kV Project	King County
Idaho Power/ PacifiCorp	Gateway West 230 kV and 500 kV Lines	Wyoming and Idaho
Idaho Power	Boardman to Hemingway 500 kV Line	Oregon and Idaho
NV Energy	Falcon-Gender 345 kV Line	Nevada

APPENDIX B- GIS Constraints and Opportunities

Constrain/Opportunity	Value	Value Definition
Address point buffers (buildings); BPA substation; Large lakes	barrier	Exclusion areas that cannot be crossed under any circumstances due to regulatory, environmental or engineering requirements.
Highway polygons created using lane widths; WSDOT Utility Restrictions – restricted; WA Natural Heritage Project Critically Imperiled Species of Special Concern (S1); Water bodies, Airport; Transfer of development rights – receiving; Convenience Store with Gas; Service Station; Marina; Resort/Lodge/Retreat; 4-Plex; Air Terminal and Hangers; Apartment; Apartment (Co-op); Apartment(Mixed Use); Apartment (Subsidized); Campground; Condominium (Residential); Condominium (Mobile Home Park); Duplex; Fraternity/Sorority House; Retirement Facility; Townhouse Plat; Triplex; Gas Station; Mobile Home Park; Daycare Center; Golf Course; Historic Prop (Misc); Historic Prop (Office); Mobile Home; Reserve/Wilderness Area; Residence Hall/Dorm; Rooming House; School (Private); School (Public); Single Family (C/I Use); Single Family (C/I Zone); Single Family (Res Use/Zone)	-5	Very high impact (duration, regulation). Very difficult or impossible to mitigate (due to technology, sensitivity of resource or cost of mitigation).
Arterial Roads buffered by 20 feet; Landslide potential (class 3); Wetlands, large; Parks; Art Gallery/Museum/Social Service; Auditorium/Assembly Building; Church/Welfare/Religious Service; Club; Condominium Office); Park-Private (Amuse Center); Park- Public (Zoo/Arbor); Condominium (Mixed Use); Group Home; Health Club; Hospital; Hotel/Motel; Medical/Dental Office; Mini Lube; Movie Theater; Nursing Home; Office Building;	-4	High impact. Mitigation would be successful, but would be difficult to implement, very costly, and/or require a long time to complete.

Post Office/Post Service; Rehabilitation Center; Restaurant (Fast Food); Restaurant/Lounge; Skating Rink (Ice/Roller); Tavern/Lounge; Vet/Animal Control Service		
WSDOT Utility Restrictions – with exceptions; WA Historical Register; WA Historical Register Districts; Historic Property Inventory – named; WA Natural Heritage Project Imperiled Species of Special Concern (S2); Slope 20% or greater, unspanable; Slope 40% or greater, unspanable (combined with slope >20% results in a total of -6); Shorelines (200' Buffer); Waterfowl habitat; Heron rookeries; Bald eagle nest buffers; Native growth protection easement; River/Creek/Stream; Water Body- Fresh	-3	Moderate impact. Would not likely result in significant adverse impact. Mitigation, if necessary, would be fairly easy to implement.
WA Natural Heritage Project Rare or Uncommon Species of Special Concern (S3); Floodway; Floodplain; Coal mine hazards; Airport approach notification zone; Landslide potential (class 2); Utility, Private (Radio/T.V.); Retail Store; Shopping Center (Community); Shopping Center (Major Retail); Shopping Center (Neighborhood); Shopping Center (Regional); Shopping Center (Specialty); Retail(Discount); Retail(Line/Strip); Open Space Timber Land/Greenbelt; Open Space (Agriculture-RCW 84.34); Open Space (Current Use-RCW 84.34)	-2	Low impact. Mitigation, if necessary, would be easy to implement.
Scenic Byways buffered by 50 feet; Railroads (rail bank) buffered by 50 feet; BPA transmission corridor; Heritage Barns buffered by 100 feet; Landslide potential (class1); Salmonid streams buffered by 60 feet; Park easements, King County; Tideland, 1st Class; Auto Showroom and Lot, Bank; Bowling Alley; Car Wash; Convenience Store without Gas; Grocery Store; Service Building; Sport Facility	-1	Very low impact. No mitigation required.
Transfer of development rights – sending; Governmental Service;	0	No impact or impact not a concern.

Greenhouse/Nursery/Horticulture Service; High Tech/High Flex; Mining/Quarry/Ore Processing; Office Park; Retail(Big Box); Terminal (Auto/Bus/Other)		
High Pressure Gas Lines buffered by 75 feet; Farm; Mortuary/Cemetery/Crematory	1	Reduces impacts and mitigation requirements, and would facilitate permitting to a very minor extent.
Recreational Trails buffered by 10 feet; BPA transmission corridor buffered by 80 feet; Vacant (Commercial); Vacant (Multi-family); Vacant (Single-family)	2	Reduces impacts and mitigation requirements, and would facilitate permitting to a fairly minor extent.
Industrial Park; Industrial (Gen Purpose); Industrial (Heavy); Industrial (Light); Mini Warehouse; Terminal (Rail); Vacant (Industrial); Warehouse	3	Reduces impacts and mitigation requirements, and would facilitate permitting to a moderate extent.
Arterial Roads buffered by 45 feet; Railroads (abandoned) buffered by 50 feet; PSE 55kV corridor; Easement; Parking (Assoc); Parking (Commercial Lot); Parking (Garage); Right-of-Way/Utility-Road; Utility-Public	4	Reduces impacts and mitigation requirements, and would facilitate permitting to a large extent.
PSE transmission ROW buffered by 50 feet	5	Reduces impacts and mitigation requirements, and would facilitate permitting to a very large extent.

Exponent®

City of Bellevue
Electrical Reliability Study
Phase 2 Report

EXCERPTS

DSD 000320

City of Bellevue
Electrical Reliability Study
Phase 2 Report

Prepared for:

Sheida Sahandy
Assistant to the City Manager
City of Bellevue
450 110th Ave. NE
Bellevue, WA 98004

Prepared by

Walter Bak, P.E.
Robert Smith, Ph.D., P.E.
Stig Nilsson, P.E.
Exponent
149 Commonwealth Drive
Menlo Park, CA 94025

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Executive Summary

Study Results

The City of Bellevue (the City) retained Exponent to perform an electric system reliability assessment to assist the City in meeting its goals to be an informed stakeholder and to work with Puget Sound Energy (PSE) to ensure a reliable electric power supply for the City. The study was performed to answer the following questions from the Electric Reliability Study Plan[1]:

1. *"How does PSE's existing system serving Bellevue perform relative to the Washington Utilities and Transportation Commission (WUTC) expectations, industry standards, and peers relative to reliability?"*

   There are over 90 circuits in Bellevue and while the performance on individual circuits can vary, the overall system in Bellevue is reliable.

   Electric system reliability is measured by the availability of the system to deliver electric power to a customer's meter in accordance with voltage and frequency requirements specified by the WUTC.[2] Reliability is therefore a measure of the probability that electric power is delivered in accordance with those requirements. Electric system reliability is typically measured based on the frequency (System Average Interruption Frequency Index [SAIFI]) and duration (System Average Interruption Duration Index [SAIDI]) of outages relative to the number of customers.

   WUTC has established reliability goals for its regulated utilities (service quality indices). Prior to 2010, the measures included SAIFI (frequency of outages per customer) and SAIDI (duration of outages per customer) goals for PSE of 1.3 and 136 minutes, respectively, excluding major storm events. While PSE has not always met the SAIDI goals system-wide, Bellevue's reliability has met the SAIFI and SAIDI goals over the past 5 years. In 2010, the reliability in Bellevue measured 0.44 and 66 minutes, respectively for SAIFI and SAIDI. In 2010, the measure for SAIDI was changed to include a 5-year average including major storm events and PSE met that goal system-wide. They will report this measure for Bellevue's circuits in 2011.

   PSE participates in an industry reliability survey through the Institute of Electrical and Electronics Engineers. PSE's overall system reliability performance is typically in the 1st or 2nd quartile on SAIFI (frequency of outages) and 2nd or 3rd quartile in SAIDI (duration of outages) (with the 1st quartile being best performance). PSE's 2010 performance for SAIFI and SAIDI was 0.86 and

[1] Reference 10.

[2] Washington Administrative Code (WAC)480-100.

129 minutes, respectively, and as shown above, Bellevue had significantly better reliability performance.

2. *"What changes relative to facilities, equipment, planning, and emergency operations will improve electric system reliability, communication, and outage response in Bellevue?"*

   While there has been improvement in the reliability of the Bellevue system over the past several years, the following enhancements are required to ensure continued improvement in reliability for the City:

   - Hardening of the Bellevue system to ensure appropriate redundancy to all substations and circuits.
   - Continued focus on underground cable replacement and remediation as well as replacement of older switches and transformers placed in underground vaults.
   - Review of specific circuits within the City that experience lower reliability to identify improvement actions.
   - Accelerate investments in distribution automation (including a Distribution Management System [e.g., Supervisory Control and Data Acquisition]) to improve reliability and to enable future technologies.
   - Develop strategies to provide greater opportunities for undergrounding lines experiencing lower reliability due to tree and storm impacts.
   - Improvements in the information technology infrastructure for outage management and customer interface to specifically improve communication and outreach to customers during outages on the system.

3. *"Will the City have adequate and reliable power supply to meet future City growth needs?"*

   Based on current plans, the City will have an adequate and reliable power supply to meet the medium-term (5–10 years) and long-term (10–20 years and beyond) growth requirements. The current plan includes:

   - Capacity additions, including upgrade of the 115 kV lines running north-south through Bellevue.
   - Addition of transformer banks to support growth in the Downtown, Bel-Red, and Eastgate/Somerset areas.
   - Upgrade of 115 kV lines to support additional transformer banks.
   - Support of PSE plans to significantly reduce the peak electric power demand through the use of more efficient electric lighting and equipment.

4. *"What opportunities are available to the City to work with PSE, regulators (WUTC,* Federal Energy Regulatory Commission*), and other stakeholders to ensure the needs and expectations of Bellevue's residents and businesses are met relative to the reliability of the power supply?"*

   Bellevue's role as an informed stakeholder requires that the City take an active role in becoming informed on matters affecting the reliability and planning for the electric system in Bellevue. This role includes direct communication with PSE as well as other stakeholders regarding electric service. Specific opportunities for the City to engage as an active stakeholder include:

   - WUTC: The City has a role in informing lawmakers and commissioners regarding matters that affect reliability. The City also has the opportunity to comment or participate in matters directly affecting PSE and its interaction with WUTC. It may be possible for Bellevue to support measures for investment brought forward by PSE that support its overall City goals for electric system reliability and service.

   - PSE: The City has many opportunities to proactively interact with PSE on issues related to system reliability, long-term planning, near-term major project planning, Smart Grid initiatives, and emergency planning.

5. *"How can the City measure and monitor whether improvement in reliability is being achieved?"*

   This reliability assessment includes recommendations for the City to consider moving forward. Proposed reliability improvement metrics have also been included to assist the City in measuring and monitoring the implementation and effectiveness of these recommendations.

This reliability study provides the analyses and recommendations to support the City in meeting its goals to be an informed and active stakeholder and to ensure that the City has an adequate and reliable electric system now and into the future.

Recommendations Summary

The outcome of this reliability assessment is a set of recommendations that will support the City's efforts to meet its stated goals. The recommendations are summarized below:

1. **Conduct Joint City/PSE Reliability Workshops—**The City should conduct an annual reliability workshop with PSE to perform a review of the following topics that relate to reliability in Bellevue:

   - Specific Circuit Reliability: The City should request reliability metrics (SAIDI and SAIFI) on a circuit basis. This will provide the City with information regarding the performance of circuits throughout the City and provide a basis for the City to work with PSE to identify appropriate means to improve performance.

- The City should trend circuit performance over time to identify the effectiveness of completed reliability projects (review number of outages and causes to trend improvement). This assessment provides the City with a means of reviewing the overall Downtown performance and performance for specific neighborhoods that have experienced frequent outages (such as neighborhoods with overhead circuits).

- Equipment Reliability Projects: The City should request a list of the current PSE projects identified for Bellevue (both funded projects in the capital plan and those waiting future funding) to understand the potential reliability improvement efforts for Bellevue.

- Maintenance and Inspection Program Results: PSE should identify to the City any new items likely to significantly affect the electric system reliability from its review of maintenance and inspection programs during the prior year.

- System Redundancy Projects: The City should review the design improvements that are being added to the Bellevue system.

- Automation Installation: The City should review with PSE the automation improvements that are being added in the Bellevue system. The City can monitor the overall upgrades to the system and the degree of system automation.

2. **Joint City/PSE Planning Workshops—**It is recommended that the City engage PSE in an annual planning workshop around future projects. The Comprehensive Plan includes an electric system plan that can serve as the basis for the annual workshop. The workshop should focus on the following items:

   - Current growth projections and electric power use in Bellevue

   - Review and update of current plan

   - Actions for capacity projects required to initiate siting and permitting activities within the next 2 years.

   An outcome of the workshop should be an updated plan for inclusion in the Comprehensive Plan (if required) and an action plan to move designated projects forward into siting analysis and/or planning.

3. **Integrated Resource Planning (IRP)—**The City should remain active in the IRP process and should begin to understand potential long-term impacts of this strategy.

4. **Vegetation Management—**The visual review of overhead circuits indicates that there are many substations and lines located in heavily wooded areas. The only way to significantly improve reliability is to perform more comprehensive tree

trimming. The City should review its vegetation policies, specifically in the areas of substations, to look at alternative vegetation approaches.

5. **Community Communications—**City personnel involved in emergency response should meet with PSE to understand the capabilities of the new outage management system (when completed) to assist in communications with the Bellevue community.

6. **Emergency Response Capability—**The City and PSE should consider the development of a more formal process (procedure) related to response and support activities during an outage. The outcome should be an agreement (or procedure) for communication and coordination during large-scale events affecting Bellevue.

7. **Energy Efficiency Improvements—**The City should lead the energy efficiency effort to assist PSE in reaching its long-term electric energy usage goals to help ensure adequate electric power supply during peak power periods for the City. Electric energy savings programs require active outreach to the customers and citizens to support various efficiency initiatives. The PSE long-term plan has a large reliance on reducing the electric energy demand by installing lower power consuming appliances and lighting systems. The City will have a major role to play in terms of City policy and regulations that support efforts that are alternatives to building additional power plants to supply peak power during high demand periods. The City will also have a major role in community outreach.

8. **Undergrounding of Distribution Lines—**The City should investigate opportunities for additional undergrounding of distribution lines through coordination of multiple utility projects and evaluation of local improvement districts. The City's Comprehensive Plan requires undergrounding of new distribution lines and strategies should be developed to increase opportunities to convert overhead lines to underground circuits.

9. **City Interface with WUTC—**Bellevue's involvement with WUTC should be one of informing lawmakers and commissioners regarding matters that affect reliability. This involvement should include:

    - Assigning a designated individual to electric system matters. This individual should remain informed of electric system activities related to WUTC.

    - Developing "white papers" for submittal to WUTC to inform the Commission of issues affecting electric reliability in the City. This provides a means to provide feedback to WUTC without direct response to hearings.

    - Commenting on or participating in matters directly affecting PSE and their interaction with the WUTC.

There are several additional recommendations that can be incorporated into the recommendations listed above. These include:

10. **Smart Grid Strategies—**PSE has identified a series of Smart Grid technology projects that are being considered over the next 2 years. These projects include a range of programs from the base infrastructure required to enable the Smart Grid to specific customer-related efforts. The City should review the overall PSE plan and determine its level of support for the various customer initiatives. The City needs to define a Smart Grid approach that it would like to see implemented in Bellevue, specifically addressing the level of support for customer interface applications, such as customer energy management, demand response, home automation, etc. The City should work with PSE to develop a Bellevue deployment plan consistent with PSE obligations. (Include with Recommendation #1)

11. **Long-Range Planning—**The City and PSE should synchronize their growth projections for the City by frequent information exchange on expected projects, expected timing of projects, and coordination of actions required by PSE and the City to address these projects. This exchange is meant to assist longer-term planning and should occur well in advance of any specific permitting or development activities. (Include with Recommendation #2)

12. **Multi-Utility Planning—**The City should engage with its utility partners to identify new projects (both large and small) to maximize efficiency for projects in the rights-of-way. The City can take advantage of projects that require trenching to place conduit for potential future use of undergrounding. The existence of conduit may allow for more economic alternatives for undergrounding in the future. (Include with Recommendation #1)

Detailed descriptions of these recommendations are included in this report.

Conclusions

This assessment of the electric system serving the City has shown that electric system reliability is improving and that the programs and projects shown in PSE's planning documents should continue to improve system reliability. However, successful execution of plans, programs, and projects is required to ensure that there is an adequate and reliable electric power system serving the City.

The recommendations offered for consideration by the City are intended to provide a basis for the City to become an informed and active stakeholder relative to decisions and actions required to support continued and improved electric system reliability.

2.2.8 Recommendations

Based on the outage assessment and the current status of PSE's programs to respond to these events, the following recommendations are made to improve the City's ability to be a more proactive participant in improving reliability:

- There are several programs underway to address prevention of outages and to reduce duration of outages. The City can and should proactively monitor the progress and extent of those programs focused on improving the reliability of the City's power distribution system. This will require the City to add staff with power system know-how.
- The City should investigate opportunities for additional undergrounding of distribution lines through coordination of multiple-utility projects and evaluation of funding for conversion of overhead lines to underground cable circuits by forming local improvement districts.
- PSE has ongoing reliability initiatives and performs system-wide and targeted projects to improve system reliability. The City should track the reliability impacts experienced in the various neighborhoods. Since, in the future, PSE will be reporting additional reliability information including storm outages, the City can utilize this information to determine the effectiveness of the various reliability programs and projects, and to work with PSE in identifying circuits requiring attention. A fast track implementation of system improvements is an option for the City to explore with PSE, although accelerated investments might have a negative impact on the power rates.
- The visual review of overhead circuits indicates that there are many substations and lines located in heavily wooded areas and the only way to significantly improve reliability is to perform more comprehensive tree trimming. The City should review its vegetation policies, specifically in the substation areas, to look at alternate vegetation approaches where the risks for large-scale disturbances related to vegetation issues is high.

The remainder of the section provides a discussion of the overall system design and work processes relative to the potential for reliability risk.

2.3 Review of PSE's System Design

2.3.1 Scope

System design has a major impact on electric reliability from the standpoint of limiting outages and reducing the restoration period in response to events. This section provides an assessment of the current PSE system relative to the overall design and layout of the Bellevue distribution system. The review of PSE's system design is intended to identify potential opportunities or vulnerabilities in the overall electric power system relative to reliability within Bellevue.

2.3.2 Approach

The assessment was performed solely through a review of publicly available WUTC documents, publically available PSE and other documents, and limited discussions with PSE's staff. In addition, a walk-through of PSE's substations and control centers was a part of the review in order to obtain an understanding of PSE's design practices. PSE proprietary and confidential documents were not made available for the review. The information reviewed for this assessment is listed below and was discussed with PSE personnel during meetings on these topics:

- Distribution System Design, Loadings, and Operations
- Transmission System Design, Loadings, and Operations
- Capital Project Planning and Prioritization
- Projects and Reliability Initiatives in Bellevue
- Substation and Line Maintenance and Problem Investigations
- PSE Electric Substation Work Practice Standards
- PSE Electric Relay Work Practice Standards.

The WUTC information included in Washington Administrative Code (WAC) 480-100 series was also reviewed as part of this assessment.

2.3.3 State of Washington Requirements

2.3.3.1 Relevant State Codes

WUTC provides oversight of electric utilities through regulations codified in WAC Chapter 480-100. As noted in WAC 480-100-001, the purpose of these regulations is "to administer and enforce chapter 80.28 of Revised Code of Washington (RCW) by establishing rules of general applicability and requirements for consumer protection, financial records and reporting, electric metering, and electric safety and standards". The principal statutes that define WUTC's authority and responsibility with respect to electric utilities are found in RCW Title 80. WUTC regulates electric non-public power utilities, such as PSE[44]. These laws provide the basis for the operations of the electric utilities and how they must conduct business. A more detailed discussion of the regulations and their impact on system reliability is provided in Section 4.2.1.

A brief summary relative to the regulatory impacts on reliability are:

- Requirements for maintaining fair rates subject to rate case hearings: These requirements have an impact on the utility's capital expenditures and projects selected each year.

[44] WUTC does not have jurisdiction over the Public Utility Districts (PUD) or Municipal Utilities.

- Requirements for power quality that define voltage range provided to the customers: This item requires both the utility and end-users (major industrial or power users) to manage their assets to minimize voltage fluctuations on the system.
- Requirements for submitting annual reliability reports: Regulated utilities are required to submit reports on electric system reliability and on actions taken to improve reliability. This requirement also has a major impact on the selection of capital projects and maintenance each year.
- Requirements for interacting with jurisdictions relative to access to rights-of-way in order to maintain a safe and reliable system.
- Guidance on renewable, energy efficiency, and environmental concerns: The State provides requirements and incentives to utilities to promote reductions in power use and the use of environmentally friendly power sources.

2.3.3.2 PSE's Regulatory Environment

Based on this review it was concluded that the state of Washington has codes and requirements similar to other states. However, the code requirements are less detailed than, for example, those of the state of California, which has issued detailed regulations in regard to design, operation, and maintenance of the electric power system.[45] California's key code sections are:

- General Order 95—Rules for Overhead Electric Line Construction
- General Order 128—Rules for Construction of Underground Electric Supply and Communication Systems
- General Order 165— Inspection Cycles for Electric Distribution Facilities.

That is, the state of California has issued detailed rules for design, construction, and maintenance of facilities. No similar rules have been found among WUTC's rules. Thus, it appears as if PSE can design and operate its power system with a higher degree of freedom. However, it still has to meet prevailing standards such as the National Electric Safety Code.[46]

According to information provided by PSE, expenditures and investment costs to be included in the rate base are not reviewed and approved in advance by WUTC but are reviewed after the expenditures and investments have been made. That is, PSE carries the entire risk for investment decisions that it makes until the investments have been made and are presented to WUTC for inclusion in the rate base. If WUTC does not find the investments or expenditures to be prudent it might not allow for these costs to be included in the rate base. In some other states, such investments may have to be preapproved by the regulators prior to initiating the project or starting construction.

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[45] See http://docs.cpuc.ca.gov/gos/index.html for information about the California codes.

[46] IEEE Standard C2-2012 National Electric Safety code: ISBN: 9780738165882 (Latest Issue).

2.3.4 Review of PSE's Power Supply

Electric reliability depends on a stable power supply. Relative to the City, the power supply starts with generation and transmission assets feeding the distribution assets in Bellevue. Since the power flows to whatever loads are connected, it is not possible to evaluate the power generation portion specifically related to Bellevue. The Bellevue-specific aspect of the power supply relates to having transmission lines that are capable of supplying the generated power to the City. This section provides a brief synopsis of the current power supply situation for Bellevue.

2.3.4.1 Risk Analysis—Present Generation Capacity

Generation capacity has been sufficient to support the overall PSE electric demand at present, including Bellevue. However, issues have arisen about the ability of wind energy to be delivered through the transmission system in the Northwest from wind power plants in eastern Washington, Idaho, and Oregon.[47] This has not caused power supply problems for Bellevue but indicates that the location of PSE's power supply sources is important and that bottlenecks exists outside of PSE's service territory that can impact how much power PSE will be able to transfer over transmission lines that are not owned by PSE. The risk to Bellevue related to insufficient generation available to PSE cannot be quantified because data are lacking to enable such an analysis. A detailed discussion of generation issues is provided in Section 3 with the review of the Integrated Resource Plan (IRP).

2.3.5 Risk Analysis—Bulk Power Transmission System for Bellevue

2.3.5.1 Scope

PSE operation depends on power wheeling over relatively few transmission lines. This task entailed reviewing the contingencies under which PSE might lose all or a significant amount of the power it needs to keep its customers supplied with electric power in order to assess any potential risks to reliability.

2.3.5.2 Present Transmission System Design

The City receives its electric supply via a 115 kV looped subtransmission system that is connected to primary substations at Sammamish (to the north) and Talbot Hill (to the south). These two stations, in turn, are connected to the high-voltage transmission grid that serves the northwestern states, and receive energy from a mixture of fossil fuel and renewable sources, often located many miles away from Bellevue. The 115 kV lines roughly encircle the City and feed several distribution substations, which step the voltage down to 12.5 kV, a voltage which can more readily be routed through the neighborhoods of the City. It is important to note that most (although not yet all) of these distribution substations are fed from the 115 kV system using two different lines, a method which provides redundancy should one line experience a

[47] See http://www.nytimes.com/2011/11/05/business/energy-environment/as-wind-energy-use-grows-utilities-seek-to-stabilize-power-grid.html for a discussion of wind power issues in the Pacific Northwest.

fault or if maintenance on a line is required. On the 12.5 kV system, the service transformers, whether located on poles, underground, or as ground-level "pad-mounted" units, further reduce the voltage to the familiar ones we all use, such as 120, 240, or 480 VAC, and also provide 3-phase service to commercial and industrial customers.

Figure 30 provides a map of the existing 115 kV system for the City and the surrounding area. The map also shows an existing, double circuit (two 3-phase circuits on one pole) 230 kV line that is owned by Seattle City Light which is not available for power transmission into the City, although the line affects the power flows on other lines owned by other entities in the region. PSE has two 230 to 115 kV, 325 MVA transformers and three 115 kV lines feeding power north up to the City from its Talbot Hill substation. The two lines from Talbot Hill to Lakeside carry about 157 MW each under N-0 conditions (normal winter peak load with all circuits in operation).[48] The map also shows five 115 kV circuits feeding power from the north into the City. These terminate in the Sammamish substation, where there are also two 230/115 kV, 325 MVA transformers installed to feed power into the 115 kV lines.

The Talbot Hill and Sammamish substations receive power from 230 kV lines connected to the Bonneville Power Administration's (BPA) Maple Valley substation (which is shown in Figure 31) and from its Monroe substation to the northeast of Sammamish. The Maple Valley substation is located a short distance to the east of Talbot Hill. Figure 31 also shows the 230 kV line that comes from BPA's Monroe substation to PSE's Novelty Hill substation (not shown on the BPA map) and from there a transmission line extends west where it is terminated in PSE's Sammamish substation, which has a total of three 230 kV line terminations. One of these is leased from BPA by PSE. This line loops south from Sammamish via Klahanie to BPA's Maple Valley Substation. This lease expires in 2018 at which time the lease has to be renegotiated or the line reverts to BPA's control. The third line connects PSE to the Seattle City Light substation at Bothell.

[48] Reference 33 (Section 28, Reliability/Availability of Systems). N is the number of elements in the system and the minus zero designation means that no element is missing or out of service.

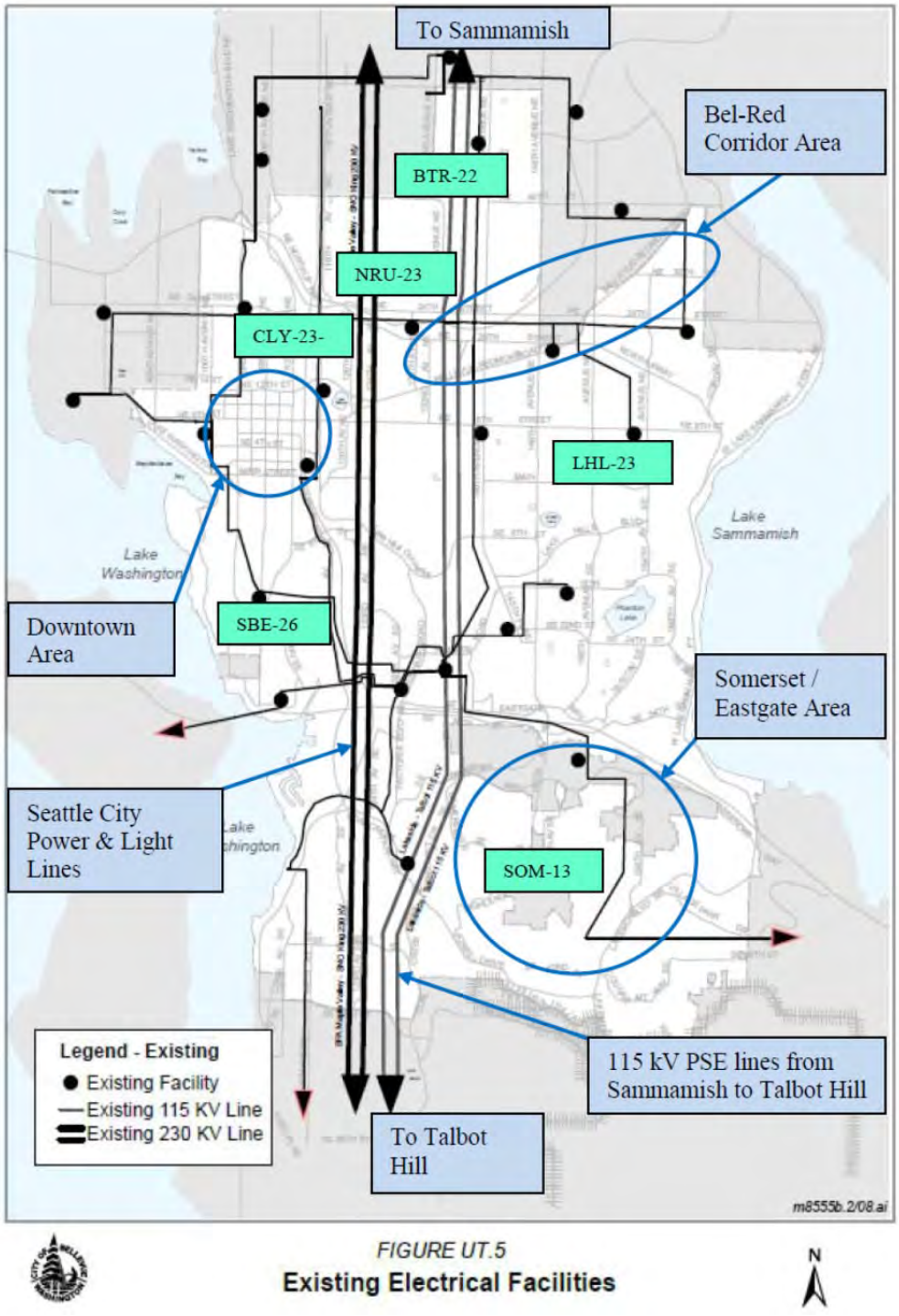


Figure 30. Existing Transmission Facilities around the City of Bellevue

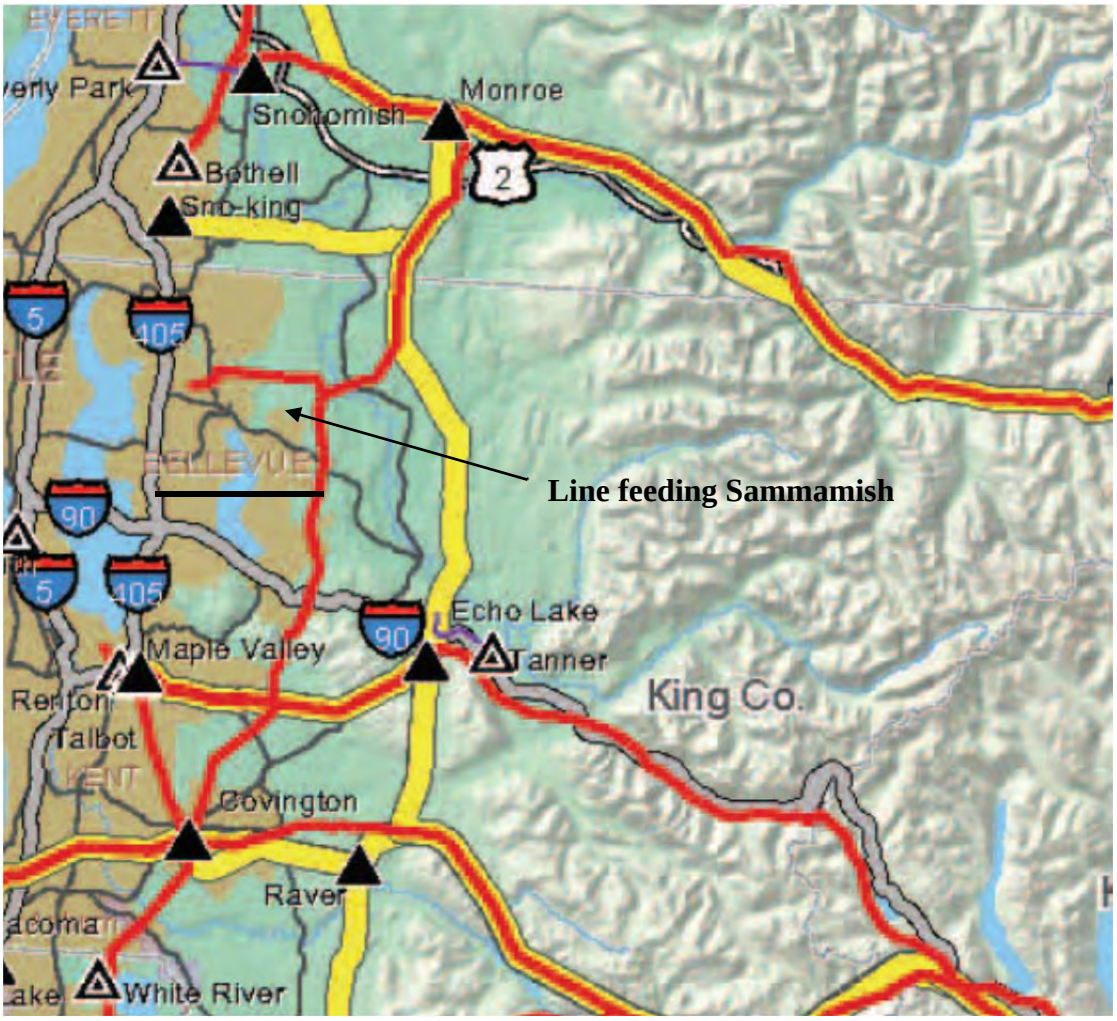


Figure 31. BPA's 500 kV (Yellow) and 230/345 kV (red) lines East and South of Bellevue

2.3.5.3 Bulk Power (230 kV) Transmission System Assessment

BPA's Maple Valley substation is a strong source supplied via 500 kV lines, whereas the Sammamish substation receives its power via longer 230 kV circuits from the Monroe, Bothell, or Maple Valley substations. (PSE also owns a 230 kV line going from Sammamish to the Bothell substation, which is owned by Seattle City Light.)

A loss of the 230 kV line to Monroe or the one to Maple Valley (N-1 contingency) is a serious stress to the City's power supply but should not cause any outages in the City.[49] There will be a future need for better voltage support to the Sammamish substation in order to support growth in the City and the surrounding areas.[50] Conversion of one of the 115 kV lines between Talbot

[49] Loss of the 230 kV lines from BPA was one of the reasons (but not the only one) for the widespread power outage in 2006. (Based on interview with PSE personnel; see also Reference 34)

[50] Interview with PSE planners.

Hill and Sammamish to 230 kV and installation of a 230/115 kV, 325 MVA transformer in the Lakeside substation will also be needed to support the region's expected future growth.

2.3.6 115 kV Transmission System Review

2.3.6.1 Scope

PSE's 115 kV system is considered a subtransmission system with transmission service being provided by BPA. This review consisted of assessing PSE's 115 kV transmission system, since disturbances on the 115 kV system would be most likely to cause power system disturbances in Bellevue.

2.3.6.2 System Load Scenarios and Planning Assumptions

PSE is a winter peaking utility. Therefore, transmission system outages have a larger impact in the winter than a similar outage during the summer period, since the summer peak load is only about 65% of winter peak.

PSE has not experienced any load growth since 2008. The planned growth has therefore been shifted foreword by a couple of years. The present planning criteria is for 0.5% annual growth for the immediate future and a growth rate of about 1% per year for the next 10 years.

PSE builds its transmission infrastructure to minimize outages and avoid overloads on the 115 kV transmission system on an N-1 basis (N-1 is the first contingency). This is defined as a Category B event by the North American Electric Reliability Corporation (NERC). NERC defines a Category C event as an N-2 contingency case (two simultaneous events). An example of this is a breaker failure (the first event) that would lead to clearing all circuits connected to a substation bus (the second event). For this contingency, according to the NERC rules, PSE is allowed to drop non-consequential load.

PSE also tries to minimize many so called N-1-1 events. That is, with one outage in the system, planned or unplanned, it tries to be in position to handle a second, unplanned outage. However, this is not possible for some portions of the 115 kV transmission system where a portion of the City is fed via a single 115 kV line. A loss of this line might cause power disruptions to a portion of the power users in the City. For example, as is shown in Figure 32, the loss of the single, radial line to Lake Hills would cause a loss of power to those connected to the substation, unless power can be provided via a looped 12.5 kV distribution circuit that can be fed from another 115 kV substation.

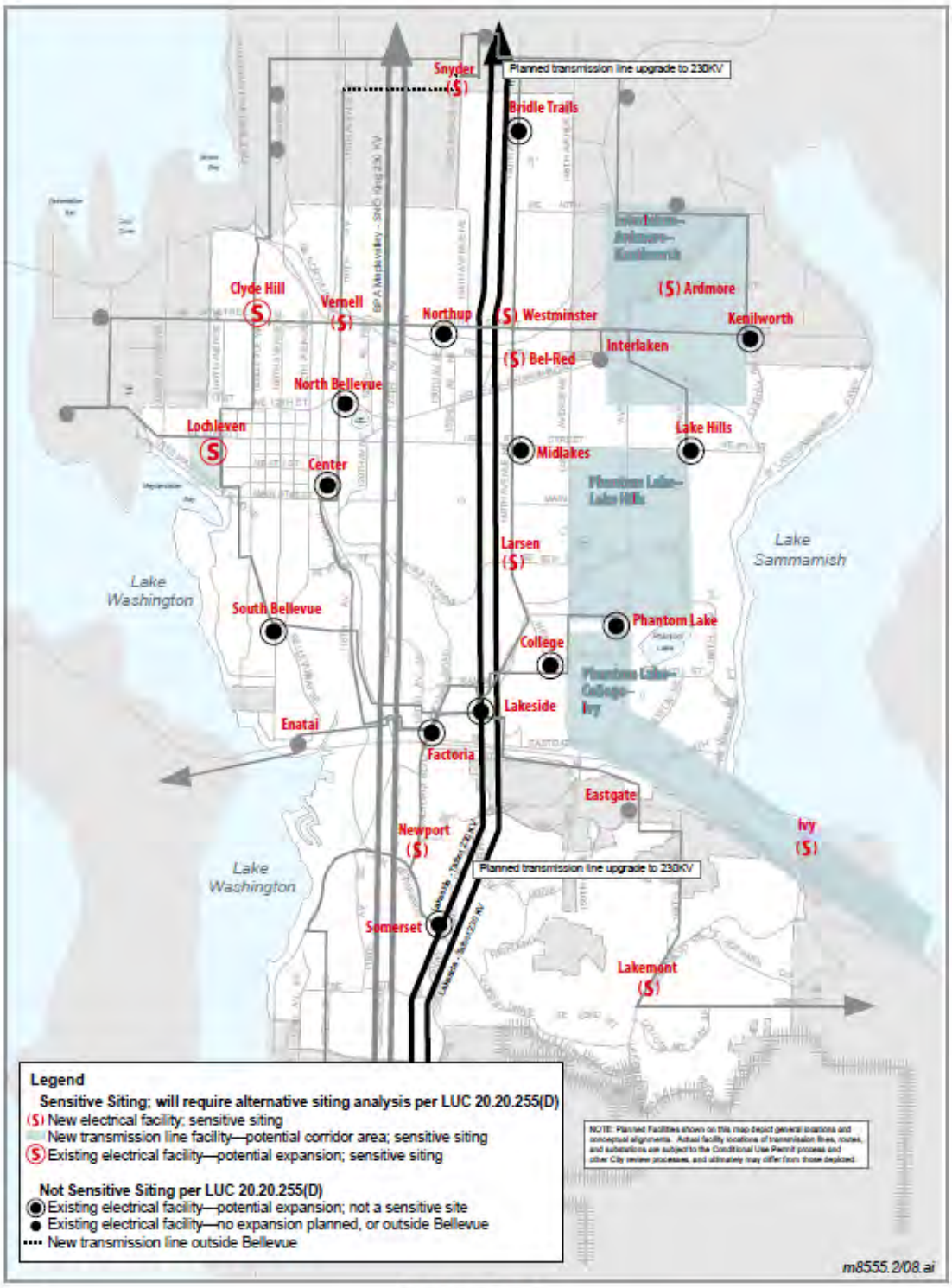


Figure 32. PSE's Expansion Plan for Bellevue

While in general, underground systems should have fewer faults per circuit mile than overhead transmission circuits, they are often subjected to flooding of the vaults and workmanship issues related to joints or splices that can affect the reliability of the circuits. That is, underground systems are not as robust and forgiving as overhead circuits are. These issues are reflected in the actual failure statistics as discussed in Section 2.2.3.3.

2.3.7.4 Comparison to Other Utilities

Some older utilities use a low voltage network that typically operates at voltages that can be directly used by the power users. This means voltage levels at 480 V or 120/208 V. The load flows in these types of systems are not easily monitored and faults frequently lead to underground vault explosions since faults in cables of such a system will often burn free. In younger, modern cities, the power distribution is typically handled as it is done in Bellevue using 15 kV or higher class distribution cable systems, often with redundant feeder cables to supply the loads. In modern high rise buildings, 5 to 15 kV class substations are sometimes placed on many of the floors up through the building. Since PSE began to install underground cables a long time ago for the Downtown area, it does not have the redundant feeder cables often used for critical loads in newer cities. PSE has therefore installed a number of unloaded reliability circuits, which can be switched to feed power to customers affected by a cable outage. Thus, PSE's system design compares well with other cities with which Exponent is familiar.

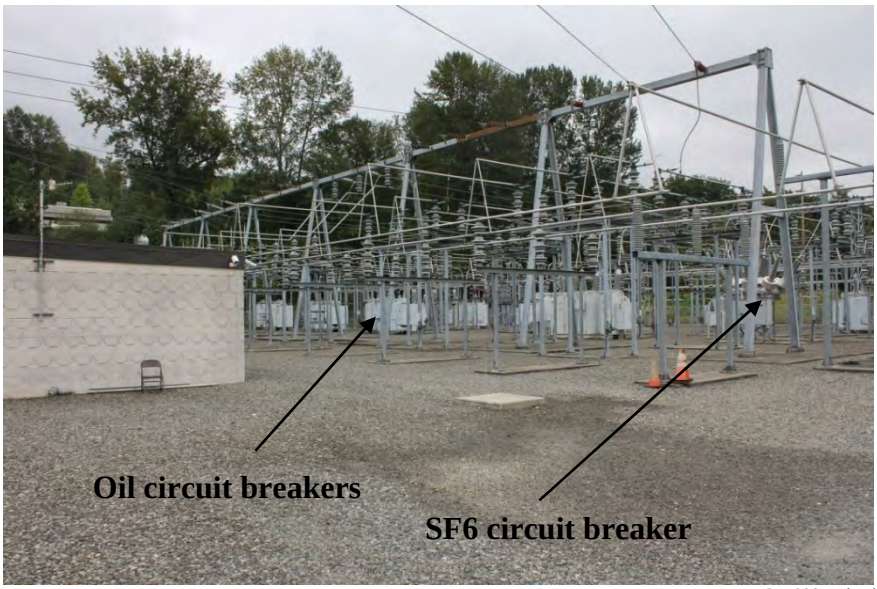
2.3.7.5 Recommendations

- The City needs to decide how to approach conversion of overhead distribution lines, used primarily in the residential areas, to underground systems, which requires special funding mechanisms.
- PSE needs to continue to reinforce the distribution system to meet the N-1 criteria for the entire City.

2.3.8 PSE's Substation Designs

2.3.8.1 Transmission Substations

PSE has built, owns, and operates transmission substations operating with voltages up to 230 kV for its bulk power supply. These incorporate large power transformers, which are used to reduce the voltage for distribution of power at 115 kV. Most of the substations used for power infeeds to load areas contain transformers rated 25 MW that are used to reduce the voltage from 115 kV to 12.5 kV for power distribution using cables and overhead distribution lines. The power is then stepped down to voltage levels that can be used by PSE's customers by means of underground vault transformers, pad mount transformers placed aboveground, or pole top transformers placed on the distribution power poles close to residences.



IMG_1908 resized.jpg

Figure 37. Lakeside 115 kV switchyard

Figure 38 shows a new 325 MVA transformer that was installed a short time ago to replace a transformer that failed. The installed transformer was a spare that had been procured by PSE in case of a failure of a transformer of this type. Since PSE has established 325 MVA as the rated power for bulk 230/115 kV transformers, PSE is able to have one spare high power transformer to be used in case of any bulk power transformer failure. This enabled PSE to restore the Sammamish substation to normal operation in a short time after removing the failed transformer. It could have taken from 10 to 18 months to obtain a replacement transformer, during which time the station would have had to operate at reduced capacity. PSE demonstrated in this case that it pursues a prudent strategy of spare parts inventory. Figure 39 shows that the new transformer is equipped with an on-line gas-in-oil monitoring device, which should enable early detection of many incipient transformer failures, which should reduce the cost of future transformer repairs.

The Sammamish substation appears to be relatively well designed to survive at least moderate earthquake forces. The transformers are welded to the foundation and if the breakers are also welded or secured to their foundations, they should remain in place during an earthquake. The station for the most part uses equipment placed directly on ground level foundations, which reduces the risk of amplification of earthquake forces. One potentially weak point might be the attachment of the flexible connections shown in Figure 40, since some experience from other earthquakes has demonstrated that flexible conductors attached to the overhead structure by means of suspension insulators have failed and fallen down to the ground. However, in case of a severe earthquake, the power supply is not likely to remain after the event. But such damage would be easy to repair and if the equipment is not seriously damaged, it should be relatively easy to restore the power and to put the system back in operation.[53] An assessment of the dynamic forces on the suspension insulators caused by earthquake forces would possibly reduce the risk of damage to the substation and would be a prudent use of resources.

[53] Experience has shown that the transformer breakers will be tripped because of sudden pressure or Buchholtz relay operations from the transformer protections. However, if the transformers are not damaged by the earthquake forces, restoring power is a simple operation.

Table 6. Major Project Roadmap

Capacity Requirement	Action	Potential Need Date	Initiate Early Planning Time Frame
Downtown			
Growth to 125 MVA	Add transformer bank	2016	2012
Growth to 150 MVA	Add transformer bank	2020	2016
Growth to 175 MVA	Add transformer bank	2026	2022
Growth to 200 MVA	Add transformer bank	Post 2026	Unknown
Bel-Red			
Growth to 20 MVA	Add transformer bank	2018	2012
Growth to 40 MVA	Add transformer bank	2026	2022
Somerset/Eastgate			
Growth/Reliability	Add transformer bank	2018	2012
115 kV System			
50 MVA Need Downtown/Regional Growth	Upgrade 115 kV line	2018–2022	2012
Additional 50 MVA Downtown	Add third transmission feed from north	2020–2024	2015

3.4 Future System Assessment Recommendations

The future system status has been reviewed using the future plans for growth in Bellevue, PSE's long-range planning, and potential technology innovations. Based on this review, a set of findings and recommendations is provided to the City of Bellevue for their use as an informed stakeholder.

Recommendation Future 1: Energy Efficiency Programs

Finding: PSE's long-range plans indicate a significant reliance on energy efficiency for management of the peak electric power demand.

Reliability Actions: Support for Long-Term Power Supply

Recommendation Future 1: The City should lead the electric energy efficiency effort to assist PSE in reaching its peak electric power demand goals to avoid using or building new peak electric power plants. Electric energy efficiency programs require active outreach to the customers and citizens to support various energy efficiency initiatives. The PSE long-term plan has a large reliance on electric energy efficiency.

This is a longer-term issue that will be included in future PSE IRPs. The City should remain active in the IRP process and should begin to understand potential long-term impacts of this strategy.

Recommendation Future 2: Smart Grid Initiatives

Finding: PSE is initiating Smart Grid programs to comply with WUTC requirements.

Reliability Actions: Enabling of reliability impacts of Smart Grid technology.

Recommendation Future 2: PSE has identified a series of Smart Grid technology projects that are being considered over the next 2 years. These projects include a range of programs from base infrastructure required to enable the Smart Grid to specific customer-related efforts. Several projects that support development of the infrastructure are currently underway:

- Upgrade of information technology systems
- Upgrade SCADA in transmission substations
- Distribution SCADA on feeder breakers
- Extension of fiber optic cabling through T&D system.

These programs represent upgrades to the PSE infrastructure that are being undertaken on a system-wide basis. Additional programs to enable customer interface applications will be needed. These technologies have been discussed in other recommendations.

An issue with Smart Grid implementation is that PSE must review customer interface applications on a system-wide basis and Bellevue may have different needs and requirements than other parts of the PSE service territory. Security of these communications systems will become a major issue that needs to be resolved before major investments are made in the new technologies.

Therefore, the City should review the overall PSE plan and determine their level of support for the various customer initiatives that would be appropriate for the City to provide. The types of initiatives to be considered are those relating to customer energy management, demand response, and home automation. These technologies are enabled by significant communication system upgrades, but allow for consumers to have greater control over energy usage and expenditure.

Recommendation Future 3: Major Project Planning (see Recommendation Role 2 also)

Finding: PSE maintains a plan for expansion of the system in Bellevue to support growth of the City and the region. However, as the lead time to permit larger projects (required to add capacity or reinforce the City infrastructure) has grown, it requires that the City understand the projects from a more detailed perspective than just a conceptual framework.

Finding: There is the potential for several of the growth-related projects to occur within this decade. The specific projects for consideration are upgrade of the 115 kV lines, additional

capacity required for the Bel-Red and Somerset/Eastgate areas, and additional capacity requirements Downtown.

Reliability Actions: Conduct major project discussions well in advance of permit applications to ensure sufficient lead time to permit larger projects (required to add capacity or reinforce the City infrastructure).

Recommendation Future 3: It is recommended that the City engage PSE in an annual planning workshop around future projects with the intent of understanding the requirements from a City perspective. The Comprehensive Plan includes an electric system plan that can serve as the basis for the annual workshop. The workshop should focus on the following items:

- Current growth projections and electric power use in Bellevue
- Review of current plan applicability (Figure UT.5a from the City of Bellevue Comprehensive Plan)
- Update of the current plan
- Develop actions for capacity projects required to initiate siting and permitting activities within the next 2 years.

An outcome of the workshop should be an updated plan for inclusion in the Comprehensive Plan (if required) and an action plan to move designated projects forward into siting analysis and/or planning.

As a minimum, the following capacity additions have been identified as being needed within the next 5 to 10-year time frame. These capacity additions are based on the proposed growth within Bellevue and an assessment of current loadings on the Bellevue substations.

- Upgrade of existing 115 kV lines to 230 kV
- Addition of transformer banks to support expected growth in various areas of the City (Downtown, Bel-Red, and Somerset/Eastgate)
- Addition of new 115 kV lines to reinforce the overall electric system.

Based on recent Exponent staff experience with T&D capital projects, capacity additions of this magnitude typically require the following project execution times:

- Transformer bank additions require 18−24 months to complete from start of engineering to operation. This project time frame is based on the major material long-lead times (which have been increasing), and typical engineering and construction times. This time frame can be different based on difficulty in working at existing stations or permitting new stations. Also, additional time is required for planning and permitting.

- Line projects may require 4−5 years from the start of engineering to completion since permitting of lines typically requires significant engineering to be completed before the formal permitting process proceeds. The time frame for these projects is dependent on the length of the line segment, the number of jurisdictions involved, and the number of permits required (federal, state, and local). Line projects often require engineering to be completed in order to satisfy permit applications so that these projects have a longer time frame than substation projects.

Recommendation Future 4: Long-Range Planning

Finding: Both Bellevue and PSE work with various developers and companies to identify new potential facilities in Bellevue. There is an opportunity to share and communicate the results of these planning activities. This exercise relates to longer-term issues that are expected to be addressed in the future.

Reliability Actions: Coordination of growth planning and major project activities.

Recommendation Future 4: While information is shared for the IRP, and to the extent that information can be shared, it is recommended that a more formal meeting (annually) be held to ensure that all of Bellevue's needs are identified to PSE and that both organizations are coordinated regarding future load demand. This information sharing can also be included in the annual planning meeting.

The City and PSE should synchronize their growth projections for the City by exchanging information on expected projects, expected timing of projects, and coordination actions required by PSE and the City to address these projects. This exchange is meant to be longer-term planning and well in advance of any specific permitting or development activities.

4 Role of the City of Bellevue

4.1 Study

4.1.1 Study Scope

The Role of the City assessment was performed to answer the following question: "what opportunities are available to the City to work with PSE, regulators [WUTC, FERC], and other stakeholders to ensure the needs and expectations of Bellevue's residents and businesses are met relative to the reliability of the power supply?"

4.1.2 Study Approach

The Role of the City assessment was performed in the following steps:

- Evaluation of potential interactions with WUTC and other government agencies as it relates to the City's ability to inform decision-makers or to advocate for policy change
- Evaluation of City's interaction with PSE around planning and permitting relative to influencing electric system reliability in Bellevue
- Review of transparency of operations relative to improvements in communication between PSE and its customers as it relates to reliability.

4.2 Enhance Role of City as an Informed Stakeholder

4.2.1 Regulatory Agencies

4.2.1.1 Study Approach

Prior to discussing the opportunities for Bellevue to interact with regulatory agencies, it is important to understand the regulatory framework under which PSE operates the electric power system and the regulatory framework as it affects the City. A brief summary of the regulatory requirements and their impact on reliability is provided below.

4.2.1.2 Washington Utilities and Transportation Commission

WUTC provides oversight to electric utilities through regulations codified in the WAC Chapter 480-100. As noted in WAC 480-100-001, the purpose of these regulations is "to administer and enforce chapter 80.28 RCW by establishing rules of general applicability and requirements for

consumer protection, financial records and reporting, electric metering, and electric safety and standards." The principal statutes that define WUTC's authority and responsibility with respect to electric utilities are found in RCW Title 80.

In determining the opportunity for the City to interact with WUTC, Exponent reviewed the responsibility of the agency to oversee the operation of electric utilities regulated by the agency. These requirements were then reviewed as they relate to PSE activities. Relative to electric system reliability, there are several requirements that are highlighted here:

PSE-Related Activities

- PSE is required to publish and communicate rates for electric power delivery through the filing of tariffs and rate schedules with WUTC (WAC 480-100-028 and WAC 480-100-103). Any changes to these tariffs or rate schedules must be presented at public hearings before WUTC and are subject to public hearings (RCW 80.28.020 and WAC 480-100-194). This requires PSE to present its basis for the proposed increases (for its investments and costs for providing services) to WUTC and to justify these expenditures as prudent since these expenditures are the basis for the increases and the means of PSE recovering their investment. The proposed changes are then reviewed by WUTC staff and a decision regarding the proposed changes is issued. While this process introduces risk to PSE's investment plans, the process is not expected to significantly alter PSE's investment program.

  This process of utility commission oversight is common to regulated utilities in the United States. In the case of PSE, they present their request for rate increases after investments are made so they are recovering expenses after they have been incurred. In other states, the rate case proceeding precedes the investments and the level of investment is approved prior to execution of projects. In the case of PSE, this requires that their investments (e.g., capital projects) be considered as prudent uses of capital across their entire system.

- PSE is required to have a rate structure that provides the same rates for similar services. This requirement is based on RCW 80.28.80. This requirement establishes a basis that a utility cannot provide preferred service and that service must be provided on a non-prejudicial basis except for a few special exemptions provided in the RCW. This requirement means that PSE must select projects to maintain their electric system assets from an overall system perspective.

- PSE is required to submit annual reliability reports that provide the service performance to its customers (WAC 480-100-398). This report highlights the current performance as well as actions that PSE will take to improve performance. This report addresses the entire service area. PSE indicates system circuits of concern (top 50) and identifies specific actions for these circuits. For 2010, there were no circuits identified in the Bellevue area (although Lake Hills-23 was on the list in 2009) (Reference 4).

- Through RCW19.285, the state of Washington has required that utilities meet a portion of their generation requirements through the use of renewable technologies. The state has required that at least 15% of generation come from renewable sources by 2020. The intent of this requirement is to encourage the use of renewable energy sources and energy efficiency in the state of Washington. This requirement affects reliability in the sense that PSE must develop a generation mix that satisfies its load demands and its renewable energy portfolio. In the future, as renewable energy sources and distributed energy sources become a bigger power source and a more local source, there will be a challenge to maintain the T&D system within acceptable voltage levels.

- WUTC (WAC 480-100-238) requires utilities to submit an IRP that is intended to present how a utility will meet its system demand and what the mix of generation sources will be. The IRP is required to examine alternatives that allow for meeting future demand at the "lowest reasonable cost." Utilities are also required to address conservation relative to energy reduction from energy efficiency and other means. The requirement is to submit the IRP on a biannual basis.

  PSE provides an IRP defining its strategy to respond to future load scenarios. The current IRP has been referred to previously in Section 3 in discussing future system status.

- Requirements for delivery of power are specified in WAC 480-100-368 and -373 for system frequency and voltage, respectively. The requirements state that the system must be operated at a frequency of 60 cycles per second under normal conditions and the voltage (depending on service class) must be maintained within ±5% of the standard voltage on the distribution feeder. There are additional requirements related to both utility and customer actions to control voltage fluctuation.

  This requirement directly relates to the issue of power quality. PSE is required to deliver voltage within the specified range. For customers who require a tighter band on voltage fluctuations, there are standard technologies employed by the end user at these sites to maintain the required voltage stability. Typically, information technology and manufacturing plants most often use site-specific technologies to control voltage that may interrupt their operations.

City-Related Activities

- Through RCW 35.96.040, the state of Washington specifies requirements that allow cities or towns to create local improvement districts and to levy and collect special assessments against the real property benefitting from the conversion of overhead facilities to underground facilities. This requirement directly relates to the funding mechanism required to convert existing

overhead facilities. Issues regarding the conversion of overhead lines to underground were presented in Section 2.2.6.4.

- Through RCW 36.70A, the state of Washington requires cities and counties to develop comprehensive land use plans to govern growth management in their jurisdictions, if they are required or choose to plan under RCW 36.07A.040.
- Through RCW 80.32, the state of Washington allows cities to establish franchise agreements with utilities relative to use of city rights-of-way (public roads, streets, and highways).

There are additional requirements in the state of Washington statutes and WUTC regulations that govern interconnections to the electric system, requirements for the renewable portfolio, and purchase of power from qualifying facilities.

4.2.1.3 Western Electricity Coordinating Council

The second organization with oversight responsibility is WECC, which is chartered with ensuring the reliability and security of the bulk electric system in the Western Interconnection. Since PSE has limited bulk transmission assets, their involvement with WECC deals with coordination of their transmission lines with the WECC area. PSE interacts with WECC for operations of its transmission lines at 100 kV and above. WECC provides requirements for operations and maintenance of the transmission system to ensure the reliability, stability, and security of the transmission system in the western United States and Canada. PSE involvement with WECC is mostly from an operations, maintenance, and protection standpoint to ensure that its system operates and coordinates planning with other regional entities. WECC develops standards for the western region based on review and application of NERC reliability standards which defines requirements to maintain reliability of the transmission system in the United States. WECC activities are focused only on transmission and do not reach into the distribution system within Bellevue or other parts of the PSE service territory. However, this interface is important from the transmission standpoint where events on the transmission system can result in significant wide-area outages.

4.2.1.4 Analysis

From a WUTC perspective relative to electric power, cities are considered as any other member of the public. This means that Bellevue has access to the published tariffs and rate schedules of PSE and has the ability to participate in public hearings and to offer comments and opinions relative to these hearings. Therefore, Bellevue's primary interaction with WUTC is one of being an active participant relative to changes in laws and tariffs that may affect electric system reliability in the State of Washington.

From an overall regulatory perspective, the City has the right to execute franchise agreements with companies that provide utility services to the City. These items are discussed in Section 4.2.2.2.

From the perspective of WECC, Bellevue has no real involvement with this group since it deals with issues on the transmission system (and large generation). WECC, however, does provide a source of information relative to electricity planning in the region and provides short- and long-term views of the electric transmission system. Their planning documents identify needs of the system moving forward and will provide Bellevue with an independent assessment of potential transmission needs in the area that may affect assets providing service to Bellevue or that are located in Bellevue.

4.2.1.5 Recommendations

There are potentially two areas of involvement by Bellevue relative to WUTC:

- Since WUTC operates and oversees all regulated utilities, any changes in fundamental requirements must be driven by state law and enforcement by WUTC must be consistent and fair among all regulated companies. Therefore, Bellevue's involvement in this aspect is one of informing lawmakers and commissioners regarding matters that affect reliability. However, matters affecting the electric system must be viewed in a global rather than a local context.
- Bellevue does have the opportunity to comment or participate in matters directly affecting PSE and their interaction with WUTC. The City may choose to support or oppose measures for investment brought forward by PSE that support its overall City goals for electric system reliability and service. Again, PSE has to propose its plans to WUTC on a system-wide basis, but Bellevue has the ability to support and advocate for initiatives that meet its goals and objectives.

From an overall regulatory perspective, interaction with the regulatory agencies provides Bellevue with a means of keeping current on plans for the electric system and advocating for projects that meet Bellevue's objectives.

4.2.2 Puget Sound Energy

4.2.2.1 Study Approach

Bellevue's primary involvement in electric system reliability is through its interaction and collaboration with PSE. There are several areas where Bellevue is actively involved with electric system activities by PSE. The interaction between the City and PSE relative to specific reliability initiatives and outage performance was discussed in Section 2. The major areas of interaction discussed here are planning, permitting, and emergency response.

4.2.2.2 City Policies

Bellevue establishes policies for utilities in the Utilities Element of the Comprehensive Plan[105]. The City provides its long-term vision and plans in its Comprehensive Plan, which provides goals, policies, and plans for all areas and aspects of City operations. The Utilities Element addresses many activities relating to electric reliability, including:

- A high level plan for utility capacity expansion to meet City and regional needs and to guide planning and decision-making
- Coordination of public and private trenching activities (related to the potential for undergrounding opportunities)
- Notification to the City prior to vegetation management in the City rights-of-way
- Required undergrounding of all new electrical distribution facilities
- Encouragement of consolidation of facilities
- Facilitation of conservation and environmentally sensitive energy sources
- Encourage communication with utilities, WUTC, and the City about cost distribution and undergrounding of electric distribution lines.

All of these policies have the potential to impact reliability. Additionally, through the Franchise Agreement between the City and PSE, the City provides requirements for work in the City rights-of-way that are intended to reflect the policies of the Comprehensive Plan. Based on a review of these documents, the City is influencing reliability through its planning and permitting process, its vegetation management policies, the ability to underground new facilities, and coordination of activities to take advantage of joint utility efforts. In the longer term, renewable and alternate energy sources and conservation will factor into the overall electric energy picture in Bellevue.

The recommendations provided in Sections 2 and 3 are consistent with the policies of the Comprehensive Plan. The recommendations are based on focusing the City's efforts on areas that will drive improvements in reliable service to existing and new members (business and residential) of the community, that satisfies the City's goals, and that understands the requirements of PSE as a regulated utility. The recommendations are provided to support City reliability through improved system design (redundancy), expanded use of automation and information technology, and improved communications between the City and PSE on matters affecting reliability and growth.

[105] Reference 26.

4.2.2.3 Planning

Both Bellevue and PSE engage in planning for the City. However, the planning needs for each organization are focused on different areas and concerns. Bellevue planning is required to address services and land use planning across all aspects of city operations, such as impact on land use, rights-of way, roadways, water and sewage, and coordination of projects by other utilities (electric, gas, and telecommunications). Therefore, planning by Bellevue involves the following:

- City growth projections including major facility and capital projects
- Forecast and plans for land use
- Forecast and plans for roadway additions and changes
- Forecast and plans for utility (water, electric, gas, telecommunications) additions and changes
- Forecast and plans for parks and public areas.

PSE focuses on planning for electric and gas system operations. PSE obtains its growth plans and projections from interactions with its various customers including cities, developers, companies, and facility owners. PSE and Bellevue share many of the same customers when it comes to planning for growth in Bellevue.

From the perspective of electric system planning, there are two main elements:

- Overall long-term growth planning to identify the potential for growth in Bellevue and to identify the need for additional electric system capacity.
- Medium-term tactical planning for specific projects that affect the electric distribution system in Bellevue as well as the PSE-owned transmission lines. The long-term plan is based on growth projections in the PSE service territory (Bellevue and surrounding areas) that impact the need for additional service to various areas of the City. The Comprehensive Plan Utilities Element Figures UT.5 and UT.5a present the current view of potential plans for electric expansion in Bellevue to meet future needs.

Discussions with staff in both Bellevue and PSE indicate that the overall growth plan is developed based on individual discussions with prospective developers and then later meetings are held between PSE and Bellevue to ensure that PSE has input from Bellevue relative to preparing their IRP. This level of planning is one of the means that PSE utilizes to project growth and to develop system plans to support growth. Since these are longer-term plans to identify future needs, the major need is to coordinate the results of the planning activities to ensure that PSE is informed by City input relative to growth for inclusion in its long-term planning process.

The medium-term tactical planning is directed at potential projects that may need to be performed in Bellevue on existing or new locations. Typical maintenance or replacement projects are handled through the normal permit process. PSE performs ongoing assessments and studies of its electric system to ensure that the system is capable of handling current and future demands. The PSE plans are based on their projections for future growth in Bellevue and other parts of their system. These medium-term tactical projects are also part of the IRP. The ability to turn the medium-term tactical plans into real projects varies by size and type of project. The projects subject to tactical planning are large expansion projects (substation expansions, new feeders, substation connections) that require significant lead-time to proceed to an actual project. Based on the discussion in Section 3, there will be a need for new facilities as the City grows and reaches its build-out limits.

Bellevue has entered into a Franchise Agreement with PSE[106] that outlines requirements for PSE operation, construction, and support of facilities in Bellevue. The Franchise Agreement outlines the requirements for the various types of projects performed by PSE. The Franchise Agreement and the City Comprehensive Plan Policies include requirements that call for siting reviews of the larger capacity projects. Based on discussions with staff at PSE and Bellevue, the review and update of the utility growth plans in the Comprehensive Plan requires review and update. Since these capacity expansions represent large and complex projects, and given the significant growth expectations of the City, a regular update of the plan is appropriate to ensure that the City and PSE understand the requirements for future growth.

4.2.2.4 Permitting

Once a project is ready to proceed, it then enters the permitting process. For major projects (including those on sensitive site locations per the Comprehensive Plan), the following steps are typically required:

- Pre-application meeting
- Siting analysis that must include three alternatives
- Tentative agreement on an alternative
- Submittal of the application
- City recommendation
- Hearings and appeals, if required
- City Council decision
- Permit issued.

The typical time frame for these types of projects (from initial request to permit) is approximately 3 years and can be longer. Typical smaller projects follow a similar permitting

[106] Reference 27.

process but start with submittal of the application, and the process proceeds in a quicker manner. If the project is on the public right-of-way and is covered by the Franchise Agreement, then issue of the permit is handled through the Franchise Agreement and does not require City Council approval.

4.2.2.5 Analysis

Based on discussions with Bellevue and PSE staff, observations relative to the planning and permitting process are:

- There is good agreement that both parties understand the permitting process and that working relations between the parties is good. However, there is sometimes a need to get new PSE contractors to more quickly understand the process.
- Complete information in the permitting process results in a more routine permit process. Incomplete information tends to slow the process.
- For larger projects, more complete siting analysis information on the alternatives (specifically impacts and mitigation plans) will improve the permitting process.
- There is more public interaction and comment for any large projects, especially for aboveground infrastructure.
- The PSE tariffs are clear and understood by the City relative to services provided under tariff. When multiple non-City utilities are involved in a project, all have Franchise Agreements, and there is some negotiation required to determine who pays for the services depending on the project initiator.
- Future projects are understood at a conceptual level, but the details are not fully appreciated until the permitting process is initiated.
- Coordination between the various utilities requesting right-of-way work could be improved from a planning perspective so that each utility can plan for these opportunities.

4.2.2.6 Recommendations for PSE Interaction

The assessment indicates that there are opportunities to improve the overall knowledge sharing and coordination in the planning and permitting process. While the interactions between the organizations are good due to proximity and history, much of the interaction is based on informal communications. The following recommendations are provided:

- It is recommended that the City engage PSE in an annual planning workshop around large future capital projects. This is the same recommendation that is defined in Section 3. The outcome of these workshops should be an action

plan to move projects forward. The intent of this recommendation is to have these major project discussions well in advance of permit applications. PSE has developed and maintains a long-term system planning strategy relative to the electric power system. This plan is generally represented in the IRP. However, as the lead time to permit larger projects (required to add capacity or reinforce the City infrastructure) has grown, it requires that the City understand the projects from a more detailed perspective than just a conceptual framework.

- Both Bellevue and PSE work with various developers and companies to identify new potential facilities in Bellevue. While information is shared for the IRP, and to the extent that information can be shared, it is recommended that a more formal meeting (annually) be held to ensure that all Bellevue needs are identified to PSE and that both organizations are coordinated regarding future load demand. This exercise relates to longer-term issues that are expected to be addressed in the future.

- There are opportunities for multiple utilities to take advantage of projects being performed by one of the utilities. This is a coordination function that is best captured by the City. It is recommended that the City engage their utility partners to identify new projects (both large and small) to attempt to maximize projects in the rights-of-way. This planning activity is intended to take place in advance of permit applications so that the utilities can plan these projects into their annual work. This action also represents a potential means to advance undergrounding of circuits if PSE can take advantage of trenching to add conduits for future use.

4.2.3 Transparency of Operations

The transparency of operations is focused on the communications between PSE and its customers during emergency and outage events. The City has a role to play as a representative of the community. However, PSE has also provided transparency in its operations through the information provided around its various business processes, projects, and plans.

4.2.3.1 Emergency Planning

The emergency response programs are well-defined for the both the City of Bellevue and PSE in their respective policies and procedures. The City of Bellevue maintains its emergency response program in its Emergency Operations Plan.[107] The plan supports and is compatible with King County and state of Washington emergency plans, the National Response Framework, and the Regional Disaster Plan for Public and Private Organizations in King County. Bellevue has adopted the National Incident Management System (NIMS) as the basis for incident management. The plan includes roles and responsibilities for the City departments and also discusses non-governmental agency support. In this case, PSE is identified as an

[107] Reference 28.

organization that will provide support during emergency events when appropriate. When requested, PSE will assign a liaison to the EOC, if available. However, PSE does assign a liaison to the King County Emergency Coordination Center (ECC) if a more regional emergency is called. Bellevue has also implemented programs for first responder "GETS" cards that provide priority access through the phone system. A HAM radio system is employed through the Amateur Radio Emergency Service to address situations where phone towers are down and normal (cell) phone communication cannot be used.

PSE maintains its emergency response program in its Corporate Emergency Response Plan.[108] This document outlines how PSE addresses emergency operations for both its electric and gas systems. Similar to Bellevue, PSE maintains an EOC and is in the process of adopting the NIMS protocol. Some key aspects of the PSE Emergency Response Plan include:

- An electric emergency is defined as:
  - 12 distribution circuits out in one region and escalating
  - 30 distribution circuits out system-wide and escalating
  - Poor weather conditions (wind, snow, ice) predicted
  - Earthquake or other hazardous conditions.
- PSE's overall response strategy is summarized as:
  - Restoration priorities are assigned for each region.
  - Focus on correcting problems that can be fixed quickly and restore the greatest number of customers.
  - Restore first and then repair (based on conditions of the damage). Damaged sections may be de-energized and service may be restored up to the point of damage.
  - Schedule and complete the repairs.
  - Facilities are generally restored in the following order: transmission, distribution substations, distribution feeders, and individual service. PSE maintains a more detailed list in its Corporate Emergency Response Plan document.
- PSE maintains a list of critical facilities and accepts municipality identification of critical facilities. PSE also maintains a list of locations that require priority for medical reasons (nursing homes, individuals).
- PSE maintains someone onsite at the King County ECC to coordinate on regional events.

[108] Reference 29.

- PSE has defined contacts as liaisons with Bellevue even if they do not staff the Bellevue EOC.
- PSE has established agreements with other entities, including their subcontracting partners, to provide resources in an emergency. This includes a Western Region mutual assistance agreement for support from other utilities outside of the area to assist in restoration and repair in a major emergency (such as the 2006 storm event).
- PSE also employs a HAM radio operations system in the event that normal phone service is not available.

The Bellevue and PSE EOCs are similar, but they serve different functions. The PSE plan is related to their service territory and the PSE EOC may be activated without Bellevue needing to activate its own EOC. Similarly, the Bellevue EOC focuses on events in Bellevue, and depending on the emergency conditions, may open without PSE having to activate its center. However, in all cases, there are established interfaces within each organization to provide communication during an emergency. Additionally, both Bellevue and PSE participate in regional emergency planning exercises and have significant information on their websites regarding emergency response.

There are several coordination actions required in order to recover from an electric system emergency outage. Bellevue indicated that they have provided a priority list of critical facilities to PSE so that these are known in advance. Another issue centers on coordination of local city police and fire departments to support PSE crews in getting access to streets and areas to provide assessment, restoration, and repair services. There currently is no formal protocol for handling these interactions in an emergency and they are generally handled informally by requests from PSE to the Bellevue EOC as crews identify needs in the field.

4.2.3.2 Communications with Stakeholders

A major issue during the 2006 winter storm was the lack of communication on the status of the outage and restoration activities. The PSE OMS is currently a manual system as described previously in Section 2.4.6. The system does not currently provide web-based information on specific outage locations and statuses, and the manual process can get overwhelmed in a large outage or emergency.[109] PSE utilizes media outlets to try to communicate during these times; however, this has not been effective in the past at keeping customers at specific locations informed of outage status. Even in a major storm outage (non-emergency), the manual outage management process may be overburdened.

Many utilities are taking lessons learned from major storm events in all parts of the country and are engaging in installation or upgrades to their OMSs. Lessons learned[110] from major storms in

[109] Web-based systems assume that people have access to the Internet, which may not be available during a severe power system outage event.

[110] Reference 35.

the southeast United States indicate the need and the benefits of a fully-integrated computerized system to improve response in major storm events. These integrated systems allow for communication of real-time information to personnel located in multiple locations to facilitate decisions and to update progress. The ability to get visibility into the outage extent and to communicate rapidly with field personnel improves the overall response time. Several other utilities in the Northwest are in the process or have recently upgraded OMSs.

PSE has taken many actions to improve their response to a major event. Some key actions include:

- PSE is currently implementing a major upgrade to its OMS. This upgrade was defined in Section 2.4.6. A key feature of the OMS is that it can automatically locate circuit status visually on a display board that will allow personnel in multiple locations to have access to the data.
- Currently, in a major outage event, where PSE, Bellevue, and King County have activated ECCs and EOCs, communication channels will be strained based on the volume of people needing information. Per their emergency protocols, PSE will communicate from its EOC directly with the King County ECC. The King County ECC communicates with the other governmental entities. Additionally, PSE has liaisons for its various stakeholders and PSE will communicate directly to the City of Bellevue. When completed, the OMS installation should provide a means for faster and more accurate reporting of information.
- The PSE EOC will also issue regular status updates during an emergency. These updates will go to the various EOCs, municipalities, and the news media. The news media (radio) represents a significant distribution channel during major emergency events. PSE also updates its customer call center information to be consistent with releases to the news media. Unfortunately, in a major electric outage, normal communications channels may not be available, and individuals should be equipped with the ability to access the radio news media.

4.2.3.3 Recommendations

The assessment indicates that there are opportunities to improve the communication channel in outage and emergency events. The following recommendations are provided:

- PSE is deploying a new OMS system over the next year that should improve overall outage communications. After deployment, it may be appropriate for selected City personnel involved in emergency response to gain an understanding of the enhanced capabilities in order to better assist in communicating to the Bellevue community.
- There is an opportunity to improve the emergency response and recovery capability between PSE and Bellevue relative to coordination of PSE activities, and Bellevue emergency management, transportation, police, and

fire functions. This opportunity may also include Bellevue staff assisting PSE in identifying damaged areas. It is recommended that the City engage PSE in discussions to develop a formal process for these communications to facilitate response and recovery in the future.

- The improvements in the system over the past 5 years have had a positive impact on reducing outages and duration during normal operation. However, the overall system cannot be hardened sufficiently to prevent major outages for an event similar to the 2006 storm. A storm of this magnitude that impacts the regional transmission system requires significant time to restore power to all customers. It is expected that citizens within the City should be prepared to be without power for up to 3–7 days after this type of event. The City should consider an education campaign to make its citizens aware of the problems and help them to be better prepared to deal with future emergencies.

4.3 Role of the City Recommendations

Bellevue's role as an informed stakeholder requires that the City take an active role in becoming informed on matters affecting the reliability and planning for the electric system in Bellevue. This role includes direct communication with PSE as well as other stakeholders regarding electric service. Based on this review, a set of recommendations were described earlier in this section that focus on planning, permitting, emergency or outage management, and regulatory interface. A summary of the assessment is provided below.

Question:

- "What opportunities are available to the City to work with PSE, regulators (WUTC, FERC), and other stakeholders to ensure the needs and expectations of Bellevue's residents and businesses are met relative to the reliability of the power supply?"

Recommendation 1: WUTC Interaction

Finding: From a WUTC perspective relative to electric power, cities are considered as any other member of the public. Bellevue's primary interaction with WUTC is one of being an active participant relative to changes in laws and tariffs that may affect electric system reliability in the state of Washington.

Reliability Actions: Bellevue's ability to be a knowledgeable stakeholder will require assignment of an engineer knowledgeable in the electric power system to foster the City interaction with stakeholders.

Recommendation 1A: Bellevue's involvement with WUTC may be one of informing lawmakers and commissioners of matters that the City believes affect the City's electric reliability or general electric service. For issues affecting electric reliability that are of interest to the City:

- A designated individual can be assigned to electric system matters. The individual should remain informed of electric system activities related to WUTC.
- On matters of interest to the City, white papers can be developed for submittal to WUTC on issues affecting electric reliability. This provides a means to provide feedback to WUTC without direct response to hearings. Potential policy matters could be advanced using this approach.

Recommendation 1B: Bellevue has the opportunity to comment or participate in matters directly affecting PSE and their interaction with WUTC. Bellevue also has the ability to support and advocate for initiatives that meet its goals and objectives. The recommended actions are:

- The City can support or advocate for PSE positions of interest to Bellevue. As programs and rate discussions take place between WUTC and PSE, the City has the opportunity to advocate for positions that support City goals.
- The City should comment and participate in various programs submitted to WUTC by PSE, where PSE is seeking advisory input from stakeholders including the IRP, Smart Grid plan, and reliability programs.

Recommendation 2: Major Project Planning

Finding: The assessment indicates a need to review and update the utility growth plans in the Comprehensive Plan. The large capacity projects will require significant lead time for siting analysis and permitting.

Reliability Actions: Conduct major project discussions well in advance of permit applications to ensure sufficient lead time to permit larger projects (required to add capacity or reinforce the City infrastructure).

Recommendation 2: It is recommended that the City engage PSE in an annual planning workshop around future capacity and expansion projects. The Comprehensive Plan includes an electric system plan that can serve as the basis for the annual workshop. The workshop should focus on the following items:

- Current growth projections and electric power use in Bellevue (see Recommendation Role 3)
- Review of current plan applicability (Figure UT.5a)
- Update of the current plan
- Develop actions for capacity projects required to initiate siting and permitting activities within the next 2 years.

An outcome of the workshop should be an updated plan for inclusion in the Comprehensive Plan (if required), and an action plan to move designated projects forward into siting analysis and/or planning.

As a minimum, the following capacity additions have been identified as being needed within the next 5–10 year time frame:

- Upgrade of the existing 115 kV lines to 230 kV
- Addition of transformer banks to support expected growth in various areas of the City (Downtown, Bel-Red, and Somerset/Eastgate)
- Addition of new 115 kV lines to reinforce the overall electric system.

As previously stated, based on recent Exponent staff experience with T&D capital projects, typical time frames for projects of this size and complexity are as follows:

- Transformer additions require 18−24 months to complete from start of engineering to operation. Additional time is required for planning and permitting.
- Line projects may require 4−5 years from the start of engineering to completion since permitting of lines typically requires significant engineering to be completed before the formal permitting process proceeds.

Recommendation 3: Long-Range Planning

Finding: Both Bellevue and PSE work with various developers and companies to identify new potential facilities in Bellevue. There is an opportunity to share and communicate the results of these planning activities. This exercise relates to longer-term issues that are expected to be addressed in the future.

Reliability Actions: Coordination of Growth Planning and Major Project Activities

Recommendation 3: While information is shared for the IRP, and to the extent that information can be shared, it is recommended that a more formal meeting (annually) be held to ensure that all of Bellevue's needs are identified to PSE and that both organizations are coordinated regarding future load demand. This information sharing can also be included in the annual planning meeting.

The City and PSE should synchronize their growth projections for the City by frequent information exchange on expected projects, expected timing of projects, and coordination actions required by PSE and the City to address these projects. This exchange is meant to assist longer-term planning and should occur well in advance of any specific permitting or development activities.

Recommendation 4: Multi-Utility Planning

Finding: There are opportunities for multiple utilities to take advantage of projects being performed by one of the utilities.

Reliability Actions: This action also represents a potential means to advance undergrounding of circuits if PSE can take advantage of trenching to add conduits for future use.

Recommendation 4A: It is recommended that the City engage their utility partners to identify new projects (both large and small) to attempt to maximize projects in the rights-of-way. This planning activity is intended to take place in advance of permit applications so that the utilities can plan these projects into their annual work.

Recommendation 4B: The City can take advantage of projects that require trenching to place conduit for future use of potential undergrounding. The existence of conduit may allow for more economic alternatives for undergrounding in the future. This action requires City planning to identify future projects that require trenching and to discuss with PSE the placement of conduit. This will be an ongoing action as projects are defined, but can be coordinated through the City Planning Department. (This action is associated with Recommendation Current 3A).

Recommendation 5: Emergency Response Capability

Finding: There is an opportunity to improve the emergency response capability between PSE and Bellevue relative to coordination of PSE activities (e.g., Bellevue transportation, police, and fire functions). Currently, the coordination activities are more informal and on an as-needed basis. This opportunity may also include Bellevue staff assisting PSE in identifying damaged areas.

Reliability Actions: The ability to improve recovery time in Bellevue after an outage can be improved by better coordination between City first responders and PSE crews.

Recommendation 5: The City and PSE should consider the development of a more formal process (procedure) related to response and support activities during an outage. The ability to coordinate activities (especially during a major outage) may include the following activities:

- Locating damage
- Coordination of access to areas of damage
- Access to PSE outage information
- Coordination of recovery plans
- Emergency support to people in need.

The outcome should be an agreement (or procedure) for communication and coordination during large scale events affecting Bellevue.

PUGET SOUND ENERGY

QUANTA TECHNOLOGY

Eastside Needs Assessment Report
Transmission System
King County

Redacted Draft

October 2013

Puget Sound Energy

Report prepared by:
Thomas J. Gentile, P.E. – Quanta Technology
Donald J. Morrow, P.E. – Quanta Technology
Zach Gill Sanford – Puget Sound Energy
Carol O. Jaeger, P.E. – Puget Sound Energy

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Section 1 Executive Summary

The analysis discussed in this report verified that there is a transmission capacity deficiency in the Eastside area of Lake Washington which will develop by the winter of 2017-18. This transmission capacity deficiency is expected to increase beyond that date. Cities in the deficiency area include Redmond, Kirkland, Bellevue, Clyde Hill, Medina, Mercer Island, Newcastle and Renton along with towns of Yarrow Point, Hunts Point, and Beaux Arts.

Assessment Objective

The objective of this needs assessment is to assess the sufficiency of transmission supply within the next 10 years to Puget Sound Energy's customers and communities on the east side of Lake Washington.

As part of the mandatory North American Electric Reliability Corporation (NERC) Compliance Enforcement Program[1], PSE performs an annual comprehensive reliability assessment[2] to determine if any potential adverse impacts to the reliability of delivery of electricity exist on the PSE transmission system. During the 2009 comprehensive reliability assessment[3], PSE determined that there was a transmission reliability supply need developing due to the loss of one of the Talbot Hill Substation[4] transformers.

Since 2009, other issues have also been identified which impact this portion of the PSE system. These issues include concerns over the projected future loading on the Talbot Hill Substation, increasing use of Corrective Action Plans (CAPs) to manage outage risks to customers in this portion of the PSE system, and regional transmission reinforcement needs that were identified by ColumbiaGrid studies to support the movement of power from existing wind generation and hydroelectric generation across the Cascade Mountains to load centers around the Puget Sound.

The study described in this report focused specifically on the central King County portion of the larger PSE system in order to provide a more focused needs assessment. The timing of this study was intended to provide sufficient lead time to implement viable, long term solutions before the issues identified by the study develop. This report discusses the review of the current transmission infrastructure to support the current load and the future load growth in this area.

Method and Criteria

The studies documented by this report are collectively referred to as the "2013 Eastside Needs Assessment." To assess area supply needs, comprehensive reliability analyses were performed to determine the present and future transmission supply to PSE's Eastside area in King County and the Puget Sound area as a whole. In 2009, as part of

[1] NERC Reliability Standards for the Bulk Electric Systems of North America

[2] PSE Planning Studies and Assessment TPL-001 to TPL-004 Compliance Report

[3] 2009 PSE Planning Studies and Assessment TPL-001 to TPL-004 Compliance Report

[4] Talbot Hill Substation is located in Renton

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the TPL-001 through TPL-004 Compliance Report, PSE's analysis showed that there was a potential thermal violation with the loss of one of the two transformers at Talbot Hill Substation. For the 2013 Eastside Needs Assessment, PSE performed an updated analysis to evaluate if this potential thermal violation would still exist with updated load forecasts. The 2013 Eastside Needs Assessment was performed consistent with the mandatory NERC TPL annual comprehensive analysis. Supplemental performance studies were also performed to provide a clear understanding of the location and causation of these potential thermal violations.

For the 2013 Eastside Needs Assessment, PSE used the WECC 2012 series base cases to develop the 2013-14, 2017-18, and 2021-22 heavy winter cases. These cases were set up to account for normal weather with 100% of the forecasted level of conservation and were updated with the current PSE system configuration and load information. To better understand the extent of the need and risks faced by customers in this portion of the PSE system, sensitivity studies were conducted to evaluate performance under different levels of conservation. Sensitivities studies were also conducted to assess system performance under extreme weather conditions that are expected to occur once every twenty years.

This assessment also reviewed the near and long-term summer cases run for the 2012 NERC Transmission Planning (TPL) standard requirements. For the TPL report, cases had been developed for heavy summer of 2014 and 2018 using the 2012 WECC series base cases. These cases were set up to account for normal summer weather with 100% of the forecasted level of conservation and were updated with the current PSE system configuration and load information.

This analysis covered PSE facilities that are part of the Bulk Electric System (BES) and the interconnected system covered by the Western Electricity Coordinating Council (WECC). BES facilities must be studied in accordance with the latest approved versions of the mandatory NERC Reliability Standards and the WECC Reliability Standards[5]. These standards set forth the specific methods for studying the performance of the transmission system – 100 kV and above – and govern how that system is planned, operated and maintained.

In addition to the mandatory reliability standards, PSE has also issued Transmission Planning Guidelines[6] which describe how to plan and operate PSE's electric transmission system. These guidelines are in place to encourage the optimal use of the transmission system for service to loads and generators while complying with the mandatory standards. These guidelines also support transfers between utilities, when applicable, to support economic use of available resources.

Performance criteria are also established to determine if a need exists to improve the system. These performance criteria serve as a baseline to measure performance and to identify where reinforcements may be needed. The needs documented in this report were determined by whether or not the study area would perform such that it satisfied all approved applicable NERC, WECC and PSE transmission performance criteria[7].

Study Assumptions

The following key assumptions were adopted to more fully understand the potential reliability impacts:

- The study horizon selected was the ten year period from 2012 to 2022.
- System load levels used the PSE corporate forecast published in June 2012.

[5] TPL-001-WECC-CRT-2 – System Performance Criterion Under Normal Conditions, Following Loss of a Single BES Element, and Following Extreme BES Events

[6] PSE Transmission Planning Guidelines, November 2012

[7] PSE Transmission Planning Guidelines, pages 3-5 & 7, November 2012

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- Area forecasts were adjusted by substation to account for expected community developments as identified by PSE customer relations and distribution planning staff.
- Generation dispatch patterns reflected reasonably stressed conditions to account for generation outages as well as expected power transfers from PSE to its interconnected neighbors.
- Winter peak Northern Intertie transfers were 1,500 MW exported to Canada.
- Summer peak Northern Intertie transfers were 2,850 MW imported from Canada.

Specific Areas of Concern

The 2013 Eastside Needs Assessment was a fresh look at current and future system conditions which did not pre-judge the existence of any specific issues on the PSE system. Since 2009 a variety of concerns have been identified and these were investigated in the analysis. During the course of the analysis, some additional potential problems were identified that also were evaluated. The major issues include:

1. Overload of PSE Facilities in the Eastside Area: Several previous studies had identified potential overloading of transformers at Sammamish and Talbot Hill Substations[8]. These include the 2008 Initial King County Transformation Study, 2009 PSE TPL Planning Studies and Assessment, and the 2012 PSE TPL Planning Studies and Assessment[9]. Those studies indicated that potential thermal violations may occur on facilities from Talbot Hill Substation to Sammamish Substation. The 2013 Eastside Needs Assessment validated those concerns and identified transmission supply needs that focused on two 230-115 kV supply injections into central King County at Sammamish and Talbot Hill Substations. In the 2013 Eastside Needs Assessment the team found:

    - For the winter peak at approximately 5,200 MW (2017-18 in the model) there are two 115 kV elements with loadings above 98% for Category B (N-1) contingencies and five 115 kV elements above 100% for Category C (N-1-1 & N-2) contingencies.

    - For the summer peak at approximately 3500 MW (2018 in the model), there are two 230 kV elements above 100% and two 115 kV elements above 93% loadings for Category B (N-1) Contingencies. Also there are three elements above 100% loading and one above 99% loading for Category C (N-1-1) contingencies.

2. Small Margin of Error to Manage Risks from Inherent Load Forecast Uncertainties: The 2012 Corporate load forecast for winter under normal weather conditions and 100% conservation indicates load increases 138 MW from 2013-14 to 2021-22 (Figure 1-1), or about 17 MW of increased load per year. This annual increase is significantly lower than previous forecasts and is much lower than the 2011 forecast of approximately 22 MW per year[10],

    In extreme weather, system load can be much higher than this forecast. To illustrate, Figure 1-1 shows that the difference in forecast load between normal and extreme winter weather for the year 2014 is actually 497 MW – almost 10 percent of the total PSE load (assuming 100% of the forecast conservation for both). Normal weather represents the projected load at 23° F and extreme weather represents the projected load at 13° F. As the temperature gets close to 13° F, the forecasted load in any given year could easily surpass the entire 138 MW load increase projected for the 10 year study period. This effect has occurred recently on the

[8] Sammamish Substation is located in Redmond. Talbot Hill Substation is located in Renton.

[9] The 2010 and 2011 TPL Planning Studies also identified the Lakeside 230-115 kV transformer as needed and planned for 2016. It did not show up as a deficit in the long term due to being modeled as installed by the long term case year.

[10] 2011 PSE IRP Section H Page H-12 from 2010 to 2017

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PSE system. In winter 2009, the system hit an all-time peak of 5038 MW[11] at a temperature of 16° F, which was 194 MW higher than the 2009 forecast for normal weather peak load in 2009 . This 2009 actual peak load level is also higher than the 2012 forecast for normal system peak load in 2021.

The 2013 Eastside Needs Assessment shows a load level of need at approximately 5,200 MW winter peak. To illustrate the importance of conservation in our modeling, the team forecasted PSE load levels under a variety of conditions. If only 75% of forecasted conservation materializes, the 5,200 MW load level would be hit as early as 2015 under normal weather conditions. Even if 100% conservation is achieved, under extreme weather conditions PSE could exceed the 5,200 MW level during the winter 2013-14. These winter peak forecast sensitivities are illustrated in Figure 1-1:

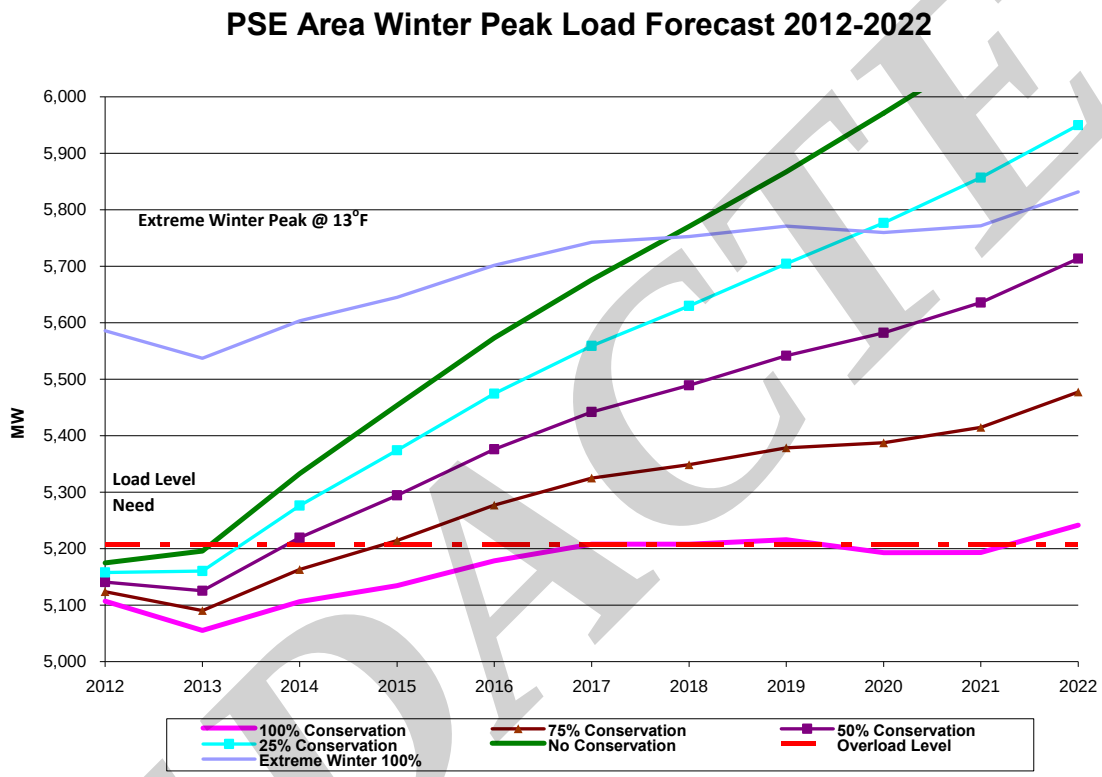

Figure 1-1: Corporate System Load Forecast for Winter 2012 to 2022

The 2013 Eastside Needs Assessment shows a summer load level of need is approximately 3340 MW (Figure 1-2). Summer peak load is calculated for an 86° F peak day. This load level could occur as early as 2014 and becomes more likely with time. While PSE has traditionally been a winter peaking utility, the increase in commercial load has driven summer load growth disproportionately higher than the winter growth in recent years. The projected summer peak growth is on average approximately 37 MW per year. The corporate load forecast does not indicate loading for an "extreme summer" peak, which would be expected to be higher than shown on these projections.

[11] This does not include approximately 270 MW of load on PSE's system served by other transmission providers.

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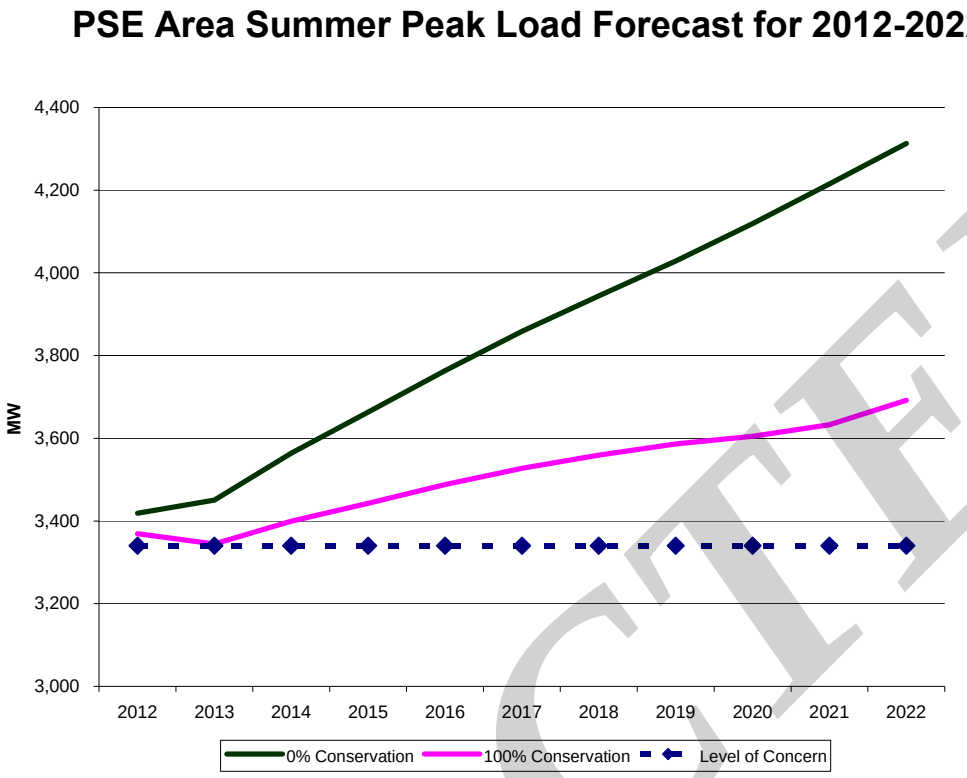

Figure 1-2: Corporate Load Forecast for Summer Peak from 2012 to 2022

3. Increasing Use and Expansion of Corrective Action Plans: An existing CAP in place to prevent overloads in the winter on either of the Talbot Hill transformer banks is increasing outage risk to customers. This CAP is to manually open [redacted], which removes [redacted]. Taking this step reduces the inherent reliability of the network since the transmission system cannot handle as many contingencies without overloads, voltage issues or loss of customers' power.

   As the PSE system load grows, the overload of either Talbot Hill transformer at winter peak may not be sufficiently reduced by this CAP. If loading on the overloading transformer is not reduced by use of the existing CAP, then [redacted] and [redacted] will also be opened. In addition to the reduction in reliability discussed above, opening these four 115 kV lines results in splitting northern King County from southern King County and puts approximately 32,400 customers at risk of outage, being served by just 1 transmission line without a backup line available (i.e., "radial supply"). This action also puts an additional 33,000 customers in Bellevue and Kirkland at risk of outage should there be an outage of [redacted] while the north and south systems are operating separately.

   There are two contingencies in the north end of King County that would trigger a CAP under summer conditions. These contingencies are (1) the loss of [redacted] along with the loss of the [redacted]; and (2) the loss of the [redacted] along with the loss of [redacted]. This CAP would open [redacted]. Taking this action places 33,000 customers at risk of outage should an additional

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transmission line outage occur. The 33,000 customers are served from two separate lines, so a single line outage would take out approximately half of the 33,000.

4. Emerging Regional Impacts Identified by ColumbiaGrid: ColumbiaGrid was formed in 2006 by regional utilities to improve the operational efficiency, reliability, and planned expansion of the Northwest transmission grid through an open and transparent process. The ColumbiaGrid produces a Biennial Transmission Expansion Plan that addresses system needs in the Pacific Northwest, including the PSE system. The latest report indicated a need to improve the dependability of the transfer capability through the Puget Sound Area. This need occurs during high load conditions and much of the rest of the year as facilities such as transmission lines are taken out of service to do required maintenance and improvements. ColumbiaGrid indicated that a reduced risk of curtailments is needed to reliably deliver power from regional and renewable generation such as PSE's wind generation in eastern Washington, to King County. Also, there are regional commitments to increase flows across the Northern Intertie to 2300 MW that will show up in the ten-year time frame.

   To significantly reduce regional curtailments, ColumbiaGrid identified six specific projects which include installing inductors on the 115 kV system in Seattle, adding a 500-230 kV transformer at BPA's Raver Substation in south King County, and increasing 230 kV south-north transmission capacity along the Eastside.

Statements of Need

The 2013 Eastside Needs Assessment confirmed that by winter of 2017-18, there is a transmission supply need on the Eastside of Lake Washington which impacts PSE customers and communities in and around Kirkland, Redmond, Bellevue, and Newcastle along with Clyde Hill, Medina, and Mercer Island. The supply need focuses on the two 230 kV supply injections into central King County at Sammamish Substation in the north and Talbot Hill Substation in the south. The transmission supply becomes a need at a PSE load level of approximately 5,200 MW, where overloads will result in operating conditions that will put thousands of Eastside customers at risk of outages. According to PSE projections, demand is expected to exceed this level in winter 2017-18.

The assessment also identified that higher overloads are expected to develop as load grows beyond the 5,208 MW (100% conservation) shown in 2017-18. For example as shown below, if only 75% of the conservation forecast is achieved - equivalent to 5,300 MW load in that same time period, the overloads will have grown. By the end of the 10 year study period, the study indicates that overloads will continue to grow even with all of the projected conservation in effect. These possible overloads will result in more hours operating under conditions that will put thousands of Eastside customers at risk of outages.

Under both load forecast conditions (full conservation and 75% conservation), the overloads occur for both Category B contingencies which are the loss of a single element (i.e., "N-1") and Category C contingencies which are the loss of more than one element, (i.e., "N-1-1" or "N-2"). Table 1-1 shows the overloads expected by 2017-18 for winter peak under normal weather conditions.

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Table 1-1: Potential Thermal Violations for 2017-18 Winter Peak with Normal Weather

	2017-18 Winter Peak	2017-18 Winter Peak
	5208 MW	5325 MW
Contingency	100% Conservation	75% Conservation
Cat B (N-1)	Talbot Hill - Lakeside #1 115 kV line – 98.6%	Talbot Hill - Lakeside #1 115 kV line – 99.9%
	Talbot Hill - Lakeside #2 115 kV line – 98.4%	Talbot Hill - Lakeside #2 115 kV line – 99.8%
	Talbot Hill 230-115 kV transformer #2 – 90.3%	Talbot Hill 230-115 kV transformer #1 – 90.9%
		Talbot Hill 230-115 kV transformer #2 – 92.4%
Cat C (N-1-1)	Talbot Hill-Lakeside #1 115 kV Line - 127.8%	Talbot Hill-Lakeside #1 115 kV Line - 129.9%
	Talbot Hill-Lakeside #2 115 kV Line - 127.6%	Talbot Hill-Lakeside #2 115 kV Line - 129.7%
	Talbot Hill 230-115 kV transformer #1 - 105.7%	Talbot Hill 230-115 kV transformer #1 - 108.1%
	Talbot Hill 230-115 kV transformer #2 - 105.7%	Talbot Hill 230-115 kV transformer #2 – 107.6%
	Talbot Hill-Boeing Renton-Shuffleton 115 kV Line - 110.6%	Talbot Hill-Boeing Renton-Shuffleton 115 kV Line - 112.5%
	Shuffleton – O'Brien 115 kV Line – 97.9%	Shuffleton – O'Brien 115 kV Line – 99.7%
	Shuffleton – Lakeside 115 kV Line – 97.3%	Shuffleton – Lakeside 115 kV Line – 98.9%
Cat C (N-2 or Common Mode)	Talbot Hill-Lakeside #1 115 kV Line - 101.5%	Talbot Hill-Lakeside #1 115 kV Line – 100.5%
	Talbot Hill-Lakeside #2 115 kV Line - 101.1%	Talbot Hill-Lakeside #2 115 kV Line – 103.0%
	Talbot Hill 230-115 kV transformer #1 – 91.8%	Talbot Hill 230-115 kV transformer #1 – 93.8%
	Talbot Hill 230-115 kV transformer #2 – 92.8%	Talbot Hill 230-115 kV transformer #2 – 94.4%

The analysis also identified that overload conditions will occur for Summer Peak conditions under normal weather. These overloads can occur as early as 2014 with a load level of approximately 3,300 MW. These overloads increase by the year 2018 when the load is expected to increase to 3,500 MW. Those issues are listed in Table 1-2.

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Table 1-2: Potential Thermal Violations for 2014 and 2018 Summer Peak with Normal Weather

	2014 Summer Peak	2018 Summer Peak
	3343 MW	3554 MW
Contingency	100% Conservation	100% Conservation
Cat B (N-1)	Monroe-Novelty Hill 230 kV line - 132.6%	Monroe-Novelty Hill 230 kV line - 133.0%
	Maple Valley - Sammamish 230 kV line - 111.4%	Maple Valley - Sammamish 230 kV line - 132.3%
		Talbot Hill - Lakeside #1 115 kV line - 93.9%
		Talbot Hill - Lakeside #2 115 kV line - 93.8%
Cat C (N-1-1)	Sammamish 230-115 kV transformer #1 - 95.5%	Sammamish 230-115 kV transformer #1 - 100.7%
	Sammamish 230-115 kV transformer #2 - 100.8%	Sammamish 230-115 kV transformer #2 - 106.4%
		Beverly Park - Cottage Brook 115 kV line - 100.5%
		Sammamish - Lakeside #2 115 kV line - 99.8%

When winter load reaches the point that overloads are possible, PSE or BPA would use CAPs to automatically or manually prevent overloads under the NERC reliability requirements. The CAPs required to prevent N-1-1 overloads would open lines between Sammamish and Talbot Hill. Some of the CAPs place customers at risk of outage due to transmission lines being switched to a radial supply, with no backup transmission line available. Load growth by the end of the 10 year study period will result in additional lines required to be opened, putting over 60,000 customers at risk of resulting outages. Some of the CAPs are set up today as BPA nomograms or PSE manual corrective action plans. If extreme winter weather were to occur today, loading would be high enough that CAPs would be employed to remain NERC compliant.

Future load growth will result in additional lines required to be opened, putting over 60,000 customers at risk of resulting outages. Additional power supply is needed in the central King County area to prevent overloads and outages, see .Figure 1-3.

The diagram below indicates areas at risk of outage if switching is performed to prevent overloads, and then subsequent outages occur on transmission lines that had been switched open. The subsequent outages could be due to radial lines experiencing faults due to car-pole accidents, lightning, or tree limbs. Outages could also occur if PSE dispatchers must drop load to prevent transformer overloads while transmission lines are switched open. In the diagram, green lines indicate a line or transformer whose loss during peak winter load could result in overloads of other system elements. The gold colored lines indicate those lines or transformers at risk of overloading when the green element trips out. The gray shaded areas indicate where customers would be at risk of outage from switching to mitigate the overloads.

This study finds that within the 10 year study period, additional transmission supply to the Eastside is needed to meet future demand growth of the area.

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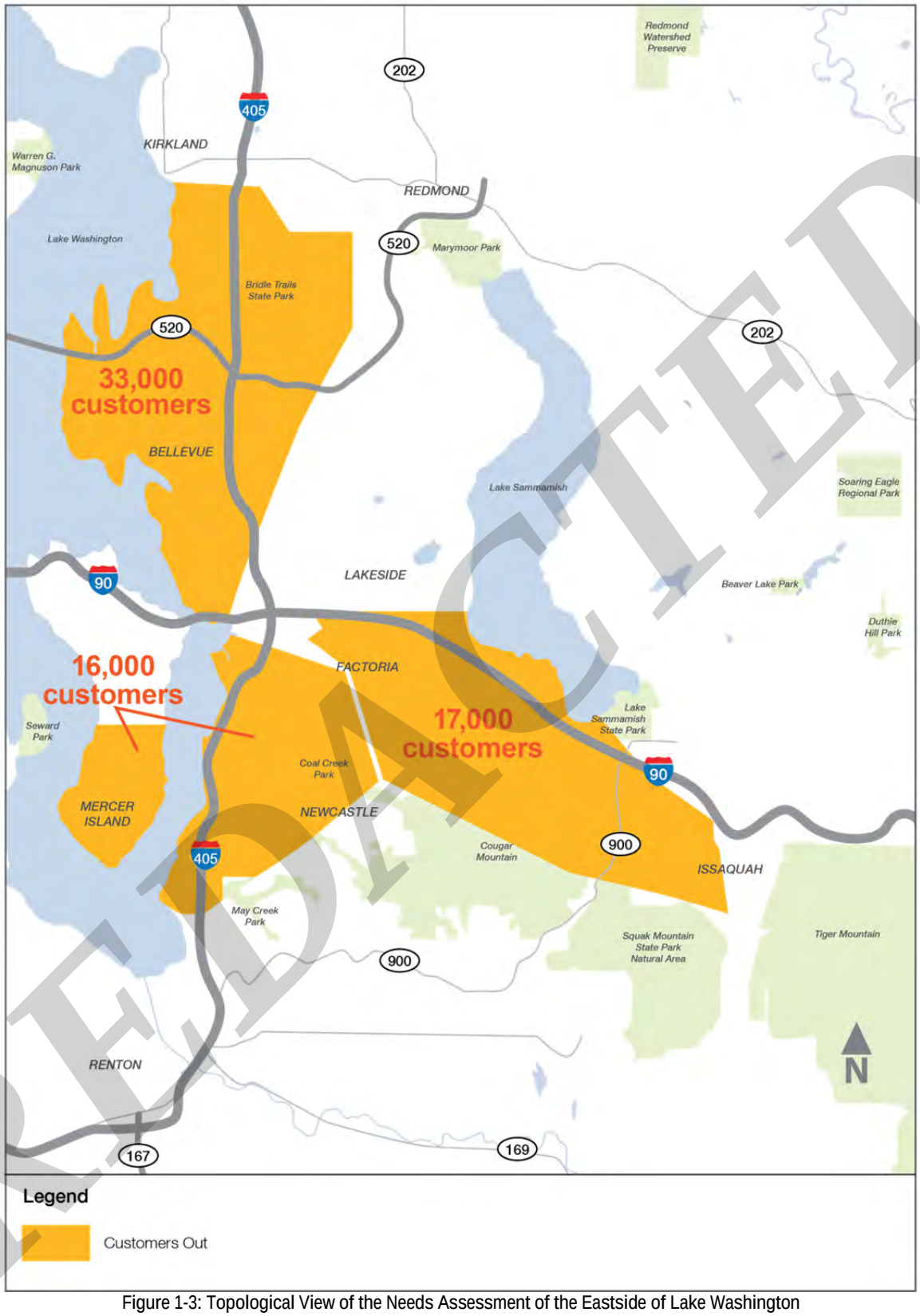

Figure 1-3: Topological View of the Needs Assessment of the Eastside of Lake Washington

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Section 2 Introduction and Background Information

2.1 Study Objective

The study objective was to assess the capability of existing transmission infrastructure to supply the communities on the east side of Lake Washington, called the "Eastside", within Puget Sound Energy's (PSE's) central King County area. These communities include Bellevue, Kirkland, Redmond, Mercer Island, and Newcastle as well as the smaller towns along the shore. A review was performed to determine the needs for future transmission supply to the Eastside. This study review was performed due to concerns identified in 2009 TPL studies that were related to the projected future loading on the Talbot Hill Substation, future requirements of the Columbia Grid, and operational issues of PSE's control area. These supply issues were exacerbated by impacts on the PSE system due to Puget Sound Area Northern Intertie (PSANI) related events during winter supply conditions and heavy south to north flows that had been identified in analysis conducted by Columbia Grid.

This present report reviews the entire infrastructure, and design of the transmission system with respect to present and future viability. The following tasks were completed as part of this study review and are discussed in this report: (i) updated the block load forecast of the King County area; (ii) merged this block load forecast into the 2012 PSE system load forecast (iii) conducted future performance simulations of the King County area for the years 2014, 2018 and 2022; (iv) reviewed the Columbia Grid 2013 Biennial Transmission Expansion Plan; and (v) reviewed operational issues with PSE's control area operators; and (vi) aligned the recommendations with the recommendations from the Columbia Grid analysis of PSANI events under heavy south to north flows.

Quanta Technology, LLC., assisted Puget Sound Energy in conducting this study, including research, analysis and documentation.

2.2 Background Information

One of the major drivers in the determination of need for additional transmission facilities is the existing load on the system and the projected load growth that is expected to occur. As early as 2008, PSE had indications that additional transmission supply was needed to support the central King County portion of PSE's service territory. In 2008, PSE conducted a King County Transformation Study that indicated increased loading had occurred at the Talbot Hill Substation, which has two 230-115 kV transformers. Concerns were noted that if load continued to grow in the area, then by 2017-18 one transformer would overload if the other transformer tripped off-line. This study used the F2008 Puget Sound Energy Electric Load Forecast.

The needs for additional transmission sources into central King County were confirmed while performing the mandatory NERC 2009 reliability compliance studies. In that analysis, PSE observed a potential thermal issue when there was a bus fault at Talbot Hill Substation. The bus fault caused the overload of a Talbot Hill transformer for the loss of the other transformer for the 2010-2011 winter peak[12]. Based upon the adjusted 2009 PSE load forecast, the peak load modeled in the 2010-2011 Winter peak case was 5,329 MW[13]. For the 2018-2019 Winter peak case a load of 5,765 MW was modeled.

To resolve this equipment overload, a temporary measure of manually switching out two 115-kV lines from Talbot Hill –Lakeside was identified as a Corrective Action Plan (CAP) that could be used to mitigate the overload[14]. The CAP would be used at a PSE load level of approximately 5,300 MW. At that time, PSE implemented the CAP and has been using it in its operations for managing the reliability of service in that area.

[12] Page 13, 2009 PSE Planning Studies and Assessment TPL-001 to TPL-004 Compliance Report

[13] Page 7, 2009 PSE Planning Studies and Assessment TPL-001 to TPL-004 Compliance Report

[14] Page 22, 2009 PSE Planning Studies and Assessment TPL-001 to TPL-004 Compliance Report

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In early 2009, PSE's corporate load forecast group responded to the national economic crisis to re-evaluate the projected load forecast. The resulting revision reduced the forecast 2010-11 winter peak by 3% from the previous year's forecast.

In 2009, PSE set their all-time record loads for both the winter and summer seasons. The 2009 winter peak load was 5,038 MW and the 2009 summer peak was 3,509 MW. This compares with a 2009 forecast of 4,973 MW for winter and 3,086 MW for summer. Neither the forecast number nor the peak load includes the 270 MW of transmission level customers used in the area load. It should be noted that the 2009 winter peak forecast assumed a normal winter temperature of 23° F, while the peak load occurred with a temperature of 16°F. For a discussion of the forecast methodology and the limitations on its use, see Section 4.1.5.

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2.3 King County Area Description

King County is a major load center of the Puget Sound Region. The Eastside area is in central King County and includes the cities of Redmond, Kirkland, Bellevue, Mercer Island, Newcastle and Renton, as well as the smaller towns of Yarrow Point, Hunts Point, Medina, Clyde Hill and Beaux Arts. The greater Eastside area also includes towns and cities to the north and east of the core area which are not a focus of this study: Bothell, Woodinville, Duvall, Carnation, Sammamish, Issaquah, Preston, Fall City, Snoqualmie, and North Bend.

Figure 2-1 Street Map of Eastside Area

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The load density of north King County is shown below in Figure 2-2. The map shows that the most densely populated areas, shown in red, of King County are Kenmore, Kirkland, Redmond, Bellevue, and Renton.

The easterly border of King County is along the Cascade Mountain Range, which creates a natural obstacle between the densely populated western Washington communities clustered around Seattle and Tacoma, and the sparsely populated arid region of eastern Washington.

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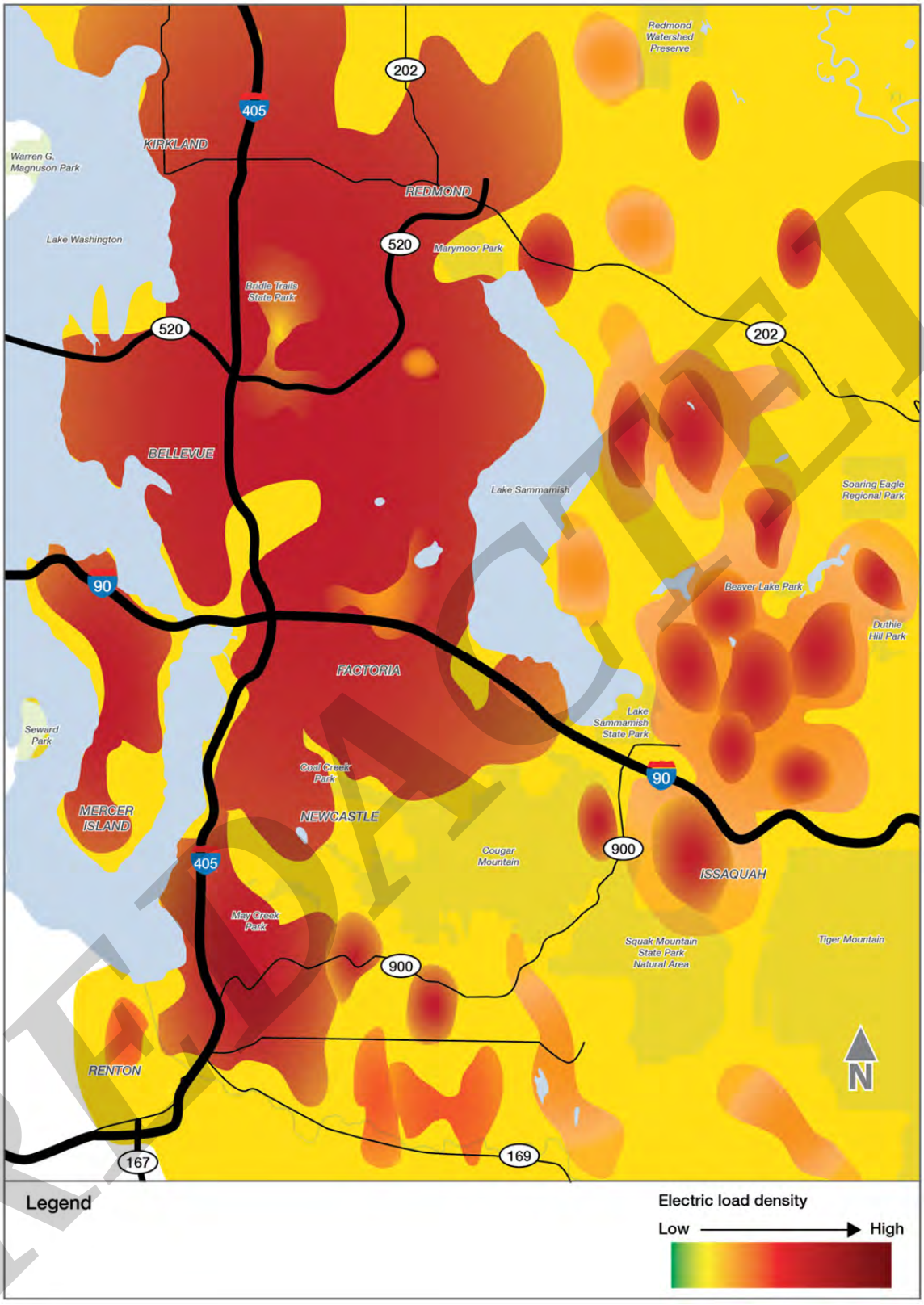

Figure 2-2: King County Load Density Map

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The King County load is supplied from Bonneville Power Administration's (BPA) 500 kV sources at Monroe (Monroe), SnoKing (Mill Creek) Maple Valley (Renton), and Covington (Covington) Substations, as well as 500 kV switching stations at Echo Lake (south of Snoqualmie) and Raver (Ravensdale). There is very little generation in King County; a small amount of hydro generation in eastern King County provides less than 5% of the county's peak load requirements. Therefore PSE depends on its transmission system and on transmission interconnections with neighboring utilities to bring power to its load center in King County.

King County also has 230 kV supply from the following substations: Sammamish (Redmond), Novelty Hill (Redmond Ridge), Talbot Hill (Renton), O'Brien (Kent), and Berrydale (Covington). To serve the loads in King County, there are eight 230 kV/115 kV transformers; two at Sammamish, two at Talbot Hill, and one at Novelty Hill, two at O'Brien, and one at Berrydale. North King County load is generally served by Sammamish and Novelty 230 kV sources but due to the interconnecting nature of the system, Talbot Hill transformers serve part of the North King and South King systems. Sammamish and Novelty Hill are both connected to the Monroe-Maple Valley 230 kV line, which is leased from BPA. See Figure 2-3 and Figure 2-4 on the following pages.

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Figure 2-3: Puget Sound Area System Overview One-Line Diagram

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Figure 2-4: Major Electrical Infrastructure Supporting the Eastside Area

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The 11 - 115 kV lines out of Lakeside Substation serve 15 substations in Bellevue and 14 substations in Newcastle, Issaquah, Mercer Island, Medina, Kirkland and Redmond, as shown in Figure 2-5. Lakeside Substation is supplied by 230-115 kV transformers at Sammamish and Talbot Hill. Lakeside connects to switching stations at Shuffleton (Renton), Lake Tradition (Issaquah) and Ardmore (Bellevue). In the Eastside area, when regional power flows are from south to north the power serving the Eastside will generally flow from south to north. In this case, power for the Eastside starts at Talbot Hill and flows north to Lakeside and continues to Sammamish Substation. When regional flows are north to south, Talbot Hill will still feed north past Lakeside but power will also flow south out of Sammamish Substation which feeds approximately sixty percent of the load between Sammamish and Lakeside Substations during north-south regional flows. Talbot Hill is a strong source of supply between Lakeside and Sammamish Substations.

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Figure 2-5 One-Line Diagram of Eastside Study Area

All of the 115 kV transmission lines in the Eastside area have been uprated to their maximum capacity ratings, except the two lines to Mercer Island, which operate normally open. PSE has two 115 kV transmission lines on separate structures on a transmission right of way (ROW) between Sammamish and Talbot Hill Substations, which interconnect at Lakeside Substation. There are three 115 kV lines in parallel with this corridor in the north, two lines in parallel in the south, all supplying load to distribution substations.

The Bellevue area is a higher-density load center without a 230 kV bulk transmission source nearby. With 230 kV supplies in the north at Sammamish Substation and the south at Talbot Hill Substation, lower-capacity 115 kV transmission lines bring power to Bellevue from the 230 kV transmission substations in Redmond and Renton.

2.4 Study Horizon

PSE has studied the Eastside area for the near-term (years 1-5) and long-term (years 6-10) horizons. Since PSE peaks during the winter season, the reliability analysis focused on the winter peak for years 2013-14, 2017-18, and 2021-22. Summer peak was also analyzed for years 2014 and 2018 for the annual 2012 NERC TPL analysis; the 2012 NERC TPL summer results were included in this study.

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Section 3 Analysis Description

A number of comprehensive reliability analyses were performed to determine the present and future transmission supply to the central King County area. The following detailed studies were performed to assess any adverse conditions to the reliability and operating characteristics of the PSE system or surrounding systems in the context of applicable standards:

2013 Eastside Needs Assessment: Power flow simulations were performed for the near and far-term horizon to determine if there are any thermal or voltage violations to King County's Eastside area. Past studies have shown supply issues to this area. While the recent economic downturn has impacted the future load growth projections of PSE overall, the load within the Eastside continues to grow. This study uses the latest corporate load forecast and adjusts the lumpiness of the load based on PSE's knowledge of future block loads.

2008 Initial King County Transformation Study: Power system simulation studies were performed on the King County system which indicated increased loading at Talbot Hill Substation, pointing to future overloads of either transformer for the loss of the other transformer at Talbot Hill. A bus section fault or loss of one of the lines from BPA Maple Valley Substation could also result in Talbot Hill transformer overloads.

2009 PSE Planning Studies and Assessment-TPL-001 to TPL-004 Compliance Report: As required per the 2009 NERC Compliance Enforcement Program, PSE performed an assessment of the system based on criteria described in NERC Standards TPL-001 through TPL-004. There were a number of potential overloads and voltage violations identified with these studies. The proposed solutions are generally system projects that will mitigate the issues via a topology change, line uprate, or additional transformation. The solutions may also take the form of a Remedial Action Scheme (RAS), as well. PSE demonstrated through a valid assessment that its portion of the interconnected transmission system is planned such that the Network can be operated to supply projected customer demands and projected Firm (non-recallable reserved) Transmission Services, at all demand levels over the range of forecast system demands, under the contingency conditions.

2012 PSE Planning Studies and Assessment-TPL-001 to TPL-004 Compliance Report:
PSE performed an assessment of the system based on criteria described in NERC Standards TPL-001 through TPL-004. There were a number of potential overloads and voltage violations identified with these studies. The proposed solutions are generally system projects that will mitigate the issues via a topology change, line uprate, or additional transformation. The solutions may also take the form of a Remedial Action Scheme (RAS), as well.

BPA Transformation Study: A study was conducted by PSE in 2010 to review the impact of BPA 500-230 kV transformation at Monroe, Maple Valley or Covington which had been identified by BPA as alternative sites for the new transformer. A Covington transformer plus Lakeside 230-115 kV transformation provides better improvements to stressed contingencies than Covington plus Lake Tradition, Berrydale and Christopher 230-115 kV transformers combined. A Maple Valley transformer would stress PSE's system in the Talbot Hill vicinity more than a Covington transformer.

ColumbiaGrid 2013 Biennial Transmission Expansion Plan: ColumbiaGrid 2013 Biennial Transmission Expansion Plan looks out over a ten-year planning horizon (2013 - 2023) and identifies the transmission additions necessary to ensure that the parties to the ColumbiaGrid Planning and Expansion Functional Agreement can meet their commitments to serve load and meet firm transmission service commitments. The Expansion plan still includes the addition of a Lakeside 230-115 kV transformer in the Ten-Year Plan, and the additional 230-115 kV transformation at Lake Tradition in the long term. The new issues in the 2013 Expansion plan include Northern Intertie transfer issues.

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A limitation in the 500/230 kV transformation in the Puget Sound area was noted in previous System Assessments. To resolve this issue, The Puget Sound Area Transmission Expansion Plan and the ColumbiaGrid Ten-Year Plan include a new 500-230 kV transformer at Raver which is scheduled to be installed in 2016.

Study Criteria: The following is a list of the criteria, standards and guides which apply to this needs statement:

1. TPL-001- System Performance Under Normal (No Contingency) Conditions (Category A)
2. TPL-001-WECC-CRT-2 – System Performance Criterion Under Normal Conditions, Following Loss of a Single BES Element, and Following Extreme BES Events:
3. TPL-002 - System Performance Following Loss of a Single Bulk Electric System Element (Category B)
4. TPL-003 - System Performance Following Loss of Two or More Bulk Electric System Elements (Category C)
5. TPL-004 - System Performance Following Extreme Events Resulting in the Loss of Two or More Bulk Electric System Elements (Category D)
6. PSE's Transmission Planning Guidelines
7. Northwest Power Pool Coordinated Plan
8. PSE Procedures to Establish and Communicate Operating Limits

Section 4 Study Assumptions

4.1 Steady State Model Assumptions

4.1.1 Study Assumptions

The 230 kV Eastside Area steady state models were developed to be representative of the long term projection of the winter peak system demand level to assess reliability performance under heavy load conditions. The model assumptions included consideration of Puget Sound area generation units' unavailability conditions as well as variations in surrounding area transfer level conditions.

The following assumptions are used in the 2013 Eastside Needs Assessment. The primary focus was on the winter peaks for years 2013-14, 2017-18, and 2021-22 utilizing the latest corporate load forecast modified to reflect the lumpiness of the load by substation. The Eastside load is defined as the sum of the MW flows out of the bus on the Talbot Hill end of the Talbot Hill - Lakeside #1 & #2 115 kV lines, Shuffleton end of the Shuffleton - Lakeside 115 kV line, Lake Tradition end of the Lake Tradition - Goodes Corner - Lakeside 115 kV line, and Sammamish end of the Sammamish - Lakeside #1 & #2, Sammamish - North Bellevue - Lakeside, Sammamish - Lochleven - Lakeside, and Sammamish - Ardmore - Lakeside 115 kV lines.

The difference in winter peak load forecasts with 100% conservation from 2013-14 to 2021-22 is 138 MW, which on average, is only approximately 15 MW per year (see Figure 4-1). Sensitivities on the amount of conservation and weather were run to reflect the inherent risks associated with an essentially flat load growth. Figure 4-1 shows the load levels in the study with various levels of conservation.

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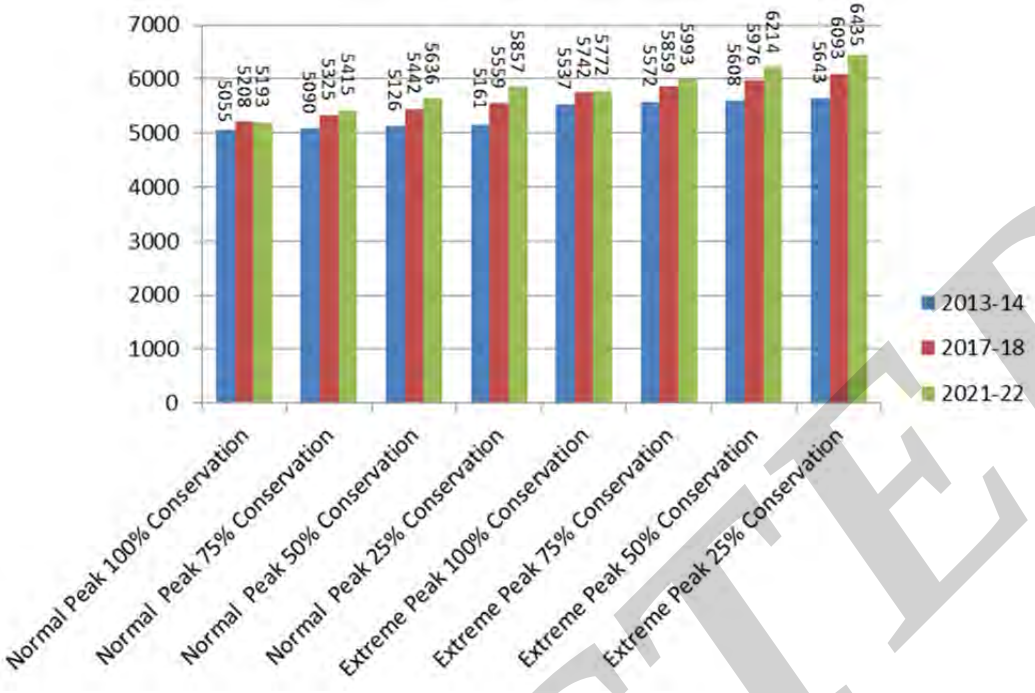

Figure 4-1: Winter Peak Load Growth with Varying Levels of Conservation

The Northern Intertie for the winter peak was modeled with a south to north flow of 1,500 MW into Canada.

The generation dispatches for the winter peak were modeled to reflect the standard way PSE studies the King County area which is to reduce generation in the north of the PSE area to create a greater south to north power flow during contractual flows from the Northwest to Canada. A winter low generation sensitivity case with adjusted Puget Sound area generation was run to identify risks associated with running a no Puget Sound Area generation case.

4.1.2 Source of Power Flow Models

The power flow models used in the study were based on WECC base cases created in 2012 for the winters 2012 -13, 2016 -17 and 2021-22 and for summers 2012 and 2017. These base cases are updated annually by all WECC members to reflect expected load forecasts, planned projects, generation changes and system adjustments. The 2012-13 winter case was modified to model the expected 2013-14 winter, the 2016-17 winter case to 2017-18 winter, the 2012 summer case to 2014 summer, and the 2017 summer case to 2018 summer. The cases were updated to reflect the PSE Corporate load forecast as discussed in Section 4.1.5.

The winter cases were then adjusted to reflect the case where the region sees high south to north power flows with no Puget Sound area generation. In previous studies, this scenario was the one that indicated the greatest problems on the Eastside in the winter. For TPL studies, four other scenarios are also studied:

- High South to North flows on the Northern Intertie with high Puget Sound area generation
- High South to North flows on the Northern Intertie and high south to north flows on the Paul - Raver 500 kV line with no Puget Sound area generation
- High North to South power flows on the Northern Intertie with no Puget Sound area generation
- High North to South power flows on the Northern Intertie with high Puget Sound area generation

The summer cases were run through four generation and Northern Intertie scenarios for PSE's 2012 TPL report; the TPL report summer results were used for this study.

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The adjusted cases were then tailored for system improvements. Most improvements had been included already in the WECC cases. Additionally, the Seattle City Light (SCL) inductors and the Raver transformer were modeled. The PSE Lakeside 230 kV project was removed from the 2018 summer and 2021-22 winter cases since this project was proposed for perceived Eastside transmission supply need.

The cases were also adjusted for forecasted load in future years. First a block load adjustment was made where expected load is known for substations in King County. Then the system load for each of the study years was scaled to the level forecasted by PSE's Load Forecast Group in 2012.

4.1.3 Transmission Topology Changes

Projects added to the Eastside Needs Assessment base case are listed in Section 9 - Appendix B Table B-1 and Table B-2.

4.1.4 Generation Additions and Retirements

In addition to the generation increases included in the WECC base case by other utilities, PSE added generation capacity at the Snoqualmie and Lower Baker hydro units in 2013. These increases were modeled in the summer cases. The winter cases used no Puget Sound area generation for low generation scenarios, so the additional hydro generation was not relevant.

4.1.5 Forecasted Load (including assumptions concerning energy efficiency, interruptible loads, etc.)

The 2012 PSE Corporate system load forecast was used as a basis for the demand levels modeled in the study. PSE Corporate Load Forecast Group uses econometric regression models (*not end use models*) to forecast use per customer and customer counts for its electric and gas service area. The regression models are developed by customer class, such as residential, commercial, industrial, and so on.

The use-per-customer and customer equations are driven by a number of regional economic, demographic, weather, binary and other independent variables. The forecasts of the underlying economic and demographic variables are developed using information from Moody's Analytics and other regional sources of economic data.

The use per customer equation is driven primarily by historical data and variables such as unemployment rate, total employment, manufacturing employment, real personal income, retail rates and weather variables like heating and cooling degree days. The base forecast created by the regression model is modified appropriately to account for impacts of conservation programs and any known changes to large customers managed by the major accounts group. The conservation estimates prepared by the Integrated Resource Planning team distribute the implementation of conservation measures based on cost effectiveness analyses. The forecast of conservation savings is a major determinant of the final shape of the load forecast.

Customer count growth is driven by historical data and changes in population, household growth, housing permits, total employment and manufacturing employment in PSE's service area.

A major influence on PSE in the early 1990s was Washington's Growth Management Act (GMA). Elements of the GMA provide direction as to where growth and load will locate. PSE's planning process continues to provide input and updates on future planned transmission and distribution facilities for local jurisdiction Comprehensive Plan revisions to support their growth forecasts. Overall, the GMA and the local Comprehensive Plans coupled with PSE Annual Corporate Customer and Sales Forecasts provide a measure of predictability as to where and when construction of planned facilities will be needed.

PSE Annual Corporate Customer and Sales Forecasts include summer and winter peak load forecasts for a 20 year period. These forecasts include both normal and extreme winter load levels, with and without Demand Side Resources (DSR). Forecasts for Network Loads and other T & D service categories are obtained from customers

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annually for a 10-year period. Transmission Planning uses the most recent normal peak loads as a starting point and checks sensitivities to forecasted load as set forth in the NERC transmission planning requirements[15].

Table 4-1 shows PSE's 20 year load forecasts for the calendar years of 2010 to 2012 for normal (23° F) and extreme weather (13° F) with 100% conservation. PSE Load Forecast is provided for PSE system load, and does not include the 270 MW of Transmission Customer industrial loads. Transmission Customer loads are included in the area load for the TPL and 2013 Eastside Need Assessment. The load forecasts have decreased from the earlier years. The 2013 Eastside Need Assessment used the latest forecast.

From Table 4-1, the total load growth between 2013 and 2021 for normal weather is 138 MW. The difference in load between normal weather and extreme weather for 2013 is 482 MW. If the temperature on the peak day drops from 23° F to 13° F, the load increase would be approximately 3.5 times the total normal load growth over the study period.

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[15] TPL-001-2 R2.1.4: http://www.nerc.com/docs/standards/sar/atfnsdt_recirc_ballot_tpl_001_2_clean_20110711.pdf

Table 4-1: PSE Load Forecasts from 2010 to 2012 for Normal and Extreme Weather

	Forecasted 2010		Forecasted 2011		Forecasted 2012	
Year	Max of Normal Peak w/ DSR	Max of Extreme Peak w/ DSR	Max of Normal Peak w/ DSR	Max of Extreme Peak w/ DSR	Max of Normal Peak w/ DSR	Max of Extreme Peak w/ DSR
2010	4,842	5,260	4,781	5,253		
2011	4,868	5,291	4,878	5,363		
2012	4,913	5,344	4,893	5,388	4,837	5,316
2013	4,947	5,387	4,925	5,433	4,785	5,267
2014	4,961	5,407	4,965	5,487	4,836	5,333
2015	4,947	5,400	4,979	5,513	4,865	5,375
2016	4,954	5,414	5,003	5,548	4,909	5,432
2017	4,967	5,434	5,023	5,579	4,938	5,472
2018	4,989	5,462	5,027	5,593	4,938	5,483
2019	5,017	5,498	5,044	5,622	4,946	5,501
2020	5,063	5,551	5,025	5,615	4,923	5,490
2021	5,141	5,639	5,028	5,630	4,923	5,502
2022	5,222	5,731	5,078	5,693	4,972	5,562
2023	5,302	5,821	5,149	5,775	5,039	5,641
2024	5,383	5,913	5,225	5,865	5,117	5,732
2025	5,466	6,007	5,303	5,955	5,193	5,820
2026	5,547	6,099	5,382	6,047	5,266	5,905
2027	5,629	6,192	5,464	6,142	5,341	5,993
2028	5,711	6,285	5,552	6,244	5,426	6,090
2029	5,795	6,380	5,645	6,351	5,515	6,192
2030			5,490	6,091	5,605	6,296
2031					5,694	6,399
2032					5,785	6,504
2033					5,878	6,610

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The conservation in MW, by county, utilized in the 2012 forecast is shown below in Table 4-2.

Table 4-2: Conservation in MW, by County

Conservation Effects by County Normal Peaks (23ºF) 100% Target Conservation (MW)										
Year of Study	King	Thurston	Pierce	Whatcom	Skagit	Island	Kitsap	Kittitas	Jefferson	Total
2012	33.0	7.8	6.9	5.2	3.4	2.1	7.4	0.8	1.3	67.9
2013	69.6	16.5	14.6	10.8	7.2	4.4	15.5	1.7	2.7	142.9
2014	112.3	26.7	23.6	17.5	11.5	7.0	24.8	2.7	4.3	230.5
2015	158.5	37.8	33.2	24.6	16.2	9.9	34.8	3.9	6.1	324.9
2016	196.1	46.8	41.0	30.3	20.0	12.1	42.7	4.8	7.5	401.5
2017	233.0	55.6	48.6	35.9	23.7	14.3	50.3	5.8	8.9	476.2
2018	280.4	66.9	58.3	43.1	28.4	17.2	60.1	7.1	10.7	572.1
2019	325.4	77.6	67.4	49.8	32.9	19.8	69.2	8.3	12.4	662.9
2020	389.5	92.8	80.4	59.5	39.2	23.5	82.2	10.2	14.9	792.1
2021	443.5	105.6	91.2	67.5	44.6	26.6	92.8	11.7	16.9	900.4
2022	474.0	112.9	97.3	72.0	47.6	28.2	98.4	12.7	18.0	961.1
2023	495.6	118.0	101.4	75.1	49.6	29.3	102.1	13.4	18.8	1003.4
2024	514.9	122.6	105.1	77.9	51.5	30.3	105.3	14.1	19.5	1041.2
2025	535.1	127.3	109.0	80.7	53.3	31.3	108.5	14.7	20.3	1080.3

Figure 4-2 shows the twenty year window of PSE's Winter Normal Peak with 0%, 25%, 50%, 75% and 100% conservation. As Figure 4-2 shows, with 100% conservation, the load levels of PSE are relatively flat for the years of study. The difference between 2013 and 2021 is 138 MW.

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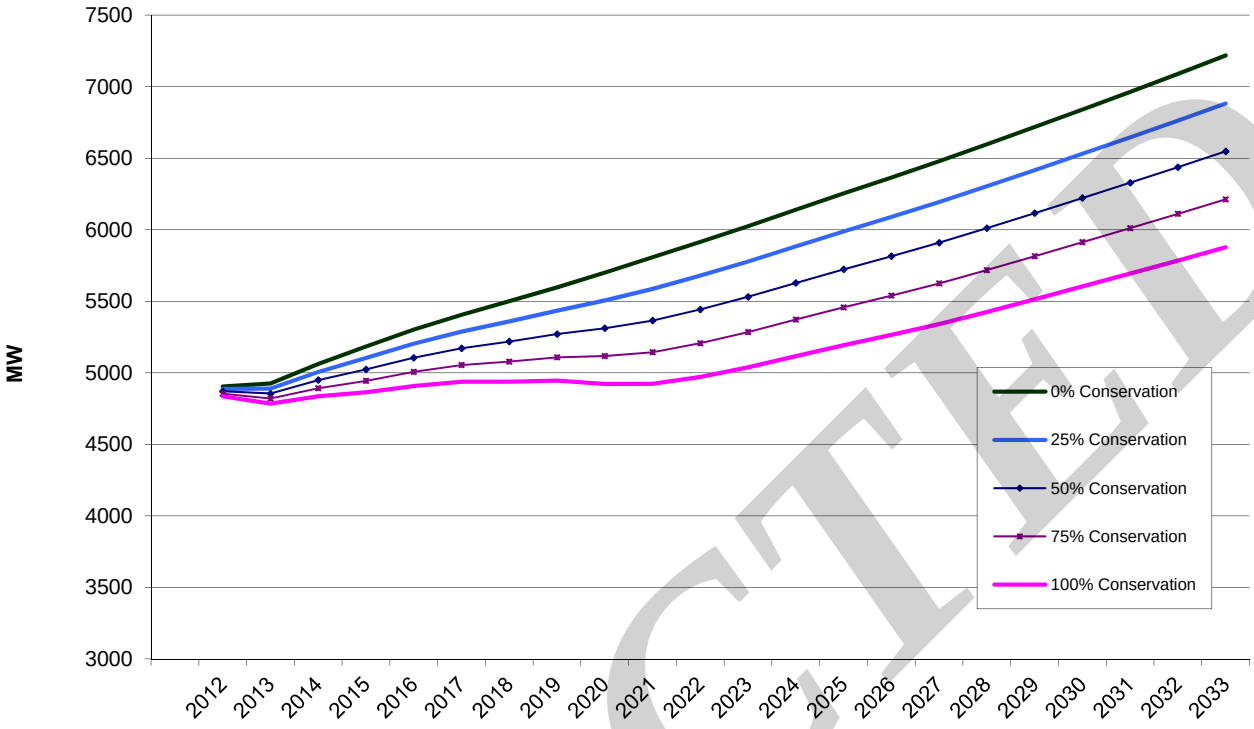

Figure 4-2: Twenty Year Graph of PSE's Forecast Winter Normal Peak with 0%, 25%, 50%, 75% and 100% Conservation

4.1.6 Load Levels Studied

For the power flow studies associated with the 230 kV Eastside Needs Assessment, the heavy winter 2013-14, 2017-18 and 2021-22 cases were used. Substation loading for the PowerWorld cases was developed using the substation loading at the time of the January 18, 2012 system peak as a proxy to the distribution of the load. There were a few substations without Supervisory Control and Data Acquisition (SCADA) load readings. Those substations were assigned values based on manual onsite substation load readings during the same load cycle. Both megawatts (MW) and megavars (MVAR) were determined in this manner.

Small Area Load Forecast: PSE distribution planners keep current on developments planned for their respective planning areas. These anticipated new loads are generally known within a 2-5 year time frame; specific projects are not often known with confidence beyond 5 years in advance. PSE planners reviewed such new loads expected in the King County area within the study period and added those expected loads to the historical load for each substation. These small area load adjustments were included in the substation load spread before the company-wide load was scaled to the corporate load forecast.

Transmission Customer Load: The corporate load forecast together with the interconnected Transmission Customer load, or non PSE load, was used to determine future loads for the power flow studies. The Transmission Customer load typically runs between 250 MW and 300 MW. For purposes of this study, 270 MW was used for a typical value. For example, in the year 2013-2014 the winter peak load forecast for the PSE area is 5055 MW which comprises the projected forecast of 4785 MW plus 270 MW of Transmission Customer loads. Loads were developed similarly for years 2017-18 and 2021-22. For completeness, this non-PSE load was included in the 2013 Eastside Needs Assessment and is shown in Table 4-3.

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Table 4-3: Winter Peak Load levels studied in the Eastside Needs Assessment

Area Load Used for Eastside 230 Study												
Year Studied	Report	Season	Normal Peak 100% Conservation	Normal Peak 75% Conservation	Normal Peak 50% Conservation	Normal Peak 25% Conservation	Normal Peak 0% Conservation	Extreme Peak 100% Conservation	Extreme Peak 75% Conservation	Extreme Peak 50% Conservation	Extreme Peak 25% Conservation	Extreme Peak 0% Conservation
2013-14	2012 E230	Winter	5055	5090	5126	5161	5196	5537	5572	5608	5643	5678
2017-18	2012 E230	Winter	5208	5325	5442	5559	5676	5742	5859	5976	6093	6210
2021-22	2012 E230	Winter	5193	5415	5636	5857	6078	5772	5993	6214	6435	6656

Note: PSE Load Forecast is provided for PSE system load, not including the 270 MW of Transmission Customer industrial load. Transmission Customer load is included in the area load for the TPL and Eastside Needs Assessment studies.

Conservation Sensitivities: The winter forecast was adjusted for sensitivities regarding the amount of expected conservation at peak load. PSE's corporate load forecast assumes 100% of the targeted conservation levels are achieved. To understand the reliability risk due to higher than expected load, PSE ran load sensitivity studies which adjusted conservation levels as a proxy for the higher loads. For the load sensitivity studies, conservation was adjusted to 75%, 50%, and 25% of expected values.

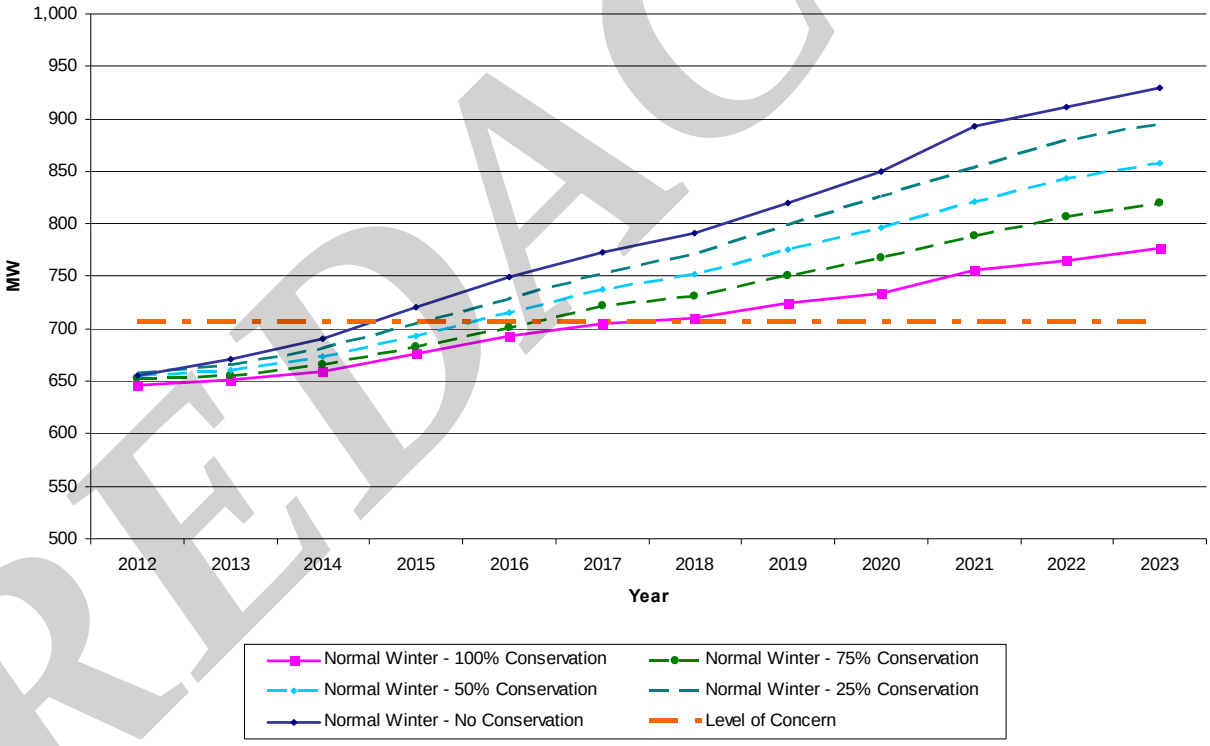

Figure 4-3: Eastside Load Forecast for Normal Winter Load Forecast 2012-2023

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4.1.7 Load Power Factor Assumptions

The power factor at each substation was based on the MW and MVAR loadings at the time of the January 18, 2012 system peak. As the load levels changed based on the load forecast, the power factor at each substation did not change.

4.1.8 Transfer Levels

The NI (Northern Intertie) flows were assumed based on season and historic flows; Winter Peak NI-1500 MW S-N and Summer Peak NI-2850 MW N-S.

4.1.9 Generation Dispatch Scenarios

For the winter peak load cases, no PSE and SCL generation west of the Cascades were run. Tacoma Power generation was left on, due certain internal system constraints. The generators off-line in the Eastside Needs Assessment are listed in Table 4-4.

A low-generation case was simulated as a sensitivity. The Puget Sound area generation run during that case is indicated in Table 4-4.

Table 4-4: List of Puget Sound Area Generators Adjusted in the 2013 Eastside Needs Assessment

Generation Plant	Winter MW Rating	Expected MW Output during Winter Peak for Low-Generation Sensitivity Case	Type	Owner	Transmission Delivery Area
Enserch	184.8	125	Natural Gas, Combined Cycle	PSE	Whatcom County
Sumas	139.8	0	Natural Gas, Combined Cycle	PSE	Whatcom County
Ferndale	282.1	0	Natural Gas, Combined Cycle	PSE	Whatcom County
Whitehorn	162.2	0	Natural Gas, Simple Cycle	PSE	Whatcom County
Fredonia	341	0	Natural Gas, Simple Cycle	PSE	Skagit County
Sawmill	31	22	Biomass	Private Owner	Skagit County
Upper Baker	106	80	Hydro Dam	PSE	Skagit County
Lower Baker	78	54	Hydro Dam	PSE	Skagit County
Komo Kulshan	14	0	Hydro Run-of-River	Private Owner	Skagit County
March Point	151.6	134	Natural Gas, Combined Cycle	Shell	Skagit County
Ross	450	295	Hydro Dam	SCL	Snohomish County
Gorge	190.7	157	Hydro Dam	SCL	Snohomish County
Diablo	166	160	Hydro Dam	SCL	Snohomish County
South Tolt River	16.8	0	Hydro Run-of-River	SCL	Northeast King County
Snoqualmie	37.8	0	Hydro Run-of-River	PSE	East King County
Twin Falls	24.6	0	Hydro Run-of-River	Private Owner	East King County
Cedar Falls	30	0	Hydro Run-of-River	SCL	East King County
Freddy 1	270	0	Natural Gas, Combined Cycle	Atlantic Power/PSE	Pierce County
Electron	20	4	Hydro Run-of-River	PSE	Pierce County
Frederickson	162.2	0	Natural Gas, Simple Cycle	PSE	Pierce County
Expected MW output during Winter peak is based off of actual 2011-2012 Winter peak output except for SCL hydro, which is based off of modeled generation levels in WECC winter peak case.					

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4.1.10 Reactive Resource and Dispatch Assumptions

All existing and planned area reactive resources were assumed available and dispatched if conditions called for their dispatch. The reactive output of units was constrained to defined limits and shunt reactive resources were dispatched as conditions required.

4.1.11 Conservation Assumptions

PSE employs conservation as a strategic measure to manage energy requirements and provide customer benefits. Conservation programs have been funded for over 20 years and are projected to continue to receive strong funding in the next 20 years. PSE's Energy Efficiency Group has demonstrated the efficacy of its funded programs on a continuing basis. As a result, conservation is included in PSE's Integrated Resource Plan (IRP) as a cost-effective source of new energy.

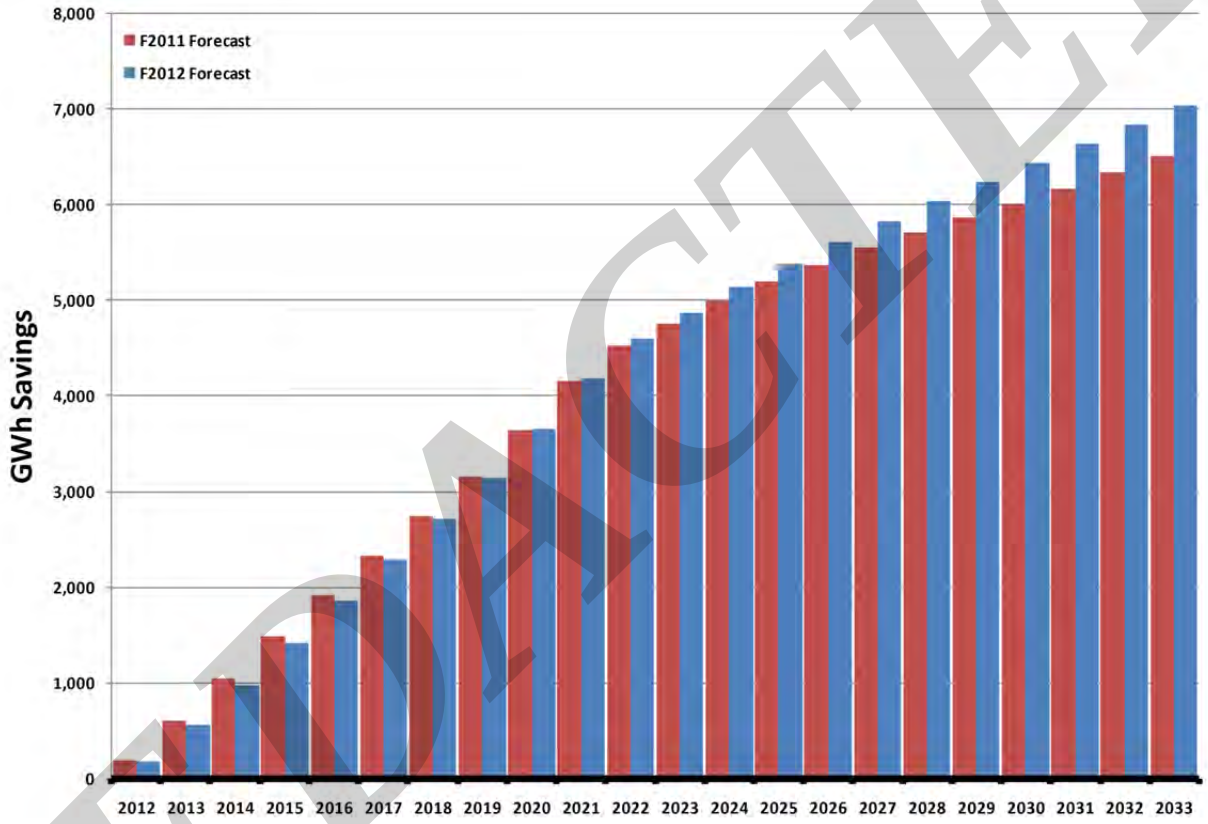

Figure 4-4: PSE Conservation Forecast in 20 year Horizon Measured in Gigawatt-Hours; Comparison of 2012 Forecast to 2011 Forecast

4.1.12 Explanation of Operating Procedures and Other Modeling Assumptions

PSE's Transmission Planning group has prepared a CAP that instructs PSE Transmission Operators to take certain actions in the event of either Talbot Hill 230-115 kV transformers overloading. While the CAP was initiated to address the potential for either transformer to exceed its emergency rating, the CAP can also be used to address the event of either transformer exceeding its operating limit as well.

The CAP instructs the PSE Transmission Operators to open the Talbot Hill – Lakeside #1 & #2 115 kV lines if either Talbot Hill 230-115 kV transformer overloads. The contingency that would cause the transformers to overload would be a double-contingency (N-1-1) loss of a Talbot Hill transformer and the Berrydale transformer during high winter loading.

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With future load growth, the CAP may be expanded to state that if the transformer overload is not sufficiently reduced or the Shuffleton – Lakeside 115 kV line overloads as a result of [redacted], then the Transmission operation should open [redacted]

While none of these planned actions would drop load in a system normal configuration, the opening of [redacted] exposes three substations supplying 16,000 customers [redacted] and three substations supplying 17,000 customers on [redacted] to an outage on the lines, as shown in Figure 4-5. Furthermore, if [redacted] are opened, North and Central King County is at risk of manual load shedding for an N-1-1 loss of [redacted]. See Figure 4-5 below that shows areas in jeopardy of outage when transmission lines are opened under the CAP's to prevent overloads of the Talbot Hill and Sammamish transformers.

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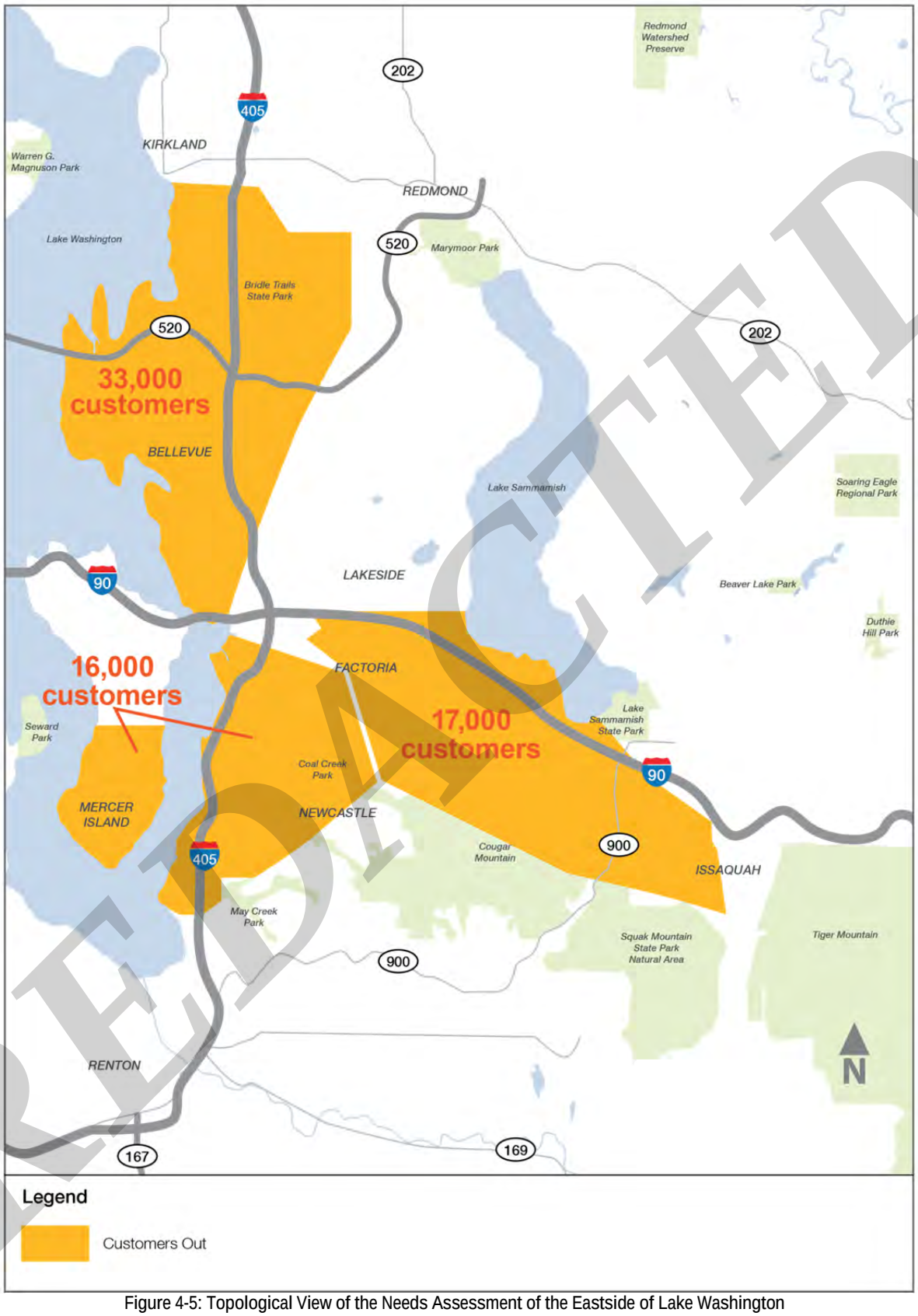

Figure 4-5: Topological View of the Needs Assessment of the Eastside of Lake Washington

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If, with future load growth, the Talbot Hill 230-115 kV transformers are at risk of overloading for an N-1 loss of one transformer during Winter peak conditions, then the CAP described above would be implemented as a pre-emptive, pre-contingent measure to ensure that overloads don't materialize. In this case [redacted] would be opened during winter peak conditions, regardless of the loading on the Talbot Hill transformers.

There is also a CAP intended for use during the summer peak in the event of the loss of [redacted]. The CAP instructs the PSE Transmission Operators to open [redacted].

While none of these planned actions would drop load in a system normal configuration, the opening of the transmission lines exposes seven substations supplying 23,000 customers on [redacted] and [redacted] to a subsequent outage on the lines. The total customer impact of 33,000 is shown in Figure 4-5.

With future load growth, the CAP may be expanded to state that if the associated overloads are not sufficiently reduced, then the Transmission Operator should also open [redacted].

While none of these additional actions would drop load in a system normal configuration, the opening of [redacted] exposes one substation supplying 6,000 customers on [redacted] and seven substations supplying 23,000 customers on [redacted] to a subsequent outage on the lines.

In the King County area, PSE has eight transmission transformers, any one of which, when tripped, could trigger a CAP. The customers at risk of outages due to the CAPs described above are supplied by four of the eight transmission transformers, located at Talbot Hill and Sammamish. When a transformer trips, it takes substantial time to test and replace: 18-24 hours typically for testing, and 3-5 weeks to replace the damaged transformer with a spare transformer. This is a long duration of exposure if CAPs must be employed during the transformer outage.

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4.2 Changes in Study Assumptions

The Bothell - SnoKing 230 kV #1 & #2 lines, owned by SCL, overloaded for various outages in all cases. These overloads were excluded from the results page, as SCL is planning to upgrade these lines whether or not the Eastside 230 kV project is built. Furthermore, the Eastside 230 kV project scope is not expected to significantly alleviate these line overloads.

SCL's Maple Valley - SnoKing 230 kV #1 & #2 lines overloaded for various outages in all cases; these overloads were observed in the base case and were expected to also occur in the more extreme cases. However, these overloads were caused in large part by the loss of [redacted]. BPA has winter operating procedures in place that will protect against these overloads through use of nomograms.

The [redacted] contingencies did not solve for the majority of the cases, due to the high South to North flows on the Northern Intertie. Therefore, the overloads in more extreme cases were not listed, as the contingency did not solve. The potential issues caused by the high South to North flows are managed through the use of nomograms by BPA.

Certain local 115 kV PSE system overloads within King County were excluded from the listed results, as they were clearly a local system problem that did not contribute to the need for the Eastside 230 kV project. The following systems or lines were excluded: Moorlands three line system, Asbury three line system, Krain Corner 115-55 kV system, and Novelty Hill - Stillwater - Cottage Brook 115 kV lines. These are known system issues with planned projects that are independent in nature from the Eastside 230 kV project.

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Section 5 Performance Requirements

5.1 Planning Standards and Criteria

This study examined thermal overloads for Category A (N-0), Category B (N-1) and Category C (N-2 and N-1-1) outages as required by NERC, WECC and PSE Transmission Planning Guidelines. PSE plans for winter and summer peak, such that no thermal or voltage violations result. While the peaks occur for just a few hours per year, there are many more hours each year where operating flexibility is impacted by system capacity. PSE plans for normal summer and winter temperatures, which are 23ºF in winter and 86ºF in summer. PSE also studies extreme winter peak temperature (13ºF) as an indicator of future deficiencies.

NERC TPL-001- System Performance Under Normal (No Contingency) Conditions (Category A): PSE shall demonstrate through a valid assessment that its portion of the interconnected transmission system is planned such that, with all transmission facilities in service and with normal (pre-contingency) operating procedures in effect, the Network can be operated to supply projected customer demands and projected Firm (non- recallable reserved) Transmission Services at all Demand levels over the range of forecast system demands, under the conditions defined in Category A of Table 1[16].

NERC TPL-002 – System Performance Following Loss of a Single Bulk Electric System Element (Category B): PSE shall demonstrate through a valid assessment that its portion of the interconnected transmission system is planned such that the Network can be operated to supply projected customer demands and projected Firm (non-recallable reserved) Transmission Services, at all demand levels over the range of forecast system demands, under the contingency conditions as defined in Category B of Table 1[17].

Category B outages can occur at any time when a single element trips off line. The NERC TPL Standards Table 1 Category B states that there should be no loss of load or curtailed firm transfers with the exception outlined in footnote b of Table 1[18]. Utilities may only shed directly-connected ("consequential") load to stay compliant. Non-consequential load loss is not allowed for Category B events for BES level less than 300 kV. The system shall remain stable. Cascading or uncontrolled islanding shall not occur. Therefore any overloads showing up for a Category B event are very serious.

NERC TPL-003 – System Performance Following Loss of Two or More Bulk Electric System Elements (Category C): PSE shall each demonstrate through a valid assessment that its portion of the interconnected transmission systems is planned such that the network can be operated to supply projected customer demands and projected Firm (non-recallable reserved) Transmission Services, at all demand

[16] Table 1 TPL-001 - System Performance Under Normal (No Contingency) Conditions (Category A)

[17] Table 1 TPL-002 - System Performance Following Loss of a Single Bulk Electric System Element (Category B)

[18] Footnote b Table 1 - An objective of the planning process is to minimize the likelihood and magnitude of interruption of firm transfers or Firm Demand following Contingency events. Curtailment of firm transfers is allowed when achieved through the appropriate-dispatch of resources obligated to re-dispatch, where it can be demonstrated that Facilities, internal and external to the Transmission Planner's planning region, remain within applicable Facility Ratings and the re-dispatch does not result in the shedding of any Firm Demand. For purposes of this footnote, the following are not counted as Firm Demand: (1) Demand directly served by the Elements removed from service as a result of the Contingency, and (2) Interruptible Demand or Demand-Side Management Load. In limited circumstances, Firm Demand may be interrupted throughout the planning horizon to ensure that BES performance requirements are met. However, when interruption of Firm Demand is utilized within the Near-Term Transmission Planning Horizon to address BES performance requirements, such interruption is limited to circumstances where the use of Firm Demand interruption meets the conditions shown in Attachment 1. In no case can the planned Firm Demand interruption under footnote 'b' exceed 75 MW for US registered entities. The amount of planned Non-Consequential Load Loss for a non-US Registered Entity should be implemented in a manner that is consistent with, or under the direction of, the applicable governmental authority or its agency in the non-US jurisdiction.

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Levels over the range of forecast system demands, under the contingency conditions as defined in Category C of Table 1[19] .

Category C outages have subcategories of N-2 and N-1-1. An N-2 outage is when a single event trips multiple facilities, such as a transmission bus fault tripping all breakers on the bus or a double-circuit transmission line outage. Breaker failure is also included as a Category C outage. For these outages, there is no time allowed for operator response, but the utility is allowed to have automatic processes to shed non-consequential load to stay compliant.

An N-1-1 Category C outage is a Category B outage followed by a period of time to manually adjust the system to a secure state, followed by a second Category B outage. PSE utilizes 30 minutes to make manual system adjustments after the first outage occurs, to prevent overloads upon the second outage event.

TPL-001-WECC-CRT-2: System Performance Criterion Under Normal Conditions, Following Loss of a Single BES Element, and Following Extreme BES Events. System simulations and associated assessments are needed periodically to ensure that reliable systems are developed that meet specified performance requirements with sufficient lead time, and that systems continue to be modified or upgraded as necessary to meet present and future system needs.

PSE Transmission Planning Guidelines, November 2012: The Transmission Planning Guidelines explain the criteria and standards used to assess the ability of Puget Sound Energy's existing and future electric transmission system, and how they are applied to provide safe and reliable service at reasonable cost. The guidelines address both specific and general issues the transmission planner needs to consider. There may be issues specific to site, project, region, or customer that will require plans to be developed on a case-by case basis. However, the Transmission Planning Guidelines are structured in a way that will help achieve consistency across the PSE transmission system.

5.2 Performance Criteria

5.2.1 Steady State Thermal and Voltage Limits

PSE has two thermal operating limits; normal and emergency. The normal operating limit is a specific level of electrical loading that a system, facility, or element can support or withstand through the daily demand cycles without loss of equipment life. The emergency limit is a specific level of electrical loading that a system, facility, or element can support or withstand for a finite period. The emergency rating assumes acceptable loss of equipment life or other physical or safety limitations for the equipment involved. If there is a violation of the emergency limit, a transmission line may not meet applicable clearance, tension and sag criteria. PSE's operating practice is to shift or shed load or dispatch generation to avoid reaching an emergency limit.

System steady state voltages and post contingency voltage deviation shall be within acceptable limits. For PSE system the acceptable limits are: the steady state voltage levels are not above 105% or below 90% for any bus, the voltage deviation for Category B events does not exceed 5%, and the voltage deviation for multiple contingency Category C events does not exceed 10%.[20]

[19] Table 1 TPL-003 - System Performance Following Loss of Two or More Bulk Electric System Elements (Category C)

[20] PSE Transmission Planning Guidelines, November 2012, page 7

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5.2.2 Steady State Solution Parameters

Devices with automatic settings were allowed to adjust automatically for base case runs, reflecting manual operation by Transmission Operators where appropriate: LTC's, phase-shifters, and shunt reactive devices. During contingency runs, LTC and phase-shifter operations were disabled. Shunt reactive devices with known fast-acting schemes were allowed to switch. Inter-area AGC was enabled for the analysis since generation or load loss simulations for the Eastside Needs Assessment were all modeled within the Northwest area and AGC response would be expected for those conditions.

Table 5-1: Study Solution Parameters

Case	Area Interchange	Transformer LTCs	Phase Angle Regulators	SVDs & Switched Shunts
Base	Tie Lines Regulating	Stepping	Regulating or Statically Set	Regulating
Contingency	Tie Lines Regulating	Disabled	Disabled	Regulating

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5.3 System Testing

5.3.1 System Design Conditions and Sensitivities Tested

Four base scenarios were developed for the additional winter studies run for the 2013 Eastside Needs Assessment. The study plan is shown in Figure 5-1.

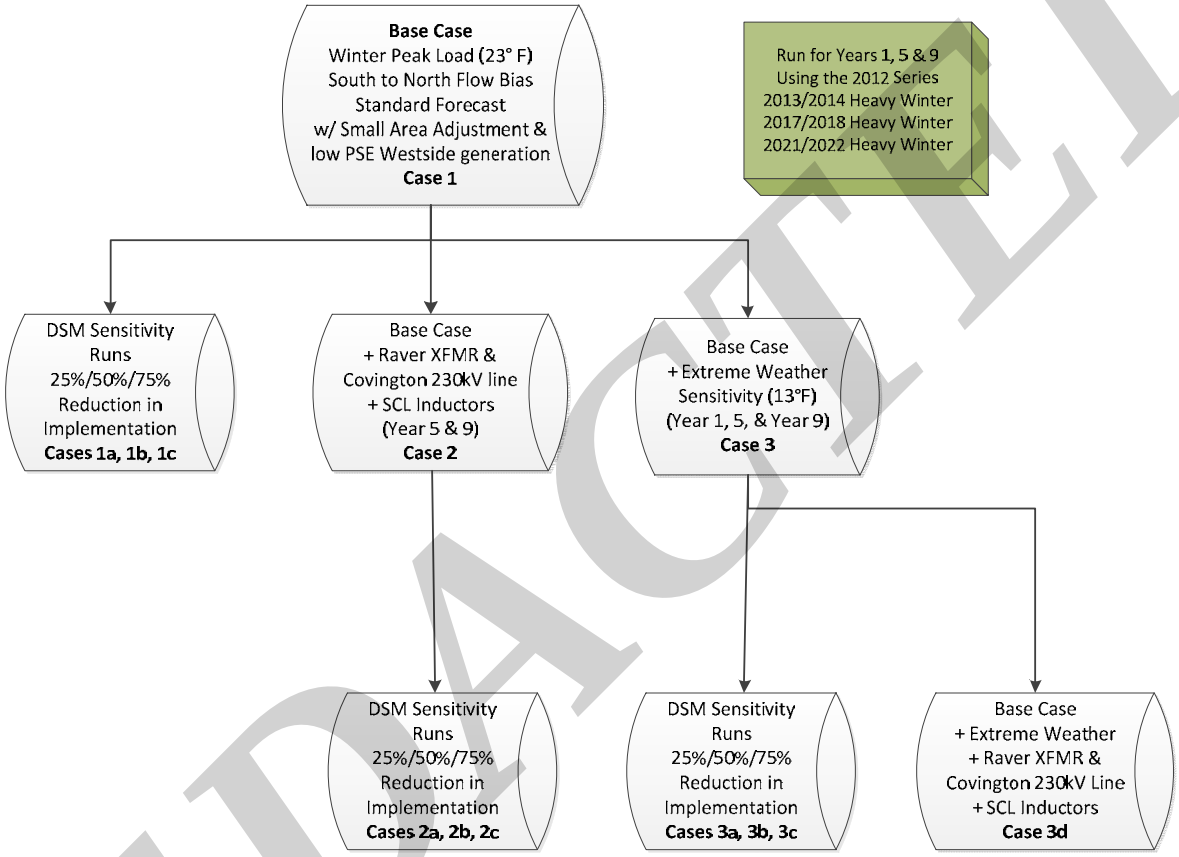

Figure 5-1: Eastside Project Need Validation Study Plan

Case 1 represents base years 2013-14, 2017-18, and 2021-22 winter peaks, normal weather adjusted by substation to reflect the lumpiness of the load. Case 1 includes a south to north bias of 1500 MW with low PSE generation in the Puget Sound area.

Case 2 represents 2017-18 and 2021-22 with additions of a 500 kV/230 kV transformer at Raver, a Raver to Covington 230 kV line, and 115 kV series inductors to the Broad Street - Massachusetts and Broad Street - East Pine 115 kV underground cables in Seattle City Light.

Case 3 represents extreme weather for Case 1.

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Case 3d represents extreme weather for Case 2.

The winter cases were run with no generation in the Puget Sound area, a case which PSE normally runs for the annual TPL assessment. However, since it is an extreme case, a low-generation case was run for the 2013 Eastside Needs Assessment as a sensitivity to determine whether some of the violations seen during the power flows could be offset by running generation. The generation levels for the low-generation sensitivity case are shown in Table 4-4, in the column labeled "Expected MW Output during Winter Peak for Low-Generation Sensitivity Case."

Sensitivities on the amount of conservation realized were performed for each of the cases above, to indicate the possible additional violations that could occur should conservation be achieved at a level below the projection or if economic growth should be higher than forecast. This was done because the 10 year load forecast with full projected conservation had such a flat growth profile. The load levels were adjusted to reflect 75%, 50%, and 25% conservation as a proxy for higher loads. The case assumptions are summarized in Table 5-2.

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Table 5-2: Winter and Summer Case Study Assumptions

Winter and Summer Case Study Assumptions						
Case Name	Amount of Conservation	System Load	Eastside Load	Northern Intertie	PSE/SCL Westside Gen	Other Adjustments Modeled
1 100% Conservation 2013-14 Winter	100%	5055 MW	652 MW	1500 MW Export	0 MW	Saint Clair 230-115 kV transformer; Talbot Hill - Berrydale #1 line uprate; Starwood autotransformer removal with Tacoma Power voltage increase
1 75% Conservation 2013-14 Winter	75%	5090 MW	656 MW	1500 MW Export	0 MW	Saint Clair 230-115 kV transformer; Talbot Hill - Berrydale #1 line uprate; Starwood autotransformer removal with Tacoma Power voltage increase
2 100% Conservation 2017-18 Winter	100%	5208 MW	706 MW	1500 MW Export	0 MW	Block load allocated per King Co Dist. Planers; Planned improvements include 2013 adjustments + Alderton 230-115 kV transformer; Beverly Park 230-115 kV transformer; Raver 500-230 kV transformer; SCL series inductors
2 75% Conservation 2017-18 Winter	75%	5325 MW	722 MW	1500 MW Export	0 MW	Block load allocated per King Co Dist. Planers; Planned improvements include 2013 adjustments + Alderton 230-115 kV transformer; Beverly Park 230-115 kV transformer; Raver 500-230 kV transformer; SCL series inductors
2 100% Conservation 2021-22 Winter	100%	5126 MW	756 MW	1500 MW Export	0 MW	Block load allocated per King Co Dist. Planers; Planned improvements include 2017-18 adjustments
2 75% Conservation 2021-22 Winter	75%	5415 MW	789 MW	1500 MW Export	0 MW	Block load allocated per King Co Dist. Planers; Planned improvements include 2017-18 adjustments
3 100% Conservation 2013-14 Extreme Winter	100%	5537 MW	718 MW	1500 MW Export	0 MW	Saint Clair 230-115 kV transformer; Talbot Hill - Berrydale #1 line uprate; Starwood autotransformer removal with Tacoma Power voltage increase
3d 100% Conservation 2017-18 Extreme Winter	100%	5742 MW	782 MW	1500 MW Export	0 MW	Block load allocated per King Co Dist. Planers; Planned improvements include 2013 adjustments + Alderton 230-115 kV transformer; Beverly Park 230-115 kV transformer; Raver 500-230 kV transformer; SCL series inductors
3d 100% Conservation 2021-22 Extreme Winter	100%	5772 MW	845 MW	1500 MW Export	0 MW	Block load allocated per King Co Dist. Planers; Planned improvements include 2013 adjustments + Alderton 230-115 kV transformer; Beverly Park 230-115 kV transformer; Raver 500-230 kV transformer; SCL series inductors
2014 Heavy Summer	100%	3343 MW	516 MW	2850 Import	2171 MW	Saint Clair 230-115 kV transformer; Talbot Hill - Berrydale #1 line uprate; Starwood autotransformer removal with Tacoma Power voltage increase
2018 Heavy Summer	100%	3554 MW	552 MW	2850 Import	2276 MW	Planned improvements include 2013 adjustments + Alderton 230-115 kV transformer; Beverly Park 230-115 kV transformer; White River - Electron Heights 115 kV line re-route into Alderton; White River 2nd bus section breaker; Lake Hills - Phantom Lake 115 kV line; Sammamish-Juanita 115 kV line

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5.3.2 Steady State Contingencies / Faults Tested

The above cases were tested based on Category A, B, and C contingencies described in the NERC TPL, and WECC standards and PSE's Transmission Planning Guidelines. Descriptions of the type of contingencies tested are listed in Table 5-3.

Table 5-3: Summary of NERC, WECC and/or PSE Category Contingencies Tested

NERC WECC PSE Categories	Description of Outaged Element(s)	Contingencies Modeled
A	All lines in-service	N/A
B A-2; 6.1 a. PP4; 3.1 a.	Loss of a generator, transmission circuit, transformer or single pole DC line	Category B contingencies included all PSE and interconnected transmission lines and transmission transformers,
C A-2; 6.1 a. PP4; 3.1 a.	Normally loss of a bus or circuit breaker; or loss of any category B element followed by another category B element with system adjustments between events; or loss of any two circuits of a multi circuit tower line or loss of a bipolar DC line; or a stuck breaker with delayed clearing of a generator, transmission circuit, transformer or bus section.	Category C: N-2 contingencies included all common-structure double circuit lines, all transmission buses and bus sections with 3 or more transmission elements, and all stuck transmission breakers. Category C: N-1-1 included a pairwise combination of all Category B elements followed by all other Category B elements.
D A-2; 6.1 a. PP4; 3.1 a.	Loss of a generator, transmission circuit, transformer or bus section; or other transmission planning entity selected critical outage or loss of a category B element followed by loss of any two circuits of a multi circuit tower or a stuck breaker	Category D was not performed in this study

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Section 6 Results of Analysis

6.1 Overview of Results

The following sections describe the results of the analysis. The thermal loading percentages described below are based on a percentage of the emergency rating for each facility.

6.1.1 N-0 Thermal and Voltage Violation Summary

For all cases, there are no thermal or voltage violations for the all lines in (N-0) state.

2013-14 – Case 1-Winter Peak, Normal Weather: For all elements in service (N-0) state, there were no thermal or voltage violations for 2013-14 winter peak, normal weather with all levels of conservation modeled (i.e. 100%, 75%, 50%, or 25%)

2013-14 – Case 3-Winter Peak, Extreme Weather: For all elements in service (N-0), there were no thermal or voltage violations for 2013-14 winter peak, extreme weather, with all levels of conservation modeled (i.e. 100%, 75%, 50%, or 25%) conservation.

2017-18 – Case 2-Winter Peak, Normal Weather: For all elements in service (N-0), there were no thermal or voltage violations for 2017-18 winter peak, normal weather, with all levels of conservation modeled (i.e. 100%, 75%, 50%, or 25%) conservation.

2017-18 – Case 3-Winter Peak, Extreme Weather: For all elements in service (N-0), there were no thermal or voltage violations for 2017-18 winter peak, extreme weather, with all levels of conservation modeled (i.e. 100%, 75%, 50%, or 25%) conservation.

2021-22 – Case 2-Winter Peak, Normal Weather: For all elements in service (N-0), there were no thermal or voltage violations for 2021-22 winter peak, normal weather, with all levels of conservation modeled (i.e. 100%, 75%, 50%, or 25%) conservation.

2021-22 – Case 3-Winter Peak, Extreme Weather: For all elements in service (N-0), there were no thermal or voltage violations for 2021-22 winter peak, extreme weather, with all levels of conservation modeled (i.e. 100%, 75%, 50%, or 25%) conservation.

6.1.2 2013-14 Thermal Summaries: Winter Peak, Normal and Extreme Weather & Summer Peak Normal Weather

Table 6-1 shows the summary of results for categories B (N-1) and C (N-1-1 & N-2) for 2013-14 winter and 2014 summer peaks with normal weather. Table 6-1 shows that for the winter peak, normal weather, 100% conservation, (PSE Load 5,055 MW), there are no Category B thermal violations but there are five (5) potential thermal violations in the King County area for Category C contingencies. Those five potential violations are as follows and highlighted in yellow in

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Table 6-2.

1. Talbot Hill - Lakeside #1 115 kV Line
2. Talbot Hill - Lakeside #2 115 kV Line
3. Talbot Hill 230-115 kV transformer #1
4. Talbot Hill 230-115 kV transformer #2
5. Talbot Hill - Boeing Renton - Shuffleton 115 kV Line

Those Category C contingencies can be mitigated by operational procedures and re-dispatching. Also, Table 6-1 lists six (6) additional facilities within the King County area, which are operating from 90% to 100% of the emergency operating limits and are above the operating limits. Those facilities are highlighted in gray on

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Table 6-2.

1. White River 230-115 kV transformer #2 – 97.4%
2. White River 230-115 kV transformer #1 – 96.9%
3. Talbot Hill - Berrydale #1 115 kV line – 96.0%
4. Berrydale 230-115 kV transformer – 92.4%
5. O'Brien 230-115 kV transformer #2 – 94%
6. O'Brien 230-115 kV transformer #1 – 93.2%

Table 6-2 also shows potential thermal overloads of elements outside of PSE's service area. Two lines of notice include Maple Valley - SnoKing #1 & #2 230 kV lines, which pass through the Eastside of King County.

For the 2014 summer peak normal weather, (PSE load of 3343 MW), high generation in the north and high imports from British Columbia (Table 6-1), there is one (1) potential Category B (N-1) thermal violation (Monroe - Novelty Hill 230 kV line) and for the same case with no generation in the north there is one (1) potential Category B thermal violation (Maple Valley - Sammamish 230 kV line). Those potential over loads are the result of losing [redacted]. Those facilities are owned by BPA. There is also one (1) potential Category C (N-1-1) potential thermal violation (Sammamish 230-115 kV transformer #2).

Table 6-3 show the potential impact of extreme winter weather with 100% and 50% conservation in 2013-14, (PSE load of 5,537 MW and 5,608 MW respectively). There are no potential Category B thermal violations, but there are three (3) elements which are operating at 90% or greater of the emergency limits and are above the operating limits; Talbot Hill 230-115 kV transformer #1, Talbot Hill 230-115 kV transformer #2, and White River 230-115 kV transformer #2.

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Table 6-1: Summary of Elements above Emergency and Operating Limits: 2013-14 Winter Peak, Normal Weather & Summer Peak Normal Weather

Year of Study	Normal or Extreme Weather	Case Conditions	Amount of Conservation/ System Load	Type of Contingency	Elements above Emergency Limit	Elements > 90% of Emergency Limit or above Operating Limit
2013-14 Winter	Normal	South-North NI Flow No Western Generation	100% 5055 MW	N-1		
2013-14 Winter	Normal	South-North NI Flow No Western Generation	100% 5055 MW	N-1-1	Talbot Hill-Lakeside #1 115 kV Line Talbot Hill-Lakeside #2 115 kV Line Talbot Hill 230-115 kV transformer #1 Talbot Hill 230-115 kV transformer #2 Talbot Hill-Boeing Renton-Shuffleton 115 kV Line	White River 230-115 kV transformer #2 White River 230-115 kV transformer #1 Talbot Hill-Berrydale #1 115 kV line Berrydale 230-115 kV transformer O'Brien 230-115 kV transformer #2 O'Brien 230-115 kV transformer #1
2013-14 Winter	Normal	South-North NI Flow, No Western Generation	100% 5055 MW	N-2 or Common Mode		Talbot Hill-Lakeside #2 115 kV Line Berrydale 230-115 kV transformer
2013-14 Winter	Normal	South-North NI Flow, No Western Generation	75% 5090 MW	N-1		
2013-14 Winter	Normal	South-North NI Flow No Western Generation	75% 5090 MW	N-1-1	Talbot Hill-Lakeside #1 115 kV Line Talbot Hill-Lakeside #2 115 kV Line Talbot Hill-Boeing Renton-Shuffleton 115 kV Line Talbot Hill 230-115 kV transformer #1 Talbot Hill 230-115 kV transformer #2	White River 230-115 kV transformer #2 White River 230-115 kV transformer #1 Talbot Hill-Berrydale #1 115 kV line Berrydale 230-115 kV transformer O'Brien 230-115 kV transformer #2 O'Brien 230-115 kV transformer #1
2013-14 Winter	Normal	South-North NI Flow, No Western Generation	75% 5090 MW	N-2 or Common Mode		Talbot Hill-Lakeside #2 115 kV Line Berrydale 230-115 kV transformer
2013-14 Winter	Normal	South-North NI Flow, No Western Generation	50% 5126 MW	N-1		
2013-14 Winter	Normal	South-North NI Flow, No Western Generation	50% 5126 MW	N-1-1	Talbot Hill-Lakeside #1 115 kV Line Talbot Hill-Lakeside #2 115 kV Line Talbot Hill-Boeing Renton-Shuffleton 115 kV Line Talbot Hill 230-115 kV transformer #1 Talbot Hill 230-115 kV transformer #2	White River 230-115 kV transformer #1 White River 230-115 kV transformer #2 Talbot Hill-Berrydale #1 115 kV line Berrydale 230-115 kV transformer O'Brien 230-115 kV transformer #2 O'Brien 230-115 kV transformer #1
2013-14 Winter	Normal	South-North NI Flow, No Western Generation	50% 5126 MW	N-2 or Common Mode		Talbot Hill 230-115 kV transformer #2 Talbot Hill-Lakeside #2 115 kV Line Berrydale 230-115 kV transformer
2014 Heavy Summer	Normal	Hi Gen, Hi Import from BC	100% 3343 MW	N-1	Monroe-Novelty Hill 230 kV line	
2014 Heavy Summer	Normal	No Gen, Hi Export to BC	100% 3343 MW	N-1	Maple Valley - Sammamish 230 kV line	
2014 Heavy Summer	Normal	No Gen, Hi Export to BC	100% 3343 MW	N-1-1	Sammamish 230-115 kV transformer #2	Sammamish 230-115 kV transformer #1

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Table 6-2: Elements above Emergency and Operating Limits: 2013-14 Winter Peak, 100% Conservation, Normal Weather, Thermal Loadings (Redacted)

Case	Category	Worst Contingency	Owner of Facilities Out	Element(s)	Owner of Overloaded Facilities	Percent Overload
2013-14 Winter	B	[redacted]	BPA	Maple Valley - SnoKing #1 230 kV line	SCL	110.0%
2013-14 Winter	B	[redacted]	BPA	Maple Valley - SnoKing #2 230 kV line	SCL	107.8%
2013-14 Winter	C	[redacted]	BPA	Maple Valley - SnoKing #1 230 kV line	SCL	124.0%
2013-14 Winter	C	[redacted]	BPA	Maple Valley - SnoKing #2 230 kV line	SCL	123.8%
2013-14 Winter	C	[redacted]	BPA	Talbot Hill - Lakeside #1 115 kV line	PSE	97.1%
2013-14 Winter	C	[redacted]	BPA	Talbot Hill - Lakeside #2 115 kV line	PSE	96.9%
2013-14 Winter	C	[redacted]	PSE	Berrydale 230-115 kV transformer	PSE	96.6%
2013-14 Winter	C	[redacted]	BPA & SCL	Maple Valley - SnoKing #1 230 kV line	SCL	146.7%
2013-14 Winter	C	[redacted]	BPA & SCL	Maple Valley - SnoKing #2 230 kV line	SCL	145.0%
2013-14 Winter	C	[redacted]	PSE	Talbot Hill 230-115 kV transformer #1	PSE	100.9%
2013-14 Winter	C	[redacted]	BPA & PSE	Talbot Hill - Lakeside #1 115 kV line	PSE	115.2%
2013-14 Winter	C	[redacted]	BPA & PSE	Talbot Hill - Lakeside #2 115 kV line	PSE	115.1%
2013-14 Winter	C	[redacted]	BPA & PSE	Talbot Hill - Boeing Renton - Shuffleton 115 kV line	PSE	101.1%

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Table 6-2: Elements above Emergency and Operating Limits: 2013-14 Winter Peak, 100% Conservation, Normal Weather, Thermal Loadings (Redacted) (CONTINUED)

2013-14 Winter	C	[redacted]	PSE	Talbot Hill 230-115 kV transformer #2	PSE	100.5%
2013-14 Winter	C	[redacted]	PSE	White River 230-115 kV transformer #2	PSE	97.4%
2013-14 Winter	C	[redacted]	PSE	White River 230-115 kV transformer #1	PSE	96.9%
2013-14 Winter	C	[redacted]	PSE	Talbot Hill - Berrydale #1 115 kV line	PSE	96.0%
2013-14 Winter	C	[redacted]	PSE	Berrydale 230-115 kV transformer	PSE	92.4%
2013-14 Winter	C	[redacted]	PSE	O'Brien 230-115 kV transformer #2	PSE	94.0%
2013-14 Winter	C	[redacted]	PSE	O'Brien 230-115 kV transformer #1	PSE	93.2%

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Table 6-3: Summary of Elements above Emergency and Operating Limits: 2013-14 Winter Peak, Extreme Weather

Year of Study	Normal or Extreme Weather	Case Conditions	Amount of Conservation/ System Load	Type of Contingency	Elements above Emergency Limit	Elements > 90% of Emergency Limit or above Operating Limit
2013-14 Winter	Extreme	South-North NI Flow No Western Generation	100% 5537 MW	N-1		Talbot Hill 230-115 kV transformer #1 Talbot Hill 230-115 kV transformer #2 White River 230-115 kV transformer #2
2013-14 Winter	Extreme	South-North NI Flow No Western Generation	50% 5608 MW	N-1-1	Talbot Hill-Lakeside #1 115 kV Line Talbot Hill-Lakeside #2 115 kV Line Talbot Hill-Boeing Renton-Shuffleton 115 kV Line Talbot Hill 230-115 kV transformer #1 Talbot Hill 230-115 kV transformer #2 White River - Lea Hill - Berrydale 115 kV line Talbot Hill-Berrydale #1 115 kV line Berrydale 230-115 kV transformer O'Brien 230-115 kV transformer #1 O'Brien 230-115 kV transformer #2 White River 230-115 kV transformer #1 White River 230-115 kV transformer #2	Shuffleton-Lakeside 115 kV line O'Brien 115 kV North bus section breaker O'Brien - Asbury 115 kV line Shuffleton - President Park - Lake Tradition 115 kV line
2013-14 Winter	Extreme	South-North NI Flow No Western Generation	50% 5608 MW	N-2 or Common Mode	Talbot Hill-Lakeside #2 115 kV Line Berrydale 230-115 kV transformer	Talbot Hill-Lakeside #1 115 kV Line Talbot Hill 230-115 kV transformer #1 Talbot Hill 230-115 kV transformer #2

6.1.3 2017-18 Thermal Summaries: Winter Peak, Normal and Extreme Weather & Summer Peak Normal Weather

Table 6-4 shows the summary of results for categories B (N-1) and C (N-1-1 & N-2) for 2017-18 winter and summer peaks with normal weather.

Table 6-4 shows that for the winter peak, normal weather, 100% conservation, (PSE load of 5,208 MW), there are no potential Category B thermal violations but there are three (3) facilities which are loaded from 90% to 100% of the emergency ratings. These facilities are highlighted in gray in Table 6-5.

1. Talbot Hill - Lakeside #1 115 kV line – 98.6%
2. Talbot Hill - Lakeside #2 115 kV line – 98.4%
3. Talbot Hill 230-115 kV transformer #2 – 90.3%

If 50% of conservation is achieved, (PSE load of 5,442 MW), the number of potential Category B thermal overloads increase to two (2) facilities.

1. Talbot Hill - Lakeside #1 115 kV Line
2. Talbot Hill - Lakeside #2 115 kV Line

There are six (6) potential thermal violations (same as 2013-14) of PSE lines or transformers in the King County area for Category C contingencies. These facilities are highlighted in yellow on Table 6-5, which shows that the potential thermal overloads vary up to a high of 128%. Overloads caused by BPA facility outages which are controlled by BPA generation dispatch are not highlighted.

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1. Talbot Hill - Lakeside #1 115 kV Line
2. Talbot Hill - Lakeside #2 115 kV Line
3. Talbot Hill 230-115 kV transformer #1
4. Talbot Hill 230-115 kV transformer #2
5. Talbot Hill - Boeing Renton - Shuffleton 115 kV Line
6. Maple Valley - Sammamish 230 kV Line

If 75% of conservation is achieved, (PSE load of 5,325 MW), the number of potential Category C thermal overloads increase to seven (7) facilities and some occur for more than one Category C contingency.

1. Talbot Hill - Lakeside #1 115 kV Line
2. Talbot Hill - Lakeside #2 115 kV Line
3. Talbot Hill - Boeing Renton - Shuffleton 115 kV Line
4. Talbot Hill 230-115 kV transformer #1
5. Talbot Hill 230-115 kV transformer #2
6. White River - Lea Hill - Berrydale 115 kV line
7. Maple Valley - Sammamish 230 kV line

If 50% of conservation is achieved, (PSE load of 5,442 MW), the number of potential Category C thermal overloads increase to ten (10) facilities and some occur for more than one Category C contingency.

1. Talbot Hill- Lakeside #1 115 kV Line
2. Talbot Hill- Lakeside #2 115 kV Line
3. Talbot Hill - Boeing Renton-Shuffleton 115 kV Line
4. Talbot Hill 230-115 kV transformer #1
5. Talbot Hill 230-115 kV transformer #2
6. Maple Valley - Sammamish 230 kV line
7. White River - Lea Hill - Berrydale 115 kV line
8. Talbot Hill - Berrydale #1 115 kV line
9. Shuffleton - O'Brien 115 kV line
10. Shuffleton - Lakeside 115 kV line

For the 2018 summer peak, normal weather, (PSE load of 3,554 MW), high generation in the north and high imports from British Columbia (Table 6-12), there are two (2) potential Category B (N-1) thermal violations (Monroe - Novelty Hill 230 kV line and Maple Valley - Sammamish 230 kV line) and there are three (3) potential Category C (N-1-1 & N-2) thermal violations (Beverly Park - Cottage Brook 115 kV line, Sammamish 230-115 kV transformer #1, and Sammamish 230-115 kV transformer #2). The sections of the Monroe - Novelty Hill 230 kV line and Maple Valley - Sammamish 230 kV line that may overload are owned by BPA.

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Table 6-6 shows the results of the generation sensitivity case for 2017-18, in which 1,031 MW of Puget Sound area generation was turned on. For the winter peak, normal weather, 100% conservation, (PSE load of 5,208 MW), and Puget Sound generation of 1,031 MW, there are no potential Category B thermal violations. There are four (4) potential Category C (N-1-1) violations remaining above the emergency limits (Talbot Hill - Lakeside #1 & #2 115 kV lines, and Talbot Hill 230-115 kV transformers #1 and #2). Running this level of generation also resulted in a new transformer operating above 90% for an N-1-1 contingency; the Sammamish transformer #2 will be above 90% if there are outages of both Sammamish transformer #1 and the Novelty Hill transformer. In general, turning on 1,000 MW of generation in the northern part of the Puget Sound area can have a significant impact in reducing transmission line overloads, but minor impact for transformer overloads.

Table 6-7 shows that for the 2017-18 winter peak, extreme weather, (PSE load of 5,742 MW), no generation in the north and high exports to British Columbia, there are two (2) potential Category B (N-1) thermal violations (Talbot Hill - Lakeside #1 & #2 115 kV lines (99.2% & 98.6%)); and there are twelve (12) potential Category C (N-1-1 & N-2) thermal violations.

The operational solution to temporarily remedy the potential overloads on Talbot Hill #1 transformer for the Category C loss of the North Talbot Hill 230 kV bus during extreme winter weather is to open breakers preemptively [redacted]. When that occurs there is added risk of losing load with the next N-1 contingency.

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Table 6-4: Summary of Elements above Emergency and Operating Limits: 2017-18 Winter Peak, Normal Weather & Summer Peak Normal Weather

Year of Study	Normal or Extreme Weather	Case Conditions	Amount of Conservation/ System Load	Type of Contingency	Elements above Emergency Limit	Elements > 90% of Emergency Limit or above Operating Limit
2017-18 Winter	Normal	South-North NI Flow No Western Generation	100% 5208 MW	N-1		Talbot Hill-Lakeside #1 115 kV Line Talbot Hill-Lakeside #2 115 kV Line Talbot Hill 230-115 kV transformer #2
2017-18 Winter	Normal	South-North NI Flow No Western Generation	100% 5208 MW	N-1-1	Talbot Hill-Lakeside #1 115 kV Line Talbot Hill-Lakeside #2 115 kV Line Talbot Hill 230-115 kV transformer #1 Talbot Hill 230-115 kV transformer #2 Talbot Hill-Boeing Renton-Shuffleton 115 kV Line Maple Valley-Sammamish 230 kV line	Talbot Hill-Berrydale #1 115 kV line White River - Lea Hill - Berrydale 115 kV Line Shuffleton-O'Brien 115 kV line Shuffleton-Lakeside 115 kV line Berrydale 230-115 kV transformer O'Brien 230-115 kV transformer #2 O'Brien 230-115 kV transformer #1
2017-18 Winter	Normal	South-North NI Flow No Western Generation	100% 5208 MW	N-2 or Common Mode	Talbot Hill-Lakeside #1 115 kV Line Talbot Hill-Lakeside #2 115 kV Line	Talbot Hill 230-115 kV transformer #1 Talbot Hill 230-115 kV transformer #2 Berrydale 230-115 kV transformer
2017-18 Winter	Normal	South-North NI Flow No Western Generation	75% 5325 MW	N-1		Talbot Hill-Lakeside #1 115 kV Line Talbot Hill-Lakeside #2 115 kV Line Talbot Hill 230-115 kV transformer #1 Talbot Hill 230-115 kV transformer #2
2017-18 Winter	Normal	South-North NI Flow No Western Generation	75% 5325 MW	N-1-1	Talbot Hill-Lakeside #1 115 kV Line Talbot Hill-Lakeside #2 115 kV Line Talbot Hill-Boeing Renton-Shuffleton 115 kV Line Talbot Hill 230-115 kV transformer #1 Talbot Hill 230-115 kV transformer #2 White River - Lea Hill - Berrydale 115 kV line Maple Valley - Sammamish 230 kV line	Talbot Hill-Berrydale #1 115 kV line Shuffleton-O'Brien 115 kV line Shuffleton-Lakeside 115 kV line Berrydale 230-115 kV transformer O'Brien 230-115 kV transformer #2 O'Brien 230-115 kV transformer #1 O'Brien 115 kV North bus section breaker O'Brien-Asbury 115 kV line
2017-18 Winter	Normal	South-North NI Flow No Western Generation	75% 5325 MW	N-2 or Common Mode	Talbot Hill-Lakeside #1 115 kV Line Talbot Hill-Lakeside #2 115 kV Line	Talbot Hill 230-115 kV transformer #1 Talbot Hill 230-115 kV transformer #2 Berrydale 230-115 kV transformer
2017-18 Winter	Normal	South-North NI Flow No Western Generation	50% 5442 MW	N-1	Talbot Hill-Lakeside #1 115 kV Line Talbot Hill-Lakeside #2 115 kV Line	Talbot Hill 230-115 kV transformer #1 Talbot Hill 230-115 kV transformer #2 Talbot Hill-Boeing Renton-Shuffleton 115 kV Line
2017-18 Winter	Normal	South-North NI Flow No Western Generation	50% 5442 MW	N-1-1	Talbot Hill-Lakeside #1 115 kV Line Talbot Hill-Lakeside #2 115 kV Line Talbot Hill-Boeing Renton-Shuffleton 115 kV Line Talbot Hill 230-115 kV transformer #1 Talbot Hill 230-115 kV transformer #2 Maple Valley-Sammamish 230 kV line White River - Lea Hill - Berrydale 115 kV line Talbot Hill-Berrydale #1 115 kV line Shuffleton - O'Brien 115 kV line Shuffleton-Lakeside 115 kV line	Berrydale 230-115 kV transformer O'Brien 230-115 kV transformer #2 O'Brien 230-115 kV transformer #1 O'Brien 115 kV North bus section breaker O'Brien - Asbury 115 kV line Shuffleton - President Park - Lake Tradition 115 kV line
2017-18 Winter	Normal	South-North NI Flow No Western Generation	50% 5442 MW	N-2 or Common Mode	Talbot Hill-Lakeside #2 115 kV Line	Talbot Hill-Lakeside #1 115 kV Line Berrydale 230-115 kV transformer Talbot Hill 230-115 kV transformer #1 Talbot Hill 230-115 kV transformer #2
2018 Heavy Summer	Normal	Hi Gen, Hi Import from BC	100% 3554 MW	N-1	Monroe-Novelty Hill 230 kV line	

REDACTED

Table 6-4: Summary of Elements above Emergency and Operating Limits: 2017-18 – Winter Peak, Normal Weather & Summer Peak Normal Weather (CONTINUED)

2018 Heavy Summer	Normal	No Gen, Hi Export to BC	100% 3554 MW	N-1	Maple Valley - Sammamish 230 kV line	Talbot Hill-Lakeside #1 115 kV line Talbot Hill-Lakeside #2 115 kV line
2018 Heavy Summer	Normal	Hi Gen, Hi Import from BC	100% 3554 MW	N-1-1	Beverly Park - Cottage Brook 115 kV line Sammamish 230-115 kV transformer #1 Sammamish 230-115 kV transformer #2	Novelty Hill 230-115 kV transformer
2018 Heavy Summer	Normal	Hi Gen, Hi Import from BC	100% 3554 MW	N-2 or Common Mode		Sammamish-Lakeside #2 115 kV line

REDACTED

Table 6-5: Elements above Emergency and Operating Limits: 2017-18 Winter Peak, 100% Conservation, Normal Weather, Thermal Loadings (Redacted)

Case	Category	Worst Contingency	Owner of Facilities Out	Element(s)	Owner of Overloaded Facilities	Percent Overload
2017-18 Winter	B	[redacted]	BPA	Maple Valley - SnoKing #1 230 kV line	SCL	119.3%
2017-18 Winter	B	[redacted]	BPA	Maple Valley - SnoKing #2 230 kV line	SCL	118.2%
2017-18 Winter	B	[redacted]	BPA	Talbot Hill - Lakeside #1 115 kV line	PSE	98.6%
2017-18 Winter	B	[redacted]	BPA	Talbot Hill - Lakeside #2 115 kV line	PSE	98.4%
2017-18 Winter	B	[redacted]	PSE	Talbot Hill 230-115 kV transformer #2	PSE	90.3%
2017-18 Winter	C	[redacted]	BPA	Maple Valley - SnoKing #1 230 kV line	SCL	123.9%
2017-18 Winter	C	[redacted]	BPA	Maple Valley - SnoKing #2 230 kV line	SCL	123.3%
2017-18 Winter	C	[redacted]	PSE	Talbot Hill - Lakeside #2 115 kV line	PSE	101.1%
2017-18 Winter	C	[redacted]	BPA	Talbot Hill - Lakeside #1 115 kV line	PSE	101.5%
2017-18 Winter	C	[redacted]	PSE	Talbot Hill 230-115 kV transformer #1	PSE	91.8%
2017-18 Winter	C	[redacted]	PSE	Talbot Hill 230-115 kV transformer #2	PSE	92.8%
2017-18 Winter	C	[redacted]	PSE	Berrydale 230-115 kV transformer	PSE	93.6%
2017-18 Winter	C	[redacted]	BPA & SCL	Maple Valley - SnoKing #1 230 kV line	SCL	176.6%

REDACTED

Table 6-5: Elements above Emergency and Operating Limits: 2017-18 Winter Peak, 100% Conservation, Normal Weather, Thermal Loadings (Redacted) (CONTINUED)

2017-18 Winter	C	[redacted]	BPA & SCL	Maple Valley - SnoKing #2 230 kV line	SCL	157.8%
2017-18 Winter	C	[redacted]	BPA & PSE	Talbot Hill - Lakeside #1 115 kV line (Redispatch not enough)	PSE	127.8%
2017-18 Winter	C	[redacted]	BPA & PSE	Talbot Hill - Lakeside #2 115 kV line (Redispatch not enough)	PSE	127.6%
2017-18 Winter	C	[redacted]	PSE	Talbot Hill 230-115 kV transformer #1 (Redispatch not enough)	PSE	105.7%
2017-18 Winter	C	[redacted]	BPA & PSE	Talbot Hill - Boeing Renton - Shuffleton 115 kV line (Redispatch not enough)	PSE	110.6%
2017-18 Winter	C	[redacted]	PSE	Talbot Hill 230-115 kV transformer #2 (Redispatch not enough)	PSE	105.7%
2017-18 Winter	C	[redacted]	PSE	Talbot Hill - Berrydale #1 115 kV line	PSE	97.6%
2017-18 Winter	C	[redacted]	PSE	White River - Lea Hill - Berrydale 115 kV line	PSE	98.0%
2017-18 Winter	C	[redacted]	BPA & PSE	Shuffleton - O'Brien 115 kV line	PSE	97.9%
2017-18 Winter	C	[redacted]	PSE	Berrydale 230-115 kV transformer	PSE	93.8%
2017-18 Winter	C	[redacted]	BPA & SCL	Maple Valley - Sammamish 230 kV line	BPA	104.4%

REDACTED

Table 6-6: Elements above Emergency and Operating Limits: 2017-18 Winter Peak, 100% Conservation, Normal Weather, Low Generation Sensitivity Case, Thermal Loadings (Redacted)

						No Gen	With Gen
Case	Category	Worst Contingency	Owner of Facilities Out	Element(s)	Owner of Overloaded Facilities	% Overload	% Overload
2017-18 Winter	B	[redacted]	PSE	Talbot Hill 230-115 kV transformer #2	PSE	90.3%	87.4%
2017-18 Winter	B	[redacted]	BPA	Maple Valley - SnoKing #1 230 kV line	SCL	119.3%	86.5%
2017-18 Winter	B	[redacted]	BPA	Maple Valley - SnoKing #2 230 kV line	SCL	118.2%	84.2%
2017-18 Winter	B	[redacted]	BPA	Talbot Hill - Lakeside #1 115 kV line	PSE	98.6%	84.1%
2017-18 Winter	B	[redacted]	BPA	Talbot Hill - Lakeside #2 115 kV line	PSE	98.4%	83.9%
2017-18 Winter	C	[redacted]	BPA	Maple Valley - SnoKing #1 230 kV line	SCL	123.9%	89.0%
2017-18 Winter	C	[redacted]	BPA	Maple Valley - SnoKing #2 230 kV line	SCL	123.3%	87.1%
2017-18 Winter	C	[redacted]	PSE	Talbot Hill - Lakeside #2 115 kV line	PSE	101.1%	87.2%
2017-18 Winter	C	[redacted]	BPA	Talbot Hill - Lakeside #1 115 kV line	PSE	101.5%	85.8%
2017-18 Winter	C	[redacted]	PSE	Berrydale 230-115 kV transformer	PSE	93.6%	90.2%
2017-18 Winter	C	[redacted]	PSE	Talbot Hill 230-115 kV transformer #1	PSE	91.8%	89.3%
2017-18 Winter	C	[redacted]	PSE	Talbot Hill 230-115 kV transformer #2	PSE	92.8%	90.5%
2017-18 Winter	C	[redacted]	BPA & SCL	Maple Valley - SnoKing #1 230 kV line	SCL	176.6%	112.9%
2017-18 Winter	C	[redacted]	BPA & SCL	Maple Valley - SnoKing #2 230 kV line	SCL	157.8%	110.9%
2017-18 Winter	C	[redacted]	BPA & PSE	Talbot Hill - Lakeside #1 115 kV line	PSE	127.8%	108.7%

REDACTED

Table 6-6: Elements above Emergency and Operating Limits: 2017-18 Winter Peak, 100% Conservation, Normal Weather, Low Generation Sensitivity Case, Thermal Loadings (Redacted) (CONTINUED)

2017-18 Winter	C	[redacted]	BPA & PSE	Talbot Hill - Lakeside #2 115 kV line	PSE	127.6%	108.5%
2017-18 Winter	C	[redacted]	PSE	Talbot Hill 230-115 kV transformer #2	PSE	105.7%	102.2%
2017-18 Winter	C	[redacted]	PSE	Talbot Hill 230-115 kV transformer #1	PSE	105.7%	102.0%
2017-18 Winter	C	[redacted]	BPA & PSE	Talbot Hill - Boeing Renton - Shuffleton 115 kV line	PSE	110.6%	98.8%
2017-18 Winter	C	[redacted]	PSE	Talbot Hill - Berrydale #1 115 kV line	PSE	97.6%	96.5%
2017-18 Winter	C	[redacted]	PSE	White River - Lea Hill - Berrydale 115 kV line	PSE	98.0%	94.8%
2017-18 Winter	C	[redacted]	PSE	Berrydale 230-115 kV transformer	PSE	93.8%	93.0%
2017-18 Winter	C	[redacted]	PSE	O'Brien 230-115 kV transformer #2	PSE	93.9%	91.3%
2017-18 Winter	C	[redacted]	PSE	O'Brien 230-115 kV transformer #1	PSE	93.1%	90.5%
2017-18 Winter	C	[redacted]	PSE	Sammamish 230-115 kV transformer #2	PSE	83.8%	90.3%
2017-18 Winter	C	[redacted]	BPA & PSE	Shuffleton - O'Brien 115 kV line	PSE	97.9%	86.4%
2017-18 Winter	C	[redacted]	BPA & PSE	O'Brien 115 kV North bus section breaker	PSE	92.5%	85.0%
2017-18 Winter	C	[redacted]	BPA & PSE	Shuffleton - Lakeside 115 kV line	PSE	97.3%	83.6%
2017-18 Winter	C	[redacted]	BPA & SCL	Maple Valley - Sammamish 230 kV line	BPA	104.4%	76.7%

REDACTED

Table 6-7: Summary of Elements above Emergency and Operating Limits: 2017-18 Winter Peak, Extreme Weather

Year of Study	Normal or Extreme Weather	Case Conditions	Amount of Conservation / System Load	Type of Contingency	Elements above Emergency Limit	Elements > 90% of Emergency Limit or above Operating Limit
2017-18 Winter	Extreme	South-North NI Flow No Western Generation	100% 5742	N-1	Talbot Hill-Lakeside #1 115 kV Line 99.1% Talbot Hill-Lakeside #2 115 kV Line 98.9%	Talbot Hill 230-115 kV transformer #1 Talbot Hill 230-115 kV transformer #2 Talbot Hill - Boeing Renton - Shuffleton 115 kV line
2017-18 Winter	Extreme	South-North NI Flow No Western Generation	100% 5742	N-1-1	Talbot Hill-Lakeside #1 115 kV Line Talbot Hill-Lakeside #2 115 kV Line Talbot Hill-Boeing Renton-Shuffleton 115 kV Line Talbot Hill 230-115 kV transformer #1 Talbot Hill 230-115 kV transformer #2 White River - Lea Hill - Berrydale 115 kV line Shuffleton-Lakeside 115 kV line Talbot Hill-Berrydale #1 115 kV line Berrydale 230-115 kV transformer O'Brien 115 kV North bus section breaker O'Brien 230-115 kV transformer #1 O'Brien 230-115 kV transformer #2	O'Brien - Asbury 115 kV line Shuffleton - President Park - Lake Tradition 115 kV line White River 230-115 kV transformer #1 White River 230-115 kV transformer #2 Sammamish 230-115 kV transformer #2
2017-18 Winter	Extreme	South-North NI Flow No Western Generation	75% 5859	N-1	Talbot Hill-Lakeside #1 115 kV Line Talbot Hill-Lakeside #2 115 kV Line	Talbot Hill 230-115 kV transformer #1 Talbot Hill 230-115 kV transformer #2 Talbot Hill - Boeing Renton - Shuffleton 115 kV line Berrydale 230-115 kV transformer
2017-18 Winter	Extreme	South-North NI Flow No Western Generation	75% 5859	N-1-1	Talbot Hill-Lakeside #1 115 kV Line Talbot Hill-Lakeside #2 115 kV Line Talbot Hill-Boeing Renton-Shuffleton 115 kV Line Talbot Hill 230-115 kV transformer #1 Talbot Hill 230-115 kV transformer #2 White River - Lea Hill - Berrydale 115 kV line Shuffleton-Lakeside 115 kV line Talbot Hill-Berrydale #1 115 kV line Berrydale 230-115 kV transformer O'Brien 115 kV North bus section breaker O'Brien 230-115 kV transformer #1 O'Brien 230-115 kV transformer #2	O'Brien - Asbury 115 kV line Shuffleton - President Park - Lake Tradition 115 kV line White River 230-115 kV transformer #1 White River 230-115 kV transformer #2 Sammamish 230-115 kV transformer #2 Shuffleton - O'Brien 115 kV line O'Brien - Midway #1 115 kV line Talbot Hill - Lake Tradition #1 115 kV line Sammamish 230-115 kV transformer #1
2017-18 Winter	Extreme	South-North NI Flow No Western Generation	75% 5859	N-2 or Common Mode	Berrydale 230-115 kV transformer Talbot Hill-Lakeside #1 115 kV Line Talbot Hill-Lakeside #2 115 kV Line Talbot Hill 230-115 kV transformer #1 Talbot Hill 230-115 kV transformer #2	Shuffleton - O'Brien 115 kV line Talbot Hill - Boeing Renton - Shuffleton 115 kV line O'Brien - Midway #1 115 kV line
2017-18 Winter	Extreme	South-North NI Flow No Western Generation	50% 5967 MW	N-1	Talbot Hill-Lakeside #1 115 kV Line Talbot Hill-Lakeside #2 115 kV Line Talbot Hill 230-115 kV transformer #1 (99.6%) Talbot Hill 230-115 kV transformer #2 (99.9%)	Berrydale 230-115 kV transformer Talbot Hill - Boeing Renton - Shuffleton 115 kV line
2017-18 Winter	Extreme	South-North NI Flow No Western Generation	50% 5967 MW	N-1-1	Talbot Hill-Lakeside #1 115 kV Line Talbot Hill-Lakeside #2 115 kV Line Talbot Hill-Boeing Renton-Shuffleton 115 kV Line Talbot Hill 230-115 kV transformer #1 Talbot Hill 230-115 kV transformer #2 White River - Lea Hill - Berrydale 115 kV line Shuffleton-Lakeside 115 kV line Talbot Hill-Berrydale #1 115 kV line Berrydale 230-115 kV transformer O'Brien 115 kV North bus section breaker O'Brien 230-115 kV transformer #1 O'Brien 230-115 kV transformer #2	Shuffleton-Lakeside 115 kV line O'Brien 115 kV North bus section breaker O'Brien - Asbury 115 kV line Shuffleton - President Park - Lake Tradition 115 kV line White River 230-115 kV transformer #1 White River 230-115 kV transformer #2 Shuffleton-O'Brien 115 kV line Sammamish 230-115 kV transformer #2
2017-18 Winter	Extreme	South-North NI Flow No Western Generation	50% 5967 MW	N-2 or Common Mode	Berrydale 230-115 kV transformer Talbot Hill-Lakeside #1 115 kV Line Talbot Hill-Lakeside #2 115 kV Line Talbot Hill 230-115 kV transformer #1 Talbot Hill 230-115 kV transformer #2	Talbot Hill 230-115 kV transformer #2 Shuffleton - O'Brien 115 kV line Talbot Hill - Boeing Renton - Shuffleton 115 kV line O'Brien - Midway #1 115 kV line O'Brien 230-115 kV transformer #2

REDACTED

6.1.4 2021-22: Winter Peak, Normal & Extreme Weather Thermal Summaries

Table 6-8 shows the summary of results for categories B (N-1) and C (N-1-1 & N-2) for 2021-22 winter and summer peaks with normal weather.

Table 6-9 indicates that the PSE load level for the winter peak, normal weather, 100% conservation, for 2021-22 is 5,193 MW. There are no potential Category B (N-1) thermal violations but there are five (5) elements with loadings from 90% to 100% of the emergency ratings. Those facilities are highlighted in gray on Table 6-9.

1. Talbot Hill - Lakeside #1 115 kV Line – 95.2%
2. Talbot Hill - Lakeside #2 115 kV Line – 95.1%
3. Talbot Hill 230-115 kV transformer #1 – 91.0%
4. Talbot Hill 230-115 kV transformer #2 – 91.5%
5. Talbot Hill - Boeing Renton - Shuffleton 115 kV Line – 91.5%

For Category C (N-1-1) contingencies there are six (6) elements above the emergency limits and an additional six (6) elements with loadings above 90% of their emergency limits. Those facilities are highlighted in yellow for overloads.

1. Talbot Hill - Lakeside #1 115 kV Line
2. Talbot Hill - Lakeside #2 115 kV Line
3. Talbot Hill 230-115 kV transformer #1
4. Talbot Hill 230-115 kV transformer #2
5. Talbot Hill - Boeing Renton - Shuffleton 115 kV Line
6. Shuffleton - Lakeside 115 kV Line

The PSE load level for the winter peak, normal weather, 75% conservation, for 2021-22 is 5,415 MW. Table 6-8 indicates that there are no potential Category B (N-1) thermal violations but there are five (5) elements with loadings above 90% of the emergency ratings (Talbot Hill-Lakeside #1 & 2 115 kV Lines, Talbot Hill 230-115 kV transformers #1 & 2, and Talbot Hill-Boeing Renton-Shuffleton 115 kV Line). For Category C (N-1-1) contingencies there are ten (10) elements above the emergency limits and an additional five (5) elements with loadings above 90% of their emergency limits.

Table 6-10 shows that for the 2021-22 winter peak, extreme weather, (PSE load of 5,772 MW), no generation in the north and high exports to British Columbia, there are four (4) potential Category B (N-1) thermal violations (Talbot Hill - Lakeside #1 & #2 115 kV lines, Talbot Hill-Boeing Renton-Shuffleton 115 kV line, and the Talbot Hill 230-115 kV transformer #1). There are fourteen (14) potential Category C (N-1-1 & N-2) thermal violations.

The extreme winter cases are run as an indication of the flexibility and robustness of the electric transmission system in a near or far future year. As shown in Tables 6-7 and 6-10, the increased load to be expected with extremely cold weather could lead to many more overloads than those projected with loads during normal weather, even with reduced conservation effects. While most utilities, including PSE, do not construct facilities on the basis of extreme seasonal temperatures, it does serve as an indicator of system stresses further into the future.

REDACTED

Table 6-8: Summary of Elements above Emergency and Operating Limits: 2021-22 Winter Peak, Normal Weather

Year of Study	Normal or Extreme Weather	Case Conditions	Amount of Conservation/ System Load	Type of Contingency	Elements above Emergency Limit	Elements > 90% of Emergency Limit or above Operating Limit
2021-22 Winter	Normal	South-North NI Flow No Western Generation	100% 5193 MW	N-1		Talbot Hill-Lakeside #1 115 kV Line Talbot Hill-Lakeside #2 115 kV Line Talbot Hill 230-115 kV transformer #1 Talbot Hill 230-115 kV transformer #2 Talbot-Boeing Renton-Shuffleton 115 kV Line
2021-22 Winter	Normal	South-North NI Flow No Western Generation	100% 5193 MW	N-1-1	Talbot Hill-Lakeside #1 115 kV Line Talbot-Lakeside Hill #2 115 kV Line Talbot Hill-Boeing Renton-Shuffleton 115 kV Line Talbot Hill 230-115 kV transformer #1 Talbot Hill 230-115 kV transformer #2 Shuffleton-Lakeside 115 kV line	White River - Lea Hill - Berrydale 115 kV Line Berrydale 230-115 kV transformer O'Brien 230-115 kV transformer #2 O'Brien 230-115 kV transformer #1 O'Brien 115 kV North bus section breaker Talbot Hill-Berrydale #1 115 kV line
2021-22 Winter	Normal	South-North NI Flow No Western Generation	100% 5193 MW	N-2 or Common Mode	Talbot Hill-Lakeside #2 115 kV Line	Talbot Hill-Lakeside #1 115 kV Line Talbot Hill 230-115 kV transformer #1 Talbot Hill 230-115 kV transformer #2 Berrydale 230-115 kV transformer
2021-22 Winter	Normal	South-North NI Flow No Western Generation	75% 5415 MW	N-1		Talbot Hill-Lakeside #1 115 kV Line Talbot Hill-Lakeside #2 115 kV Line Talbot Hill-Boeing Renton-Shuffleton 115 kV Line Talbot Hill 230-115 kV transformer #1 Talbot Hill 230-115 kV transformer #2
2021-22 Winter	Normal	South-North NI Flow No Western Generation	75% 5415 MW	N-1-1	Talbot Hill-Berrydale #1 115 kV line Talbot Hill-Lakeside #1 115 kV Line Talbot Hill-Lakeside #2 115 kV Line Talbot Hill-Boeing Renton-Shuffleton 115 kV Line Talbot Hill 230-115 kV transformer #1 Talbot Hill 230-115 kV transformer #2 White River - Lea Hill - Berrydale 115 kV line Shuffleton-Lakeside 115 kV line Berrydale 230-115 kV transformer O'Brien 230-115 kV transformer #2	O'Brien 230-115 kV transformer #1 O'Brien 115 kV North bus section breaker O'Brien-Asbury 115 kV line Shuffleton-President Park - Lake Tradition 115 kV line Shuffleton-O'Brien 115 kV Line
2021-22 Winter	Normal	South-North NI Flow No Western Generation	75% 5415 MW	N-2 or Common Mode	Talbot Hill-Lakeside #1 115 kV Line Talbot Hill-Lakeside #2 115 kV Line Berrydale 230-115 kV transformer	Talbot Hill 230-115 kV transformer #1 Talbot Hill 230-115 kV transformer #2 Shuffleton - O'Brien 115 kV Line Talbot Hill-Boeing Renton-Shuffleton 115 kV Line
2021-22 Winter	Normal	South-North NI Flow No Western Generation	50% 5636 MW	N-1	Talbot Hill-Lakeside #1 115 kV Line Talbot Hill-Lakeside #2 115 kV Line	Talbot Hill 230-115 kV transformer #1 Talbot Hill 230-115 kV transformer #2 Berrydale 230-115 kV transformer Talbot Hill - Boeing Renton - Shuffleton 115 kV line
2021-22 Winter	Normal	South-North NI Flow No Western Generation	50% 5636 MW	N-1-1	Talbot Hill-Lakeside #1 115 kV Line Talbot Hill-Lakeside #2 115 kV Line Talbot Hill-Boeing Renton-Shuffleton 115 kV Line Talbot Hill 230-115 kV transformer #1 Talbot Hill 230-115 kV transformer #2 White River - Lea Hill - Berrydale 115 kV line Talbot Hill-Berrydale #1 115 kV line Shuffleton-Lakeside 115 kV line Berrydale 230-115 kV transformer O'Brien 230-115 kV transformer #1 O'Brien 230-115 kV transformer #2 O'Brien 115 kV North bus section breaker	O'Brien - Asbury 115 kV line Shuffleton - President Park - Lake Tradition 115 kV line Shuffleton-O'Brien 115 kV line Sammamish 230-115 kV transformer #2 White River 230-115 kV transformer #1 White River 230-115 kV transformer #2 O'Brien-Midway #1 115 kV Line
2021-22 Winter	Normal	South-North NI Flow No Western Generation	50% 5636 MW	N-2 or Common Mode	Talbot Hill-Lakeside #1 115 kV Line Talbot Hill-Lakeside #2 115 kV Line Berrydale 230-115 kV transformer Talbot Hill 230-115 kV transformer #1	Talbot Hill-Boeing Renton-Shuffleton 115 kV Line Talbot Hill 230-115 kV transformer #2 Shuffleton - O'Brien 115 kV line

REDACTED

Table 6-9: Elements above Emergency and Operating Limits: 2021-22 Winter Peak, 100% Conservation, Normal Weather, Thermal Loadings (Redacted)

Case	Category	Worst Contingency	Owner of Facilities Out	Element(s)	Owner of Overloaded Facilities	Percent Overload
2021-22 Winter	B	[redacted]	PSE	Talbot Hill - Lakeside #1 115 kV line	PSE	95.2%
2021-22 Winter	B	[redacted]	PSE	Talbot Hill - Lakeside #2 115 kV line	PSE	95.1%
2021-22 Winter	B	[redacted]	PSE	Talbot Hill 230-115 kV transformer #1	PSE	91.0%
2021-22 Winter	B	[redacted]	PSE	Talbot Hill 230-115 kV transformer #2	PSE	91.5%
2021-22 Winter	B	[redacted]	PSE	Talbot Hill - Boeing Renton - Shuffleton 115 kV line	PSE	91.5%
2021-22 Winter	C	[redacted]	PSE	Talbot Hill - Lakeside #2 115 kV line	PSE	107.1%
2021-22 Winter	C	[redacted]	PSE	Talbot Hill - Lakeside #1 115 kV line	PSE	96.8%
2021-22 Winter	C	[redacted]	PSE	Berrydale 230-115 kV transformer	PSE	95.5%
2021-22 Winter	C	[redacted]	PSE	Talbot Hill 230-115 kV transformer #2	PSE	93.2%
2021-22 Winter	C	[redacted]	PSE	Talbot Hill 230-115 kV transformer #1	PSE	93.6%
2021-22 Winter	C	[redacted]	PSE	Shuffleton - O'Brien 115 kV line	PSE	90.0%
2021-22 Winter	C	[redacted]	PSE	Talbot Hill - Berrydale #1 115 kV line	PSE	97.6%
2021-22 Winter	C	[redacted]	PSE	Talbot Hill 230-115 kV transformer #1	PSE	108.1%

REDACTED

Table 6-9: Elements above Emergency and Operating Limits: 2021-22 Winter Peak, 100% Conservation, Normal Weather, Thermal Loadings (Redacted) (CONTINUED)

2021-22 Winter	C	[redacted]	PSE	Talbot Hill - Lakeside #1 115 kV line	PSE	117.8%
2021-22 Winter	C	[redacted]	PSE	Talbot Hill - Lakeside #2 115 kV line	PSE	117.7%
2021-22 Winter	C	[redacted]	PSE	Talbot Hill - Boeing Renton - Shuffleton 115 kV line	PSE	107.6%
2021-22 Winter	C	[redacted]	PSE	Talbot Hill 230-115 kV transformer #2	PSE	107.0%
2021-22 Winter	C	[redacted]	PSE	White River - Lea Hill - Berrydale 115 kV line	PSE	99.7%
2021-22 Winter	C	[redacted]	PSE	Shuffleton - Lakeside 115 kV line	PSE	100.8%
2021-22 Winter	C	[redacted]	PSE	Berrydale 230-115 kV transformer	PSE	96.1%
2021-22 Winter	C	[redacted]	PSE	O'Brien 230-115 kV transformer #1	PSE	94.3%
2021-22 Winter	C	[redacted]	PSE	O'Brien 230-115 kV transformer #2	PSE	95.1%
2021-22 Winter	C	[redacted]	PSE	O'Brien 115 kV North bus section breaker	PSE	94.6%
2021-22 Winter	C	[redacted]	PSE	O'Brien - Asbury 115 kV line	PSE	90.9%

REDACTED

Table 6-10: Summary of Elements above Emergency and Operating Limits: 2021-22 Winter Peak, Extreme Weather Thermal Loadings

Year of Study	Normal or Extreme Weather	Case Conditions	Amount of Conservation/ System Load	Type of Contingency	Elements above Emergency Limit	Elements > 90% of Emergency Limit or above Operating Limit
2021-22 Winter	Extreme	South-North NI Flow No Western Generation	100% 5772 MW	N-1	Talbot Hill-Lakeside #1 115 kV Line Talbot Hill-Lakeside #2 115 kV Line Talbot Hill-Boeing Renton-Shuffleton 115 kV Line Talbot Hill 230-115 kV transformer #1	Berrydale 230-115 kV transformer Talbot Hill 230-115 kV transformer #2
2021-22 Winter	Extreme	South-North NI Flow No Western Generation	100% 5772 MW	N-1-1	Talbot Hill-Lakeside #1 115 kV Line Talbot Hill-Lakeside #2 115 kV Line Talbot Hill-Boeing Renton-Shuffleton 115 kV Line Talbot Hill 230-115 kV transformer #1 Talbot Hill 230-115 kV transformer #2 White River - Lea Hill - Berrydale 115 kV line Shuffleton-Lakeside 115 kV line Talbot Hill-Berrydale #1 115 kV line Berrydale 230-115 kV transformer O'Brien 115 kV North bus section breaker O'Brien 230-115 kV transformer #1 O'Brien 230-115 kV transformer #2 O'Brien - Asbury 115 kV line Shuffleton-O'Brien 115 kV line	Shuffleton - President Park - Lake Tradition 115 kV line White River 230-115 kV transformer #1 White River 230-115 kV transformer #2 Sammamish 230-115 kV transformer #1 Sammamish 230-115 kV transformer #2 Talbot Hill-Lake Tradition #1 115 kV Line O'Brien-Metro Renton – Talbot Hill 115 kV Line O'Brien – Christopher #1 115 kV Line
2021-22 Winter	Extreme	South-North NI Flow No Western Generation	100% 5772 MW	N-2 or Common Mode	Talbot Hill-Lakeside #1 115 kV Line Talbot Hill-Lakeside #2 115 kV Line Talbot Hill 230-115 kV transformer #1 Shuffleton-O'Brien 115 kV line Berrydale 230-115 kV transformer	Talbot Hill-Boeing Renton-Shuffleton 115 kV Line Talbot Hill 230-115 kV transformer #2 O'Brien 230-115 kV transformer #2 O'Brien - Midway #1 115 kV line

6.1.5 Summary of Potential Thermal Violations

Based on Table 6-11, below, the PSE Winter load level where King County starts to have significant issues is approximately 5200 MW. The elements which are the most susceptible to potential overloads for the winter peak loads are in the Talbot Hill and Lakeside Substation areas.

The sensitivity cases with 75% conservation instead of 100% conservation indicate system performance concerns with higher winter loads. Those sensitivity studies show even higher overloads of the elements already overloaded in the 100% conservation cases. In general, should loads grow faster than forecast, or conservation not provide anticipated peak load relief, the potential overloads will be higher than the results reported. Even when the corporate load does not increase from 2017-18 to 2021-22, the Eastside load has grown, resulting in an increased number of potential violations.

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Table 6-11: Summary of Potential Thermal Violations for Winter Peak Load Season

Contingency	2013-14 5055 MW 100% Con	2013-14 5090 MW 75% Con	2017-18 5208 MW 100% Con	2017-18 5325 MW 75% Con	2021-22 5193 MW 100% Con	2021-22 5415 MW 75% Con
Cat B (N-1)			Talbot Hill - Lakeside #1 115 kV line – 98.6%	Talbot Hill - Lakeside #1 115 kV line – 99.9%	Talbot Hill - Lakeside #1 115 kV line – 95.2%	Talbot Hill - Lakeside #1 115 kV line – 99.2%
			Talbot Hill - Lakeside #2 115 kV line – 98.4%	Talbot Hill - Lakeside #2 115 kV line – 99.9%	Talbot Hill - Lakeside #2 115 kV line – 95.1%	Talbot Hill - Lakeside #2 115 kV line – 99.1%
			Talbot Hill 230-115 kV transformer #2 – 90.3%	Talbot Hill 230-115 kV transformer #1 – 90.9%	Talbot Hill 230-115 kV transformer #1 – 91.0%	Talbot Hill 230-115 kV transformer #1 – 94.7%
				Talbot Hill 230-115 kV transformer #2 – 92.4%	Talbot Hill 230-115 kV transformer #2 – 91.5%	Talbot Hill 230-115 kV transformer #2 – 93.6%
						Talbot Hill - Boeing Renton - Shuffleton 115 kV line - 95.4%
Cat C (N-1-1)	Talbot Hill-Lakeside #1 115 kV Line - 115.2%	Talbot Hill-Lakeside #1 115 kV Line - 115.9%	Talbot Hill--Lakeside #1 115 kV Line - 127.8%	Talbot Hill-Lakeside #1 115 kV Line - 129.9%	Talbot Hill--Lakeside #1 115 kV Line - 117.8%	Talbot Hill--Lakeside #1 115 kV Line - 122.9%
	Talbot Hill-Lakeside #2 115 kV Line - 115.1%	Talbot Hill-Lakeside #2 115 kV Line - 115.8%	Talbot Hill--Lakeside #2 115 kV Line - 127.6%	Talbot Hill-Lakeside #2 115 kV Line - 129.7%	Talbot Hill-Lakeside #2 115 kV Line - 117.7%	Talbot Hill-Lakeside #2 115 kV Line - 122.8%
	Talbot Hill 230-115 kV transformer #1 - 100.9%	Talbot Hill 230-115 kV transformer #1 - 101.6%	Talbot Hill 230-115 kV transformer #1 - 105.7%	Talbot Hill 230-115 kV transformer #1 - 108.1%	Talbot Hill 230-115 kV transformer #1 - 108.1%	Talbot Hill 230-115 kV transformer #1 - 112.8%
	Talbot Hill 230-115 kV transformer #2 - 100.5%	Talbot Hill 230-115 kV transformer #2 - 101.6%	Talbot Hill 230-115 kV transformer #2 - 105.7%	Talbot Hill 230-115 kV transformer #2 – 107.6%	Talbot Hill 230-115 kV transformer #2 - 107.0%	Talbot Hill 230-115 kV transformer #2 - 109.8%
	Talbot Hill-Boeing Renton-Shuffleton 115 kV Line -101.1%	Talbot Hill-Boeing Renton-Shuffleton 115 kV Line - 101.7%	Talbot Hill-Boeing Renton-Shuffleton 115 kV Line - 110.6%	Talbot Hill-Boeing Renton-Shuffleton 115 kV Line - 112.5%	Talbot Hill-Boeing Renton-Shuffleton 115 kV Line - 107.6%	Talbot Hill-Boeing Renton-Shuffleton 115 kV Line - 112.3%
				White River - Lea Hill - Berrydale 115 kV line - 100.2%	White River - Lea Hill - Berrydale 115 kV line - 99.7%	White River - Lea Hill - Berrydale 115 kV line - 104.0%
				Maple Valley - Sammamish 230 kV line - 100.5%		Talbot Hill-Berrydale #1 115 kV line - 101.9%
						Shuffleton-Lakeside 115 kV line - 105.2%
						Berrydale 230-115 kV transformer - 100.8%
						O'Brien 230-115 kV transformer #2 - 100.2%
						O'Brien 230-115 kV transformer #1 - 99.4%
Cat C (N-2 or Common Mode)			Talbot Hill-Lakeside #1 115 kV Line - 101.5%	Talbot Hill-Lakeside #1 115 kV Line - 103.0%	Talbot Hill - Lakeside #1 115 kV line – 96.8%	Talbot Hill-Lakeside #1 115 kV Line – 100.7%
			Talbot Hill-Lakeside #2 115 kV Line - 101.1%	Talbot Hill-Lakeside #2 115 kV Line - 100.5%	Talbot Hill - Lakeside #2 115 kV line – 107.1%	Talbot Hill-Lakeside #2 115 kV Line - 111.7%
					Talbot Hill 230-115 kV transformer #1 – 93.6%	Talbot Hill 230-115 kV transformer #1 – 97.3%
					Talbot Hill 230-115 kV transformer #2 – 93.2%	Talbot Hill 230-115 kV transformer #2 – 95.1%
					Berrydale 230-115 kV transformer - 95.5%	Berrydale 230-115 kV transformer - 100.2%

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Based on Table 6-12 below, the PSE summer load level where King County starts to have significant issues is approximately 3,500 MW. The elements which are the most susceptible to potential overloads for the summer peak loads are in the Sammamish Substation area.

Table 6-12: Summary of Potential Thermal Violations for Summer Peak Load Season

Contingency	2014 3343 MW 100% Con	2018 3554 MW 100% Con
Cat B (N-1)	Monroe-Novelty Hill 230 kV line - 132.6%	Monroe-Novelty Hill 230 kV line - 133.0%
	Maple Valley - Sammamish 230 kV line - 111.4%	Maple Valley - Sammamish 230 kV line - 132.3%
		Talbot Hill - Lakeside #1 115 kV line - 93.9%
		Talbot Hill - Lakeside #2 115 kV line - 93.8%
Cat C (N-1-1)	Sammamish 230-115 kV transformer #2 - 100.8%	Beverly Park - Cottage Brook 115 kV line - 100.5% (Have solution)
	Sammamish 230-115 kV transformer #1 - 95.5%	Sammamish 230-115 kV transformer #1 - 100.7% (Have solution)
		Sammamish 230-115 kV transformer #2 - 106.4% (Have solution)
Cat C (N-2)		Sammamish - Lakeside #2 115 kV line - 99.8%

6.1.6 Temporary Mitigations and Associated Risks

Based on the analysis described above there are a number of system events that require the Transmission Operators to implement operating procedures in place to temporarily reduce or mitigate the potential thermal violations. Table 6-13 indicates mitigation needed for each of the winter overload contingencies identified in 2017-18.

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Table 6-13: Mitigations for Worst Winter 2017-18 Contingencies

Contingency	2013-14 Winter Peak 5208 MW 100% Conservation	2017-18 Winter Peak 5208 MW 100% Conservation	2017-18 Winter Peak 5325 MW 75% Conservation	Contingency Causing Overload	Mitigation Plan - Worst Contingency	Customers at Risk
Cat B (N-1)		Talbot Hill - Lakeside #1 115 kV line – 98.6%	Talbot Hill - Lakeside #1 115 kV line – 99.9%	[redacted]	[redacted]	None
		Talbot Hill - Lakeside #2 115 kV line – 98.4%	Talbot Hill - Lakeside #2 115 kV line – 99.9%	[redacted]	[redacted]	None
		Talbot Hill 230-115 kV transformer #2 – 90.3%	Talbot Hill 230-115 kV transformer #2 – 92.4%	[redacted]	[redacted]	None
			Talbot Hill 230-115 kV transformer #1 – 90.9%	[redacted]	[redacted]	None
Cat C (N-1-1)	Talbot-Lakeside #1 115 kV Line - 115.2%	Talbot-Lakeside #1 115 kV Line - 127.8%	Talbot-Lakeside #1 115 kV Line - 129.9%	[redacted]	[redacted]	49,000 for line outage, 33,000 for transformer outage
	Talbot-Lakeside #2 115 kV Line - 115.1%	Talbot-Lakeside #2 115 kV Line - 127.6%	Talbot-Lakeside #2 115 kV Line - 129.7%	[redacted]	[redacted]	49,000 for line outage, 33,000 for transformer outage
	Talbot Hill 230-115 kV transformer #1 - 100.9%	Talbot Hill 230-115 kV transformer #1 - 105.7%	Talbot Hill 230-115 kV transformer #1 - 108.1%	[redacted]	[redacted]	More lines may need to be opened for next N-1-1 contingencies
	Talbot Hill 230-115 kV transformer #2 - 100.5%	Talbot Hill 230-115 kV transformer #2 - 105.7%	Talbot Hill 230-115 kV transformer #2 – 107.6%	[redacted]	[redacted]	More lines may need to be opened for next N-1-1 contingencies
	Talbot Hill-Boeing Renton-Shuffleton 115 kV Line - 101.1%	Talbot Hill-Boeing Renton-Shuffleton 115 kV Line - 110.6%	Talbot Hill-Boeing Renton-Shuffleton 115 kV Line - 112.5%	[redacted]	[redacted]	23,000 for line outage, 33,000 for transformer outage

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Table 6-13: Mitigations for Worst Winter 2017-18 Contingencies (CONTINUED)

		O'Brien 230-115 kV transformer #1 - 93.1%	O'Brien 230-115 kV transformer #1 - 94.9%	[redacted]	[redacted]	More lines may need to be opened for next N-1-1 contingencies
		O'Brien 230-115 kV transformer #2 - 93.9%	O'Brien 230-115 kV transformer #2 - 95.7%	[redacted]	[redacted]	More lines may need to be opened for next N-1-1 contingencies
		Berrydale 230-115 kV transformer - 93.8%	Berrydale 230-115 kV transformer - 96.0%	[redacted]	[redacted]	More lines may need to be opened for next N-1-1 contingencies
		Talbot Hill-Berrydale #1 115 kV line - 97.6%	Talbot Hill-Berrydale #1 115 kV line - 99.8%	[redacted]	[redacted]	32,000 for line outage, 50,000 for transformer outage
		Shuffleton - Lakeside 115 kV line - 97.3%	Shuffleton - Lakeside 115 kV line - 98.9%	[redacted]	[redacted]	None
			White River - Lea Hill - Berrydale 115 kV line - 100.2%	[redacted]	[redacted]	32,000 for line outage, 50,000 for transformer outage
			Maple Valley - Sammamish 230 kV line - 100.5%	[redacted]	[redacted]	None
Cat C (N-2 or Common Mode)		Talbot-Lakeside #1 115 kV Line - 101.5%	Talbot-Lakeside #1 115 kV Line - 103.0%	[redacted]	[redacted]	32,000 for line outage, 50,000 for transformer outage
		Talbot-Lakeside #2 115 kV Line - 101.1%	Talbot-Lakeside #2 115 kV Line - 100.5%	[redacted]	[redacted]	None
		Talbot Hill 230-115 kV transformer #1 - 91.8%	Talbot Hill 230-115 kV transformer #1 - 93.8%	[redacted]	[redacted]	None
		Talbot Hill 230-115 kV transformer #2 - 92.8%	Talbot Hill 230-115 kV transformer #2 - 94.4%	[redacted]	[redacted]	None

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The following table indicates mitigation needed for each of the summer overload contingencies identified in 2018.

Table 6-14: Mitigation for Worst Summer 2018 Contingencies

Contingency	2014 Summer Peak 3343 MW 100% Conservation	2018 Summer Peak 3554 MW 100% Conservation	Contingency Causing Overload	Mitigation	Customers at Risk
Cat B (N-1)	Monroe-Novelty Hill 230 kV line - 132.6%	Monroe-Novelty Hill 230 kV line - 133.0%	[redacted]	[redacted]	None
	Maple Valley - Sammamish 230 kV line - 111.4%	Maple Valley - Sammamish 230 kV line - 132.3%	[redacted]	[redacted]	None
		Talbot Hill - Lakeside #1 115 kV line - 93.9%	[redacted]	[redacted]	None
		Talbot Hill - Lakeside #2 115 kV line - 93.8%	[redacted]	[redacted]	None
Cat C (N-1-1)	Sammamish 230-115 kV transformer #2 - 100.8%	Sammamish 230-115 kV transformer #2 - 106.4%	[redacted]	[redacted]	33,000
	Sammamish 230-115 kV transformer #1 - 95.5%	Sammamish 230-115 kV transformer #1 - 100.7%	[redacted]	[redacted]	33,000
		Beverly Park - Cottage Brook 115 kV line - 100.5%	[redacted]	[redacted]	27,000
Cat C (N-2)		Sammamish - Lakeside #2 115 kV line - 99.8%	[redacted]	[redacted]	None

6.2 Other Assessment Criteria Compliance

6.2.1 Columbia Grid

As stated in the ColumbiaGrid 2012 System Assessment[21], ColumbiaGrid was formed with seven founding members in 2006 to improve the operational efficiency, reliability, and planned expansion of the northwest transmission grid. Eleven parties have signed ColumbiaGrid's Planning and Expansion Functional Agreement (PEFA) to support and facilitate multi-system transmission planning through an open and transparent process. ColumbiaGrid's primary grid planning activity is to develop a biennial transmission expansion plan that looks out over a ten-year planning horizon and identifies the transmission additions necessary to ensure that the parties to the ColumbiaGrid Planning and Expansion Functional Agreement can meet their commitments to serve load and transmission service commitments. A significant feature of the transmission expansion plan is its single-utility planning approach. The plan has been developed as if the region's transmission grid were owned and operated by a single entity. This approach results in a more comprehensive, efficient, and coordinated plan than would otherwise be developed if each transmission owner completed a separate independent analysis.

[21] ColumbiaGrid 2012System Assessment, page 1 – Executive Summary, July 2012

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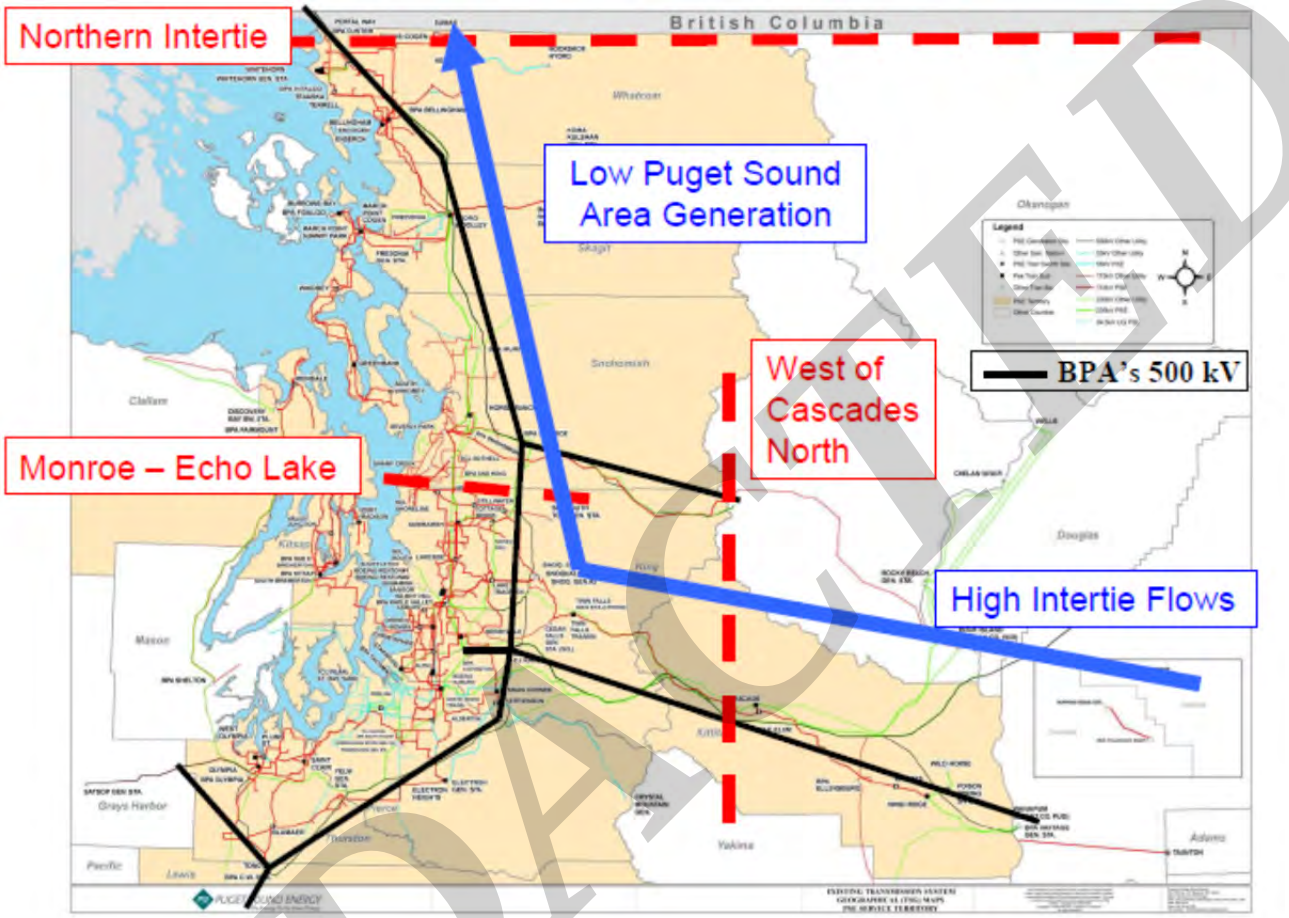
The capacity of the Northern Intertie path in the north to south direction is 2,850 MW on the west- side and 400 MW on the east-side with a combined total transfer capability limit of 3,150 MW (Figure 6-2). The total capacity of the path in the south to north direction is 2,000 MW, with a limit of 400 MW on the east-side (Figure 6-1). Both of these directional flows can impact the ability of the system to serve loads in the Puget Sound area.



[22]

Figure 6-1: Winter Power Flow resulting from Northern Intertie

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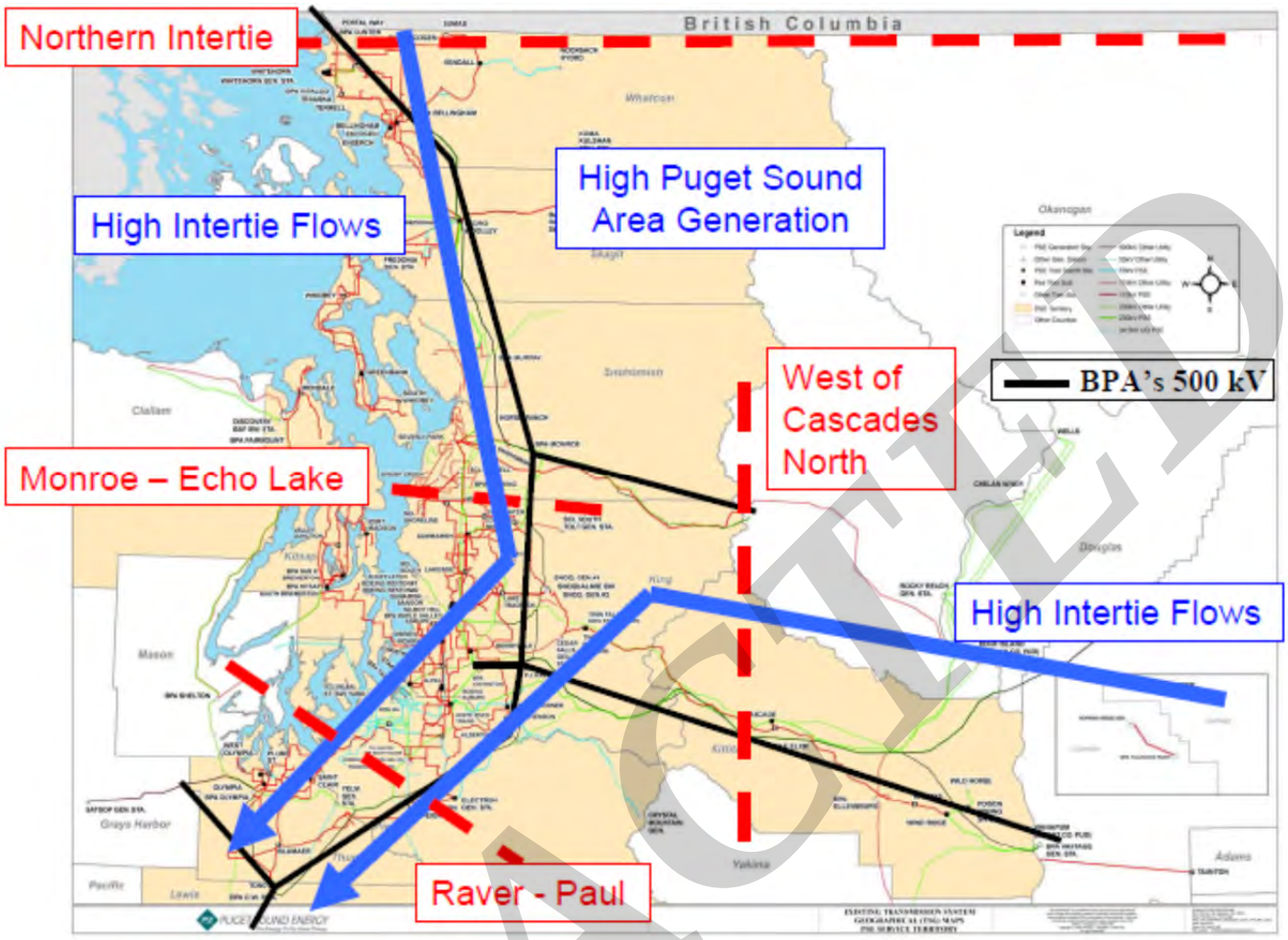
[22] PSE Attachment K, Puget Sound Area Transmission Meeting, PSE Presentation Slide #9, Dec 18, 2012



[23]

Figure 6-2: Summer Power Flow Resulting from Northern Intertie

The major issues in the PSE area were identified in the 2012 System Assessment, dated July 2012. The Assessment documented that: BPA is making commitments to increase flows across the Northern Intertie to 2,300 MW through the Network Open Season that will show up in the ten-year time frame. 200 MW of this new commitment is planned to be scheduled on the east side of the Northern Intertie at Nelway. Therefore in the ten- year summer cases this flow will increase to 2,300 MW to cover the additional commitments that are being made on the Northern Intertie including the 200 MW on the east side of the tie at Nelway.

6.2.2 2009 TPL Study Results

Issues associated with loading in the Talbot Hill area under winter conditions and south-north regional transmission flows were first shown in the 2009 TPL study. (The previous year's TPL study had noted high loading on Talbot Hill transformers, although these were not identified as Category B or C overloads in any of the study years used for the 2008 TPL.) As a result, PSE identified short-term mitigation in the form of CAPs and also began studying options for improving the power supply in the central King County area.

Load forecasts used in the 2009 TPL study followed corporate forecasts published in December 2008. There was an updated forecast in June 2009 which projected lower normal peaks. Due to the conservative approach used in the TPL report, it is deemed that the change in the peak loads would not influence any TPL results.

[23] PSE Attachment K, Puget Sound Area Transmission Meeting, PSE Presentation Slide #10, Dec 18, 2012

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The 2009 TPL Study assumed no generation in Puget Sound Area as opposed to minimum generation in earlier reports - for the low generation scenarios. Also, the NI (Northern Intertie) flows were assumed realistic based on season and historic flows. This information is tabulated in Table 6-15.

The winter season in years 2010 (2010-11) and 2019 (2018-19) was studied both in Northern Intertie (NI) import and export conditions. Loads used were 1 in 2 year winter peak. The summer season in years 2010 and 2019 was also studied both in Northern Intertie (NI) import and export conditions. Loads used were 1 in 2 year summer peak. PSE's system load peaks during the winter season; summer represents reduced-load conditions. For the near-term cases winter peak load of 5,329 MW and summer peak load of 3,417 MW is modeled. For the long-term cases a winter peak load of 5,765 MW and summer peak load of 3,678 MW is modeled. To cover a broad range of operating conditions, Northern Intertie flows and PSE generation levels were varied in all case studies.

Table 6-15 shows the different scenarios used for the study.

Table 6-15: Scenarios for the 2009 TPL Study

WECC case	Base case	Northern Intertie flows (North-South (N-S) or South –North (S-N)	Puget Sound Area Generation
2009 HS3A APPROVED OPERATING CASE	2010HS-A	N-S 2850/300 MW	Full generation
2009 HS3A APPROVED OPERATING CASE	2010HS-B	N-S 2850/300 MW	No generation
2009 HS3A APPROVED OPERATING CASE	2010HS-C	S-N 2000/0 MW	Full generation
2009 HS3A APPROVED OPERATING CASE	2010HS-D	S-N 2000/0 MW	No generation
2009-10 HW2 OPERATING CASE	2010-11HW-A	S-N 1500/300 MW	No generation
2009-10 HW2 OPERATING CASE	2010-11HW-B	S-N 1500/300 MW	Full generation
2009-10 HW2 OPERATING CASE	2010-11HW-C	N-S 1450/0 MW	No generation
2009-10 HW2 OPERATING CASE	2010-11HW-D	N-S 1450/0 MW	Full generation
2019 HEAVY SUMMER 1 BASE CASE	2019HS-A	N-S 2850/300 MW	Full generation
2019 HEAVY SUMMER 1 BASE CASE	2019HS-B	N-S 2850/300 MW	No generation
2019 HEAVY SUMMER 1 BASE CASE	2019HS-C	S-N 2000/0 MW	Full generation
2019 HEAVY SUMMER 1 BASE CASE	2019HS-D	S-N 2000/0 MW	No generation
2018-19 HW1 BASE CASE	2018-19HW-A	S-N 1500/300 MW	No generation
2018-19 HW1 BASE CASE	2018-19HW-B	S-N 1500/300 MW	Full generation
2018-19 HW1 BASE CASE	2018-19HW-C	N-S 1450/0 MW	No generation
2018-19 HW1 BASE CASE	2018-19HW-D	N-S 1450/0 MW	Full generation

The 2009 TPL study indicated that as soon as the winter of 2010-11, during south-north regional transmission flows with low Puget Sound Area generation, a Category C loss [redacted] or a Category C loss of [redacted] could overload the Talbot Hill transformer #2. The [redacted] outage would load the Talbot Hill transformer to 101% of its emergency limit, which could be mitigated by dispatching generation. The [redacted] outage was shown to result in a 107% load on Talbot Hill transformer #2, which would be mitigated by instituting a CAP to open [redacted]. Installation of 230-115 kV transformation in central King County was identified as a long-term mitigation and studies commenced as to best transformation location and associated system improvements.

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Section 7 Conclusions on Needs Assessment

This 2013 Eastside Needs Assessment has shown that PSE is facing a transmission capacity deficiency on the Eastside of Lake Washington. Overloads of Talbot Hill and Sammamish transformers as well as several 115 kV lines point to the need for a new power supply centered in the Eastside area. By the fall of 2017, additional 230-115 kV transformation or generation integrated at the 115 kV level will be required in the Eastside area to relieve the overloads predicted in this study. Depending on the location of a new transformer, additional 115 kV or 230 kV line capacity will also be required.

In multiple contingencies studied, different parts of the transmission system will overload or will be close to overloading within the 10 year study period. When the regional power flows are south to north, as is typical in the winter, there are potential overloads in the Talbot Hill Substation area, on both transformers and transmission lines. When the regional power flows are north to south, as is typical in the summer, there are potential overloads in the Sammamish Substation area. In each case, it is the need to provide power to PSE communities in the Eastside area that is stressing the local power system.

The Eastside area has no utility generation sources. In King County, local generation covers less than 10% of the peak load. Therefore the King County area is quite dependent on transmission interties to Bonneville Power Administration and other neighboring utilities that can transport bulk power from generation located north, south and east of King County, primarily in the east. Bulk power is most often transported at 230 kV or higher voltage. This study has indicated possible overloads of existing 230 kV lines in future years. A 2012 Columbia Grid study has also indicated the need for additional 230 kV capacity in the King County area.

The core area of the Eastside in Bellevue is eight miles from any 230-115 kV source. This has placed a strain on the two nearest substations providing 230-115 kV transformation to the Eastside: Sammamish and Talbot Hill Substations. Continuing load growth in the Eastside area would increase the overload problems being shown in the first 5 years of the study.

This study examined thermal overloads for Category A (N-0), Category B (N-1) and Category C (N-2 and N-1-1) outages as required by NERC, WECC and PSE Transmission Planning Guidelines.

At approximately 5,200 MW PSE system load, as forecast for 2017-18 winter, multiple elements are at risk of overload. If the load growth is higher or conservation goals are not achieved as projected, the overloads will be higher and occur sooner.

PSE uses CAPs to automatically or manually prevent overloads under the NERC reliability requirements. The CAPs required to prevent N-1-1 overloads would open lines between Sammamish and Talbot Hill. Some of the CAPs place customers at risk of outage due to transmission lines being switched into a radial mode, with a feed from just one end. In the future, load growth will result in additional lines required to be opened, putting over 60,000 customers at risk of subsequent outages.

This analysis has shown a transmission capacity deficiency in the Eastside area of Lake Washington will develop by the winter of 2017-18. This transmission capacity deficiency will continue to increase beyond that date.

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Appendix A: Load Forecast

Table A-1: 2012 Annual Peak Load Forecast Distribution

	100% Conservation		Net of 100% Conservation			Gross of Conservation (0% Conservation)		
Year	Normal 23º	Extreme 13º	Normal Peak (23º)	Extreme Peak (13º)	ERM Peak (PSO)	Normal Peak (23º)	Extreme Peak (13º)	ERM Peak (PSO)
2012	68	68	4,837	5,316	5,316	4,905	5,384	5,384
2013	140	140	4,785	5,267	5,267	4,926	5,408	5,408
2014	226	226	4,836	5,333	5,333	5,063	5,560	5,560
2015	319	319	4,865	5,375	5,375	5,184	5,694	5,694
2016	394	394	4,909	5,432	5,432	5,303	5,826	5,826
2017	468	468	4,938	5,472	5,472	5,406	5,940	5,940
2018	562	562	4,938	5,483	5,483	5,500	6,045	6,045
2019	651	651	4,946	5,501	5,501	5,597	6,152	6,152
2020	778	778	4,923	5,490	5,490	5,701	6,268	6,268
2021	885	885	4,923	5,502	5,502	5,808	6,386	6,386
2022	944	944	4,972	5,562	5,562	5,916	6,506	6,506
2023	986	986	5,039	5,641	5,641	6,025	6,627	6,627
2024	1,023	1,023	5,117	5,732	5,732	6,140	6,754	6,754
2025	1,061	1,061	5,193	5,820	5,820	6,254	6,881	6,881
2026	1,100	1,100	5,266	5,905	5,905	6,365	7,004	7,004
2027	1,138	1,138	5,341	5,993	5,993	6,479	7,131	7,131
2028	1,172	1,172	5,426	6,090	6,090	6,598	7,262	7,262
2029	1,203	1,203	5,515	6,192	6,192	6,718	7,396	7,396
2030	1,236	1,236	5,605	6,296	6,296	6,840	7,531	7,531
2031	1,270	1,270	5,694	6,399	6,399	6,964	7,668	7,668
2032	1,305	1,305	5,785	6,504	6,504	7,090	7,808	7,808
2033	1,341	1,341	5,878	6,610	6,610	7,219	7,951	7,951

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Table A-2: 2012 Annual Peak Load Forecast for Eastside Area

	Normal Peaks (23 ^{0}F) Net of Conservation			Extreme Peaks (13 ^{0}F) Net of Conservation			Normal Peaks (23 ^{0}F) Gross of Conservation		Extreme Peaks (13^{0}F) Gross of Conservation	
Year	Eastside % of King Co	Eastside	King	Eastside % of King Co	Eastside	King	Eastside	King	Eastside	King
2012	27.5	646	2,348	27.4	709	2,586	655	2,381	718	2,619
2013	27.5	652	2,371	27.5	718	2,615	671	2,440	737	2,685
2014	27.5	660	2,399	27.5	729	2,652	691	2,512	760	2,764
2015	28.0	676	2,413	28.0	748	2,672	720	2,572	793	2,831
2016	28.5	694	2,434	28.5	769	2,699	750	2,630	825	2,896
2017	28.8	706	2,448	28.8	782	2,719	773	2,681	849	2,952
2018	29.0	710	2,449	29.0	790	2,725	792	2,729	872	3,006
2019	29.5	724	2,454	29.5	807	2,735	820	2,779	903	3,061
2020	30.0	733	2,445	30.0	820	2,732	850	2,834	937	3,122
2021	30.9	756	2,449	30.8	845	2,742	893	2,892	982	3,187
2022	30.9	765	2,476	31.0	861	2,776	912	2,950	1,008	3,251
2023	30.9	777	2,514	31.0	874	2,821	930	3,010	1,028	3,317
2024	30.9	790	2,558	31.0	890	2,871	949	3,073	1,050	3,387
2025	30.9	804	2,602	31.0	906	2,922	969	3,137	1,072	3,458
2026	30.9	818	2,646	31.0	922	2,973	989	3,201	1,094	3,530

NOTES:

1. Normal and Extreme County Peaks taken from PSE F2012: Electric County Peaks worksheet.
2. Eastside Normal and Extreme Peaks for years 2013, 2017 and 2021 are taken from the E230 Project worksheet: Eastside Load. The King County load was adjusted for expected block loads known to PSE Planning within the 10-year study period.
3. The Eastside load is calculated for years 2013, 2017 and 2021 based on the expected block loads with interpolation being used to calculate the in between years.

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Appendix B: Upgrades Included in Base Cases

Table B-1: Projects Added to the Eastside Needs Assessment Winter Base Case

2013-14	2017-18	2021-22
Beverly Park - Cottage Brook breaker replacement	Beverly Park - Cottage Brook breaker replacement	Beverly Park - Cottage Brook breaker replacement
Cottage Brook - Moorlands line reconductor	Cottage Brook - Moorlands line reconductor	Cottage Brook - Moorlands line reconductor
Saint Clair 230-115 kV transformer	Saint Clair 230-115 kV transformer	Saint Clair 230-115 kV transformer
Talbot Hill - Berrydale #1 line uprate	Talbot Hill - Berrydale #1 line uprate	Talbot Hill - Berrydale #1 line uprate
Starwood autotransformer removal / Tacoma Power voltage increase	Starwood autotransformer removal / Tacoma Power voltage increase	Starwood autotransformer removal / Tacoma Power voltage increase
	Alderton 230-115 kV transformer	Alderton 230-115 kV transformer
	Lake Holm Substation (block load)	Lake Holm Substation (block load)
	Beverly Park 230-115 kV transformer	Beverly Park 230-115 kV transformer
	Sensitivity Study 2: Raver 500-230 kV transformer	Sensitivity Study 2: Raver 500-230 kV transformer
	Sensitivity Study 2: SCL series inductors	Sensitivity Study 2: SCL series inductors

Table B-2: Projects Added to the Summer NERC TPL Base Case for the Eastside Area

2014	2018
Beverly Park - Cottage Brook breaker replacement	Beverly Park - Cottage Brook breaker replacement
Cottage Brook - Moorlands line reconductor	Cottage Brook - Moorlands line reconductor
Saint Clair 230-115 kV transformer	Saint Clair 230-115 kV transformer
Talbot Hill - Berrydale #1 line uprate	Talbot Hill - Berrydale #1 line uprate
Starwood autotransformer removal / Tacoma Power voltage increase	Starwood autotransformer removal / Tacoma Power voltage increase
	Alderton 230-115 kV transformer
	White River - Electron Heights 115 kV line re-route into Alderton
	White River 2nd bus section breaker
	Lake Hills - Phantom Lake 115 kV line
	Lake Holm Substation (block load)
	Cumberland Substation 115 conversion (block load)
	Beverly Park 230-115 kV transformer

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Appendix C: Quanta Technology and Puget Sound Energy Author Biographies

Quanta Technology assisted Puget Sound Energy in conducting this study, including research, analysis and documentation. Quanta Technology is an expertise-based, independent consulting company providing business and technical expertise to the energy and utility industries. They assist with deploying strategic and practical solutions to improve a company's business performance. Their mission is to provide value to clients in every engagement with the industry-best technical and business expertise, holistic and practical advice, and industry thought leadership.

Thomas J. Gentile, PE, *Quanta Technology Vice President Transmission Strategy,* is based in Massachusetts and has over 36 years of experience and proven leadership with transmission and distribution system planning, analysis, engineering, program/project management and interfacing with RTOs/ISOs and regulatory agencies. Mr. Gentile has participated in various planning, operating and market committees at NERC, NPCC, NYISO and ISO-NE. Tom received MSEE and BSEE degrees from Iowa State University and Northeastern University. He is a registered professional engineer in the State of Massachusetts.

Donald J. Morrow, PE, *Quanta Technology Partner, Senior Vice President of Corporate Strategy and Quanta Technology Expert*, has more than 30 years of utility and consulting experience. During the course of his career, Don has held a wide range of technical and management responsibilities including system planning, control area operations, transmission operations, energy trading, maintenance scheduling, operator training, protection, distribution operations, energy management systems and natural gas dispatch. Don received his BSEE and MBA from the University of Wisconsin, Madison. Don developed the transmission practice at Quanta Technology and he has led several transmission planning projects since 2006, including the SPP EHV Overlay study, the Smartransmission Project (www.smartstudy.biz), and Companhia de Electricidade de Macau in Macua, China. He is a registered professional engineer in the states of Wisconsin and Arkansas.

Carol O. Jaeger, PE, *Puget Sound Energy Consulting Engineer*, *Transmission Planning*, has over 30 years experience in transmission and distribution planning, distribution design, and substation design and operations. She received her BSEE from the University of Washington and is a registered professional engineer in the state of Washington.

Zach Gill Sanford, *Puget Sound Energy Engineer, Transmission Planning*, has over 4 years experience in transmission planning and NERC compliance. He received his BSEE from the University of Washington.

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PUGET SOUND ENERGY

QUANTA TECHNOLOGY
Smart Solutions, Real Results

Supplemental Eastside Needs Assessment Report

Transmission System
King County

April 2015

Puget Sound Energy

Report prepared by:
Thomas J. Gentile, P.E. – Quanta Technology
Donald J. Morrow, P.E. – Quanta Technology
Eleanor M. Ewry, P.E. – Puget Sound Energy
Carol O. Jaeger, P.E. – Puget Sound Energy

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Executive Summary

This document summarizes the changes to the Eastside Needs Assessment Report dated October 2013, based upon the recent updates to the Puget Sound Energy (PSE) load forecast, system topology, facility ratings, changes affecting the Northern Intertie as the monitored flowgate for the Puget Sound Area Northern Intertie ("PSANI") issues, and changes to the Seattle City Light (SCL) system. This is a supplemental document that should be read in concert with the 2013 Eastside Needs Assessment Report ("2013 Needs Assessment").

The 2013 Needs Assessment concluded that there is a transmission capacity deficiency in the Eastside area which will develop by the winter of 2017-18. The assessment also concluded that the transmission capacity deficiency will continue to get worse as load grows. The 2013 Needs Assessment identified a number of concerns related to this transmission capacity deficiency, which included:

- Overload of PSE facilities in the Eastside area under certain contingencies
- Increasing use and expansion of Corrective Action Plans ("CAPs") to manage these overloads
- Inherent load forecast uncertainties which leave a small margin for error for the CAPs to be effective

The supplemental studies, utilizing the updated information discussed in this report, verified that there is still a transmission capacity deficiency in the Eastside area that will develop by the winter of 2017-18 and require the expanded use of CAPs to manage overloads for certain contingencies. In addition, the studies continued to show that this transmission capacity deficiency is expected to increase beyond that date. Cities in the deficiency area include: Redmond, Kirkland, Bellevue, Clyde Hill, Medina, Mercer Island, Issaquah, Newcastle, and Renton, along with towns of Yarrow Point, Hunts Point, and Beaux Arts.

The supplemental studies also verified that a transmission capacity deficiency still develops by the summer of 2018. However, the supplemental study showed that transmission capacity deficiency is actually worse than what was identified in the 2013 Needs Assessment. In the 2013 Needs Assessment, CAPs were required to mitigate the transmission capacity deficiency but load shedding was not required. In the supplemental study, both CAPs and load shedding are required to mitigate the transmission deficiency.

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1. Introduction

This document summarizes the changes and results to the Eastside Needs Assessment dated October 2013, based upon the recent updates to the PSE load forecast, system topology, facility ratings, changes affecting the use of the Northern Intertie as the monitored flowgate for PSANI issues, and changes to the SCL system. This document also presents a comparison of the results using the updated information. The method, criteria, and key assumptions are the same as utilized in the 2013 Needs Assessment with the exception of those items discussed below.

2. Differences between the 2013 and 2015 Needs Assessments

2.1 Changes to the Power Flow Cases which have Minimal Impact

There are three changes that have minimal impact on the results of the supplemental study.

2.1.1 WECC Base Case Differences

Each year, Western Electric Coordinating Council (WECC), in coordination with its members, develops a set of "base cases" to model the bulk electric system. These base cases include the most up-to-date electrical system information for the entire WECC model including updated loads, generators, transmission lines, etc. All electric providers use these base cases as starting points to study their proposed system improvements and to understand the potential impacts to the regional electric grid, thereby ensuring no adverse impacts to the reliability and operating characteristics of its system or any surrounding system. The 2013 Needs Assessment was based on WECC base cases for the winter peak for years 2013-14, 2017-18, and 2021-22. Summer peak was analyzed for years 2014 and 2018 for the annual 2012 NERC TPL analysis.

For the 2015 Needs Assessment analysis, PSE utilized WECC winter peak base cases for the years 2019-20 and 2023-24. A 2017-18 case was developed from the 2019-20 base case. Summer peak base cases included the 2020 and 2024 WECC base cases. A 2018 summer case was developed from the 2020 base case.

2.1.2 Topology Changes in the Base Case

The studies within the 2015 Needs Assessment included all projects in the 2013 Needs Assessment, which are listed in Section 9 and Appendix B Tables B-1 and B-2 of the 2013 Needs Assessment. Changes in topology between the previous set of study cases and the current study cases are included in Appendix A of this report. Based on our analysis, no topology changes listed in Appendix A significantly impacted the study results. There was one change, the Talbot 230-115 kV transformer #1 replacement, which increased the winter normal and emergency limits from 383 MW and 464 MW to 398 MW and 484 MW respectively.

2.1.3 Northern Intertie vs. North of Echo Lake and South of Custer Flowgates

Prior to 2013, Bonneville Power Administration (BPA) used the West-Side Northern Intertie as the monitored flowgate for electricity transfers between the Puget Sound area and British Columbia. A one-line diagram of this flowgate is included in Appendix D. This flowgate was managed through the use of nomograms that would dictate the amount of capacity available on the Northern Intertie based on varying Puget Sound area generation levels, expected load levels, ambient temperature, and the next worst contingency. Nomograms were published on this Path for flows in both the north-south direction

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and the south-north direction. The amount of power that could be transferred between the Northwest and BC Hydro's system on the West-Side Northern Intertie was somewhat dependent on generation in the Puget Sound area. Transmission across the Northern Intertie would be curtailed if it was found that conditions would not support transfers, both in real time and in the operations planning timeframe. In February of 2013, BPA moved away from using the Northern Intertie as the basis for determining available transfer capability through the Puget Sound area and instead developed two new flowgates. These flowgates are the South of Custer (SOC) flowgate, used for determining acceptable north-south transfer levels through the Puget Sound area and the North of Echo Lake (NOEL) flowgate, used for determining acceptable south-north transfer levels. The lines that make up these new flowgates are included in Table 2-1. One-line diagrams of these updated flowgates are also included in Appendix D. These changes are used operationally to monitor flows that do not impact the study results but help determine and prevent adverse reliability impacts when power is flowing between the Northwest and BC Hydro's system.

Table 2-1: Definitions of PSANI Flowgates

North of Echo Lake (NOEL) Flowgate Definition:	South of Custer (SOC) Flowgate Definition:
Echo Lake – SnoKing Tap 500 kV	Monroe – Custer #1 & #2 500 kV
Echo Lake – Maple Valley 500 kV	Murray – Custer 230 kV
Covington – Maple Valley 230 kV	Bellingham – Custer 230 kV

2.2 Changes to the Power Flow Cases which had Substantial Impact

There are three changes that have a substantial impact on the results of the 2013 Needs Assessment. They are described below.

2.2.1 PSE has updated the Facility Ratings for all transmission lines in the system

For the 2013 Needs Assessment analysis, PSE used an Electric Power Research Institute (EPRI) tool called DYNAMP to establish transmission line facility ratings. By 2014, DYNAMP was no longer supported and PSE converted to a program called PLS–CADD. As a result of the conversion to this new tool, the transmission line facility ratings increased over the ratings used in the previous assessment. This increase in line ratings had an impact on post-contingency loadings, effectively reducing the percentage of overloads on facilities throughout the PSE system.

For example, the winter Emergency Facility Rating of the Talbot-Lakeside 115 kV line increased from 238.6 MVA to 249 MVA. In the 2017-18 Heavy Winter case, actual post-contingency MVA loading on the line for the worst Category B contingency in the 2013 Needs Assessment was 235.3 MVA or 98% of the 238.6 MVA line rating in the case. Actual post-contingency MVA loading on the line for the worst Category B contingency in the current study case was 218.3 MVA, or 87.6% of the 249 MVA line rating used in the case. If the line rating had not changed, loading in the current case would be 91.5% of the rating. Overloads seen on this line decreased by approximately 4% due to the change in line rating.

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2.2.2 Seattle City Light Load Levels Decreased

In 2014, Seattle City Light made some corrections and adjustments to the load levels used in the WECC power flow base cases. These changes resulted in decreased Seattle City Light load levels.

2.2.3 Differences in load forecast levels utilized in the 2013 and 2015 Needs Assessments

The following briefly describes the PSE load forecasting process and the resulting differences between the 2012 and 2014 load forecast that were used in the 2013 and 2015 Needs Assessments.

PSE's service territory is very diverse, and hence, PSE experiences highly variable growth across its service territory. For the 2014 load forecast, PSE prepared a more detailed county-by-county forecast than had been done previously. The 2014 load forecast disaggregated the system wide forecast to county and sub-county regions to examine reasonableness from both system and sub-system perspectives. A small area forecast was also performed to focus on the Eastside study area.

PSE used data from PSE's electric demand and consumption history and federal and local government sources as inputs to develop an econometric load forecast using econometric-time series approach. PSE's electric demand and energy consumption history was also used to forecast future trending. Regional temperature taken at the National Oceanic and Atmospheric Administration (NOAA) station at SeaTac International Airport during the system peak was used to compare peak load reading. The load readings were normalized to 23˚ F, which was used as a 1-in-2 year normal ambient temperature at the time of system peak. Forecasts were also performed for a 1-in-20 year (or extreme temperature) forecast at 13˚ F.

To perform the system and county level forecasts, population data was also taken from the US Census as well as the US Bureau of Economic Analysis (BEA) and WA State Office of Financial Management (OFM). Employment data was taken from BEA, US Bureau of Labor Statistics (BLS), and Washington State Employment Security Department. Additionally, historic and forecasted US level data was from Moody's Analytics. At the sub-county level, population and employment data were obtained from Puget Sound Regional Council (PSRC) and WA State OFM.

PSE used the population and employment forecast evaluated by the PSRC for King, Pierce, and Kittitas counties. Population data was also taken from the US Census as well as the US BEA and WA State OFM. Employment forecast data were taken from the US BLS and PSRC.

To augment the data provided by the government agencies, PSE provided information about expected significant new loads, known as "block loads," over the next few years. This information was used for the first three years of the forecast period at full value, then at 50% value for the next three years. After six years, the forecast block loads were considered to be included in the data available on employment and population provided by the forecasting agencies so no additional load was added to the load forecast after year six.

Once an econometric forecast was developed for each county, or for the company as a whole, the peak demand and energy consumption were reduced by a forecast amount of conservation based on conservation target determined as optimal from the 2013 Integrated Resource Plan (IRP). This conservation target includes energy efficiency programs, Energy Independence and Security Act (EISA), distribution efficiency, and demand response. PSE has not implemented an active demand response program, so the demand response included in this forecast consisted of conservation programs and intrinsic conservation due to measures required by modern building codes.

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It should be noted that a segment of PSE's transmission customers were not included in the corporate load forecast. These are interconnection or high voltage customers who connect to PSE for transmission service, but do not purchase energy from PSE. Approximately 250-300 MWs are required by the transmission customers on a nearly continuous basis.

There are some differences between the 2012 and 2014 load forecast worth noting:

a. The 2012 load forecast assumed faster recovery of the US economy from the recession than the 2014 load forecast.
b. The 2014 load forecast used updated US population growth forecast from the US Bureau of Census, which is lower compared to what was used in the 2012 load forecast.
c. Because of slower housing recovery, customer growth and customer counts in the 2014 load forecast are lower than the 2012 load forecast.
d. Peak load growth and peak load levels for the system and for King County are projected to be lower in the 2014 load forecast as compared to the 2012 load forecast.
e. Based on PSRC's population and employment growth forecasts, Eastside peak loads in the 2014 load forecast are projected to grow by 2.4% per year in the next 10 years, which is driven by growth in the commercial sector and high density residential sector. Also, updates to block loads over the study period influenced the load growth in the Eastside area.

The following tables show the comparison between the 2012 and 2014 system corporate load forecast and a breakdown by county of the 2014 corporate load forecast.

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Table 2-2: Comparison of PSE's 2012 and 2014 Corporate Load Forecast

PSE Corporate Load Forecast				
	Forecasted 2012		Forecasted 2014	
Year	Max of Normal Peak w/ DSR	Max of Extreme Peak w/ DSR	Max of Normal Peak w/ DSR	Max of Extreme Peak w/ DSR
2012	4,837	5,316		
2013	4,785	5,267		
2014	4,836	5,333	4,803	5,255
2015	4,865	5,375	4,820	5,283
2016	4,909	5,432	4,844	5,317
2017	4,938	5,472	4,891	5,377
2018	4,938	5,483	4,891	5,385
2019	4,946	5,501	4,904	5,406
2020	4,923	5,490	4,856	5,365
2021	4,923	5,502	4,850	5,366
2022	4,972	5,562	4,863	5,388
2023	5,039	5,641	4,888	5,421
2024	5,117	5,732	4,961	5,504
2025	5,193	5,820	5,029	5,581
2026	5,266	5,905	5,085	5,645
2027	5,341	5,993	5,148	5,716
2028	5,426	6,090	5,224	5,802
2029	5,515	6,192	5,302	5,889
2030	5,605	6,296	5,376	5,972
2031	5,694	6,399	5,444	6,049
2032	5,785	6,504	5,512	6,126
2033	5,878	6,610	5,580	6,203
2034			5,649	6,282

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Table 2-3: PSE's 2014 Corporate Peak Load Forecast by County

2014 PSE Corporate Peak Load Forecast by County									
Year	King	Thurston	Pierce	Whatcom	Skagit	Island	Kitsap	Kittitas	Total PSE
2014	2391	549	498	374	265	144	524	59	4803
2015	2410	550	500	373	263	143	523	59	4820
2016	2427	552	503	372	262	143	524	61	4844
2017	2458	557	508	375	262	143	526	62	4891
2018	2454	559	510	375	260	143	526	64	4891
2019	2465	561	511	375	259	143	526	65	4904
2020	2445	555	506	371	254	140	518	66	4856
2021	2443	555	505	370	252	140	516	68	4850
2022	2454	557	506	370	251	139	516	70	4863
2023	2472	559	508	371	250	139	517	71	4888
2024	2515	567	515	376	252	141	522	74	4961
2025	2555	574	521	380	253	142	527	76	5029
2026	2590	580	526	384	254	143	531	78	5085
2027	2628	586	531	388	255	144	536	80	5148
2028	2675	594	538	392	256	145	541	82	5224
2029	2723	601	545	397	258	146	547	84	5302
2030	2769	609	551	402	259	147	553	87	5376
2031	2814	615	555	406	260	148	557	88	5444
2032	2859	621	559	410	261	149	562	90	5512

The 2013 Needs Assessment used PSE's 2012 corporate load forecast as the basis for the analyses and adjusted the load based on PSE's knowledge of future block loads and non-PSE customers supplied by PSE. In PSE's 2012 corporate load forecast, the forecast was provided for PSE's system as a whole, and sub-area forecasts were proportionally derived from this overall forecast. For the 2015 Needs Assessment, PSE's 2014 corporate load forecast was used and was also adjusted for non-PSE load supplied by PSE. This 2014 corporate load forecast provided an overall PSE system forecast and it also included bottom-up sub-area load forecasts for the King County and Eastside areas.

Table 2-4 below lists the Eastside and King County load levels for the cases used in the 2013 Needs Assessment and Table 2-5 lists the load levels using the 2014 load forecast. Comparing the results of the load levels for winter 2017-18, the total load level for PSE's system is 46 MW less using the 2014 load forecast (5162 MW) than the 2012 forecast (5208 MW). Using the 2014 load forecast, the King County area, without the Eastside load, is 27 MW higher (1854 MW – 1881 MW) and the Eastside area is 11 MW less than 2012 forecast (699 MW–688 MW). The remaining reduction is distributed over the rest of PSE.

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Table 2-4 Eastside and King County Load Levels Using 2012 Load Forecast in MW

Case	King County (excluding Eastside)	Eastside	Remainder of system	Total
17-18HW	1854	699	2654	5208
18HS	1258	550	1744	3552
21-22HW	1862	748	2548	5193

Table 2-5: Eastside and King County Load Levels Using 2014 Load Forecast in MW

Case	King County (excluding Eastside)	Eastside	Remainder of system	Total
17-18HW	1881	688	2592	5162
17-18EHW	2091	728	2828	5647
18HS	1379	538	1707	3625
19-20HW	1858	708	2609	5175
19-20EHW	2084	749	2843	5676
20HS	1373	561	1747	3681
23-24HW	1817	764	2577	5158
23-24EHW	2053	804	2833	5691
24HS	1399	618	1800	3817

2.3 Base Cases Used for Analysis

The WECC base cases are updated annually. The cases available for this update were Heavy Winter 2019-20 and 2023-24 and Heavy Summer 2020 and 2024. All other cases were derived from those WECC cases. Table 2-6 below includes a comparison of the cases utilized in the 2013 Needs Assessment and the 2015 Needs Assessment study cases using 2014 updated data.

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Table 2-6: Comparison of the Cases Utilized in the Eastside Needs Assessment

Case	2012	2014
2013-14 Heavy Winter	✓	--
2017-18 HW SN 100% Cons	✓	✓
2017-18 HW SN 75% Cons	✓	--
2017-18 HW SN 50% Cons	✓	--
2019-20 HW SN 100% Cons	--	✓
2021-22 HW SN 100% Cons	✓	--
2021-22 HW SN 75% Cons	✓	--
2021-22 HW SN 50% Cons	✓	--
2021-22 HW SN Extreme 100% Cons	✓	--
2021-22 HW SN Extreme 75% Cons	✓	--
2023-24 HW SN 100% Cons	--	✓
2014 HS NS	✓	--
2018 HS NS	✓	✓
2018 HS SN	✓	--
2024 HS NS	--	✓
2024 HS SN	--	✓

2.4 Points of Clarification from the 2013 Needs Assessment

2.4.1 Use of Corrective Action Plans (CAPs)

PSE uses operating procedures, such as corrective action plans (CAPs), to prevent any loss of firm load, either intentionally or due to a credible outage condition while remaining compliant with mandatory NERC/WECC reliability requirements. CAPs are generally considered temporary in nature with the understanding that permanent solutions are forthcoming. NERC Standard TPL-001-4 allows CAPs to be used to meet the performance requirements for most N-1-1 and N-2 contingencies while specifying how long they will be needed as part of the CAPs.

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2.4.2 Use of Load Shedding

While NERC and WECC allow dropping "non-consequential[1]" load for certain contingencies, intentionally dropping firm load for an N-1-1 or N-2 contingency to meet its federal planning requirements is not a practice that PSE endorses. All load modeled in the Needs Assessment studies was firm load and PSE does not consider any of its firm requirements to be non-consequential. This is consistent with the view of most utilities. It is also consistent with the views of virtually all community officials who do not consider intentionally blacking out segments of customers as a responsible way to operate a modern electricity delivery system.

PSE's concern about using load shedding for N-1-1 contingencies is best illustrated by the outage of two 230 kV-115 kV transformers in the Eastside area. Losing two 230 kV-115 kV transformers could result in the other remaining 230 kV-115 kV transformers being overloaded. In this scenario, simply re-dispatching PSE generation does not reduce these transformer overloads below the emergency rating. A transformer outage would require a minimum 24-hour outage to test and re-energize the transformer. Further, if the outaged transformer tests bad, then it must be replaced, and this can take up to another five to seven weeks. This scenario results in a significant amount of time to place PSE customers at risk either with CAPs or with exposure to load shedding.

To illustrate how other utilities in WECC address load shedding, the CAISO Planning Standards indicates in their Section 6, Planning for High Density Urban Load Area:

> *"Increased reliance on load shedding to meet these needs would run counter to historical and current practices, resulting in general deterioration of service levels. For local area long-term planning, the ISO does not allow non-consequential load dropping in high density urban load areas in lieu of expanding transmission or local resource capability to mitigate NERC TPL-001-4 standards P1-P7 contingencies and impacts on the 115 kV or higher voltage systems….In the near-term planning, where allowed by NERC standards, load dropping, including high density urban load, may be used to bridge the gap between real-time operations and the time when system reinforcements are built."*

3. Results of 2015 Needs Assessment

The detailed results of the 2015 Needs Assessment are shown in Appendix A for winter peak conditions and Appendix B for summer peak conditions. The results verified that there is a transmission capacity deficiency in the Eastside area that will develop by the winter of 2017-18. This transmission capacity deficiency in the Eastside area is expected to increase beyond that date.

Using the same methodology as the 2013 Needs Assessment, the supplemental analysis shows that a transmission capacity deficiency develops at a winter Eastside area load of 688 MW, requiring the use of CAPs, and worsens at an Eastside area load of 708 MW, requiring both the use of CAPs and exposing some PSE customers to load shedding. The transmission capacity deficiency also develops at a summer Eastside area load of 538 MW.

[1] Non-Consequential Load is defined as Non-Interruptible Load loss that does not include: (1) Consequential Load Loss, (2) the response of voltage sensitive Load, or (3) Load that is disconnected from the System by end-user equipment. Consequential Load is defined as all Load that is no longer served by the Transmission system as a result of Transmission Facilities being removed from service by a Protection System operation designed to isolate the fault.

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Similar to the 2013 results, there were a significant number of overloads that showed up in the results of power flow studies due to outages of high voltage lines owned by other utilities that interconnect to PSE. Most of these are outages in BPA's 230 kV or 500 kV network. BPA and the other interconnected utilities have operating procedures in place to prevent overloads of area facilities, including PSE lines and equipment. For example, the most frequent external contingency that causes PSE overloads is an outage of the [redacted]. BPA operates the interchange flows and generation levels so that this [redacted] line outage does not cause overloads. Therefore, overloads resulting from this [redacted] BPA line were not considered as necessary for PSE to resolve.

In addition, a number of overloads of area transmission lines can be partially mitigated by adjusting PSE generation levels in Western Washington. As such, this type of generation re-dispatch costs more than the optimal generation levels that PSE would elect, thereby driving up customer costs. Therefore, while these system adjustments are not a desirable operating condition, they are acknowledged as an available action to mitigate these types of overloads while remaining NERC compliant.

There are still a number of transmission transformer overloads which cannot be addressed by dispatching generation, similar to the 2013 Needs Assessment. These transformer overloads will require CAPs in the future to shift load; at some point the CAPs will be expanded to include load shedding in order to remain NERC compliant.

3.1 Winter Analysis

Utilizing the 2014 load forecast and the results of the winter analysis, Figure 3-1 shows two system capacity lines for the Eastside area – both of which are reflected on the graph as dashed red lines. These lines highlight the area of concern where the 2015 Needs Assessment indicates violations of the mandatory performance requirements developed for certain contingencies that put customer reliability at risk. The area of concern starts at an Eastside area load of 688 MW in the winter of 2017-18 and continues to 708 MW in the winter of 2019-20. The 2015 Needs Assessment established that a transmission capacity deficiency exists at an Eastside area load level of 688 MW that requires the use of CAPs to manage Category C overloads in winter of 2017-18. The 2015 Needs Assessment also established that the transmission capacity deficiency continues to worsen at an Eastside area load level of 708 MW, which requires the use of additional CAPs by winter of 2019-20. These additional CAPs placed approximately 63,200 customers at risk of losing power due to being served radially. By the winter of 2023-24 the CAPs will require load shedding affecting approximately 16,800 customers to prevent thermal violations under certain conditions.

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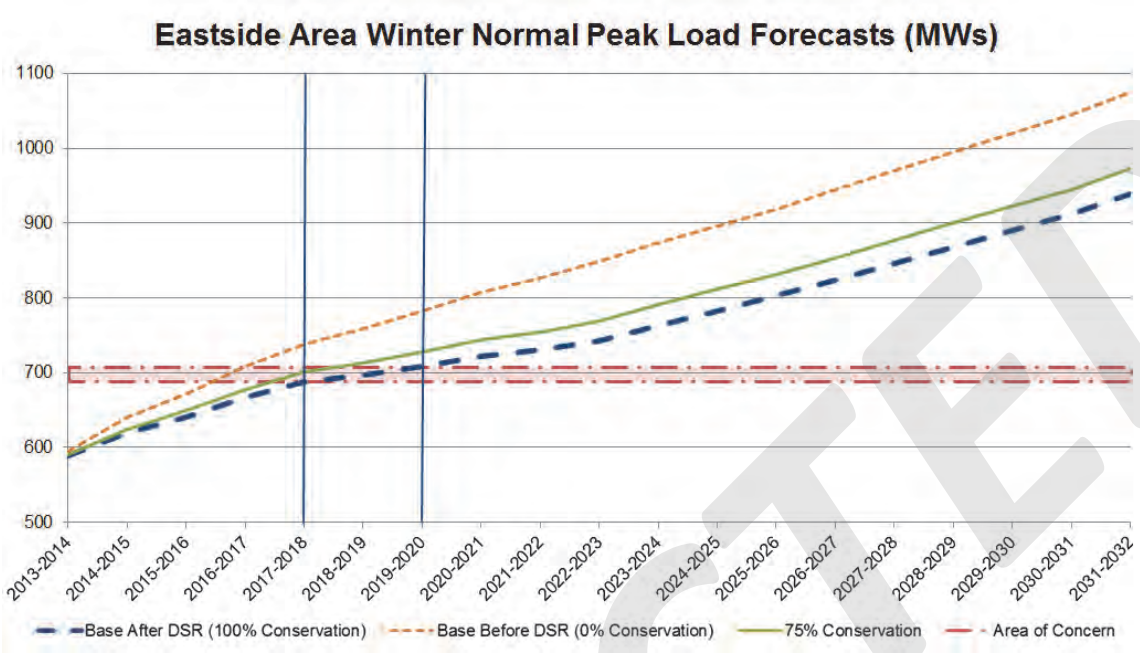

Figure 3-1: Capacity Need Results with 2015 Updated Information

The area of concern shown in Figure 3-1 is consistent with the 706 MVA level of concern identified for the Eastside area in the 2013 Needs Assessment. This value was reflected in the graph shown in Figure 4-3 of the 2013 Needs Assessment (where the units were mislabeled as "MW"). The actual MW value for the level of concern was 699 MW in the 2013 Needs Assessment. The 699 MW value reflected the load level of the Eastside area in the winter of 2017-18 in the previous study where the power flows indicated violations of the mandatory performance requirements that put customer reliability at risk. For ease of reference, this figure is repeated below as Figure 3-2.

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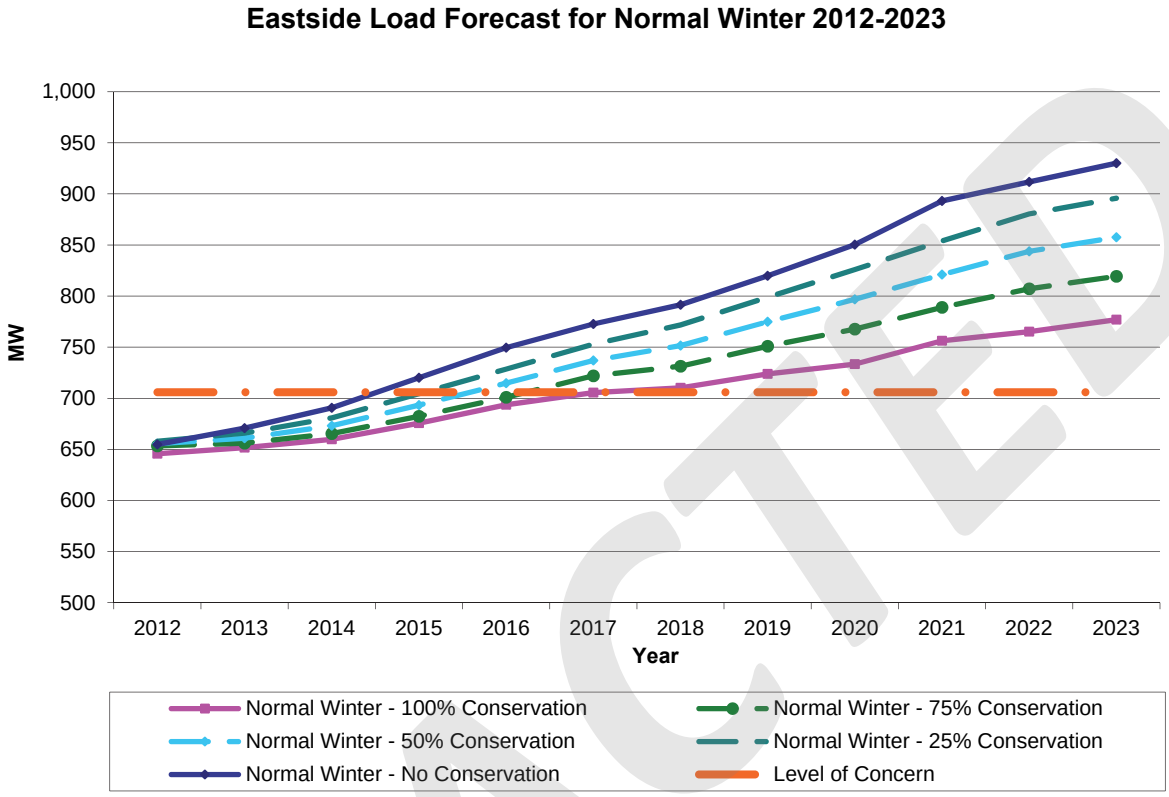

Figure 3-2: Level of Concern for Eastside Area Load in 2013 Needs Assessment

As the winter summary in Table 3-1 shows, CAPs are needed throughout the study period. As noted above, CAPs are required starting in the winter of 2017-18 to manage overloads on five elements from 12 Category C contingencies. By 2019-20, the overloads on these same five elements will be created from 18 Category C contingencies, which require additional CAPs to manage and which place approximately 63,200 customers at risk by placing them on radial feeds. By 2023-24 the overloads on these same five elements will be caused by 40 Category C contingencies, which require the use of even more CAPs and place approximately 68,800 customers at risk. In addition, by 2023-24 load shedding of approximately 133 MW will be needed to maintain a reliable and secure transmission system.

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Table 3-1: Winter Power Flow Summary Comparison of 2013 and 2015 Needs Assessment

Winter Power Flow Summary						
	2012 Load Forecast			2014 Load Forecast		
	2013-14 Winter 5055 MW 100% Conserv-ation Eastside Load = 545 MW	2017-18 Winter 5208 MW 100% Conserv-ation Eastside Load = 699 MW	2021-22 Winter 5193 MW 100% Conserv-ation Eastside Load = 748 MW	2017-18 Winter 5162 MW 100% Conserv-ation Eastside Load = 688 MW	2019-20 Winter 5175 MW 100% Conserv-ation Eastside Load = 708 MW	2023-24 Winter 5158 MW 100% Conserv-ation Eastside Load = 764 MW
Elements Above Emergency Limit:						
Category B (N-1)	0	0	2	0	0	0
Category C (N-1-1 & N-2)	5	6	5	5	5	5
Corrective Action Plans Required	Yes	Yes	Yes	Yes	Yes	Yes
Customers at Risk from Corrective Action Plans	0	68,800	76,300	0	63,200	68,800
Customers at Risk from Load Shedding	0	0	4,400	0	0	16,800
Load Shed MW	0	0	22	0	0	133
Elements Above Normal Limit or 90% of Emergency Limit:						
Category B (N-1)	0	4	6	0	3	3
Category C (N-1-1 & N-2)	6	7	8	7	6	5
Contingencies that cause post-contingency loading above 100% of Emergency Limit:						
Category B (N-1)	0	0	1	0	0	0
Category C (N-1-1 & N-2)	13*	23*	37*	12	18	40

* Note: There were additional contingencies in the study using the 2012 Load Forecast that resulted in overloads between 100% and 104%. In the supplemental study, overloads on the PSE lines between 100% and 104% were eliminated to account for the change in line ratings from 2012 to 2014. Those overloads are not included in the 2012 Load Forecast counts provided in this table.

Detailed results of the winter analysis are shown in Appendix A.

DSD 000457

3.2 Summer Analysis

The 2013 Needs Assessment showed a PSE area summer load level of need at approximately 3340 MW. This need was illustrated in Figure 1-2 of that document and is included as Figure 3-3 below for ease of reference.

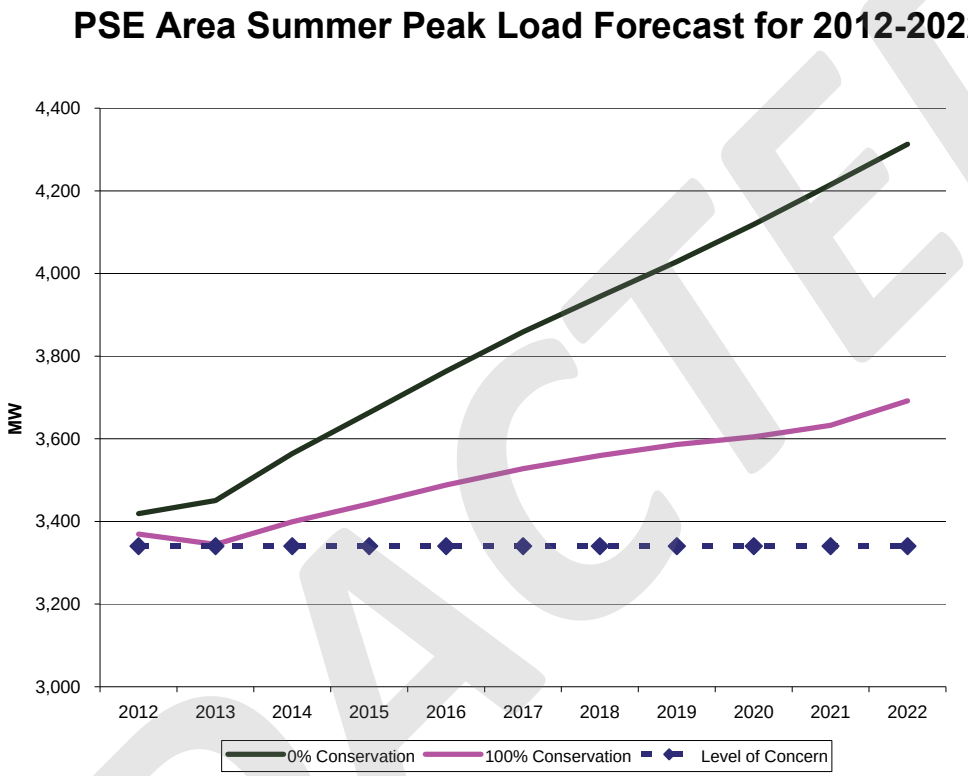

Figure 3-3: PSE Area Summer Peak Load Forecast for 2012-2022

The 2013 Needs Assessment, analyzed the summer of 2018, had a PSE area summer peak of approximately 3,552 MW. That 2013 assessment found there were two 230 kV elements above 100% and two 115 kV elements above 93% loadings for Category B (N-1) contingencies. Also, there were three elements above 100% loading and one above 99% loading for Category C (N-1-1) contingencies. In the 2013 Needs Assessment, the 3,552 MW system load corresponds to an Eastside Area load level of 550 MW. In the 2013 Needs Assessment, we identified that CAPs were needed to manage the Category C (N-1-1) contingencies and that up to 33,000 customers would be put at risk when those CAPs were utilized.

The 2015 Needs Assessment shows an Eastside summer load level of need at approximately 538MW. This need is shown in Figure 3-4 below.

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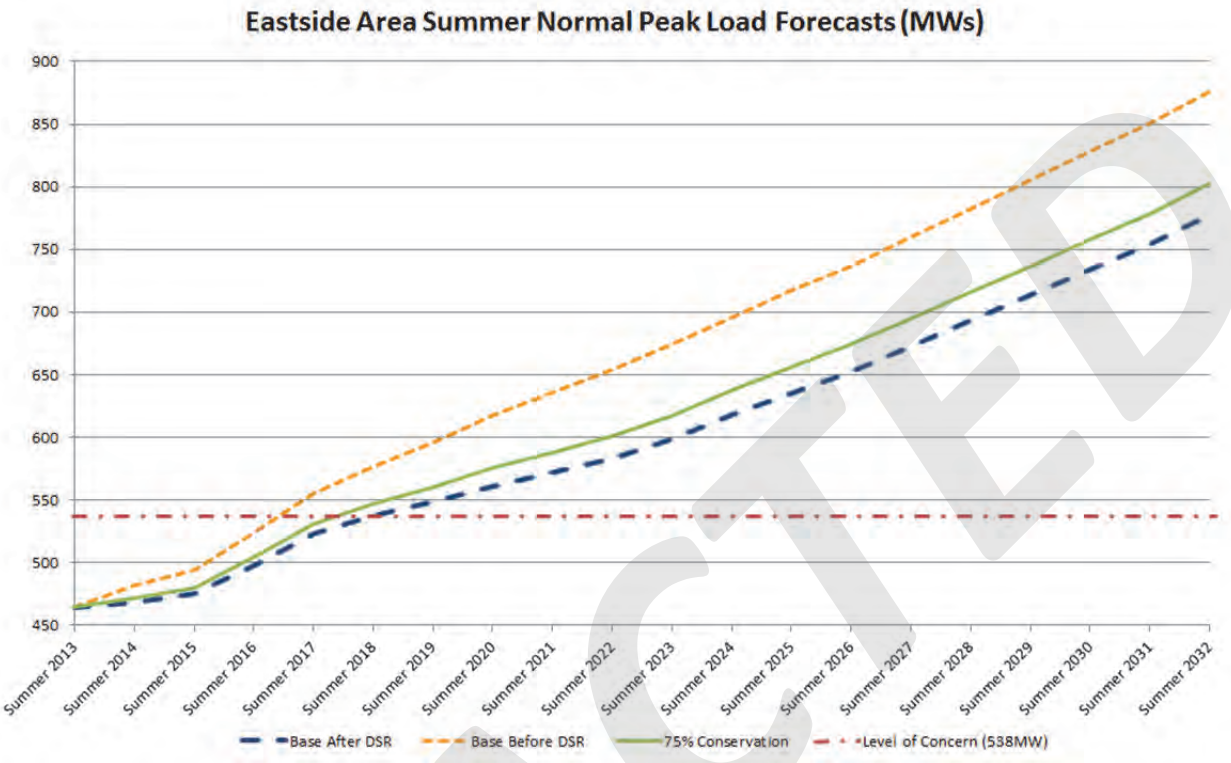

Figure 3-4: Eastside Summer Peak Load Forecast for 2012-2023

Table 3-2 summarizes the results of the 2015 Needs Assessment and it shows that the amount of customers at risk for losing power will increase to approximately 68,800 by the summer of 2018. The 2015 Needs Assessment also shows that load shedding of approximately 74 MW will be needed to maintain a reliable and secure transmission system starting in the summer 2018, increasing to approximately 78 MW in 2020 and approximately 123 MW by 2024. The number of contingencies that cause post-contingency loading above 100% Emergency Limit is six by the summer of 2018 and grows to nine by 2024.

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Table 3-2: Summer Power Flow Summary Comparison of October 2013 and 2015 Updated Results

Summer Power Flow Summary				
	2012 Load Forecast	2014 Load Forecast		
	2018 Summer 3552 MW 100% Conservation Eastside Load = 550 MW	2018 Summer 3625 MW 100% Conserv-ation Eastside Load = 538 MW	2020 Summer 3681 MW 100% Conserv-ation Eastside Load = 561 MW	2024 Summer 3817 MW 100% Conserv-ation Eastside Load = 618 MW
Elements Above Emergency Limit:				
Category B (N-1)	2 [1]	1 [1]	2 [1]	2 [1]
Category C (N-1-1 & N-2)	3	5 [2]	5 [2]	5 [2]
Corrective Action Plans Required	Yes	Yes	Yes	Yes
Customers at Risk from Corrective Action Plans	62,800	68,800	68,800	68,800
Customers at Risk from Load Shedding	0	10,900	10,900	12,700
Load Shed MW	0	74	78	123
Elements Above Normal Limit or 90% of Emergency Limit:				
Category B (N-1)	4	1	2	2
Category C (N-1-1 & N-2)	4	6	6	6
Contingencies that cause post-contingency loading above 100% of Emergency Limit:				
Category B (N-1)	2	2	2	2
Category C (N-1-1 & N-2)	8	6	7	9

[1] These elements are BPA transmission lines leased by PSE

[2] These elements include 1 BPA transmission line leased by PSE

Detailed results of the summer analysis are shown in Appendix B.

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4. Conclusions of the 2015 Needs Assessment using the 2014 PSE Load Forecast

The project date of need will remain the same at the winter of 2017-18 due to these key risk factors:

- The 2017-18 winter power flow cases still require the use of CAPs to mitigate transmission transformer overloads with load risk beginning between 2017-18 to 2019-20.
- The number of contingencies requiring the use of CAPs steadily increases as load grows.
- The forecast uses a 1-in-2 year weather forecast. Colder weather will result in higher load levels.
- 100% conservation may not be achieved, which would result in a higher load level. Even if 100% conservation is achieved, it may not be in the appropriate locations and magnitudes assumed for this assessment.
- There is only 20 MW difference on the Eastside between the winters of 2017-18 and 2019-20, and in the winter of 2019-20 with over 60,000 customers are at risk.
- By the summer of 2018, studies show that 68,800 customers will be at risk of outages and 10,900 customers at risk of load shedding using CAPs to mitigate transmission transformer overloads.
- Load shedding becomes an increasingly necessary action as load grows.

5. Statement of Need

The 2015 Needs Assessment reconfirmed that, by winter of 2017-18, there is a transmission capacity deficiency on the Eastside that impacts PSE customers and communities in and around Kirkland, Redmond, Bellevue, Issaquah, Newcastle, and Renton along with Clyde Hill, Medina, and Mercer Island. The transmission deficiency focuses on the two 230 kV supply injections into central King County at Sammamish substation in the north and Talbot Hill substation in the south. The transmission capacity becomes a need at an Eastside winter load level of approximately 688 MW, where overloads will result in operating conditions that require CAPs to manage. By winter of 2019-20, at an Eastside load level of approximately 706 MW, additional CAPs are required that will put approximately 63,200 Eastside customers at risk of outages. These results are summarized in Table 3-1 above.

The 2015 Needs Assessment also reconfirmed that by summer of 2018, there will be a transmission capacity deficiency on the Eastside which impacts PSE customers and communities in and around Kirkland, Redmond, Bellevue, Issaquah, and Newcastle along with Clyde Hill, Medina, and Mercer Island. By summer of 2018, CAPs will be required to manage overloads under certain Category C contingencies and the use of these CAPs will place approximately 68,800 customers at risk and will require 74 MW of load shedding, affecting approximately 10,900 customers. These results are summarized in Table 3-2 above.

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Appendix A. 2015 Needs Assessment Results for Winter Peak Season

Table A-1: Summary of Potential Thermal Violations for Winter Peak Load Season

2013-14 5055 MW 100% Con Eastside Load = 545 MW		2017-18 5208 MW 100 % Con Eastside Load = 699 MW		2021-22 5193 MW 100% Con Eastside Load = 748 MW		2017-18 5162 MW 100% Conservation Eastside Load = 688 MW		2019-20 5175 MW 100% Conservation Eastside Load = 708 MW		2023-24 5153 MW 100% Conservation Eastside Load = 764 MW		2023-24 Extreme 5690 MW 100% Conservation Eastside Load = 804 MW	
Category B: N-1 Contingency Results													
[redacted]	Overload	[redacted]	Overload	[redacted]	Overload	[redacted]	Overload	[redacted]	Overload	[redacted]	Overload	[redacted]	Overload
		[redacted]	Talbot Hill - Lakeside #1 115 kV line – 98.6%	[redacted]	Talbot Hill - Lakeside #1 115 kV line – 97.4%	[redacted]	Talbot Hill - Lakeside #1 115 kV line – 87.7%[3]	[redacted]	Talbot Hill - Lakeside #1 115 kV line – 91.1%	[redacted]	Talbot Hill - Lakeside #1 115 kV line – 96.1%	[redacted]	Talbot Hill - Lakeside #1 115 kV line – 101.0%
		[redacted]	Talbot Hill - Lakeside #2 115 kV line – 98.4%	[redacted]	Talbot Hill - Lakeside #2 115 kV line – 97.2%	[redacted]	Talbot Hill - Lakeside #2 115 kV line – 87.5%	[redacted]	Talbot Hill - Lakeside #2 115 kV line – 90.9%	[redacted]	Talbot Hill - Lakeside #2 115 kV line – 92.4%	[redacted]	Talbot Hill - Lakeside #2 115 kV line – 97.1%
		[redacted]	Talbot Hill 230-115 kV transformer #1 – 89.0%	[redacted]	Talbot Hill 230-115 kV transformer #1 – 91.0% (see footnote 4)	[redacted]	Talbot Hill 230-115 kV transformer #1 – 85.1%[4]	[redacted]	Talbot Hill 230-115 kV transformer #1 – 85.6%	[redacted]	Talbot Hill 230-115 kV transformer #1 – 87.1%	[redacted]	Talbot Hill 230-115 kV transformer #1 – 95.9%
		[redacted]	Talbot Hill 230-115 kV transformer #2 – 90.3%	[redacted]	Talbot Hill 230-115 kV transformer #2 – 91.5%	[redacted]	Talbot Hill 230-115 kV transformer #2 – 89.3%	[redacted]	Talbot Hill 230-115 kV transformer #2 – 90.2%	[redacted]	Talbot Hill 230-115 kV transformer #2 – 92.8%	[redacted]	Talbot Hill 230-115 kV transformer #2 – 101.9%

[2] All contingencies involving loss of the Monroe – Echo Lake – SnoKing 500 kV three-terminal line are unsolvable in the 21-22HW case without modeling the Intalco load tripping RAS. Study results reflect opening all Intalco loads, totaling about 300 MW, to get the case to a solvable state. Opening these loads slightly changes line flows in the case and may contribute to the decrease in post-contingency line loading.

[3] Decrease in post-contingency line loading can be attributed to lower area load, lower SCL load and increased line ratings between the 2012 study and the current study.

[4] The Talbot 230/115 kV transformer #1 is scheduled to be replaced in 2015 and the new expected ratings and impedance were included in the 2014 cases.

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2013-14 5055 MW 100% Con Eastside Load = 545 MW		2017-18 5208 MW 100 % Con Eastside Load = 699 MW		2021-22 5193 MW 100% Con Eastside Load = 748 MW		2017-18 5162 MW 100% Conservation Eastside Load = 688 MW		2019-20 5175 MW 100% Conservation Eastside Load = 708 MW		2023-24 5153 MW 100% Conservation Eastside Load = 764 MW		2023-24 Extreme 5690 MW 100% Conservation Eastside Load = 804 MW	
				[redacted]	Sammamish-Lakeside #1 115 kV Line - 104.7%								
				[redacted]	Sammamish-Lakeside #2 115 kV Line - 104.5%								
Category C: N-1-1 Contingency Results													
[redacted]	Overload	[redacted]	Overload	[redacted]	Overload	[redacted]	Overload	[redacted]	Overload	[redacted]	Overload	[redacted]	Overload
[redacted]	Talbot Hill-Lakeside #1 115 kV Line - 115.2%	[redacted]	Talbot Hill--Lakeside #1 115 kV Line - 127.5%	[redacted]	Talbot Hill--Lakeside #1 115 kV Line – 125.9%	[redacted]	Talbot Hill--Lakeside #1 115 kV Line – 113.3%	[redacted]	Talbot Hill-Lakeside #1 115 kV Line – 117.4%	[redacted]	Talbot Hill - Lakeside #1 115 kV line – 123.9%	[redacted]	Talbot Hill - Lakeside #1 115 kV line – 130.5%
[redacted]	Talbot Hill-Lakeside #2 115 kV Line - 115.1%	[redacted]	Talbot Hill--Lakeside #2 115 kV Line - 127.7%	[redacted]	Talbot Hill-Lakeside #2 115 kV Line – 125.8%	[redacted]	Talbot Hill-Lakeside #2 115 kV Line – 113.1%	[redacted]	Talbot Hill-Lakeside #2 115 kV Line – 117.3%	[redacted]	Talbot Hill-Lakeside #2 115 kV Line – 120.8%	[redacted]	Talbot Hill-Lakeside #2 115 kV Line – 127.2%
[redacted]	Talbot Hill 230-115 kV transformer #1 - 100.9%	[redacted]	Talbot Hill 230-115 kV transformer #1 – 105.8%	[redacted]	Talbot Hill 230-115 kV transformer #1 - 108.1%	[redacted]	Talbot Hill 230-115 kV transformer #1 – 101.0%	[redacted]	Talbot Hill 230-115 kV transformer #1 – 101.3%	[redacted]	Talbot Hill 230-115 kV transformer #1 – 103.1%	[redacted]	Talbot Hill 230-115 kV transformer #1 – 113.7%
[redacted]	Talbot Hill 230-115 kV transformer #2 - 100.5%	[redacted]	Talbot Hill 230-115 kV transformer #2 - 105.7%	[redacted]	Talbot Hill 230-115 kV transformer #2 - 107.0%	[redacted]	Talbot Hill 230-115 kV transformer #2 – 104.6%	[redacted]	Talbot Hill 230-115 kV transformer #2 – 105.4 %	[redacted]	Talbot Hill 230-115 kV transformer #2 – 108.1%	[redacted]	Talbot Hill 230-115 kV transformer #2 – 118.5%

DSD 000463

2013-14 5055 MW 100% Con Eastside Load = 545 MW		2017-18 5208 MW 100 % Con Eastside Load = 699 MW		2021-22 5193 MW 100% Con Eastside Load = 748 MW		2017-18 5162 MW 100% Conservation Eastside Load = 688 MW		2019-20 5175 MW 100% Conservation Eastside Load = 708 MW		2023-24 5153 MW 100% Conservation Eastside Load = 764 MW		2023-24 Extreme 5690 MW 100% Conservation Eastside Load = 804 MW	
[redacted]	Talbot Hill-Boeing Renton-Shuffleton 115 kV Line - 101.1%	[redacted]	Talbot Hill-Boeing Renton-Shuffleton 115 kV Line - 110.4%	[redacted]	Talbot Hill-Boeing Renton-Shuffleton 115 kV Line – 110.5%	[redacted]	Talbot Hill-Boeing Renton-Shuffleton 115 kV Line – 101.1%	[redacted]	Talbot Hill-Boeing Renton-Shuffleton 115 kV Line – 103.0%	[redacted]	Talbot Hill-Boeing Renton-Shuffleton 115 kV Line – 102.9%	[redacted]	Talbot Hill-Boeing Renton-Shuffleton 115 kV Line – 110.2%
[redacted]	White River - Lea Hill - Berrydale 115 kV line - 91.7%	[redacted]	White River - Lea Hill - Berrydale 115 kV line – 98.0%	[redacted]	White River - Lea Hill - Berrydale 115 kV line - 99.7%	[redacted]	White River - Lea Hill - Berrydale 115 kV line – 90.6%	[redacted]	White River - Lea Hill - Berrydale 115 kV line – 92.0%	[redacted]	White River - Lea Hill - Berrydale 115 kV line – 88.4%[4]	[redacted]	White River - Lea Hill - Berrydale 115 kV line – 98.2%
Category C: N-2 and Common Mode Contingency Results													
[redacted]	Overload	[redacted]	Overload	[redacted]	Overload	[redacted]	Overload	[redacted]	Overload	[redacted]	Overload	[redacted]	Overload
		[redacted]	Talbot Hill-Lakeside #1 115 kV Line - 101.5%	[redacted]	Talbot Hill - Lakeside #1 115 kV line – 96.8%[5]	[redacted]	Talbot Hill-Lakeside #1 115 kV Line – 89.9%	[redacted]	Talbot Hill-Lakeside #1 115 kV Line – 92.3%	[redacted]	Talbot Hill-Lakeside #1 115 kV Line – 98.9%	[redacted]	Talbot Hill-Lakeside #1 115 kV Line – 102.3%
		[redacted]	Talbot Hill-Lakeside #2 115 kV Line - 102.1%	[redacted]	Talbot Hill - Lakeside #2 115 kV line – 107.1%[6]	[redacted]	Talbot Hill-Lakeside #2 115 kV Line – 94.5%	[redacted]	Talbot Hill-Lakeside #2 115 kV Line – 99.4%	[redacted]	Talbot Hill-Lakeside #2 115 kV Line – 103.4%	[redacted]	Talbot Hill-Lakeside #2 115 kV Line – 107.7%
		[redacted]	Talbot Hill 230-115 kV transformer #1 – 91.8%	[redacted]	Talbot Hill 230-115 kV transformer #1 – 93.6%	[redacted]	Talbot Hill 230-115 kV transformer #1 – 88.1%	[redacted]	Talbot Hill 230-115 kV transformer #1 – 88.2%	[redacted]	Talbot Hill 230-115 kV transformer #1 – 90.1%	[redacted]	Talbot Hill 230-115 kV transformer #1 – 99.6%

[5] Using the 2012 load forecast in the 2021-22 Heavy Winter case, this contingency is unsolvable, even with the Intalco load tripping RAS modeled.

[6] N-2: ADJ Talbot – Lake Tradition #1 & Talbot – Lakeside #1 115 kV was second most limiting contingency and overloaded this element by 106.6%. It is possible that, as load drops, the limiting contingency will change.

DSD 000464

2013-14 5055 MW 100% Con Eastside Load = 545 MW		2017-18 5208 MW 100 % Con Eastside Load = 699 MW		2021-22 5193 MW 100% Con Eastside Load = 748 MW		2017-18 5162 MW 100% Conservation Eastside Load = 688 MW		2019-20 5175 MW 100% Conservation Eastside Load = 708 MW		2023-24 5153 MW 100% Conservation Eastside Load = 764 MW		2023-24 Extreme 5690 MW 100% Conservation Eastside Load = 804 MW	
		[redacted]	Talbot Hill 230-115 kV transformer #2 – 92.8%	[redacted]	Talbot Hill 230-115 kV transformer #2 – 93.2%	[redacted]	Talbot Hill 230-115 kV transformer #2 – 93.14%	[redacted]	Talbot Hill 230-115 kV transformer #2 – 92.6%	[redacted]	Talbot Hill 230-115 kV transformer #2 – 95.7%	[redacted]	Talbot Hill 230-115 kV transformer #2 – 104.8%
		[redacted]	Berrydale 230-115 kV transformer – 93.6%	[redacted]	Berrydale 230-115 kV transformer - 95.5%	[redacted]	Berrydale 230-115 kV transformer – 95.6%	[redacted]	Berrydale 230-115 kV transformer – 87.6%	[redacted]	Berrydale 230-115 kV transformer – 88.3%[7]	[redacted]	Berrydale 230-115 kV transformer – 96.7%

[7] BF: White River 115 kV bus section breaker resulted in loading the Berrydale 230/115 kV transformer to 87.3% for this case. As loading shifts off of the Berrydale transformer, the White River BSBF is less critical.

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Appendix B. Supplemental Needs Assessment Results for Summer Peak Season

Table B-2: Summary of Potential Thermal Violations for Summer Peak Load Season

2014 3343 MW 100% Con		2018 3554 MW 100% Con Eastside Load = 550 MW		2018 3625 MW 100% Conservation Eastside Load = 538 MW		2020 3681 MW 100% Conservation Eastside Load = 561 MW		2024 3813 MW 100% Conservation Eastside Load = 618 MW	
Category B: N-1 Contingency Results									
[redacted]	Overload	[redacted]	Overload	[redacted]	Overload	[redacted]	Overload	[redacted]	Overload
[redacted]	Monroe-Novelty Hill 230 kV line - 132.6%	[redacted]	Monroe-Novelty Hill 230 kV line - 133.0%	[redacted]	Monroe-Novelty Hill 230 kV line – 143.9%	[redacted]	Monroe-Novelty Hill 230 kV line – 143.1%	[redacted]	Monroe-Novelty Hill 230 kV line – 139.8%
[redacted]	Maple Valley - Sammamish 230 kV line - 111.4%	[redacted]	Maple Valley - Sammamish 230 kV line - 132.3%	[redacted]	N/A	[redacted]	Maple Valley - Sammamish 230 kV line – 110.0%[9]	[redacted]	Maple Valley - Sammamish 230 kV line – 116.4%
		[redacted]	Talbot Hill - Lakeside #1 115 kV line - 93.9%	[redacted]	N/A	[redacted]	Talbot Hill - Lakeside #1 115 kV line – 81.5%	[redacted]	Talbot Hill - Lakeside #1 115 kV line – 87.8%
		[redacted]	Talbot Hill - Lakeside #2 115 kV line - 93.8%	[redacted]	N/A	[redacted]	Talbot Hill - Lakeside #2 115 kV line – 81.3%	[redacted]	Talbot Hill - Lakeside #2 115 kV line – 87.6%
Category C: N-1-1 Contingency Results									
[redacted]	Overload	[redacted]	Overload	[redacted]	Overload	[redacted]	Overload	[redacted]	Overload

[8] Loading reported on the Maple Valley – Sammamish 230 kV and Talbot Hill – Lakeside #1 & #2 115 kV lines occurred for a Heavy Summer condition with south-to-north transfers through the system. A 2018 Heavy Summer case with south-to-north flows was not available for this study. Due to consistency in the 2020 Heavy Summer and 2024 Heavy Summer with the results encountered in 2012 (see footnote 8 for discrepancies found in this case), the 2018 case was not developed and run.

[9] The 2012 TPL study modeled the Northern Intertie gen tripping scheme which trips Whitehorn and Fredonia generation and runs back Mica and Revelstoke generation in BC. Tripping this generation in a south-to-north condition without tripping the Northern Intertie exacerbates this overload. If the limiting contingency is run without the RAS in place, overloads on the Maple Valley – Klahanie line are only 106%.

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[redacted]	Sammamish 230-115 kV transformer #1 - 95.5%	[redacted]	Sammamish 230-115 kV transformer #1 - 100.03%	[redacted]	Sammamish 230-115 kV transformer #1 – 104.2%	[redacted]	Sammamish 230-115 kV transformer #1 – 108.1%	[redacted]	Sammamish 230-115 kV transformer #1 – 109.4%
[redacted]	Sammamish 230-115 kV transformer #2 - 100.8%	[redacted]	Sammamish 230-115 kV transformer #2 - 106.4%	[redacted]	Sammamish 230-115 kV transformer #2 - 110.1%	[redacted]	Sammamish 230-115 kV transformer #2 – 114.3%	[redacted]	Sammamish 230-115 kV transformer #2 – 115.6%
				[redacted]	Novelty Hill 230/115kV Transformer #2 - 102%	[redacted]	Novelty Hill 230/115kV Transformer #2 - 103%	[redacted]	Novelty Hill 230/115kV Transformer #2 - 100%
		[redacted]	Beverly Park - Cottage Brook 115 kV line – 101.4%	[redacted]	Beverly Park - Cottage Brook 115 kV line – 110.5%	[redacted]	Beverly Park - Cottage Brook 115 kV line – 110.2%	[redacted]	Beverly Park - Cottage Brook 115 kV line – 106.4%
Category C: N-2 and Common Mode Contingency Results									
[redacted]	Overload	[redacted]	Overload	[redacted]	Overload	[redacted]	Overload	[redacted]	Overload
		[redacted]	Sammamish - Lakeside #2 115 kV line - 99.8%	[redacted]	Sammamish – Lakeside #2 115 kV – 90.8%	[redacted]	Sammamish - Lakeside #2 115 kV line 95.4%	[redacted]	Sammamish - Lakeside #2 115 kV line 99.2%
				[redacted]	Monroe-Novelty Hill 230 kV line – 143.6%	[redacted]	Monroe-Novelty Hill 230 kV line – 143.1%	[redacted]	Monroe-Novelty Hill 230 kV line – 139.9%

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Appendix C. Upgrades Included in Base Cases

Table C-3: Projects Added to the Eastside Needs Assessment Winter Base Case

2017-18	2019-20	2023-24
Bothell – SnoKing reconductor	Bothell – SnoKing reconductor	Bothell – SnoKing reconductor
Cumberland substation reconfigured to 115 kV	Cumberland substation reconfigured to 115 kV	Cumberland Substation reconfigured to 115 kV
White River – Electron Heights reroute to Alderton	White River – Electron Heights reroute to Alderton	White River – Electron Heights reroute to Alderton
Talbot 230/115 kV transformer #1 replacement	Talbot 230/115 kV transformer #1 replacement	Talbot 230/115 kV transformer #1 replacement
Spurgeon substation, Similk substation & Maxwelton substation	Spurgeon substation, Similk substation & Maxwelton substation	Spurgeon substation, Similk substation & Maxwelton substation
Carpenter substation removed	Carpenter substation removed	Carpenter substation removed
Bus section breakers at BPA Olympia and BPA Tacoma	Bus section breakers at BPA Olympia and BPA Tacoma	Bus section breakers at BPA Olympia and BPA Tacoma
Switched shunt at Paul 500 kV, Broad St. 115 kV	Switched shunt at Paul 500 kV	Switched shunt at Paul 500 kV

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Table C-4: Projects Added to the Summer NERC TPL Base Case for the Eastside Area

2018	2020	2024
Bothell – SnoKing reconductor	Bothell – SnoKing reconductor	Bothell – SnoKing reconductor
Cumberland substation reconfigured to 115 kV	Cumberland substation reconfigured to 115 kV	Cumberland substation reconfigured to 115 kV
Talbot 230/115 kV transformer #1 replacement	Talbot 230/115 kV transformer #1 replacement	Talbot 230/115 kV transformer #1 replacement
White River – Electron Heights reroute to Alderton	White River – Electron Heights reroute to Alderton	White River – Electron Heights reroute to Alderton
Spurgeon substation, Similk substation	Spurgeon substation, Similk substation	Spurgeon substation, Similk substation
Denny Way substation Phase 1	Denny Way substation Phase 1	Denny Way substation Phase 1 & Phase 2
Bus section breakers at BPA Olympia, BPA Tacoma and BPA Covington	Bus section breakers at BPA Olympia, BPA Tacoma and BPA Covington	Bus section breakers at BPA Olympia, BPA Tacoma and BPA Covington
Raver 500-230 kV Transformer	Raver 500-230 kV Transformer	Raver 500-230 kV Transformer
Switched shunt at Paul 500 kV	Switched shunt at Paul 500 kV	Switched shunt at Paul 500 kV
Switched shunt at Lake Tradition 115 kV removed	Switched shunt at Lake Tradition 115 kV removed	Switched shunt at Lake Tradition 115 kV removed

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Appendix D. West-side Northern Intertie, North of Echo Lake and South of Custer Flowgate One-Line Diagrams

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Figure D-1: One-Line Diagram – West-Side Northern Intertie

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Figure D-2: One-Line Diagram - North of Echo Lake

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Figure D-3: One-Line Diagram - South of Custer

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Independent Technical Analysis of Energize Eastside

for the

City of Bellevue, WA

April 28, 2015
Version 1.3

Prepared by
Utility System Efficiencies, Inc.

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1. Executive Summary

Utility System Efficiencies, Inc. (USE) was engaged by the City of Bellevue in December, 2014 to conduct an independent technical analysis of the purpose, need, and timing of the Energize Eastside project. Energize Eastside (EE) is Puget Sound Energy's (PSE's) proposed project to build a new electric substation and new higher–capacity (230 kilovolt) electric transmission lines in the East King County area, which encompasses Bellevue, Clyde Hill, Medina, Mercer Island, Newcastle, the towns of Yarrow Point, Hunts Point, and Beaux Arts, and portions of Kirkland, Redmond, and Renton (the Eastside). The transmission lines would extend from an existing substation in Redmond to one in Renton (See Figure 3.1).

The goals of the technical analysis were to determine:

- Is there a need for this project to address growth in Bellevue? In answering this question, the analysis included determining if PSE's load forecast is reasonable, and if their studied contingencies were reasonable. Here, reasonable is defined as just, rational, appropriate, ordinary, or usual in the circumstances.[1] If the actions or data are consistent with industry practice, it is deemed reasonable.
- Is the EE project needed to address the reliability of the electric grid on the Eastside? This question assesses the purpose of the project and its timing. In other words, is the need a local issue?
- Is there a need for the project to address regional flows, with imports/exports to Canada (ColumbiaGrid[2])? This question is examined in Appendix B, Optional Technical Analysis.

This independent technical analysis (ITA) included reviewing EE documentation, examining the forecast and growth assumptions, reviewing historical demand (MW load) of the area, reviewing weather volatility, and assessing potential variability from the forecast assumptions used in the EE study. The ITA reviewed PSE's forecasting methodology, the major elements that made up the forecast, and decisions made in the forecasting procedure (including choices on what elements or variables to include). The ITA compared PSE's forecast variables with typical industry forecast variables. The ITA also looked at the assumptions that PSE used in electrically modeling the Energize Eastside area, including generation assumptions, local loads, and regional flows. The ITA reviewed PSE's powerflow cases[3] to determine whether the modeling in the cases was consistent with the forecast, and whether the outage scenarios resulted in PSE's identified transmission deficiency.

The optional technical analysis (OTA) at Appendix B examined several hypothetical scenarios, called sensitivity studies. The OTA looked at the effect of a) reducing load growth in the Eastside area, b) reducing load growth in King County while keeping the Eastside growth the same, c) increasing Puget Sound area generation, and d) reducing the Northern Intertie[4] flow to zero (no transfers to Canada). Reduced Northern Intertie flow was examined only to assess the relative impact of local need

[1] http://www.nolo.com/dictionary/reasonable-term.html
[2] ColumbiaGrid (single word) is a regional transmission planning organization with a footprint encompassing Oregon, Washington, parts of Idaho and Montana.
[3] powerflow case: Computer model of the electric grid representing a snapshot in time with a specific scenario of electric load, generation, and equipment, including what is in service and what isn't.
[4] Northern Intertie - transmission interconnection between Washington and British Columbia (also called Path 3.)

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versus regional need and does not reflect a realistic planning scenario. The OTA also looked at the impact of an Extreme Winter forecast.

A key purpose of the ITA and the OTA was to provide an increased level of *understanding* of the purpose, need and timing of the EE project to the City Council and community stakeholders. Over the course of the project, dozens of questions were received from various stakeholders. City staff filtered stakeholder comment through the Task's scope, and submitted the need related questions to USE (Other comments as appropriate were directed to the Environmental Impact Statement (EIS) process, the Integrated Resource Plan[5] (IRP) process, etc.). A Q & A discussion is included at the end of each section of the ITA. All questions analyzed are also set forth in Appendix D.

Disclaimer: This report seeks to describe the findings in terms that a non-expert can understand. Thus, some descriptions or definitions may not be exact, in an effort to make the general concept clear. However, some questions received required a higher level of technical detail. Again, the effort was made to simplify the explanations while still providing a helpful response. A glossary is provided in Appendix A.

Results:

IS THERE A NEED FOR THIS PROJECT TO ADDRESS GROWTH IN BELLEVUE? YES.

The ITA examined the forecasting methodology used by PSE in its 2014 forecast, completed in February 2015. The 2014 forecast methodology provided improved visibility of where growth was occurring within PSE's service area. The PSE forecast shows a growing peak load demand[6] of 2.4% per year for years 2014 – 2024.

The typical utility industry forecast is composed of 1) weather normalization[7], 2) economic and demographic data, 3) application of end-use data[8] including conservation and efficiency measures, and 4) adjustment for large specific load additions (such as for a new building).

The ITA concludes that PSE has followed industry practice in forecasting its demand load, incorporating the four major components of forecasting:

- PSE incorporated weather normalizing. The variables used in the weather normalizing process were typical based on industry practice.
- PSE used typical data set elements and multiple data sources for its economic/demographic data as shown in Table 6.1, acquiring data at the county level, and for the Eastside area at the census track level, in order to differentiate growth rates within the service territory. Data on jobs and

[5] Integrated Resource Plan - A comprehensive and long-range road map for meeting the utility's objective of providing reliable and least-cost electric service to its customers while addressing applicable environmental, conservation and renewable energy requirements. A process used by utility companies to determine the mix of Supply-Side Resources and Demand-Side Resources that will meet electricity demand at the lowest cost. The IRP is often developed with input from various stakeholder groups.

[6] MW demand

[7] Weather normalization is a process that adjusts actual energy (MWh) or demand (peak MW) values to what would have happened under normal weather conditions. Normal weather conditions are expected on a 50 percent probability basis (i.e., there is a 50 percent probability that the actual peak realized will be either under or over the projected peak).

[8] End-use: How is the electricity being used? What appliances are used? What efficiency measures are employed? What load can be controlled or interrupted? Utilities and cities can influence electric end-use through Demand-Side Management technologies and practices, city code changes, efficiency programs or incentives, awareness campaigns, et cetera. The end-use data is generally limited to new DSR measures. Historical end-use data is generally not captured due to the difficulty in acquiring it (surveys, etc.).

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employment in the Eastside region were obtained by PSE from the Puget Sound Regional Council and the WA State Office of Financial Management, and included census tract level analysis. PSE employed regression analysis[9] at this step, an industry standard computer analysis technique, to determine the forecast before new conservation measures and block load adjustments. (The computerized regression analysis was not analyzed as part of this study, but the technique is a computerized estimation of the best fit of the variables to the given data.)

- PSE acquired/developed significant end-use data via their IRP process, including over four thousand Demand Side Resources (DSR) measures, incorporated National and State requirements on conservation and RPS, and optimized the achievable, technical measures with a resultant 100% Conservation scenario which projects 135 MW of winter peak DSR by 2031.
- PSE gathered block load data (major projects) and utilized short-term forecast adjustments (1-year ramp in based on certificates of occupancy and 2-year ramp-out) to account for the impact on demand.

No forecast is perfect, but by following industry practice, the ITA concludes that PSE used reasonable methods to develop the forecast. PSE's resultant forecast shows the Eastside area growing at a higher level than at the county and system level, and these growth rates are based on the data it received.

PSE is applying the Northwest US practice (as does Seattle City Light (SCL)) of basing projects on a normal 50/50 forecast (actual load will be more than forecast half the time, and less than forecast half the time). This 50/50 forecast is less conservative than scenarios utilized by many other electric utilities elsewhere in the country. Basing projects on an adverse weather scenario is more conservative, but seeks to ensure that the lights stay on given the adverse weather event.

IS THE EE PROJECT NEEDED TO ADDRESS THE RELIABILITY OF THE ELECTRIC GRID ON THE EASTSIDE?
YES.

Although the new 2014 forecast resulted in an 11 MW decrease in the Eastside area's 2017/18 winter forecast, the reduced loading still resulted in several overloaded transmission elements in winter 2017/2018, which drive the project need.

Although the corrective action plan (CAP) required in the 2017/18 winter to avoid facility overload doesn't require dropping load (turning off customers' power), by winter 2019/20 approximately 63,200 customers are at risk of losing power. In addition, by summer 2018, studies show that customers will be at risk of outages and load shedding[10] due to CAPs used to mitigate transmission overloads. Despite the possibility of an in-service date shift to summer 2018 from winter 2017/18, balancing a six month delay in a complex and multi-year EIS process (which can have its own delays) against the risk of an adverse winter and less realized conservation (which could increase 2017/18 winter loading to a point where customers are at risk of load

[9] Regression analysis is a statistical process for estimating the relationships among variables. It seeks to determine the strength of the relationship between one dependent variable (usually denoted by Y) and a series of other changing variables (known as independent variables). It is also known also as curve fitting or line fitting because a regression analysis equation can be used in fitting a curve or line to data points. It includes many techniques for modeling and analyzing variables.

[10] Load shedding - An intentional electrical power shutdown to a portion of the system (customers experience an outage) to protect the network from a greater impact or from potential damage.

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shedding), suggests it is reasonable to maintain the schedule for the existing project in-service date.

Several hypothetical scenarios were studied as part of the Optional Technical Analysis (OTA). Each one showed overloads in the 2017/18 timeframe, indicating project need in order for PSE to meet federal regulatory requirements for system reliability. The OTA results showed that reducing the Eastside area growth from 2.4% to 1.5% per year in the period from winter 2013/14 to winter 2017/18 still resulted in project need. Reducing PSE's King County growth while keeping the Eastside growth the same similarly resulted in a project need. Turning on additional generation in the Puget Sound area also resulted in a project need. (See Appendix B.)

IS THE PROJECT NEEDED TO ADDRESS REGIONAL GRID POWER FLOWS, SPECIFICALLY POWER FLOWS ON THE NORTHERN INTERTIE (TO AND FROM CANADA)? The project is necessary to address local need.

The Optional Technical Analysis examined this issue by reducing the Northern Intertie[11] flow to zero (no transfers to Canada). Although this scenario is not actually possible due to extant treaties, it was modeled to provide data on the drivers for the EE project, to examine if regional requirements might be driving the need. The results showed that in winter 2017/18, even with the Northern Intertie adjusted to zero flow, the Talbot Hill 230/115 kV transformer #2 would still be overloaded by several contingencies (several different outage scenarios). Again, the projected overloads indicate a project need at the local level to meet reliability regulations. (See Appendix B for more details.)

[11] Northern Intertie - transmission interconnection between Washington and British Columbia (Also called Path 3.)

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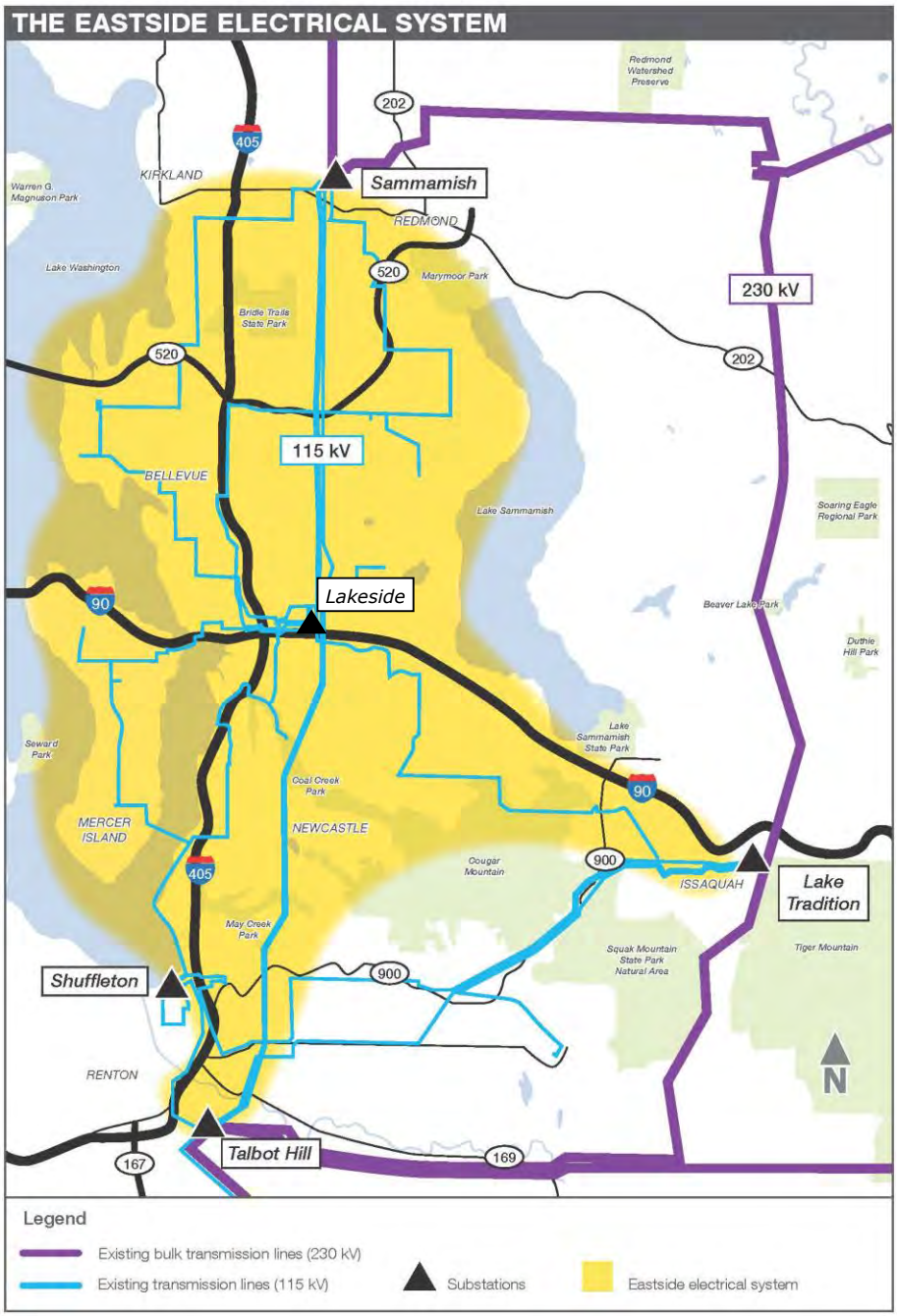
2. Eastside Area

The Eastside area is highlighted in yellow below, and was defined electrically as the area served by the 115 kV transmission lines that connect with the Lakeside Transmission Substation. Geographically it is bounded by Lake Washington and Lake Sammamish. The area is also north of PSE's Talbot Hill Substation and south of PSE's Sammamish Substation.

Figure 3.1: Eastside Area (Figure provided by PSE)



3. 2013 Eastside Needs Assessment Report

This section is included in the ITA report because PSE's 2013 Needs Assessment report is public whereas there is no updated PSE report documenting the 2014 forecast results as of the date of this writing.

The "Eastside Needs Assessment Report", published in October 2013 by PSE, focused on the central King County portion of PSE's service territory. It was based on PSE's corporate forecast which was published in June, 2012. The study determined that there was a transmission capacity deficiency in the Eastside area that would develop by the winter of 2017/2018.

Key Assumptions in PSE's 2013 Study:

- System load levels used the PSE corporate forecast published in June 2012.
- Area forecasts were adjusted by substation to account for expected community developments as identified by PSE customer relations and distribution planning staff.
- Generation dispatch patterns reflected reasonably stressed conditions to account for generation outages as well as expected power transfers from PSE to its interconnected neighbors.
- Winter peak Northern Intertie transfers were 1,500 MW exported to Canada.
- Summer peak westside Northern Intertie transfers were 2,850 MW imported from Canada.

Per PSE's 2013 study report, specific areas of concern for the 2017/2018 winter are shown in Table 4.1 below. The table lists the overloaded elements within each category of contingency.

Each of the three contingency types (N-1, N-1-1, and N-2) shown below are part of the required study process and are defined in the report glossary.

Table 4.1: PSE's 2013 Study Report: 2017/2018 Overloaded Elements

	2017/2018 Normal Winter (23° F) 100% Conservation		
	Type of Contingency		
Transmission Line or Transformer	N-1	N-1-1	N-2
Talbot Hill - Lakeside #1 115 kV line		OL	OL
Talbot Hill - Lakeside #2 115 kV line		OL	OL
Talbot Hill 230-115 kV transformer #1		OL	
Talbot Hill 230-115 kV transformer #2		OL	
Talbot Hill-Boeing Renton-Shuffleton 115 kV line		OL	
Shuffleton – O'Brien 115 kV line			
Shuffleton – Lakeside 115 kV line			

OL = Overload of Emergency Rating.

PSE's 2013 Needs Assessment report drove many need-related Stakeholder questions about the forecast, the weather scenarios, the regional scenarios, exports and imports to Canada, the outage contingencies studied and whether they were needed, the probability of having the issues, etc. PSE develops a new forecast every two years, and in February, 2015, PSE completed their new forecast with actuals through 2014. They have since restudied the situation with the new forecast. The remainder of this ITA report will relate the questions received to the new forecast and the new results.

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4. Energy versus Demand

Forecasts are developed for both energy and demand. A useful analogy is to compare energy to a car odometer and demand to a car speedometer.

- Energy (kWh) is analogous to an odometer reading, which is a cumulative measure of total miles traveled over time. Energy is a cumulative measure of total power produced or consumed over time.

Demand (kW) is analogous to a speedometer reading, which shows a snapshot of the speed at a precise moment. Demand is a snapshot of power required or power used. Peak demand is the highest demand that will be required at any particular moment during a period of time. An odometer doesn't indicate how fast someone drives, but does indicate how much driving has been done. Similarly, an energy forecast (kWh) indicates increases or decreases in the use of electricity, but doesn't indicate peak usage (kW).

Bellevue's Resource Conservation Manager (RCM) program stats on declining energy use are reflecting a decline in the average use per customer. The DSM programs, solar, etc. are showing success with this decline. But, that is one piece of the story - the energy piece on a per customer basis. The number of customers continues to increase, and the aggregate peak usage (peak demand), is continuing to increase. Growth in peak demand drives the size and amount of infrastructure required and drives the issue of grid reliability.

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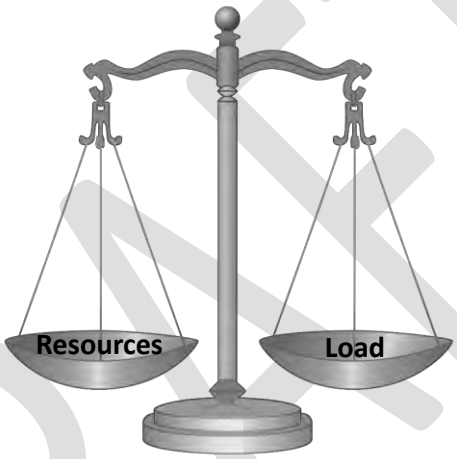
5. Typical Electric Forecast Elements

The typical utility industry forecast is composed of four main parts which will each be further explained later in this section: 1) adjustment for weather, 2) economic and demographic data, 3) application of end-use data, including energy efficiency and conservation effects, and 4) adjustment for large specific load additions (such as for a new building).

Resource planning is a related activity which provides direction on some of the forecasting elements. Resource planning (ensuring there are sufficient generation and conservation/efficiency resources to serve the customer load) requires a load forecast to know how much load one must serve. The resources must balance the load.



National Level

There are NERC Reliability Standards which pertain to the collection of data necessary to analyze the resource needs to serve peak demand while maintaining a sufficient margin to address operating events. One Standard (NERC MOD-021-1) requires that "forecasts shall each clearly document how the Demand and energy effects of DSM programs (such as conservation, time-of-use rates, interruptible Demands, and Direct Control Load Management) are addressed." Another Standard (NERC MOD-019-0.1) requires "forecasts of interruptible demands and Direct Control Load Management (DCLM) data".

State Level

There are state requirements for resource planning, which identifies generation resources and conservation/efficiency measures to serve the customer load. State Law (RCW 19.280.030), identifies the requirements of a resource plan, and states that the integrated resource plan must include:

> "(1)(a) A range of forecasts, for at least the next ten years or longer, of projected customer demand which takes into account econometric data[12] and customer usage;"

[12] Econometrics is the application of mathematics and statistical methods to economics. The data to which it is applied is called econometric data. Econometrics tests hypotheses and forecasts future trends by applying statistical and mathematical theories to economics. It's concerned with setting up mathematical models and testing the validity of economic relationships to measure the strengths of various influences.

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> "(1) (b) An assessment of commercially available conservation and efficiency resources. Such assessment may include, as appropriate, high efficiency cogeneration, demand response and load management programs, and currently employed and new policies and programs needed to obtain the conservation and efficiency resources;"

Item 1(a) above requires econometric and end-use data in the forecast. Item 1(b) requires that the forecast account for conservation and efficiency resources. Both are industry practices.

Resources consist of Supply-Side Resources (conventional generation plants, renewables, etc.) and Demand-Side Resources (resources that reduce the demand (load)).

5.1. Simplified Description of the Forecasting Procedure

1) WEATHER NORMALIZING.

The North American Electric Reliability Corporation (NERC[13]) provides direction at the national level for normalizing the demand (MW) forecast to account for weather impact.

> "The fundamental test for determining the adequacy of the Bulk Electric Power System (BEPS) is to determine the amount of resources and the certainty of these resources to be available to serve peak demand while maintaining a sufficient margin to address operating events. This test requires the collection and aggregation of demand forecasts on a normalized basis. This is defined as a forecast that has been adjusted to reflect normal weather conditions and is expected on a 50 percent probability basis, also known as a 50/50 forecast (i.e., there is a 50 percent probability that the actual peak realized will be either under or over the projected peak). This forecast can then be used to test against more extreme conditions." [14]

Normalizing the forecast seeks to remove the variation in load due to weather related factors including the temperature at the time of the peak, the temperature on the days prior to the peak, whether the peak occurred on a weekend, a weekday, a holiday, etc. Reactions to these variables vary throughout the United States, yet for a localized area there will be a typical reaction that can be calculated. These are addressed when normalizing the forecast. For example, many office buildings use less power on the weekend or on a holiday. Moreover, some residential customers will put up with a short cold or hot spell, but if it lasts "too long", they will be more likely to increase their use of heating or air conditioning.

[13] NERC: North American Electric Reliability Corporation. NERC is a not-for-profit international regulatory authority whose mission is to assure the reliability of the bulk power system in North America. NERC develops and enforces Reliability Standards as one of its duties. NERC's area of responsibility spans the continental United States, Canada, and the northern portion of Baja California, Mexico.

[14] NERC, Normalizing "NERC | MOD C White Paper | April 24, 2014", page 5 http://www.nerc.com/pa/Stand/Project%20201004%20Demand%20Data%20MOD%20C/MOD_C_White_Paper_Redline_20140424.pdf

In addition to calculating the normalized peaks, industry also typically calculates an adverse or extreme peak. Many utilities utilize a 90/10 forecast[15] to justify projects, some use an 80/20 forecast to justify projects. Utilities in the Northwest area of the United States typically base their projects on the normal (50/50) forecast, although they develop a 95/05 forecast (1-in-20) for reference.

A typical industry source for the weather data is a National Oceanic and Atmospheric Administration (NOAA) weather station. Some utilities may have their own weather recording data.

Stakeholder Questions on weather adjustment

Q1. Please explain weather adjustment. Is it reasonable/appropriate?

- A *Please see the above discussion.*
- A *Weather adjustment is reasonable and appropriate, and is required by NERC.*

2) DEVELOP A MATHEMATICAL RELATIONSHIP (EQUATION) BETWEEN A) THE ECONOMIC AND DEMOGRAPHIC DATA AND B) EITHER ENERGY USAGE (KWH) OR ELECTRIC DEMAND (KW).

For each customer class (e.g. industrial, commercial and residential), estimate the relationship between electricity consumption (usage) or demand, and the major variables that affect it (e.g. population, price, economic growth, etc.). This relationship is usually developed first, without accounting for new Demand-Side Resources (DSR), in order to show the effect of the DSR on the forecast.

Econometrics utilizes multiple sources of data. Table 5.1 lists examples of data sets that may be used in the econometric modeling.

Table 5.1: Examples of Data Used in Econometric Models

Example Data Sets used in Econometrics
Household Size
Population
Customer Count by Customer Class
Employment (Manufacturing, Non-Manufacturing, by NAICS Code[16], etc.)
GDP (Gross Domestic Product)
GMP (Gross Metropolitan Product) – a measure of the size of the economy of a metropolitan
Personal Income

[15] 90/10 forecast: 90% probability that the weather will be less severe and a 10% probability that the weather will be more severe. This is also called a 1-in-10 forecast.

[16] NAICS - The North American Industry Classification System (NAICS) is the standard used by Federal statistical agencies in classifying business establishments for the purpose of collecting, analyzing, and publishing statistical data related to the U.S. business economy (Source: Census.gov)

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3) ACCOUNT FOR END-USE DATA INCLUDING ENERGY EFFICIENCY AND CONSERVATION EFFECTS (TYPICALLY FROM AN INTEGRATED RESOURCE PLAN (IRP))

End-Use Analysis projects the quantity and use of electricity-using equipment (or a subset of them) to make a forecast or to revise one. *End-use analysis is responsive to consumer changes in kinds of equipment and allows analysis of conservation programs, energy efficiency improvements, building code modifications, increase in household electronics or typical housing square footage, etc. It breaks the data into user sectors and needs an extensive inventory of data. It readily reflects changes in the factors that influence consumption, but requires detailed assumptions on the use going forward.*

Utilities and cities can influence electric end-use through Demand-Side Management technologies and practices, city code changes, efficiency programs or incentives, awareness campaigns, et cetera. Example end-use programs are listed below.

- Residential mass market lighting and appliances
- Residential HVAC replacement
- Residential new construction
- Residential retrofits
- Commercial/Industrial lighting, equipment, HVAC
- Customized programs for larger customers
- Demand Response incentive/enabling programs
- Pricing—interruptible, time of use pricing, real time pricing

Demand-Side Management (DSM) can be broken into two components: energy efficiency and Demand Response. Energy efficiency attempts to permanently reduce the demand for energy in intervals ranging from seasons to years and concentrates on end-use energy solutions. Demand Response is designed to change on-site demand for energy in intervals from minutes to hours, targeting the lowering of electric demand/energy use during peak periods by transmitting changes in prices, load control signals or other incentives to end-users to reflect existing production and delivery costs.

When end-use factors are taken into account in the forecast, there will be multiple variables representing different elements of end-use. Some may offset others. For example, the U.S. Department of Energy noted that "Homes built between 2000 and 2005 used 14% less energy per square foot than homes built in the 1980s and 40% less energy per square foot than homes built before 1950. However, larger home sizes have offset these efficiency improvements."[17]

When utilized, the IRP process is where the end-use data is analyzed. The IRP is a comprehensive and long-range road map and is where a utility examines both Supply-Side and Demand-Side options with the objective of providing reliable and least-cost electric service to its customers while addressing applicable environmental, conservation and renewable energy requirements. Because energy efficiency is generally a low-cost resource, the IRP tends to incorporate energy efficiency as a utility system resource and reduce the need for additional Supply-Side resources.

The end-use data is generally limited to new DSR measures. Historical end-use data is not usually captured due to the difficulty in acquiring it.

[17] "Buildings Energy Data Book", US Department of Energy

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4) ADJUST FOR BLOCK LOADS (MAJOR LOAD ADDITIONS)

Known large load additions would be added to or removed from the forecasted load. This could include new large commercial buildings, major customers leaving the area, etc.

The above forecast discussion represents the system forecast, referring to the forecast for the utility's entire service area. A system forecast may be broken into sub-areas at the utility's discretion, or separate forecasts may be developed for sub-areas. Various scenarios may be modeled, to examine higher or lower conservation levels, adverse weather, et cetera.

5.2. Utilizing the System Forecast in Powerflow Cases

In order to conduct studies on the transmission system, the substation loads are calibrated to the system forecast. Once calibrated, the substation loads are modeled in the transmission planning cases for study. Multiple seasons and years may be studied.

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6. PSE's Forecast Methodology

PSE updates their load forecasts every two years. In early February, 2015, PSE completed their 2014 forecast which included historical data through 2014, and thus included the summer 2014 peak and the winter 2013/2014 peak. This new forecast was based on a new methodology. PSE shifted from a predominately system-wide view to a county by county examination. Particular focus was placed on King County, where the Eastside study area was further separated out from King County using census tract data to develop a separate Eastside forecast. This new forecast methodology provided improved visibility of where growth was occurring and where it wasn't. Consequently, after conferring with the City, USE decided to wait for the new forecast, with its improved visibility of the Eastside area, as well as its more recent actual load information.

The review of PSE's forecast methodology in this report is specific to PSE's 2014 forecast.

6.1. Weather Adjustment (Weather Normalizing)

PSE's 2014 system forecast incorporated weather normalizing consistent with industry practice.

PSE's weather normalizing process tests the following major variables via regression analysis. The regression analysis process selects out the variables that result in the best fit to the data.

- Peak hourly load for the month
- Maximum hourly load on each of the three days prior to the peak day
- Minimum and maximum temperature on the peak day
- The minimum temperature on each of the three days prior to the peak day
- The average temperature on the peak day
- The average temperature on each of the three days prior to the peak day
- Temperature 1, 2, and 3 hours before the peak
- Temperature at the peak hour
- Total monthly load
- Average monthly temperature
- The season the peak occurred in
- Whether the average temperature on the peak day, or the day before, fell below a certain threshold (cold snap variables)
- Whether it is an El Niño
- Day of the week

The factors PSE uses to normalize the effect of weather are quite typical for electric forecasting. Some utilities use humidity as a variable, PSE does not. PSE stated it did not consider humidity a significant factor. Realistically, humidity is less likely to be a factor in the winter. Heating the cold air lowers the relative humidity[18], so it feels dryer.

[18] Relative humidity is the amount of water vapor present in air. It is expressed as a percentage of the amount needed for saturation at the same temperature. Thus relative humidity varies with temperature.

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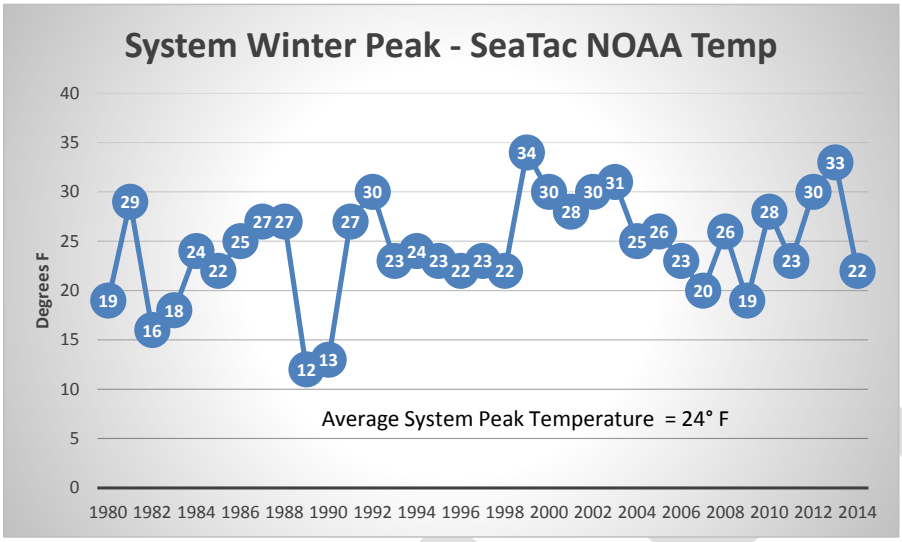
PSE utilizes the SeaTac NOAA weather station for weather data. Figure 6.1 shows the historic winter system peak[19] actual temperatures through winter 2013/2014.

Figure 6.1: Historical Temperature Data



PSE has defined their winter season as November 1 – February 28, and the normal temperature at which PSE's winter load peaks is 23° F (normal peak load temperature). PSE also defines an extreme winter peak load that has a probability of occurring once every twenty years and occurs at a temperature of 13° F. Although PSE develops the extreme winter forecast and models the effect, they only use it as an indicator of future deficiencies. PSE does not use the extreme winter forecast to justify transmission projects, they only use the normal forecast to justify projects. (Utilities in the Northwest area, including Seattle City Light (SCL), use the normal forecast for justifying projects. Many utilities outside this area use an adverse forecast to justify projects.)

Comments:

PSE uses a normal peak load temperature of 23° F. The average winter peak load temperature since 2008 is 24°F, though examining a longer span of time may show that it is 23° F. It is likely that a 1° shift upwards in temperature would reduce the normal winter forecast, but it may not be significant. One could say the normal forecast is a bit conservative. On the other hand, PSE does not use any type of adverse weather (anything worse than a 50/50 forecast) to justify a project. Many utilities design their system based on adverse weather, such as a 90/10 or 80/20 scenario where the forecast is exceeded 10% or 20% of the time. Per the Western Electricity Coordinating Council (WECC) Data Collection Manual (2014), NERC has requested that each Balancing Authority provide a 90/10 forecast. In NERC's 2014-2015 Winter Reliability Assessment, it recommends that scenarios should be assessed that reflect severe winter conditions, such as a "… higher-than-normal peak load (e.g. 90/10 forecast)." PSE does study a 95/5 (1 in 20) extreme winter, but does not use it to justify projects

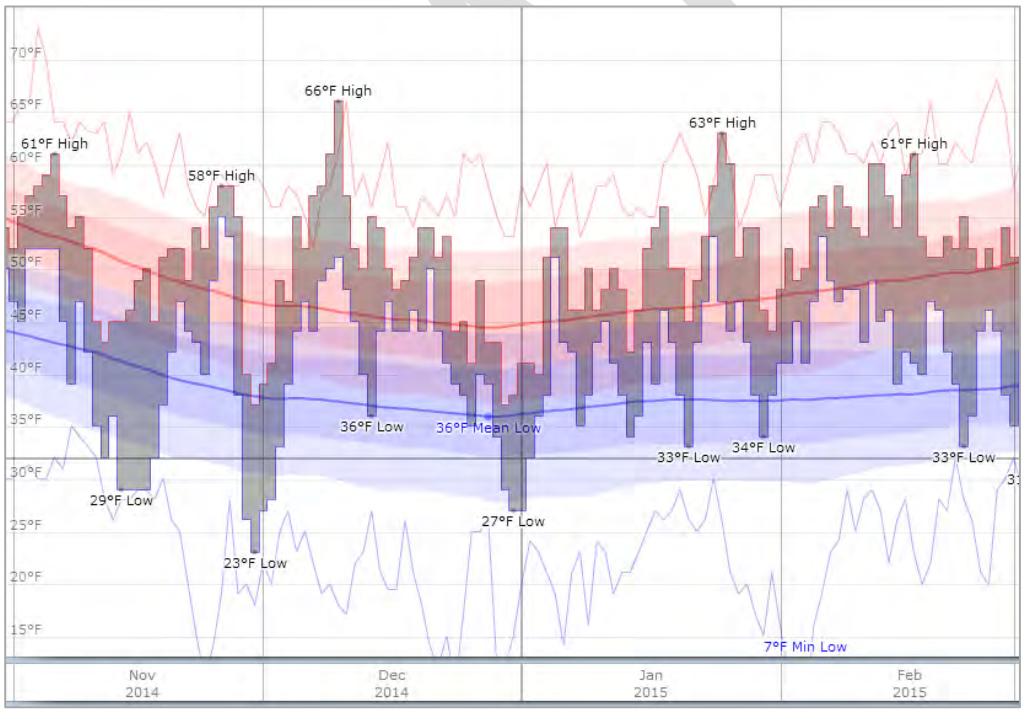
PSE uses one weather station for their service area. Some utilities use more than one weather station to reflect significant weather differences in their service territory.

[19] A system peak refers to the peak demand. In winter, this would be driven by low temperatures.

PSE feels there is not enough weather variation within their service territory to require using more than one weather station. In addition, they expressed concern that the while the SeaTac weather station is very reliable, not all the weather stations are maintained as well and there might be data reliability issues.

Although the 2014/2015 winter peak period ended February 28th, the winter peak data is not yet available. The data verification and normalizing process is not complete and typically occurs mid-year, but it is known that the 2014/15 winter peak was an unusually warm one. Figure 6.2 is taken from Weatherspark.com, and simply shows the highs and lows for each day during the winter season. The very lowest temperature for the entire season was 23°F on November 30th at 2am, per Weatherspark.com. PSE's winter peak (demand) typically occurs either in the morning between 7am and 9am or in the late afternoon/early evening between 4:30pm and 7pm. In either case the winter system peak would have occurred at a warmer temperature. Does this drive any change? At this point, no. It is expected that actual temperatures will not be the same as the defined "normal" temperature. A single data point is unlikely to change a trend. When PSE revises their forecast in two years, they will have two more data points and will recheck the trends through a new regression analysis.

Figure 6.2: Historical Temperature Data 2014/15 Winter Season – Weatherspark.com



6.2. PSE's Econometric Modeling

PSE incorporates economic and demographic data into their forecast, subdivided by customer class, using typical data set elements. See Table 6.1 for the sources of data used in their model.

Table 6.1: Data used in PSE's Economic/Demographic Model

Data Set	Historical Data Frequency	Source of Historical Data	Source of Forecasted Data
County Level Employment			
Labor Force, Employment, Unemployment Rate	Quarterly	US Bureau of Labor Statistics (BLS)	PSE's Economic/Demographic Model
Total Non-Farm Employment Goods Producing & Service Providing Sectors	Monthly	WA State Employment Security Department (ESD), using data from Quarterly Census of Employment & Wages	
County Level Personal Income			
Personal Income, Wages and Salaries	Yearly	US Bureau of Economic Analysis (BEA)	PSE's Economic/Demographic Model
County Level Population and Households			
Population (thousands)	Yearly	US BEA/ WA State Office of Financial Management (OFM)	PSE's Economic/Demographic Model
Households, Single-family & Multi-Family (thousands.)	Annual forecasts	US Census	
Household size, Single- and Multi-family (number)	Quarterly	Building Industry Association of Washington	
Eastside Area by Census Tracts			
Population	Yearly	WA State Office of Financial Management (OFM), 9/28/14	PSRC data, April 2014
Employment	Yearly	PSRC, June 2014	PSRC data, April 2014
US Level Macroeconomy			
GDP ($ x Billions, in year 2000 $), Industrial Production Index	Quarterly	Moody's	Moody's
Employment (mils.), Unemployment Rate (%)			
Personal Income ($ x Billions) Wages & salary disbursements, Other Income			
CPI (82-84=1.00[20]), consumer expenditures deflator (2000=1.0)			
Housing Starts (millions)			
Population (millions)			
T-bill rate, 3 months (%), Conventional mortgage rage (%)			

The Puget Sound Regional Council (PSRC) intends for the City of Bellevue to be a hub for regional growth. In their Vision 2040 Regional Growth Strategy report, PSRC designated five Metropolitan Cities to serve as the focal point for accommodating population and employment growth. These are Bellevue, Bremerton, Everett, Seattle, and Tacoma. The strategy is for the Metropolitan Cities "… to accommodate 32 percent of regional population growth and 42 percent of regional employment growth by the year 2040." It was also noted that it would be in the spirit of the strategy for them to accommodate an even higher percentage.

In addition, the City of Bellevue provided the following information on expected population and employment growth. "Currently there are an estimated 11,000 residents living in Downtown, and that number is expected to grow to 19,000 by 2030. Currently there are about 45,000 jobs within Downtown and that number is expected to increase to 70,300 by 2030."

Given the above, one could expect a higher growth in the Eastside area than in some of the other areas served by PSE.

[20] The average of the 1982-1984 data is set to 1.00

The following graphs display the historic and forecasted data for population, employment, and customer count, provided by PSE. Data is shown for the PSE service territory, PSE's portion of King County, and Eastside. The graphs for Eastside were developed from data sets at the census tract level. Graphs for these data sets are provided for comparison of growth rates between Eastside, King County and the PSE service territory.

The historic graph data for the PSE system goes back to 2000, and includes Jefferson County up until March 2013. The historic graph data for King County and Eastside only goes back to 2006. The Eastside customer count graphs are missing the actual data for year-end 2013; PSE recently updated their billing system with a new IT company, and not all of their customer reports were available at the time of the 2014 forecast.

Because the system graph data goes back to 2000, it shows the trend prior to the recession. The King County and Eastside graph data only goes back to 2006, so the historical trend is obscured by the recession.

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Employment and population are increasing. (Data provided by PSE. See Table 6.1 for original data sources.)

Figure 6.3: Population and Employment - PSE Service Territory

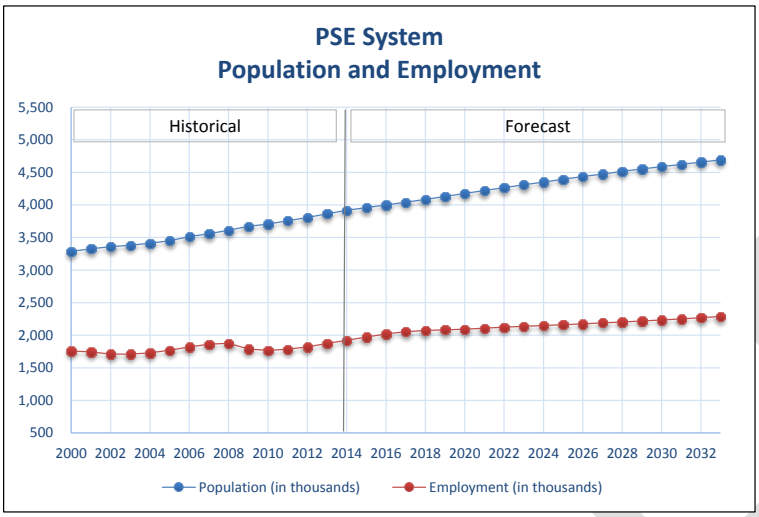


Figure 6.4: Population and Employment – King County

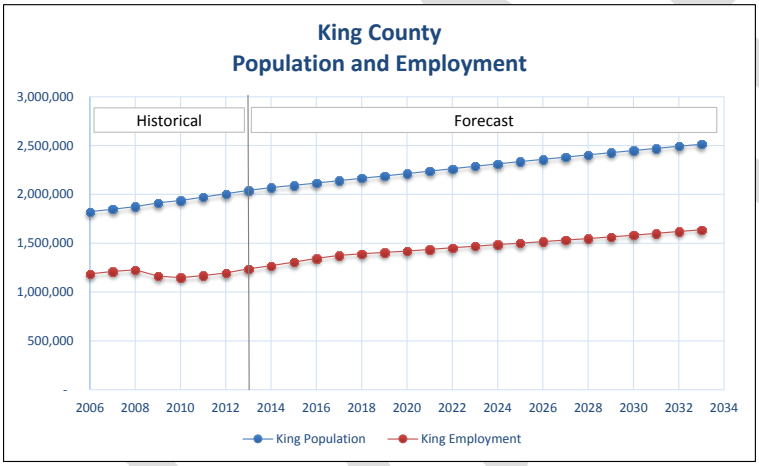
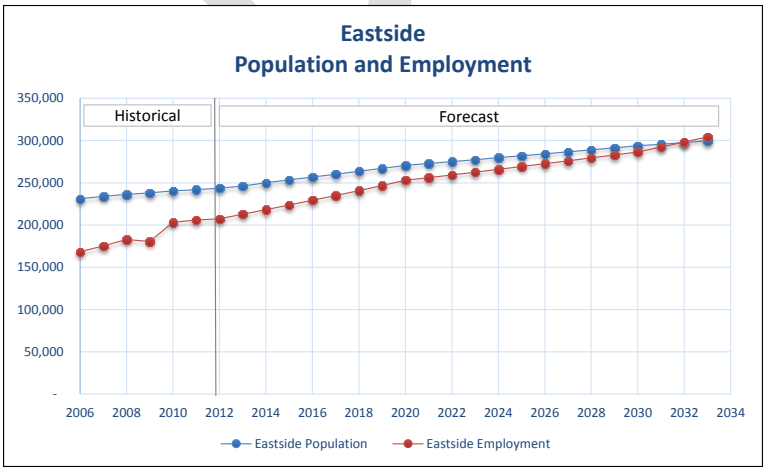
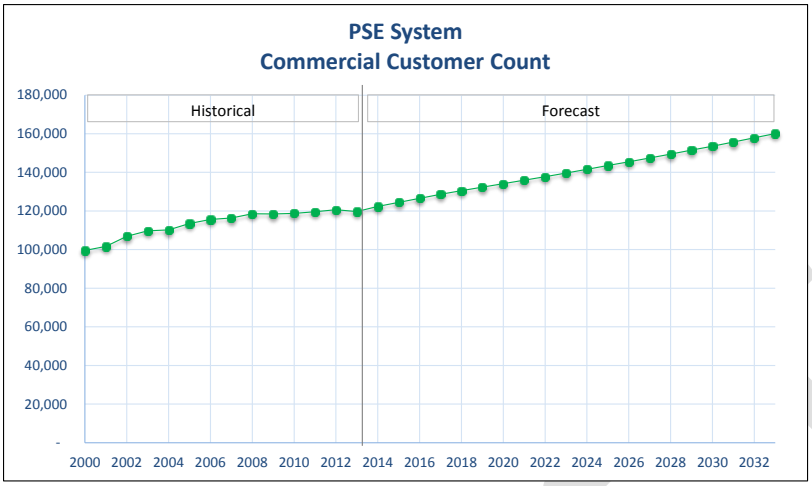


Figure 6.5: Population and Employment – Eastside



Forecasts for the commercial customer counts are increasing.

Figure 6.6: Commercial Customer Count - PSE Service Territory



The PSE system data goes back to 2000 and shows the trend prior to the recession. The King County and Eastside data only goes back to 2006, so the historical trend is obscured by the recession.

Figure 6.7: Commercial Customer Count – King County

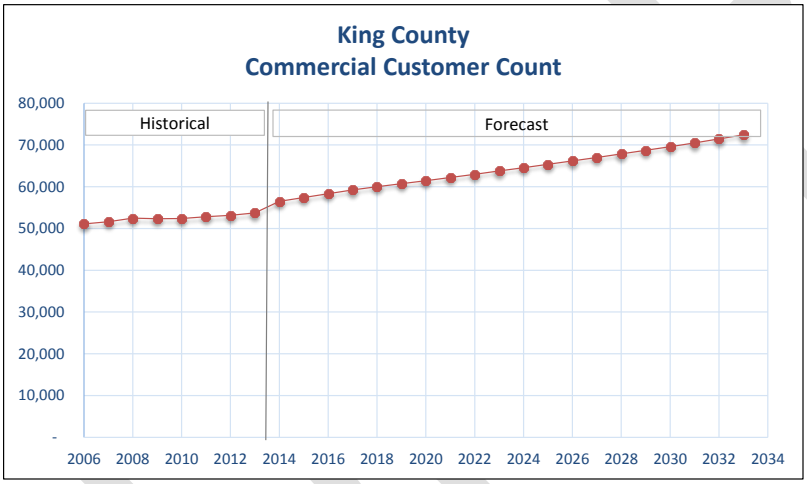
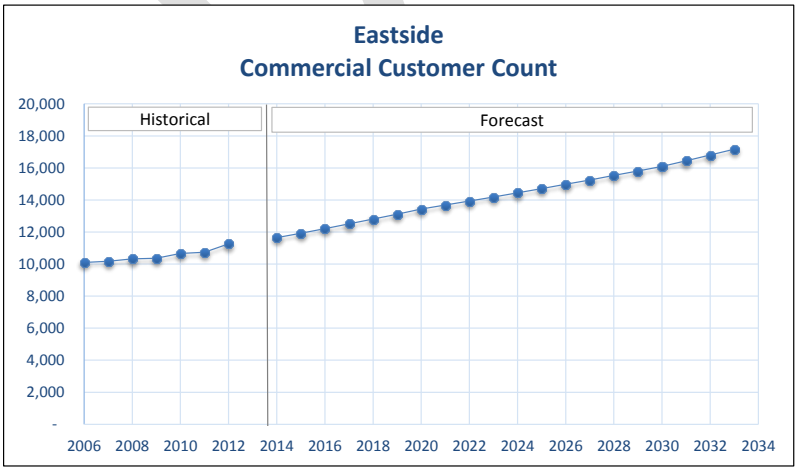
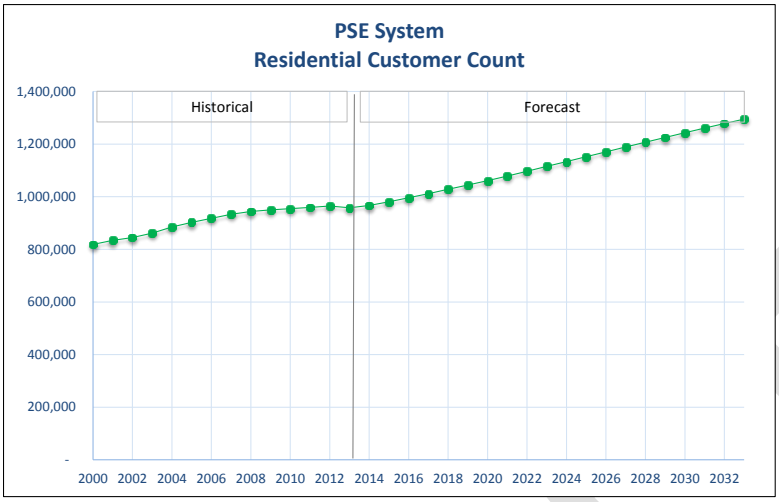


Figure 6.8: Commercial Customer Count – Eastside



Forecasts for the residential customer counts are increasing.

Figure 6.9: Residential Customer Count - PSE Service Territory



The PSE system data goes back to 2000 and shows the trend prior to the recession. The King County and Eastside data only goes back to 2006, so the historical trend is obscured by the recession.

Figure 6.10: Residential Customer Count – King County

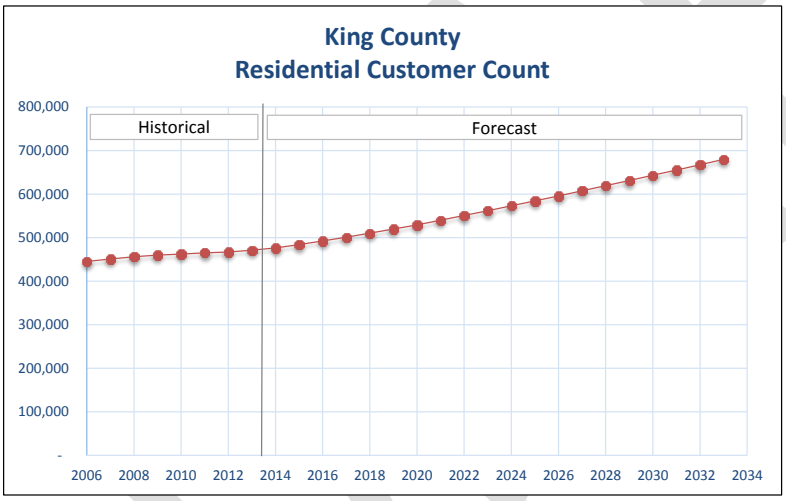
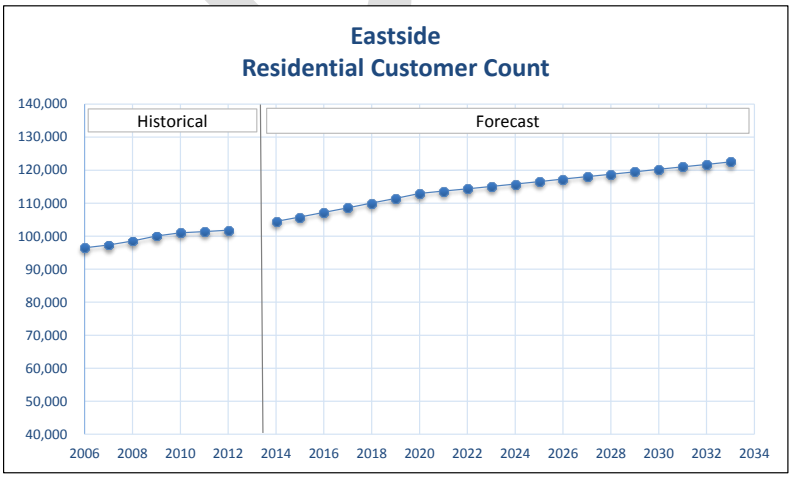
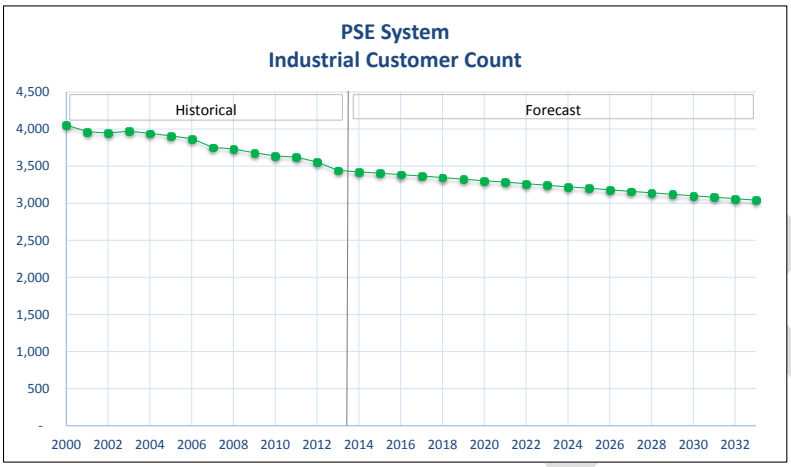


Figure 6.11: Residential Customer Count – Eastside



The industrial customer count is continuing to decline as more industrial customers move out of the area and more commercial moves in.

Figure 6.12: Industrial Customer Count - PSE Service Territory



Industrial customers include warehousing.

Figure 6.13: Industrial Customer Count – King County

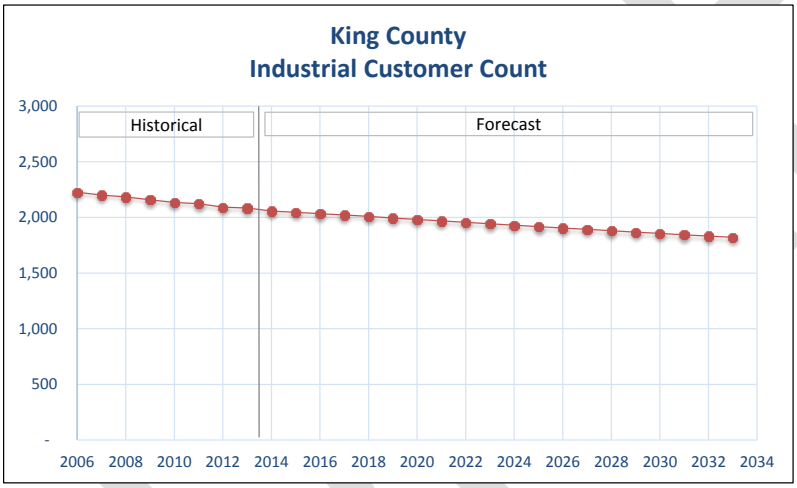
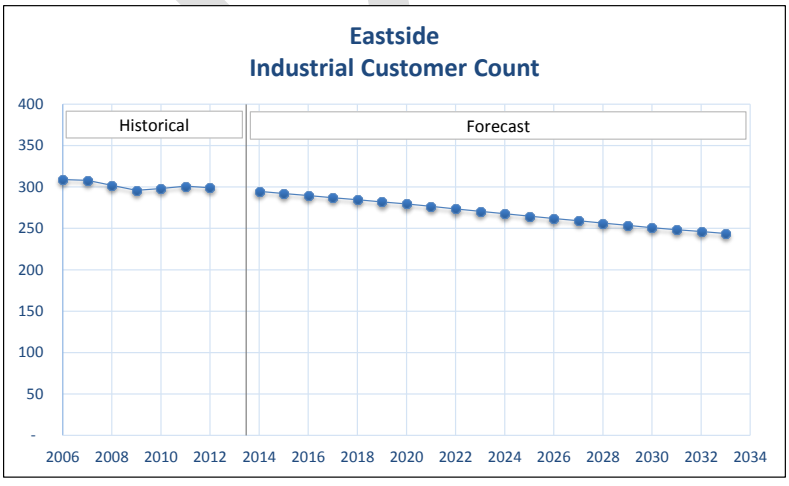


Figure 6.14: Industrial Customer Count – Eastside



6.3. End-Use Data, Including Demand-Side Response and Energy Efficiency

End-use data is evaluated in Integrated Resource Planning. The IRP is where a utility examines both Supply-Side and Demand-Side options with the objective of providing reliable and least-cost electric service to its customers while addressing applicable environmental, conservation and renewable energy requirements. Because energy efficiency is generally a low-cost resource, the IRP tends to incorporate energy efficiency as a utility system resource and reduce the need for additional Supply-Side resources.

Washington State's Renewable Portfolio Standard (RPS) law requires conservation potential be developed using Northwest Power & Conservation Council (NWPCC) methodology, and conservation targets are based on IRP with penalties for not achieving them. It requires PSE to meet specific percentages of its load with renewable resources or renewable energy credits (RECs) by specific dates.

The Energy Independence and Security Act (EISA, 2007) provides for minimum federal standards for lighting and other appliances beginning in 2012. It also sets standards for increasing the production of clean renewable fuels, increasing the efficiency of buildings and vehicles, and more.

PSE commissioned The Cadmus Group, Inc. (Cadmus) to conduct an independent study of Demand-Side Resources (DSR) in the PSE service territory as part of its biennial integrated resource planning (IRP) process. The study considered energy efficiency, fuel conversion, Demand Response, and distributed generation, totaling over four thousand measures. PSE also considered distribution efficiency. The achievable, technically feasibly Demand-Side measures were combined into bundles[21] based on levelized cost[22] for inclusion in the generation optimization analysis. The optimization model developed and tested different portfolios, combining Supply-Side Resources with Demand-Side bundles, to find the lowest cost combination of resources that: a) met capacity need; b) met renewable resources/RECs need; and c) included as much conservation as was cost effective. (Once the capacity and renewable resources/RECs needs are met, the decision to include additional conservation bundles is simply whether that next bundle of measures increases the cost or decreases it.) The final set of cost effective measures is identified as the "100% conservation" set. By 2033, the 100% conservation scenario is projected to reduce PSE's winter system peak by 1226 MW, 209 MW from the EISA programs and 1017 MW from all the other Demand-Side Resources. Only new opportunities are captured.

The table below breaks out the 100% conservation DSR at the King County and Eastside area level. The MW column shows the impact (reduction) to the demand forecast. For the Eastside area, 51 MW of peak DSR is projected by 2017, and 135 MW by 2031. These reductions are incorporated into the 100% Conservation forecast, which is what is being reviewed in this report.

[21] All the bundles are cost bundles, with the exception of a standards bundle (expected effects of codes and standards such as EISA) and a distribution efficiency bundle. An example bundle is the set of measures that cost between $28/MWh and $55/MWh.

[22] Levelized Cost - An economic assessment of the cost to build and operate a power-generating asset over its lifetime divided by the total power output of the asset over that lifetime. It is also used to compare different methods of electricity generation in cost terms on a comparable basis.

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Table 6.2: Cumulative DSR Impact (2013 IRP)

King County		
year	Annual DSR (MWh)	Peak DSR (MW)
2014	112,730	45
2015	348,463	88
2016	557,863	131
2017	756,295	171
2018	951,360	213
2019	1,147,137	246
2020	1,393,906	309
2021	1,668,547	350
2022	1,902,423	387
2023	2,112,925	421
2024	2,274,243	432
2025	2,351,296	444
2026	2,431,870	457
2027	2,508,352	471
2028	2,589,821	483
2029	2,658,889	494
2030	2,731,640	505
2031	2,798,219	517
2032	2,875,530	532
2033	2,931,133	533

Eastside Area		
year	Annual DSR (MWh)	Peak DSR (MW)
2014	94,667	21
2015	152,559	31
2016	207,980	41
2017	262,563	51
2018	317,493	61
2019	386,767	74
2020	464,427	86
2021	529,013	96
2022	585,484	107
2023	629,201	110
2024	650,086	113
2025	672,152	116
2026	693,168	120
2027	715,397	123
2028	734,411	127
2029	754,139	130
2030	771,869	134
2031	793,300	135

Source: PSE

Stakeholder Questions on Demand-Side Response:

Q2. What is the effect of the LED street light program on load?

A *The Eastside load is forecasted at 641 MW under normal conditions (Winter 15/16). The funded street light conversion program would reduce this load by 282 kW and the full conversion would reduce the load by 798 kW. On a percentage basis, the funded conversion would reduce Eastside load by 0.044% and the full conversion would reduce Eastside load by 0.12%. Though not evaluated in the 2013 IRP and thus not part of the 100% conservation measures, there will be limited impact to the overall load in any given year.*

Q3. Does the load forecast take into account local government actions, such as Bellevue's street light and traffic light initiatives?

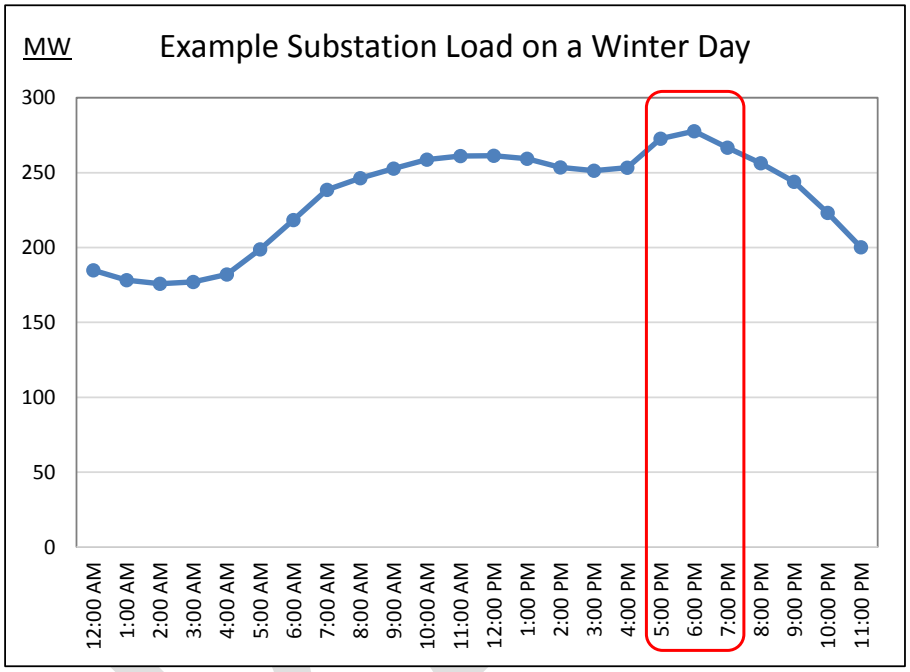
A *The LED programs were not specifically identified in the 2013 IRP. The LED technology and availability is different today than it was when the 2013 IRP study began. PSE is planning on including LED lighting in the 2015 IRP.*

Q4. What is the effect of the planned 289 kW of renewable generation (including Solarize Bellevue, the Bellevue College and the Bellevue Service Center), to the grid?

A *The Eastside load is forecasted at 641 MW under normal conditions (Winter 15/16). The planned 289 kW of renewable generation is nameplate rating, so actual output may be 80-85% of that on a sunny day. For a summer*

peak, the Eastside load could be reduced by 0.04%. For a winter peak, solar output would be significantly less or non-existent. PSE assumes that solar will not be available for the winter peak, since the winter peak usually occurs when it is dark out. The sample graph below reflects a mixed commercial/residential area, with the peak driven by the residential load. (A substation with the peak driven by commercial load could have a different load profile (different peaking curve).)

Figure 6.15: Sample Winter Load Profile



Q5. Is PSE using all the available Demand Response initiatives/opportunities?

A *Available Demand Response initiatives/opportunities were evaluated as to whether they were achievable and technically feasible. Then PSE used a generation optimization tool to identify the lowest cost combination of resources that a) meet capacity need b) meet renewable resources/RECs need, and c) included as much conservation as was cost effective. (Once the capacity and renewable resources/RECs needs are met, the decision to include additional conservation bundles is simply whether that next bundle of measures increases the cost or decreases it. The IRP has the objective of providing reliable and least-cost electric service to its customers while addressing applicable environmental, conservation and renewable energy requirements. For example, Pacificorp states that the objective of the IRP is "…providing reliable and least-cost electric service to all of our customers while addressing the substantial risks and uncertainties inherent in the electric utility business." Energy Efficient West Virginia states that IRP is a process used by utility companies to determine the mix of resources that will meet electricity demand at the lowest cost.*

Q6. How does efficiency affect energy usage?

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- A *Energy efficiency elements were described above. The 2013 IRP identified 521 aMW[23] of market achievable, technically feasible electric energy-efficiency potential by the end of 2033. To gauge achievability, Cadmus relied on customer response to past PSE energy programs, the experience of other utilities offering similar programs, and the Northwest Power and Conservation Council's most recent energy efficiency potential assessment. For the 2013 IRP, PSE assumed achievable electric energy efficiency potentials of 85 percent in existing buildings and 65 percent in new construction. If this potential proves cost-effective and realizable, it would result in a 16% reduction in 2033 forecast retail sales. (Note: this is an energy usage question, not a demand (MW) question. That said, the forecast and need are based on incorporating all of the cost-effective conservation measures (100% Conservation).)*

Q7. Provide details on cost-effective energy efficiency and Demand Response (DR) elements included in the forecast, and how "cost-effective" is determined.

- A *See Tables B-2-1, B-2-2, and B-2-3 (pages 156 – 265) of IRP Appendix N (2013) for a list of the thousands of electric measures studied. Table 13, page 20 provides a summary of the number of energy efficiency measures by customer class. The energy efficiency measures make up the majority of the DSR measures.*
- A *Cost-effective: The short answer is that PSE has an optimization tool that ensures that the capacity needs are met, ensures that the renewable resources/RECs requirements are met, then minimizes total revenue requirements for both Supply-Side and Demand-Side. Those measures it selects are "cost effective". Longer answer: The measures are bundled into similar levelized costs and the optimization tool evaluates the measures in bundles rather than each individually, then the model determines which bundles are cost effective. See IRP Chapter 5 Figure 5-17 for the DSR bundles by cost group and Appendix N Figure 15 for the DSR supply curve. Out of an identified 1226 winter peak MW of achievable, technical potential in the PSE system (*1017 MW + 209 MW EISA), 1007 MW *were identified as cost effective.*

Q8. Do the growth projections account for increased electrical efficiency? What assumptions are made, and do these represent the low, high, or average model outputs?

- A *Yes, the growth projections account for the cost effective efficiency measures.*
- A *See answers to the preceding two questions.*
- A *The forecast represents the base model.*

Q9. Concern expressed with PSE's forecast when considering energy efficiency, renewables, and Demand Response incentives.

- A *Please see above discussion and answers.*

6.4. Major Loads

PSE adjusts its forecast to incorporate major load additions, also called block load additions. The adjustment is a temporary adjustment, as they assume that within a few years the growth built into the load forecast will "catch up" and include the block load additions.

[23] aMW - The average number of megawatt-hours (MWh) over a specified time period; for example, 295,650 MWh generated over the course of one year equals 810 aMW (295,650/8,760 hours). (Source: PSE's 2013 IRP Definitions)

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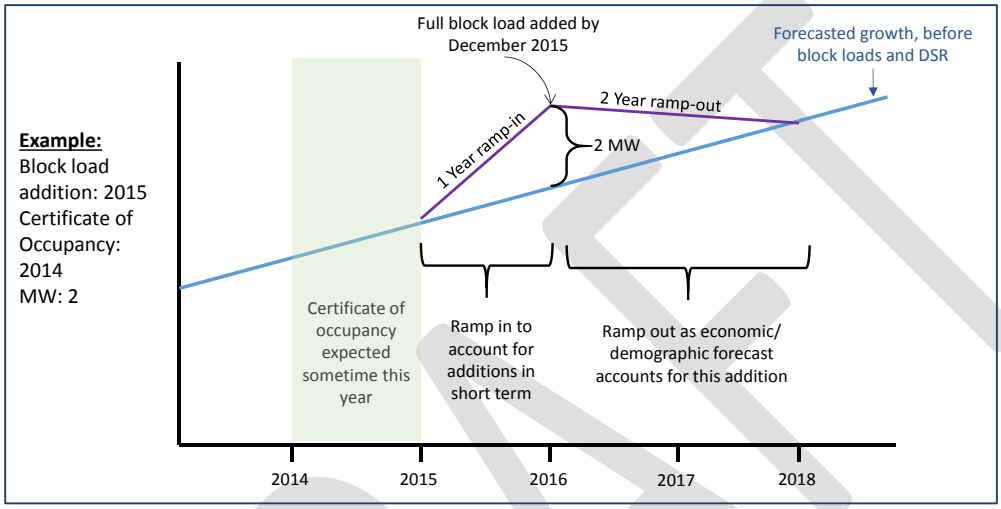
Example: A building has a certificate of occupancy in 2014, with an expected diversified load of 2 MW. PSE will assume it takes a year for the load to fully appear and will add it to the forecast using a one year ramp-in. PSE then ramps the adjustment out over two years, assuming that the growth built into the forecast will take two years to catch up to the block load addition. The block load additions are like bumps on the forecast; they don't change the overall trend, but do create short term changes. See the figure below.

Figure 6.16: Block Load Addition Methodology (from PSE)



PSE acquires data on major load additions from cities as well as directly from developers; some of this data is considered confidential and was not shared. PSE did provide a list of over fifty Eastside Block Load projects (unnamed) with estimated MW load and the expected year when the load would be fully realized. The table below provides a summary by year of this information. The square footage and number of units are reported where known. PSE's Planning group projects a probability of occurrence of 100% for loads anticipated through 2017, 50% for loads anticipated between 2018 and 2020, and 0% for projects after 2020. This probability is multiplied by the expected load before adding into the forecast. The probability factor is a way of addressing the increasing uncertainty of projects in future years.

Table 6.3 does include the City of Bellevue Projects (individually listed in Table 6.4). The Sound Transit East Link project is included in the forecast and accounts for a small portion of the load (approximately 3.5 MW) beginning in the year 2020. Although the East Link web site indicates a 2023 in-service date, PSE's initial expectation is that a small portion of the load will be needed in 2020 and as the project grows they anticipate that Sound Transit's impact on the peak demand will increase. This particular load may be forecasted in advance of need, but it would not impact the 2017/18 HW need for the Energize Eastside project.

Table 6.3: Eastside Total Block Loads by Year

Estimated Completion Year	Assigned Probability	# of Projects	Commercial Sq Footage	# of Multi-family units	MW fully energized this year	MW added to forecast
2014	100%	3	100,000	642	4.4	4.4
2015	100%	9	n/a	1231	5.3	5.3
2016	100%	6	263,000	493	7.0	7
2017	100%	7	2,157,000	1566	25.0	25
2018	50%	4	820,362	n/a	1.0	0.5
2019	50%	6	1,989,340	n/a	21.5	10.75
2020	50%	18	1,316,000	234	16.3	8.15
2021	0%	4	2,010,000	n/a	14.8	0
2022	0%	0	0	0	0.0	0
2023	0%	0	0	0	0.0	0
2024	0%	3	928,000	n/a	8.5	0
2025 and beyond	0%	9	602,000	150	17.8	0

* Square footage and number of units are reported where known.

Table 6.4 lists the thirty-nine major projects identified on the City of Bellevue's website, and is provided to show the significant growth expected in the City of Bellevue. Twelve of the Projects include data on the number of stories (building floors), and seven of these are planning fifteen stories or more.

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Table 6.4: City of Bellevue Major Projects (website)

#	Name
Downtown - In Review	
1	Bellevue Square SE Corner Expansion
2	Washington Square Hilton garden Inn
3	Goldsmith Plaza 305
4	Bellevue Center, Phase II
5	415 Office Building
6	Rockefeller Bellevue Tower Phase I
7	Marriott AC Hotel
8	AMCUT
Downtown - Under Construction	
1	Alamo Manhattan Main Street
2	Main Street Gateway / Bellevue Gateway, LLC
3	Marriott Hotel
4	Bellevue at Main / SRM
5	Bellevue Apartments / LIHI
6	Alley 111
7	Bellevue Office Tower
8	Bellevue Park II Apartments
9	Lincoln Square Expansion
10	SOMA Phase II
Downtown - Issued Land Use & Building	
1	The Summit Building C / Bentall
2	103rd Avenue Apartments / HSL Properties
3	Bellevue Center, Phase I
4	Pacific Regent of Bellevue, Phase II
Downtown - In the Pipeline	
1	Evergreen Development Bellevue Tower
2	EROS Properties
3	Fana CBD Master Development Plan
4	Metro 112 Apartment, Phase II
5	17-102nd Avenue NE
6	Eastlink Bellevue Transit Center Station
7	10625 Main Street
8	846 108th Avenue NE
9	Habib Properties
10	Bellevue Plaza
Bel-Red - In Review	
1	Spring District Residential (Land Use Approval)
2	Spring District Office, Bldgs. 16&24 (Building Permit)
3	East Link 130th Station
Bel-Red - Under Construction	
1	GRE Phase I and Phase II
Bel-Red - In the Pipeline	
1	Aegis at Overlake
2	Sherwood Center
3	East Link 120th Station

Projects can shift, developers can change their schedule, but PSE's projected timing of the block loads falls within a realistic range based on current construction schedules and plans, with the possible exception of the East Link project in 2020. However, the East Link timing wouldn't affect the EE timing. PSE's 1-year ramp-in is based on having certificates of occupancy; as long as certificates of occupancy and visual

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confirmation of both construction and occupancy rates are utilized, the forecast can be updated each time with the best available information. In addition, some of the block load project information is still limited and doesn't provide a complete picture of the electric load requirements, so assumptions must be made. These situations are also typical and another reason for the need to regularly update block load information which is a typical industry practice. In summary, PSE's block load data appears to fall within a realistic range. Construction is happening. Developers have indicated interest in future projects. Also, PSE applies a probability factor to the estimated loads to try to address the uncertainty of projects with later in-service dates, and all the forecasted impacts of the block loads on the forecast are only temporary bumps, and are ramped out of the forecast so that they don't affect the overall growth trend.

Stakeholder Questions on Major Projects

Q10. Is development like Bellevue's Spring District factored in? Are there numbers that account for the impact of individual projects in downtown Bellevue? What numbers are used to predict the load impact for these projects?

A *Yes. See Table 6.3 for the summary.*

Q11. A scenario was posed that data centers were consolidating and moving out of the Eastside area, and a question was asked whether PSE had accounted for that in their forecast.

A *PSE does account for large loads leaving the system or moving from one substation to another, but is not aware of any major changes in data centers. Data centers can be relatively small or quite large. Per PSE, the large data centers generally locate outside the PSE service area, where it is cheaper. PSE's planners have seen no indication of large data center changes. A short, independent web search did not turn up any large data center moves out of the Eastside area.*

6.5. PSE's Forecast

Figures 6.17 – 6.21 depict energy and demand (MWh and MW) forecasts, and growth rates. The peak forecast is affected by conservation programs, and all the graphs assume 100% conservation and a normal winter. PSE's conservation programs are heavily weighted toward the first 10 years of the forecast (2014-2023), with less aggressive conservation occurring in the second 10 years of the forecast (2024-2033). This can result in a slower growth rate in the load forecast for the first 10 years.

PSE reached several key conclusions in comparing the new 2014 forecast (F14) with the prior 2012 forecast (F12), which affects some of the information that PSE had publicly shared showing demand and need for the project. PSE's F14 system forecast assumed a more gradual recovery of the US economy from recession than the prior F12 forecast. The F14 system forecast also used an updated US population growth forecast from the US Bureau of Census which is lower than what was used in F12.

In addition, customer growth and customer counts in the F14 system forecast are lower than in F12 because of slower housing recovery. Finally, peak load growth and peak load levels at the system and King County level are also projected to be lower in F14 versus F12.

The Eastside area is where the load projections increased. Eastside peak loads in the new forecast, based on PSRC's population and employment growth forecasts, are

projected to grow by 2.4% per year[24] in the next 10 years driven by growth in commercial sector and high density residential sector.

Although the F14 forecasted Eastside growth rate increased over the 2012 forecast (F12), the resultant F14 forecast for Eastside reduced the projected 2017/18 normal winter loading by 11 MW. The new F14 forecast, based on census tract level demographic data for the Eastside area, had normalized actual peak loads for winter 2012/13 and 2013/14 which were less than the forecasted peak loads from the F12 forecast, which in turn resulted in lower forecasted peaks for winter 2017/18. Section 8 of the report discusses the impact on the Energize Eastside project need.

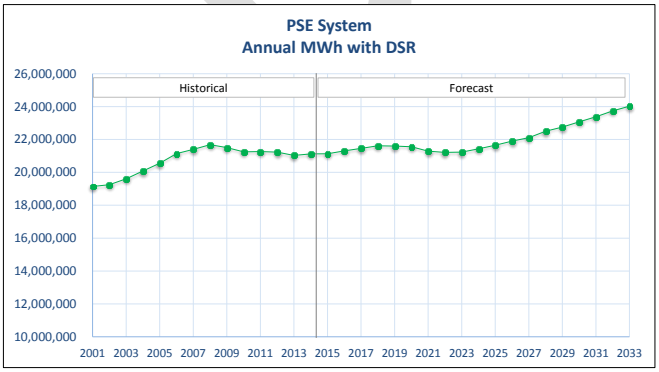
Table 6.5: PSE's Eastside 2017/18 Forecast Comparison

Forecast Development Year	2017/18 Winter Peak
2012	699 MW
2014	688 MW

Figures 6.17 – 6.20 show MWh and MW forecasts for the PSE system, King County, and the Eastside area. The EE project need is based on the MW graph for Eastside. The MWh forecasts do not drive the need, but are shown because of the number of Stakeholder questions received and the uncertainty and/or misconception of what MWh indicate. The MWh forecasts show *usage*, like the odometer, not *peak.* They reflect growth and conservation, but are not directly tied to the peak. The typical behavior or response of a household may be different on the one or two very cold days in a year, as one is getting ready in the morning or coming back from work to a cold house.

Figure 6.17 shows the energy forecast for the PSE system. The forecasted dip in energy is due in part to the aggressive conservation programs that are weighted toward the first 10 years of the forecast (2014-2023). In addition, the block loads are phased in and then phased out over time. Any block loads that come in after 2017 are only given half of the MWh since these projects are less certain to be completed. After 2020 no block loads would be phased in, with a few more years of earlier block loads phasing out.

Figure 6.17: PSE's Energy Forecast (MWh) – PSE System



[24] The growth rate is a peak load growth rate and is developed through a regression analysis.

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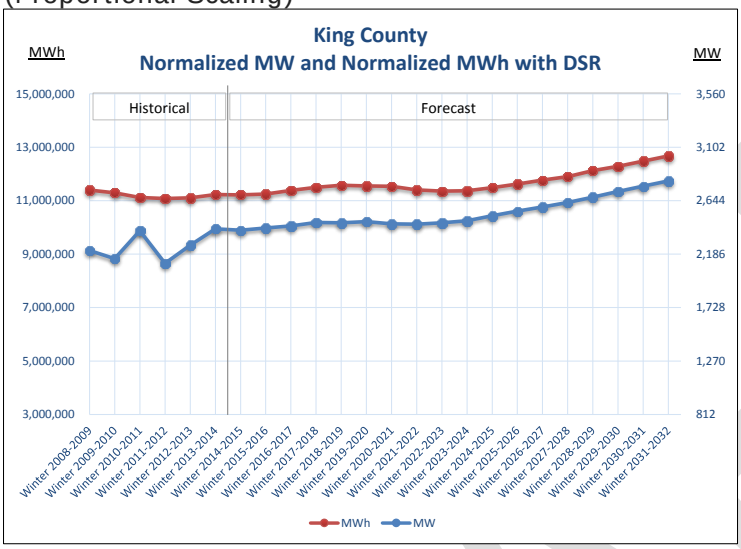
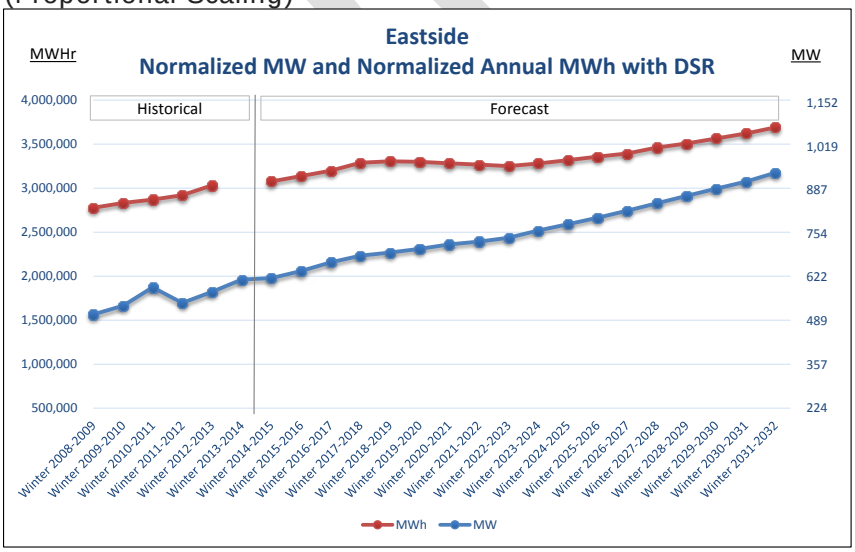
Figure 6.18 shows the energy forecast and demand forecast for King County. King County is forecasted to have a relatively flat energy and demand forecast until approximately winter 2023/2024, at which point both forecasts are increasing. The energy and demand forecasts track fairly closely in King County, but this doesn't mean the same response is expected in other areas.

Figure 6.18: PSE's Energy (MWh) and Demand (MW) Forecasts - King County
(Proportional Scaling)



In the Eastside area, the energy forecast appears to show a stronger impact from conservation compared to the demand forecast. As mentioned previously, the forecasted dip in energy is due in part to the aggressive conservation programs that are weighted toward the first 10 years of the forecast (2014-2023). It is also impacted by the block loads which are phased in and then phased out over time. After 2020 no block loads would be phased in, with a few more years of earlier block loads phasing out.

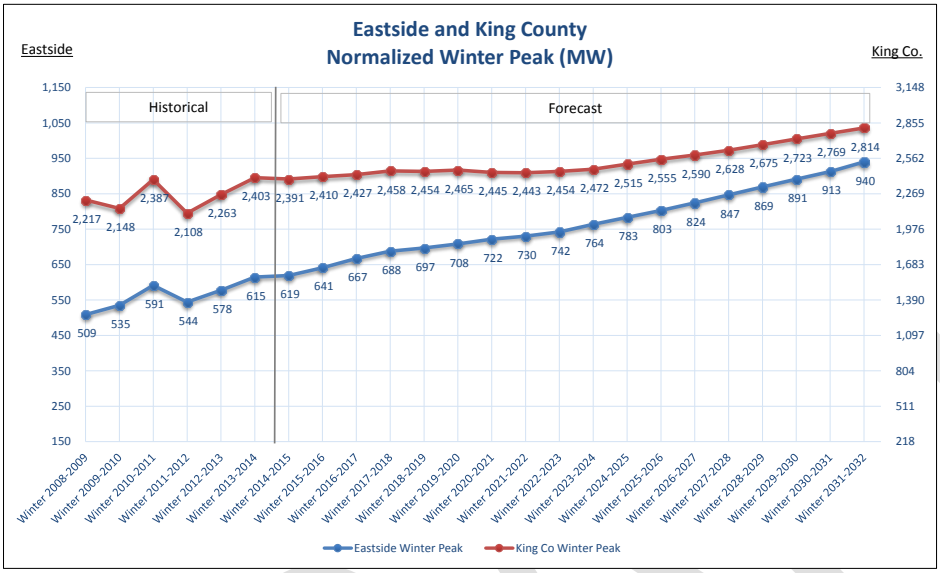
Figure 6.19: PSE's Winter Energy (MWh) and Demand (MW) Forecasts – Eastside
(Proportional Scaling)



The dip is due to a cold snap that lasted several days. Per PSE their weather adjustment does not fully account for the lag effects of longer cold snaps.

Figure 6.20 compares the Eastside and King County winter peak demand forecasts. The Eastside area is forecasted to grow at a faster rate than King County. This is in line with the Vision 2040 Regional Growth Strategy

Figure 6.20: PSE's Winter Demand Forecasts – Eastside and King County, 100% Conservation
(Proportional Scaling)



The 2014 forecast shows a 2.4% growth rate for the Eastside area from 2014-2024 and a 2.5% growth for Eastside between 2014 and 2031. In comparison, the forecast shows a 1% growth rate for King County between 2014 and 2031. The Eastside area is projected to grow significantly faster than King County as a whole, which is in line with the Vision 2040 Regional Growth Strategy report. Whether this growth will be sustained through 2031 is unknown. Note: if the growth rate is calculated from the 2010 actuals through 2017, the growth rate is 2.2% for Eastside and 0.4% for King County. See Figure 6.21 and Figure 6.22.

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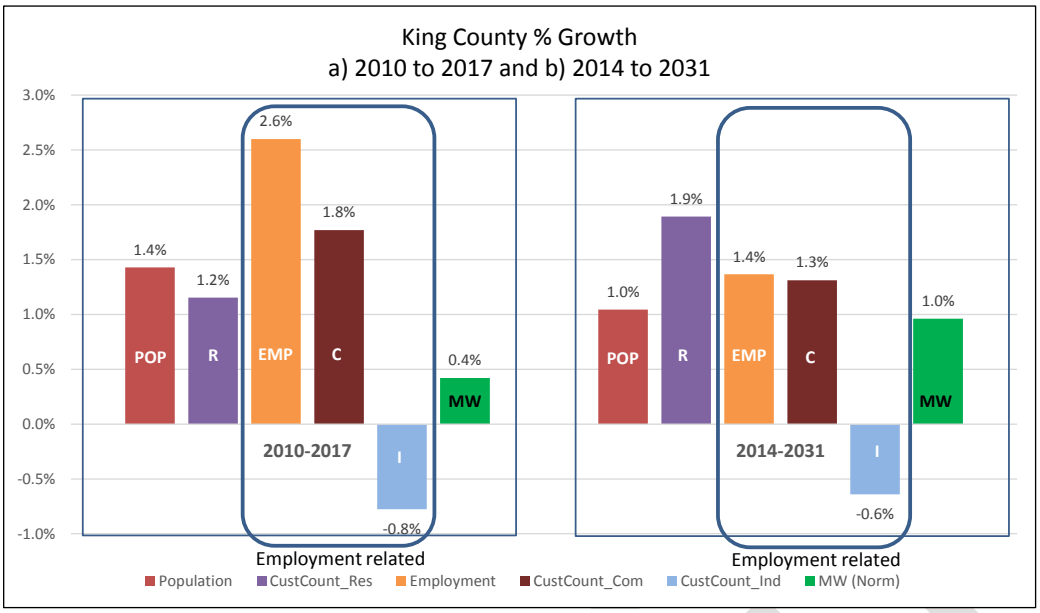
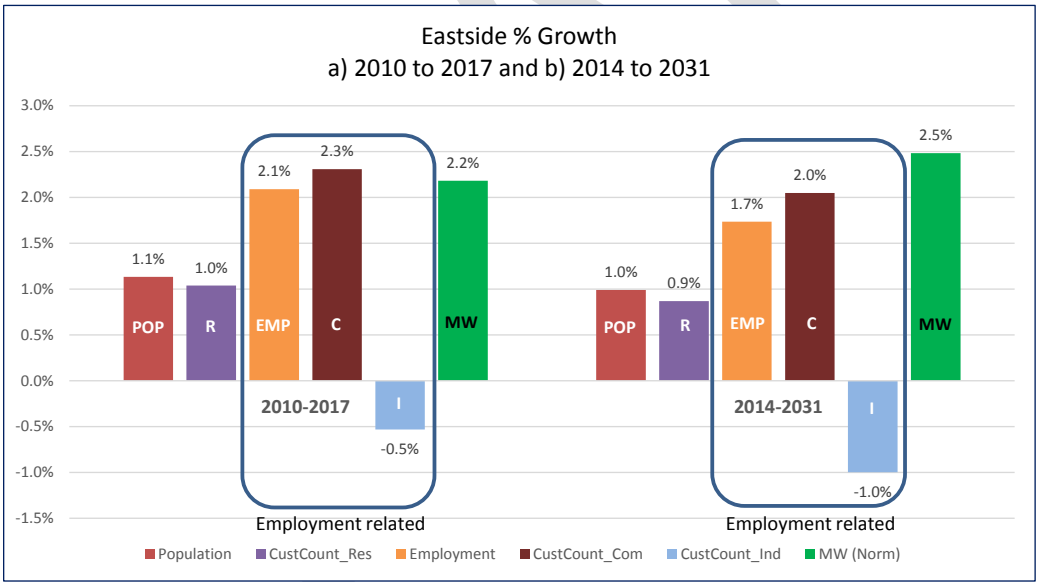
Figure 6.21: Growth Rates – King County



See Table 6.1 for original data sources. Numbers provided by PSE.

Figure 6.22: Growth Rates – Eastside Area



See Table 6.1 for original data sources. Numbers provided by PSE.

Stakeholder Questions related to Actuals (Historical Data)

Q12. What are the ACTUAL numbers for 2012, 2013 and 2014?

A *Actual numbers for employment, population and customer count are shown in Section 6.2. Actual numbers (normalized) for MWh and MW are shown in Section 6.5.*

Q13. Please show historical loads.

A *See preceding question.*

Q14. What is the source of the actuals?

- A *See Table 6.1*

Q15. Would like graph showing load history (back to 2000) and forecast.

- A *See Section 6.5*

Q16. Please include 2014/15 winter peak data.

- A *The data is not yet available for the 2014/15 winter peak. See Figure 6.2 and the paragraph above it.*

Q17. Please provide the unadjusted and temperature adjusted historical peaks.

- A *Temperature adjusted historical peaks are shown in Section 6.5. See the beginning of Section 5 and Section 5.1 for why unadjusted peaks are not used.*

Q18. What have been the highest actual aggregate winter peak loads on Eastside feeders and distribution lines …? How would they relate to PSE's forecast of future loads?

- A *The aggregate peaks for the Eastside area are captured in the historical data shown in Figure 6.19.*
- A *The historic loads are included in the regression analysis which results in the forecast of future loads.*

6.6. Summary Analysis of PSE's Forecasting

PSE has followed industry practice in forecasting their demand load.

- PSE included the major components of a typical system forecast: weather normalizing, use of econometric data, incorporating end-use data (including conservation and DSR measures), and making adjustments for block (major) loads.
- The variables used in the weather normalizing process were typical based on industry practice.
- PSE used typical data set elements and multiple data sources for economic/demographic data as shown in Table 6.1, acquiring data at the county level, and for the Eastside area at the census track level, in order to differentiate growth rates within its service territory.
- PSE employed regression analysis at this step, an industry standard computer analysis technique, to determine the forecast before Demand Side Resources (DSR) and block load adjustments. (The computerized regression analysis was not analyzed as part of this study, but the technique is a computerize estimation of the best fit of the variables to the given data. The equations are considered proprietary by PSE.)
- PSE acquired/developed significant end-use data via their IRP process on over four thousand DSR measures, incorporated National and State requirements on conservation and RPS, and optimized the achievable, technical measures with a resultant 100% Conservation scenario which projects 135 MW of Eastside winter peak DSR by 2031.
- PSE gathered block load data (major projects) and utilized short-term forecast adjustments (1-year ramp in based on certificates of occupancy and 2-year ramp-out) to account for the impact. The block load impact was further adjusted by applying a probability factor based on the projected block load in-service date, with 100% through 2017, 50% from 2018 to 2020, and 0% after 2020. The in-service date accuracy and the ramp-in timing of one year is harder to evaluate. Projects can shift, developers can change their schedule, but PSE's projected timing of the block loads falls within a realistic range based

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on current construction schedules and plans, with the possible exception of the East Link project in 2020 which wouldn't affect the EE timing. PSE's 1-year ramp-in is based on having certificates of occupancy; as long as certificates of occupancy and visual confirmation of both construction and occupancy rates are utilized, the forecast can be updated each time with the best available information. In addition, some of the block load project information is still limited and doesn't provide a complete picture of the electric load requirements, so assumptions must be made. This is also typical and another reason for the need to regularly update block load information which is a typical industry practice. In summary, PSE's block load data appears to fall within a realistic range. Construction is happening. Developers have indicated interest in future projects. Also, PSE applies a probability factor to the estimated loads to try to address the uncertainty of projects with later in-service dates, and all the forecasted impacts of the block loads on the forecast are only temporary bumps, and are ramped out such that they don't affect the overall growth trend.

No forecast is perfect, but by following industry practice, PSE used reasonable methods to develop the forecast. PSE's resultant forecast shows the Eastside area growing at a higher level than at the county and system level, and that is based on the data PSE received.

Comments on weather adjustment:

PSE is applying the Northwest US practice (as does SCL) of basing projects on a normal 50/50 forecast, which by definition should be exceeded half the time, and using a 95/5 (1-in-20) extreme weather scenario for reference (but not for developing projects). Although a regional industry standard, many other US utilities base projects on an adverse weather scenario, such as a 90/10 or 80/20. Basing projects on an adverse weather scenario is more conservative, but seeks to ensure that the lights stay on given the adverse weather event. These statistically less frequent assumptions would result in a higher load forecast, and if adopted as a policy on which to base projects, would require the system to be designed to withstand it.

Based on historical temperature data, one could suggest that PSE's forecast use a normal temperature of 24°F rather than 23°F for winter normalizing (see Figure 6.1), but: a) the 24°F average is based on a relatively short span of time, and b) the forecast used to propose projects is a normal 50/50 forecast and is expected to be exceeded given an adverse weather event. If PSE were to adopt an adverse weather policy on which to base projects, then it could make sense to re-evaluate the "normal" winter peak temperature; however, since the system demand is based on the less conservative 50/50 load forecast, using 23°F for the normal temperature is a reasonable assumption because it results in a slightly higher system demand than using 24°F.

Stakeholder Questions related to Forecast Methodology

Q19. Questions on heat map. Request to create a more accurate map.

A *USE attempted to make a replacement heat map. One can obtain usage (kWh) data at a detailed level, but that doesn't show the peak demand which drives the project need - analogy of the odometer and speedometer. USE created a map of substation peak demand, using spatial interpolation*

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between the substations, but the accuracy wasn't sufficient for the granularity of detail that is desired. The substations aren't necessarily located right where the heaviest load is. USE didn't feel the result gave a sufficiently clear representation of the area load and so did not include it.

Q20. What are the industry standards for forecasting? Compare to PSE forecast.

A *See Sections 5 & 6 for standard industry practice.*

Q21. There appear to be no industry wide standards for the development of utility load forecasts, but there do appear to be standards for Integrated Resource Plans. RCW 19.280 State IRP, WAC 480-100-238. Clarify term "conservation" and why it is used for customer load reductions.

A *Yes, the industry standards have concentrated on the IRP process, but within that are requirements relating to some of the forecast elements. There are typical industry practices.*

A *100% Conservation is defined as the cost-effective, achievable, technical DSR measures. See the Section 5 introduction and Section 6.3.*

Q22. Is PSE using population growth as a parameter? If so, at what granularity are the growth projections made? In other words, are growth projections used for individual cities, or is the Eastside treated as a whole, with one forecast governing the whole area?

A *Population is used as a parameter.*

A *Forecasts were developed at the system level, at the county level, and for the Eastside area. The Eastside forecast was developed using census tract data.*

Q23. We would like to understand economic projections as well. Is economic growth projected for each city, or only for the whole Eastside? What numbers were used?

A *Economic projections were made at the system level, at the county level, and for the Eastside area. Graphs were provided for some of the major elements (Section 6.2 and 6.5).*

Q24. Does the load forecast anticipate changes in regional transmission flow, such as south-north transmissions to Canada?

A *The load forecast is based on load. Transmission flows are irrelevant to the forecast. The link between forecast and transmission flows comes from modeling the substation load data, which was correlated to the load forecast, into a powerflow case. The powerflow case is where regional flow scenarios can be modeled. (See Appendix B, Optional Technical Analysis for study results of this scenario. It showed that even with no power flowing to Canada on the Northern Intertie (which is an unrealistic hypothetical scenario but modeled to answer the local vs. regional question), there is still a project need.*

Q25. What other factors governing the regional grid is the load forecast taking into account?

A *See preceding answer.*

Q26. Is it possible that the industry-standard methodology which PSE uses to forecast load growth has not evolved to reflect the realities of the current electricity marketplace? Are there any newer methodologies, or modifications to existing methodologies, which better reflect the realities of the modern electricity marketplace?

A *This question is outside the scope of this study; however, the IRP process continues to get attention, and frequently includes input from stakeholders, which is where Demand-Side Resources are evaluated and feed into the forecast process.*

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Q27. Is PSE's load projection reasonable? Are they the needs of Eastside or the needs or BPA, etc.? Are the loads PSE is projecting based on a farfetched combination of circumstances that are unlikely to actually happen?

A *The load projections and need determination are based on a normal weather forecast with 100% conservation. The 2014 forecast methodology and inputs are reasonable. See Section 6.6. See Section 7 for discussion on standards.*

Q28. Is PSE's forecast based on good data, independently verified?

A *Yes, PSE has followed industry practice in forecasting their demand load. See section 6.6.*

Q29. Why is PSE projecting load growth when their public documents (e.g. 10k) show they are selling less electricity?

A *The referenced 10k report is based on energy, which like an odometer reading shows usage, not peak demand. As noted previously, average use behavior is not necessarily winter peak behavior; the trends don't have to match. In addition, the data in the report is not adjusted for weather. See figures in Section 6.5 for current forecasts.*

Q30. Provide justification/rational/definition for the System Capacity line on PSE's "Customer Demand Forecast".

A *System Capacity: Occurs when the load (Eastside Area) just hits the rating limit of the critical contingency condition(s). The System Capacity line can shift depending on where load grows (if not homogenous). The contingency analysis is dictated by national standards. Using the same methodology as the 2013 report, a winter Eastside system capacity range of 688-708 MW has been identified based on the 2014 load forecast powerflow results (see Figure 8.1).*

Q31. How does PSE justify an Eastside growth rate of 1.7% to 2%?

A *PSE used reasonable methods to develop the 2014 forecast by following industry practice (see Section 6.6). The forecast is built from the data inputs via regression analysis. The 2014 demand forecast shows a 2.4% growth rate for the Eastside area from 2014-2024 and a 2.5% growth for Eastside between 2014 and 2031. In comparison, the forecast shows a 1% growth rate for King County between 2014 and 2031. The Eastside area demand is projected to grow significantly faster than King County as a whole, which is in line with the land use* Vision 2040 Regional Growth Strategy *report. Whether the forecasted demand growth will be sustained through 2031 is unknown. Note: if the growth rate is calculated from the 2010 actuals through 2017, the growth rate is 2.2% for Eastside and 0.4% for King County. See Figure 6.18 and Figure 6.19.*

A *Note: SCL's "demand" forecast growth of 0.5% noted in their latest IRP update is actually an energy forecast. SCL's actual demand forecast from December 2013 to December 2034 has an estimated compound annual growth rate (CAGR) of 1.2%, based on an estimated 1180 MW in December 2013 and using their IRP demand graph as reference. PSE has a CAGR of 2.4% from winter 2013/14 to winter 2031/32 based on an estimated 615 MW in winter 2013/14.*

Q32. What is the magnitude and timing of the need for EE? An updated peak load forecast is needed to resolve serious questions about the load forecast used by PSE to justify the project as now proposed.

A *In early February, 2015, PSE completed their 2014 forecast which included historical data through 2014, and thus included the summer 2014 peak and the winter 2013/2014 peak. See the top of Section 6 for discussion on the new forecast methodology.*

Q33. Please explain PSE's "Eastside Customer Demand Forecast" chart. A detailed quantitative analysis for the years is needed on this chart. There have been several credible articles stating electrical usage is not growing but is flat, even declining in the United States. This trend is apparent over several years and is due to conservation and technological changes in production, usage and storage. How does Energize Eastside explain this disparity? Also, solar energy has been increasing on the Eastside.

A *Please see discussions in Section 6.2 on the economic and demographic data sources, the Vision 2040 Regional Growth Strategy, and Section 6.4 on Major Loads. Please see Section 4 on Energy vs. Demand and Q4 on potential impact of solar on a winter peak.*

Q34. PSE's energy use (MWh) trend and # of customer trend is similar to SCL, yet PSE's load forecast (MW) shows a significantly higher growth % than SCL. Explain. National electricity use is declining as is regional (Pacific Northwest Utilities Conference Committee (PNUCC)). Why is PSE's forecast increasing? Explain why electricity use in Bellevue is so different from other cities.

A *Please see Q31 and Q33 answers.*

Q35. Please explain PSE's "Eastside Customer Demand Forecast" chart. Show peak demand for Bellevue. Show retail sales to customers, off-system sales and electricity delivered to transmission only customers. Concern over accuracy of trend.

A *See preceding answer. See Figures in Section 6.5.*

A *There are no off-system sales within the Eastside area; this would not affect the Eastside forecast. There are transmission only customers in King County outside of the Eastside area, but since the off-system sales customers are not PSE's customers, they wouldn't affect that forecast either.*

Q36. Is it true that PSE's "Eastside Customer Demand Forecast" graph is based on a hypothetical "grid-flow modeling scenario" … rare winter peak …

A *No. It is based on normal winter weather. The hypothetical outage scenarios are part of the industry mandated contingency analysis. Please see the weather normalizing discussion in Section 5 and see Section 7 on Standards, regarding the required contingency analysis.*

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7. Electric Utility Reliability Standards

7.1. EPAct 2005

On August 14, 2003, large portions of the Midwest and Northeast United States and Ontario, Canada, experienced an electric power blackout. The outage affected an area with an estimated 50 million people and 61,800 megawatts (MW) of electric load in the states of Ohio, Michigan, Pennsylvania, New York, Vermont, Massachusetts, Connecticut, New Jersey and the Canadian province of Ontario. The blackout began a few minutes after 4:00 pm Eastern Daylight Time (16:00 EDT), and power was not restored for 4 days in some parts of the United States. Parts of Ontario suffered rolling blackouts for more than a week before full power was restored. Estimates of total costs in the United States range between $4 billion and $10 billion (U.S. dollars). In Canada, gross domestic product was down 0.7% that August, there was a net loss of 18.9 million work hours, and manufacturing shipments in Ontario were down $2.3 billion (Canadian dollars).[25]

Partially in response to this blackout, Section 1211 was added to the Energy Policy Act of 2005 (EPAct 2005). EPAct 2005 became law on August 8, 2005. Section 1211 of the EPAct 2005 requires that the Federal Energy Regulatory Commission (FERC) certify an Electric Reliability Organization (ERO) to establish and enforce reliability standards for the bulk-power system[26], subject to FERC review. On July 20, 2006, FERC certified the North American Electric Reliability Corporation (NERC) as the ERO for the continental U.S. under the Federal Power Act Section 215.

From the NERC website (www.nerc.com):

> "NERC is a not-for-profit international regulatory authority whose mission is to assure the reliability of the bulk power system in North America. NERC develops and enforces Reliability Standards; annually assesses seasonal and long-term reliability; monitors the bulk power system through system awareness; and educates, trains, and certifies industry personnel. NERC's area of responsibility spans the continental United States, Canada, and the northern portion of Baja California, Mexico. NERC is the electric reliability organization for North America, subject to oversight by the Federal Energy Regulatory Commission and governmental authorities in Canada. NERC's jurisdiction includes users, owners, and operators of the bulk power system, which serves more than 334 million people."

Because of changes brought about by EPAct 2005, the NERC standards that were previously voluntary are now mandatory and all users of the Bulk Power System (BPS) must comply with these standards. There are currently 1426 requirements in 143 reliability standards either subject to enforcement or subject to future enforcement.

[25] http://energy.gov/sites/prod/files/oeprod/DocumentsandMedia/BlackoutFinal-Web.pdf, pg. 1

[26] In this report, the terms Bulk Power System (BPS) and Bulk Electric System (BES) will be used interchangeably. While the definitions are slightly different, for the purposes of this report and for determining the need for the Energize Eastside Project, these two terms can be treated as the same.

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7.2. Reliability Standards Applicable to Energize Eastside[27]

NERC Reliability Standard TPL-001-4[28] (Transmission System Planning Performance Requirements) is the Reliability Standard most relevant to the need for the Energize Eastside Project. TPL-001-4 Requirement 1 and Requirement 7 are currently subject to enforcement. Requirements 2-6 and 8 are not currently subject to enforcement but will be subject to enforcement on January 1, 2016. The enforcement date for Requirements 2-6 and 8 is before the planned in-service date of the Energize Eastside Project. Therefore, the Energize Eastside Project will be subject to the newer requirements before the project goes into service. In addition, the newer requirements are in many cases more stringent than the existing requirements. For the above reasons, this report will limit its discussion to the newer TPL-00104 Requirements and will not discuss the currently enforceable requirements of TPL-001-0.1, TPL-002-0b, TPL-003-0b, and TPL-004-0a[29].

Another Reliability Standard that can have an impact on the need for the Energize Eastside Project is FAC-008-3[30] (Facility Ratings). TPL-001-4 and FAC-008-3 are discussed in more detail below.

TPL-001-4 requires that each Planning Coordinator and Transmission Planner[31] perform an annual transmission assessment of its portion of the Bulk Electric System[32] (BES). This assessment must model, among other things, system peak load, known commitments for Firm Transmission Service and Interchange, and the planning events (contingencies) listed in Table 1 of TPL-001-4[33].

TPL-001-4 requires the development of a Corrective Action Plan (CAP)[34] whenever the transmission assessment determines that the system cannot meet the performance requirements listed in Table 1. In other words, once a performance requirement specified in TPL-001-4 cannot be met (e.g., an overload is found), a need has been determined.

FAC-008-3 is applicable to both Transmission Owners and Generation Owners[35]. FAC-008-3 requires each Transmission Owner and Generation Owner to have a facility[36]

[27] capitalized terms in this section refer to terms that are defined in the NERC Glossary
[28] http://www.nerc.com/files/TPL-001-4.pdf
[29] Reliability Standards TPL-001-0.1, TPL-002-0b, TPL-003-0b, and TPL-004-0a are being replaced by TPL-001-4.
[30] http://www.nerc.com/files/FAC-008-3.pdf
[31] Puget Sound Energy is registered with NERC as both a Planning Coordinator and a Transmission Planner.
[32] The Bulk Electric System (BES) definition is fairly long and involved (see http://www.nerc.com/pa/RAPA/BES%20DL/BES%20Definition%20Approved%20by%20FERC%203-20-14.pdf), but for the purposes of this report, the BES can be considered to be all networked transmission elements with an operating voltage of 100 kV or higher. Radial facilities are generally not considered to be part of the BES even if they are operated at voltages of 100 kV or higher.
[33] Table 1 is provided in Appendix RPM-1 of this report.
[34] Corrective Action Plans as used in the TPL-001-4 Reliability Standard are not the same as the Corrective Action Plans described by PSE in the Eastside Needs Assessment Report (October 2013). In TPL-001-4, a Corrective Action Plan may include operational measures (such as switching existing facilities in or out) and/or the addition of new facilities. In the Eastside Needs Assessment Report, Corrective Action Plans only refer to operational measures.
[35] Puget Sound Energy is registered with NERC as both a Transmission Owner and a Generation Owner.
[36] A facility is a set of electrical equipment that operates as a single Bulk Electric System Element (e.g., a line, a generator, a shunt compensator, transformer, etc.)

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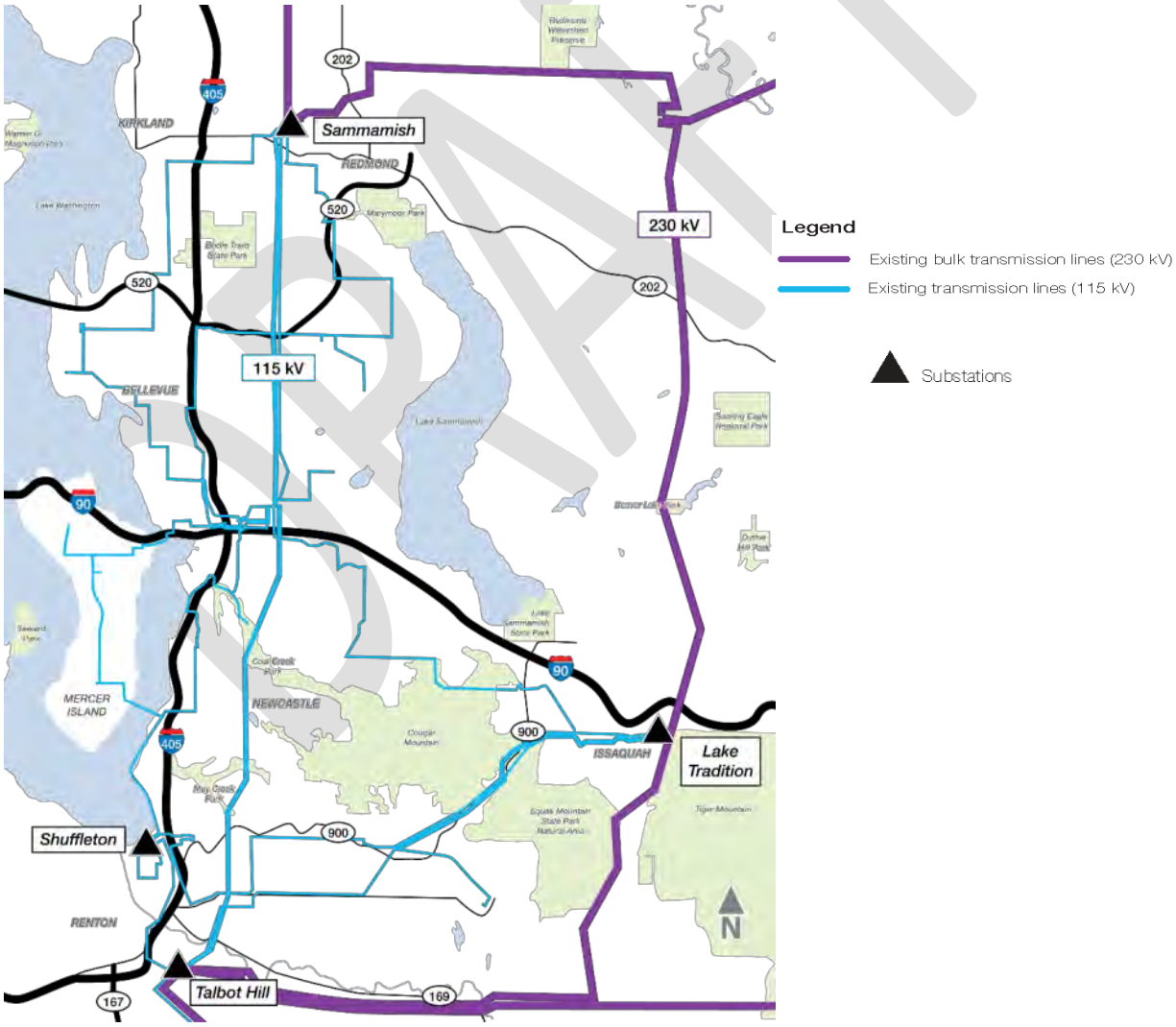
rating[37] methodology[38] that is consistent with manufacturer ratings, standards developed through an open process, or a practice that has been verified by testing, performance history, or engineering analysis. The intent of this Reliability Standard is to ensure that facility ratings are based upon sound engineering practices and are consistent across a utility's service area.

7.3. Critical Contingencies for the Energize Eastside Project

Figure 7.1 below is a sketch of the Eastside area transmission network[39]. The area between Sammamish and Talbot Hill is the area of where a number of overloads have been seen in planning studies.

Figure 7.1: Eastside Area Transmission Sketch



[37] A facility rating is the maximum or minimum voltage, current, frequency, or power flow through a facility that does not violate the applicable equipment rating of any equipment comprising the facility.
[38] A facility rating methodology is a procedure that is used to establish the facility ratings for all of a utilities facilities.
[39] From the Energize Eastside website: energizeeastside.com

The specific contingencies that cause facility rating violations on specific elements of the power system are CEII[40] and cannot be disclosed in a public document. However, the general types of contingencies that cause overloads on various facilities can be disclosed. Below is a list of the general types of contingencies that are causing overloads on the PSE eastside transmission system.

- Overlapping outages of two transformers (N-1-1) (P6),
- Overlapping outages of two transmission lines (N-1-1) (P6),
- Overlapping outages of one transmission line and one transformer (N-1-1) (P6), and
- Simultaneous outage of two transmission lines (N-2) (P7).

As discussed above, the NERC TPL-001-4 Reliability Standard requires that a Corrective Action Plan (CAP) be developed whenever the system does not meet the performance requirements specified in the standard. A CAP can include: new facilities such as transmission lines; adjustments to operating procedures (such as opening a switch at the end of a transmission line); or a combination of both new facilities and operating procedures.

7.4. Normal vs. Emergency Ratings

A "*normal rating"* is the limit at which a transmission facility can operate indefinitely (i.e., 24/7/365 for the life of the project, which in some cases could be over 50 years). An "*emergency rating"* is only available for use for a short period of time and using an emergency rating usually involves a loss of usable life for the facility. This loss of usable life is caused by the increased temperatures that the facility is subject to when loaded to its emergency limit. The higher temperatures can cause insulation in transformer banks to degrade or overhead conductors to weaken and/or sag. In some cases an emergency rating may have a lifetime limit on the number of hours it can be used (e.g., 100 hours). Once that lifetime limit is reached, a facility will not be able to exceed its normal rating or it may need to be replaced. An emergency rating cannot be used for normal overloads that might occur due to load growth or a sudden increase in load due to extreme weather. Given a typical lifetime limit of 100 hours, an emergency rating would only be good for a little over 4 days under normal (non-contingency) conditions. Therefore, an emergency rating can only be used under contingency (outage/equipment failure) conditions.

In addition to the differences between normal and emergency ratings, there are typically different ratings for summer and winter conditions. Because equipment ratings are based in part on thermal limits of the equipment (as noted above) and the ambient temperatures expected during winter are less than the ambient temperatures seen during summer, normal and emergency winter ratings are almost always higher than the respective normal and emergency ratings for summer.

PSE utilizes different normal and emergency facility ratings for summer and winter conditions, consistent with industry practice.

[40] CEII - Critical Energy Infrastructure Information CEII is protected information whose release could compromise the reliability of the BES. Each individual utility decides what information they deem to be CEII. The specific contingencies that cause overloads on the elements documented in the public Energize Eastside study reports are considered to be CEII by PSE. Other utilities also consider information such as this to be CEII.

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7.5. Transmission Reliability vs. Distribution Reliability

Transmission outages currently cause about 5% of the customer outage duration on PSE's system in the Energize Eastside area. The remaining 95% of the customer outage duration are caused by distribution outages (see Table 7.1) below[41]. As can be seen from Table 7.1, the City of Bellevue's transmission related customer outage performance is much better than the rest of the Energize Eastside area (less than 1% of the customer outage minutes were due to transmission outages).

Table 7.1: Transmission and Distribution Outage Data (from PSE)

2014 Total Outages					
Energize Eastside Area (includes City of Bellevue)					
	# of Outages	# of Customers Impacted	Total Customer Minutes	Customers Impacted Per Outage	Outage Minutes Per Customer Per Outage
Transmission outages	6	35,614	2,521,995	5936	11
All other outages	1182	120,074	47,481,181	102	0.33
Total outages for EE	1188	155,688	50,003,176		
Transmission outage percentage of total	0.5%	22.9%	5.0%		
City of Bellevue					
	# of Outages	# of Customers Impacted	Total Customer Minutes	Customers Impacted Per Outage	Outage Minutes Per Customer Per Outage
Transmission outages	3	18,939	224,327	6313	4
All other outages	745	61,963	29,964,379	83	0.65
Total outages for COB	748	80,902	30,188,706		
Transmission outage percentage of total	0.4%	23.4%	0.7%		

Table 7.1 also shows some additional pertinent information regarding the relative severity of transmission outages versus distribution outages. The number of customers affected by a transmission outage in this example is over 50 times greater than the number affected by a distribution outage. In addition, the outage duration per customer per outage is much longer for transmission outages than for distribution outages. This difference is one reason why transmission reliability is required to be so high. While the risk of an outage is low, the consequences of that outage can be quite large.

[41] This data from PSE indicates that the Energize Eastside area has fewer customer outage minutes due to transmission outages (as a fraction of the total outage minutes) than other utilities in the U.S.

The reason mentioned above is the same reason why the nuclear industry designs back-up systems for the reactor core cooling system with multiple layers of redundancy. Nuclear plants are typically designed with two sources of off-site (grid) power. If one source fails, the other can be used to supply the plant cooling load. In addition, just in case both off-site power sources are out, the plant has backup diesel generators that are capable of supplying the cooling system load. Just in case the primary diesel generators fail, there is a redundant set of diesel generators to step in if necessary. Then for additional protection, battery backup is provided in case the offsite grid power and both sets of diesel generators fail. The reason for this extreme level of redundancy is because even though the risk of a failure of four levels of cooling system power supply is incredibly small, the consequence of a failure is extremely large.

In addition to the Northeast blackout discussed above, two other major blackouts have occurred in the Western Interconnection in the last two decades. These two blackouts are discussed below.

On July 2, 1996 at 1424 MDT a disturbance occurred that ultimately resulted in the Western Systems Coordinating Council (WSCC) system (the Western Interconnection) separating into five unconnected load and generation subsystems. This disturbance resulted in the loss of 11,850 MW of load and affected 2 million people in the West. Customers were affected in Arizona, California, Colorado, Idaho, Montana, Nebraska, Nevada, New Mexico, Oregon, South Dakota, Texas, Utah, Washington, and Wyoming in the United States; Alberta and British Columbia in Canada; and Baja California Norte in Mexico. Outages lasted from a few minutes to several hours. Electric service was restored to most customers within 30 minutes, except on the Idaho Power Company (IPC) system, a portion of the Public Service Company of Colorado (PSC), and the Platte River Power Authority (PRPA) systems in Colorado, where some customers were out of service for up to six hours. On portions of the Sierra Pacific Power Company (SPP) system in northern Nevada, service restoration required up to three hours.

On August 10, 1996 a major disturbance occurred in the Western Interconnection (Western Systems Coordinating Council, WSCC) at 1548 PDT resulting in the Interconnection separating into four unconnected load and generation subsystems. Conditions prior to the disturbance were marked by high summer temperatures (near or above 100 degrees Fahrenheit) in most of the Region, by heavy exports (well within known limits) from the Pacific Northwest into California and from Canada into the Pacific Northwest, and by the loss of several 500 kV lines in Oregon. The California−Oregon Intertie (COI) (Pacific Northwest to California) north to south electricity flow was within parameters established by recent studies initiated as a result of the July 2-3, 1996 disturbance (see above). The flow on the AC system between the Pacific Northwest and California was about 4,350 MW and the flow on the Pacific DC Intertie (PDCI) (a DC system) was 2,848 MW. This disturbance resulted in the loss of over 28,000 MW of load and affected 7.5 million people in the West. Customers were affected in Arizona, California, Colorado, Idaho, Montana, Nebraska, Nevada, New Mexico, Oregon, South Dakota, Texas, Utah, Washington, and Wyoming in the United States; Alberta and British Columbia in Canada; and Baja California Norte in Mexico. Outages lasted from a few minutes to as long as nine hours.

Both of the above outages occurred prior to the implementation of mandatory Reliability Standards. The purpose of the mandatory Reliability Standards is to maintain the reliability of the BES and to help prevent major outages like these from

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happening again. As previously noted, even though the probability of outages like these is very small, the consequences of this type of outage are very large. Therefore, the Reliability Standards require the examination of contingencies that to a lay person seem to be highly unlikely.

In general, the probability of a single contingency (N-1) is at least once every three years. The probability of multiple contingencies such as N-1-1 or N-2 is somewhere between once every three years and once every 30 years. (See Section 8 and Appendix B for analysis of this subject.)

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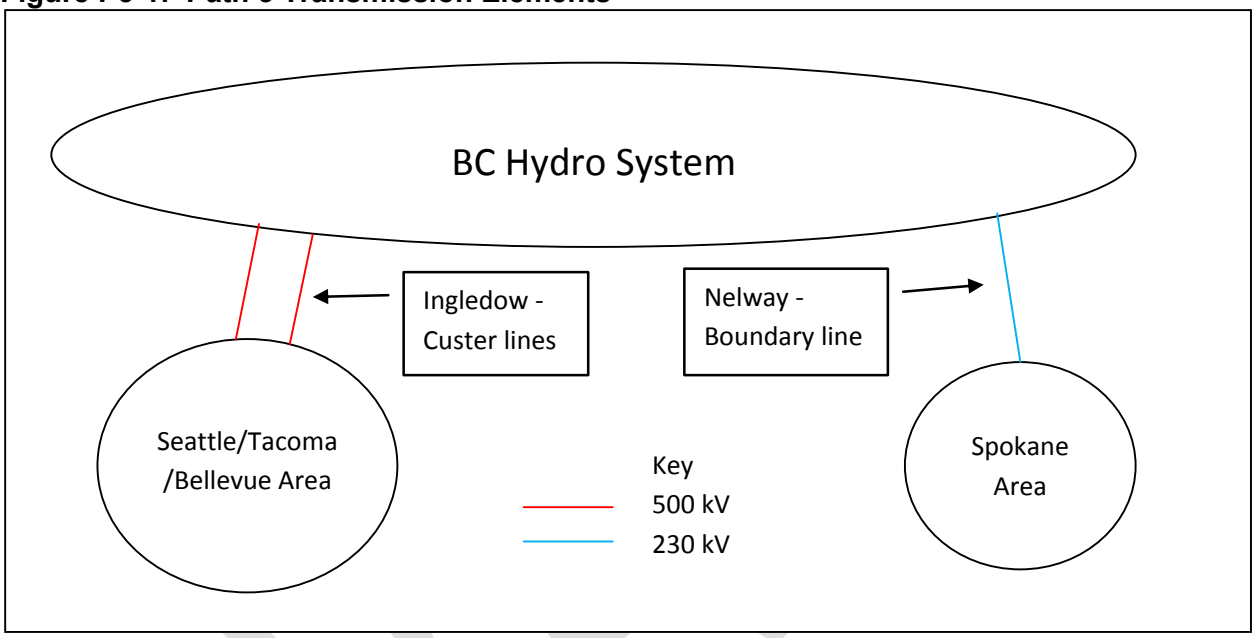
7.6. Path 3 Issues

Path 3 is the transmission interconnection between Washington and British Columbia. Path 3 consists of three transmission circuits (see Figure P3-1):

1. Ingledow - Custer 500 kV #1,
2. Ingledow - Custer 500 kV #2, and
3. Nelway - Boundary 230 kV #1.

Figure P3-1: Path 3 Transmission Elements



It should be noted when discussing Path 3 that sometimes the Nelway - Boundary 230 kV line is referred to as the Path 3 eastside intertie. This term should not be confused with eastside as it is used in the context of the Energize Eastside project. The Path 3 eastside intertie is located near Spokane, WA and is over 250 miles away from the area under consideration for the Energize Eastside project.

Path 3 has a non-simultaneous rating of 3150 MW north to south and 3000 MW south to north. Known commitments for Firm Transmission Service and Interchange on Path 3 are 2300 MW north to south and 1500 MW south to north.

The planning cases PSE used to study the need for the Energize Eastside project had Path 3 flow at 3150 MW north to south in the summer base cases and 1500 MW south to north in the winter base cases.

<u>Stakeholder Questions related to Standards and Reliability</u>

Q37. 2013 Needs Assessment report, page 43. The "3d" sensitivity, modeling 2021-2022 extreme Weather with 100% conservation. Explain why this scenario, which had 845 MW predicted Eastside load, showed no overload for N-0 yet 845 MW is above PSE's "current system capacity" line in their 2013 report. Clarify what PSE's capacity line represents.

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A *PSE's capacity line is the load level at which overloads will just begin to occur under contingency situations. Because the scenario being referred to in this question is "N-0" (or no contingency), there are no overloads. The reason for there being no overloads is that up to two additional pieces of equipment are in service to carry power to the load.*

Q38. Too much transmission reliability?

A *The requirement for transmission reliability is discussed in the section on NERC Reliability Standards. Because the Reliability Standards are mandatory, meeting these standards provides just adequate reliability.*

Q39. How are EE "need" and "reliability" related? How many outages in the next 10 years (2017-2027) are anticipated to be avoided by implementation of EE, due to transformer limitations or otherwise stressing system capacity due to local Eastside growth (excluding unpredictable weather events)?

A *EE need is related to reliability by the requirement that when overloads occur during a planning assessment under the contingencies that are required to be run (see the discussion of TPL-001-4 in the Independent Technical Analysis), there is by definition a need. This need is not necessarily EE, but something must be done to mitigate the overloads seen in the planning assessment. The question of how many outages may be avoided by implementation of EE is not relevant to the question of need. The Reliability Standards require that a defined set of contingencies be run on the system model. If overloads or other violations are found, then a Corrective Action Plan must be produced. The fact that a Corrective Action Plan is needed demonstrates that there is a need.*

Q40. What is the probability of an N-1-1?

A *The probability of an N-1-1 is not a factor that is considered in determining if there is a need for a project. However, typically the probability of an N-1-1 is between 0.33 and 0.033 outages per year or once in 3 years to once in 30 years.*

Q41. One of the rationales advanced by PSE for the new transmission lines was to increase the 'reliability' of PSE's transmission system and/or the reliability of PSE's "system" that supplies electricity to Bellevue and other east side communities.

A *Energize Eastside is a project designed to mitigate overloads found in planning studies that used projected future load growth. Therefore, a better way to look at EE is that it will maintain the current reliability that exists today and prevent it from getting worse.*

Q42. Task 8 of USE's 'scope of services' states that USE will develop a formal, written evaluation of the need for PSE's Energize Eastside (EE) project, including an assessment of the " … impacts to electrical system reliability …" Please describe (or provide in the report) a schematic/line-diagram of the "electrical system" that USE evaluated to assess the "reliability" of the "electrical system"; and describe the quantitative reliability measures/metrics that were used in performing the evaluation of the impact of PSE's EE project on the "electrical system" reliability.

A *The electrical system modeled was the entire Western Interconnection that extends from the Pacific Ocean on the west east to Colorado and from British Columbia and Alberta in the north south to Arizona and a portion of northern Mexico. The studies concentrated on the Puget Sound area, but included all facilities in the entire Western Interconnection. USE did not assess the impacts of PSE's EE project on electric system reliability. Our work scope was limited to investigating the need for EE. Therefore, we investigated the accuracy of PSE's latest load forecast (2014) and ran studies using the system model without EE in it to see if problems occurred that would require a project like EE to solve. In performing this*

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investigation, we addressed the impacts of PSE's assumptions regarding load growth and regional transfers on the system without EE to determine if there was a need for a project like EE. The Optional Technical Assessment (OTA) (Appendix B) looked at the sensitivity of modified assumptions regarding load growth, westside generation levels, and regional transfers on the need for a project like EE. Determining the preferred project to mitigate the problems found in the studies of the system without EE is one of the purposes of the EIS process, but this determination is beyond the scope of the ITA and the OTA.

Q43. Why is an N-1-1 outage scenario (rare) used to determine need?

A *Because N-1-1 contingencies must be simulated in the planning assessments required by the mandatory NERC TPL-001-4 Reliability Standard.*

Q44. Questions about reliability, outages, contingency analysis.

A *As noted in responses to other questions, probability of an outage is not considered in determining need using the NERC TPL-001-4 Reliability Standard. When performing a planning assessment all outages need to be simulated and if there are any overloads or other violations, then a Corrective Action Plan must be developed. What is included in this Corrective Action Plan will vary depending on the type of outage and what sort of mitigation is allowed for that outage in the TPL-001-4 Reliability Standard. However, need is established as soon as a Corrective Action Plan needs to be developed.*

Q45. We ask the consultant to forecast how many outages in the next five years (2016 – 2020) would be avoided by implementation of Energize Eastside.

A *Please see the responses above.*

Q46. Is it true that PSE's "Eastside Customer Demand Forecast" graph is based on a hypothetical "grid-flow modelling scenario" in which a rare winter peak electricity demand event occurs on the Eastside at exactly the same time that there are two major and simultaneous equipment outages on nearby transmission lines?

A *The demand forecast is independent of any equipment outages. The current system capacity line is determined by studies of system performance under multiple contingency scenarios with models that incorporated forecasted peak load. These studies are required to be run in this manner by the Requirements in the NERC TPL-001-4 Reliability Standard.*

Q47. Are PSE's conclusions reasonable?

A *See the conclusions section of the Independent Technical Analysis and the Executive Summary of the OTA (Appendix B).*

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8. Assessment of PSE's Identified Drivers for the Eastside Project (PSE's Results)

This section addresses PSE's findings based on their new 2014 normal winter forecast, with 100% conservation.

Table 8.1 shows the new forecasted loads for Eastside that were utilized in the powerflow cases; three normal winter and three normal summer cases were studied by PSE. The winter forecasts between 2017/18 and 2023/24 show Eastside growing, while King County otherwise declines. The ITA confirmed that the load values in Table 1 matched the new forecast and were modeled[42] in the cases.

Table 8.1: PSE's King County and Eastside Forecasted Loads in Studied Years

Forecast Development Year	King County (excluding Eastside)	Eastside
Normal Winter		
2017/18	1881	688
2019/20	1867	708
2023/24	1817	764
Normal Summer		
2018	1379	538
2020	1385	561
2024	1399	618

The ITA also confirmed the Northern Intertie (Path 3) transfers matched PSE's modeling plan (Table 8.2), and that PSE's winter generation dispatch scenario of "no PSE and SCL generation west of the Cascades" was modeled in the winter cases, as per Table 4.4 in the October 2013 Eastside Needs Assessment Report.

Table 8.2: Northern Intertie Flows

Northern Intertie	Flow Direction
Normal Winter	
3150 MW	South to North
Normal Summer	
1500 MW	North to South

Source: PSE. Verified by ITA.

Tables 8.3 and 8.4 list the overloaded elements that PSE identified based on the new 2014 forecast. The ITA confirmed these overloaded elements drive the need for an Eastside project by simulating the contingencies (outages) in the powerflow cases provided by PSE.

[42] The aggregate Eastside load matched the numbers in Table 8.1.

Table 8.3: PSE Projected Normal Winter, 100% Conservation – Overloaded Elements

South to North Flow	Type of Contingency and Season								
	2017/18 Winter (23°F) 100% Conservation			2019/20 Winter (23°F) 100% Conservation			2023/24 Winter (23°F) 100% Conservation		
Transmission Line or Transformer	N-1	N-1-1	N-2	N-1	N-1-1	N-2	N-1	N-1-1	N-2
Talbot Hill - Lakeside #1 115 kV line		OL			OL			OL	
Talbot Hill - Lakeside #2 115 kV line		OL			OL			OL	
Talbot Hill 230-115 kV transformer #1		OL			OL			OL	
Talbot Hill 230-115 kV transformer #2		OL			OL			OL	
Talbot Hill-Boeing Renton-Shuffleton 115 kV line		OL			OL			OL	

OL= Overload of Emergency Rating. Source: PSE Results. ITA verified overloaded elements driving project need.

Table 8.4: PSE Projected Normal Summer, 100% Conservation - Overloaded Elements

North to South Flow	Type of Contingency and Season								
	2018 Summer (86°F) 100% Conservation			2020 Summer (86° F) 100% Conservation			2024 Summer (86° F) 100% Conservation		
Transmission Line or Transformer	N-1	N-1-1	N-2	N-1	N-1-1	N-2	N-1	N-1-1	N-2
Sammamish 230/115 kV Xfmr[43] #1		OL			OL			OL	
Sammamish 230/115 kV Xfmr #2		OL			OL			OL	
Novelty Hill 230/115 kV Xfmr #2		OL			OL			OL	
BPA Monroe – Novelty Hill 230 kV	OL		OL	OL		OL	OL		OL
Beverly Park - Cottage Brook 115 kV line		OL			OL			OL	
Sammamish – BPA Maple Valley 230 kV line				OL			OL		

OL= Overload of Emergency Rating. Source: PSE Results. ITA verified overloaded elements driving project need.

Figure 8.1 utilizes the 2014 load forecast and was supplied by PSE. Two system capacity lines for the Eastside area reflect where the powerflow results indicated violations of the mandatory performance requirements that put customer's reliability at risk. The powerflow results show a range of need for the Eastside area between 688 MW in winter 2017/18 and 708 MW in winter 2019/20. These levels were chosen by PSE because at 688 MW system elements are overloaded, and by 708 MW they are not only overloaded but 63,200 customers are at risk of losing power, which is a more severe situation. Further detail is noted below.

- In winter 2017/18 system elements would be overloaded requiring Corrective Action Plans (CAPs) for the Category C overloads. Zero customers are at risk of losing power by the CAPs[44].

[43] Xfmr = Transformer

[44] CAPs are implemented to protect system equipment from overload and resulting loss of equipment life or damage. CAPs can result in the forced reduction of load (intentionally causing customer outages) to bring

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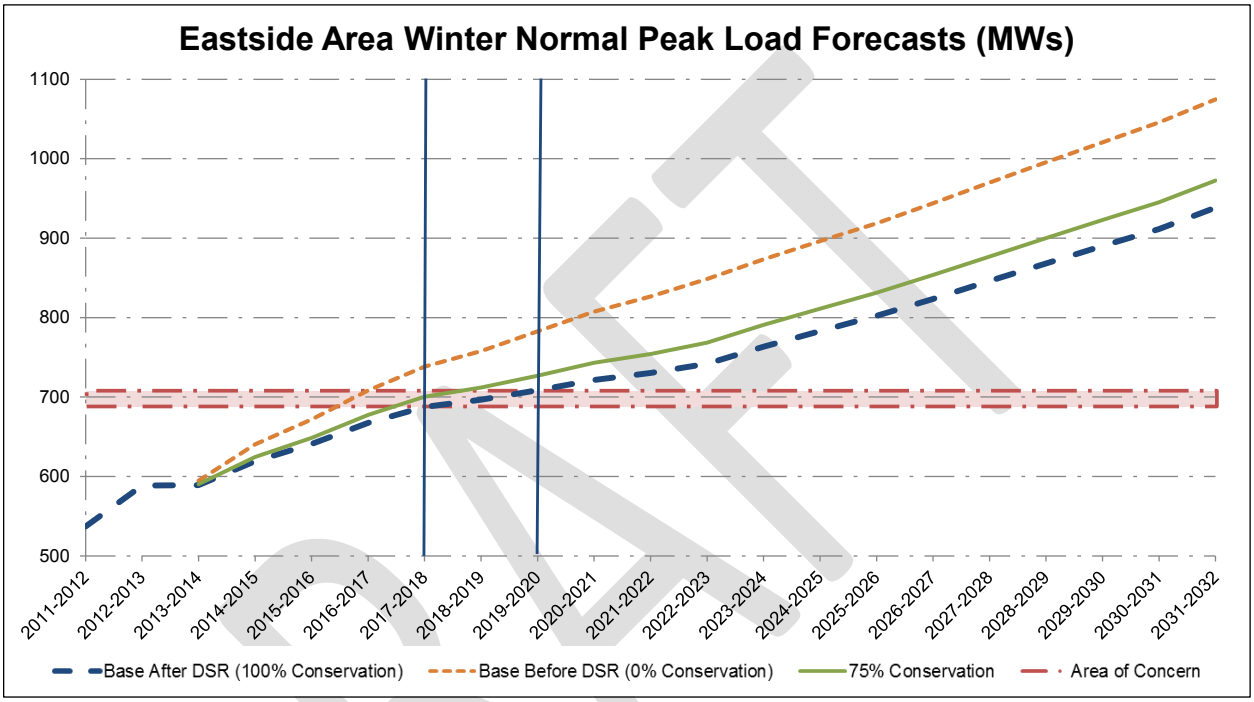
- By winter 2019/20, the CAPs radialize[45] existing loop service such that approximately 63,200 customers are at risk of losing power.
- By winter 2023/24, 16,800 customers are at risk from load shedding (intentional outage to customers to protect the system equipment), with another 52,000 customers at risk of losing power.

Figure 8.1: PSE's Graph of System Capacity, 2014 Forecast, 100% Conservation



In sum, PSE's need date for the Energize Eastside project remains as winter 2017/18. The following issues were identified by PSE and forecast levels and overloads were confirmed by the ITA:

- Transmission system elements will be over their capacity, and will require the use of CAPS to mitigate transmission overloads.
- Although the CAPS do not drop customer load in winter 2017/18, by winter 2019/20 approximately 63,200 customers are at risk of losing power. Intentionally dropping firm load for an N-1-1 or N-2 contingency to meet its federal planning requirements is not a practice that PSE endorses. This view is not unique amongst utilities. The CAISO Planning Standards states that "Increased reliance on load shedding … would run counter to historical and current practices, resulting in general deterioration of service levels."
- The forecast uses a 1 in 2 year weather forecast. Colder weather will result in higher load levels in winter 2017/18.
- 100% conservation may not be achieved which would result in a higher load level in winter 2017/18. Even if 100% conservation is achieved, it may not be in the appropriate locations and correct magnitudes.

the equipment loading below the emergency rating. This would only be used as a stopgap measure until system reinforcements (new equipment, etc.) are completed. CAPs as used here is a subset of CAPs defined in the NERC Reliability Standards. See Section 7 on Standards.

[45] Radialize: Convert from loop service to radial service (only one source).

- By the summer of 2018, studies show that customers will be at risk of outages and load shedding using CAPS to mitigate transmission overloads.

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9. Regional Issues related to EE

Note: All ColumbiaGrid regional documentation of Energize Eastside refers to the project by its terminals: Sammamish-Lakeside-Talbot. The following text refers to Energize Eastside as the Project.

Background

ColumbiaGrid is a regional transmission planning organization with a footprint encompassing Oregon, Washington, parts of Idaho and Montana. A planning team was formed with all Puget Sound area transmission owners and operators as planning participants within a year after the creation of ColumbiaGrid in 2007 to address the beginning curtailments of firm service in the Puget Sound area. Since 1997 and prior to the formation of this team, BPA had been planning to address these needs with a major 500kV line project from Monroe to Echo Lake, but construction had not started. The study team was able to identify a collection of projects to achieve the planning objectives with a cumulative scope less than the 500kV project.

The ColumbiaGrid Puget Sound Area transmission planning activity created 150 document postings on the team website that provide a detailed history of the work that led up to the regional plan. Of the 150 postings, three postings provide the information sufficient to describe the Project's role in regional objectives. The three postings are final reports and are all publicly available. These documents are:

- Transmission Expansion Plan for the Puget Sound Area (October 20,2010)
- Updated Recommended Transmission Expansion Plan for the Puget Sound Area to Support Winter South-to-North Transfers (October 28, 2011)
- Updated Transmission Expansion Plan for the Puget Sound Area to Support Summer North-to-South Transfers (February 21, 2013)

Project Specific Information

The following Project specific regional information was obtained from the above documentation.

1. Either the Project or reconductoring BPA's and SCL's Maple Valley-SnoKing 230kV lines is needed, but not both.
2. The Project or rebuilding SCL's Bothell-SnoKing 230kV lines is needed, but not both. The Bothell-SnoKing lines still need to be reconductored with the Project, but rebuilding is avoided.
3. If the Project voltage level is 115kV, the Project does not achieve the regional objectives. With that scenario, the regional objectives will be achieved by reconductoring the Maple Valley-SnoKing 230kV lines and the Bothell-SnoKing 230kV lines will need to be rebuilt.
4. The Project at 230kV is identified as the preferred alternative because of its dual purpose for regional objectives and local load service. If the Maple Valley-SnoKing 230kV lines had been reconductored prior to development of the Project, there would have been unnecessary redundancy developed in the transmission infrastructure, assuming that the Project voltage level needed to be 230kV.

ColumbiaGrid determined that the Energize Eastside project at 230 kV is the preferred alternative of all the options studied because of its dual purpose for regional objectives and local load service.

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Stakeholder Questions related to Regional vs. Local Need

Q49. What is the connection between the need for EE and Columbia Grid (CG) technical objectives?

A *The CG technical objective is to identify effects of multiple systems that prevent fulfillment of firm transmission commitments. Mitigating transmission effects that do not involve multiple systems is not within the CG mandate. After the effects are identified, the multiple system owners are convened as a team facilitated by CG to identify mitigating alternatives and select the preferred alternative. The proposed 230kV scope of EE is identified by the CG facilitated team as a preferred alternative to reconductoring SCL's Maple Valley-SnoKing 230kV lines. EE at 230kV also changes the SCL scope of rebuilding the Bothell-SnoKing 230kV lines to reconductoring these lines.*

Q50. How are the technical needs of Columbia Grid prioritized and what criteria are used for evaluation and prioritization?

A *CG performs system assessments to determine forecasted transmission constraints to serving firm transmission commitments. A constraint that affects more than one member is the criteria for creating a study team, facilitated by CG, composed of the affected members. The study team mandate is to determine the mitigating alternatives and select the preferred alternative. Each study team determines their own evaluation and prioritization criteria. In the Puget Sound Area Study Team (PSAST), the criteria is a qualitative combination of cost and a planning metric (i.e. Transmission Curtailment Risk Measure or TCRM).*

Q51. Who has regulatory oversight of Columbia Grid?

A *There is no government regulatory oversight of CG. The oversight is by CG members, who have their own government regulatory oversight at state and federal levels. CG has no construction authority. The only CG authority is determining cost allocation, but this authority is only used if members do not agree on the cost allocation for a project they agree to implement.*

Q52. Is EE an "OPEN ACCESS" project?

A *No. An "Open Access" project provides new requested transmission service. This project provides service for existing firm obligations. (The longer answer is as follows: This answer assumes that "Open Access" refers to a transmission service request under a transmission provider's Open Access Transmission Tariff (OATT). These transmission service requests are for new transmission service that involve study requirements, facility addition determinations, and FERC pricing policies. Since EE is for load growth that falls under existing transmission service, it isn't "open access" because it is not new transmission service. .*

Q53. How are the merits of each need evaluated independently and which need takes priority?

A *The CG PSAST team evaluated the regional, multi-system needs for bulk power transfers independent of local load service needs. The local load service need is evaluated by the single systems. If a single system project (e.g. EE at 230kV) affects multi-system power transfer needs, then it is included in the multi-system evaluation. Firm commitments, regardless of bulk power transfers or local load service, are equal priority to be addressed and issues mitigated.*

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Q54. Please describe how the need for EE and Power Wheeling are connected. What are PSE's power wheeling objectives for EE, and how much of the EE need is based on the ability to participate in additional power wheeling?

- A *Wheeling is the transportation of electric power over transmission lines by an entity that does not own or directly use the power it is transmitting.*
- A *(from PSE's Energize Eastside website, based on 2012 forecast) "PSE makes no profit on wheeling power. All revenue obtained from wheeling contracts is passed directly back to our customers in the form of lower rates. PSE does have contracts to wheel power across the region; those contracts bring in revenue of roughly $28 million a year. One hundred percent of this revenue is returned to our customers in the form of a rate reduction. As we stated in our presentation, 92-97% of the power flows on the Energize Eastside line will deliver electricity to local Eastside customers. The power flow studies show that the power used for regional purposes on the Energize Eastside project is 3 to 8% - not 38% (as was incorrectly stated at the meeting). This is the natural consequence of connecting a transmission line into an interconnected system."* June, 2014 http://energizeeastside.com/Media/Default/CAG/Meeting3/2014_0609_CAGLetter_SCL.pdf

Q55. Is any of the capacity of the planned EE 230 kV line, or the existing 115 kV lines between Sammamish and Talbot Hill, allocated for transmission contracts to BC Hydro or CA? If so, what %? What are PSE's power wheeling objectives for Energize Eastside? Does existing or planned/potential wheeling affect the Project capacity?

- A *No/None. PSE makes no profit from wheeling contracts. See Q56.*
- A *Per PSE, Project capacity is not affected by existing or planned/potential wheeling.*

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10. Conclusion

The independent technical analysis (ITA) determined that PSE used reasonable methods to develop the 2014 forecast by following industry practice (See section 6.6.). The ITA reviewed PSE's powerflow cases and verified PSE's modeling of the updated load forecast, the Northern Intertie transfers, and the identified winter generation dispatch.

The ITA verified the following key result:
Although the new 2014 forecast resulted in an 11 MW decrease in the Eastside area's 2017/18 winter forecast, the reduced loading still resulted in overloaded transmission elements that drive the project need to address Eastside system reliability issues.

Although the CAP required in the 2017/18 winter to avoid facility overload doesn't drop load, by winter 2019/20 approximately 63,200 customers are at risk of losing power. In addition, by summer 2018, studies show that customers will be at risk of outages and load shedding due to CAPs used to mitigate transmission overloads. One might argue to delay the Energize Eastside project six months until summer 2018 when PSE studies show that customers will be at risk of outages and load shedding. However, balancing a six month delay in a complex and multi-year EIS process, which can have its own delays, against the risk of an adverse winter or less realized conservation (which could increase 2017/18 winter loading to a point where customers are at risk of load shedding) suggests it is reasonable to maintain the schedule for the existing project in-service date.

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Appendix A – Glossary

AC	Alternating Current
aMW	aMW - The average number of megawatt-hours (MWh) over a specified time period; for example, 295,650 MWh generated over the course of one year equals 810 aMW (295,650/8,760 hours). (Source: PSE's 2013 IRP Definitions)
Balancing Authority (BA)	Balancing Authority (BA) -- an entity that manages generation, transmission, and load; it maintains load-interchange-generation balance within a geographic or electrically interconnected Balancing Authority area, and it supports frequency in real time. The responsibility of the PSE Balancing Authority is to maintain frequency on its system and support frequency on the greater interconnection. To accomplish this, the PSE BA must balance load with generation on the system at all times. When load is greater than generation, a negative frequency error occurs. When generation is greater than load, a positive frequency error occurs. Small positive or negative frequency deviations are acceptable and occur commonly during the course of normal operations, but moderate to high deviations require corrective action by the BA. Large frequency deviations can severely damage electrical generating equipment and ultimately result in large-scale cascading power outages. Therefore, the primary responsibility of the BA is to do everything it can to maintain frequency so that load will be served reliably. (Source: PSE 2013 IRP)
BES	BES - Bulk Electric System - Unless modified by the inclusion and exclusion lists in the full definition that is available in the NERC Glossary of Terms (http://www.nerc.com/files/glossary_of_terms.pdf), all Transmission Elements operated at 100 kV or higher and resources connected at 100 kV or higher. The BES does not include facilities used in the local distribution of electric energy. (Source: NERC Glossary of Terms)
BPS	BPS - Bulk Power System - A) facilities and control systems necessary for operating an interconnected electric energy transmission network (or any portion thereof); and (B) electric energy from generation facilities needed to maintain transmission system reliability. The term does not include facilities used in the local distribution of electric energy. (Source: NERC Glossary of Terms)
CAP	CAP - Corrective Action Plan - A list of actions and an associated timetable for implementation to remedy a specific problem. (Source: NERC Glossary of Terms)
COI	COI - California–Oregon Intertie - The three 500 kV AC electric transmission lines between southern Oregon and northern California.
CPI	Consumer Price Index (CPI) – A measure that examines the weighted average of prices of a basket of consumer goods and services, such as transportation, food and medical care. The CPI is calculated by taking price changes for each item in the predetermined basket of goods and averaging them; the goods are weighted according to their importance. (Source: Investopedia)
Critical Energy Infrastructure Information (CEII)	Critical Energy Infrastructure Information (CEII) Regulations –- Established by the Federal Energy Regulatory Commission (FERC). "CEII is specific engineering, vulnerability, or detailed design information about proposed or existing critical infrastructure (physical or virtual) that: Relates details about the production, generation, transmission, or distribution of energy; Could be useful to a person planning an attack on critical infrastructure; Is

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	exempt from mandatory disclosure under the Freedom of Information Act; and Gives strategic information beyond the location of the critical infrastructure." (Source: FERC)
DC	Direct Current
Demand (Utility)	Demand (Utility) – The level at which electricity or natural gas is delivered to users at a given point in time. Electric demand is expressed in kilowatts. (Source: CEC Glossary)
Demand-Side Resources (DSR)	Demand-Side Resources (DSR) - Resources that reduce the demand. (As opposed to Supply-Side Resources)
Demographic	Demographics - Studies of a population based on factors such as age, race, sex, economic status, level of education, income level and employment, among others. Demographics are used by governments, corporations and non-government organizations to learn more about a population's characteristics for many purposes, including policy development and economic market research. (Source: Investopedia.com)
Direct Control Load Management (DCLM)	Direct Control Load Management (DCLM) - Demand-Side Management that is under the direct control of the system operator. DCLM may control the electric supply to individual appliances or equipment on customer premises. DCLM as defined here does not include Interruptible Demand. (Source: NERC Glossary)
Distribution System	Distribution System - An electric power distribution system is the final stage in the delivery of electric power; it carries electricity from the transmission system to individual consumers. (Source: Wikipedia)
Econometric Data	Econometric Data – Data sets to which econometric analyses are applied.
Econometrics	Econometrics – The application of mathematics and statistical methods to economics. Econometrics tests hypotheses and forecasts future trends by applying statistical and mathematical theories to economics. It's concerned with setting up mathematical models and testing the validity of economic relationships to measure the strengths of various influences.
EPAct 2005	EPAct 2005 – The federal Energy Policy Act of 2005
ERO	ERO - Electric Reliability Organization
Firm Transmission Service	Firm Transmission Service – 1) Transmission service available at all times during a period covered by an agreement. 2) The highest quality (priority) service offered to customers under a filed rate schedule that anticipates no planned interruption. (Source: NERC)
GO	GO - Generator Owner
Interruptible Load or Interruptible Demand	Interruptible Load or Interruptible Demand - Demand that the end-use customer makes available to its Load-Serving Entity via contract or agreement for curtailment. (Source: NERC Glossary)
IRP	Integrated Resource Plan - A comprehensive and long-range road map for meeting the utility's objective of providing reliable and least-cost electric service to its customers while addressing applicable environmental, conservation and renewable energy requirements. A process used by utility companies to determine the mix of Supply-Side Resources and Demand-Side Resources that will meet electricity demand at the lowest cost. The IRP is often developed with input from various stakeholder groups. Also Integrated Resource Planning.

Levelized Cost	Levelized Cost - An economic assessment of the cost to build and operate a power-generating asset over its lifetime divided by the total power output of the asset over that lifetime. It is also used to compare different methods of electricity generation in cost terms on a comparable basis.
MW	MW - Megawatt - A unit of power equal to one million watts or one thousand kilowatts.
N-1	N-1 - Loss of a single element such as a generator, a transmission line, or a transformer (P2)
N-2	N-2 - Simultaneous loss of two elements due to a single event. For example, loss of two transmission lines on a common tower due to failure of the tower (P6)
N-1-1	N-1-1 - Loss of a single element such as a generator, a transmission line, or a transformer followed by a system readjustment such as generation redispatch, then loss of a second element such as a generator, a transmission line, or a transformer (P7)
Native load	Native load – 1. The cumulative load (power requirement) of a utility's retail customer base. 2. The end-use customers that the Load-Serving Entity is obligated to serve. (NERC Glossary) http://www.energy.ca.gov/glossary/glossary-d.html
NAICS	NAICS - The North American Industry Classification System (NAICS) is the standard used by Federal statistical agencies in classifying business establishments for the purpose of collecting, analyzing, and publishing statistical data related to the U.S. business economy (Source: Census.gov)
NERC	NERC - North American Electric Reliability Corporation
Northern Intertie	Northern Intertie - transmission interconnection between Washington and British Columbia (Also called Path 3.)
Off-system sales	Off-system sales – Sales by a utility to a customer outside of its current traditional market.
PC	PC - Planning Coordinator
PDCI	PDCI - Pacific Direct Current Intertie
PJM	PJM – PJM Interconnection is a regional transmission organization (RTO) that coordinates the movement of wholesale electricity in all or parts of Delaware, Illinois, Indiana, Kentucky, Maryland, Michigan, New Jersey, North Carolina, Ohio, Pennsylvania, Tennessee, Virginia, West Virginia and the District of Columbia.
Personal Consumption Expenditure Deflator (PCE Deflator)	Personal Consumption Expenditure Deflator (PCE Deflator) - Measures the average change over time in the price paid for all consumer purchases, thus measures changes in the cost of living. (Source: Investopedia)
Powerflow	Powerflow - a numerical analysis of the flow of electric power in an interconnected system. It can refer to the analysis program, or to a simulation
RE	RE - Regional Entity.
Regression Analysis	Regression analysis is a statistical process for estimating the relationships among variables. It seeks to determine the strength of the relationship between one dependent variable (usually denoted by Y) and a series of other changing variables (known as independent variables). It is also known also as curve fitting or line fitting because a regression analysis equation can be used in fitting a curve or line to data points. It includes many techniques for modeling and analyzing variables.

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Renewable energy credits (RECs)	Renewable energy credits (RECs) - A REC represents the property rights to the non-power qualities of renewable electricity generation, such as environmental and social qualities. A REC, and its associated attributes and benefits, can be sold separately from the underlying physical electricity associated with a renewable-based generation source. At the point of generation, both product components can be sold together or separately, as a bundled or unbundled product. (Source: US EPA)
Renewable Portfolio Standard (RPS)	Renewable Portfolio Standard (RPS) − A regulatory mandate to increase production of energy from renewable sources such as wind, solar, biomass and other alternatives to fossil and nuclear electric generation. It's also known as a renewable electricity standard. (Source: National Renewable Energy Laboratory - NREL)
Substation	Substation − Substations transform voltage from high to low or from low to high. They also perform other functions, such as limiting outages, protecting equipment, et cetera.
Supply-Side Resources	Supply-Side Resources − Conventional generation plants, renewable generation, etc. (as opposed to Demand-Side Resources).
TO	TO - Transmission Owner
TP	TP - Transmission Planner
Weather Normalizing	Weather normalization is a process that adjusts actual energy or peak outcomes to what would have happened under normal weather conditions. Normal weather conditions are expected on a 50 percent probability basis, also known as a 50/50 forecast (i.e., there is a 50 percent probability that the actual peak realized will be either under or over the projected peak).
WECC	WECC - Western Electricity Coordinating Council. WECC has been approved by the Federal Energy Regulatory Commission (FERC) as the Regional Entity for the Western Interconnection. The North American Electric Reliability Corporation (NERC) delegated some of its authority to create, monitor, and enforce reliability standards to WECC through a Delegation Agreement.
Western Interconnection	Western Interconnection - North America is comprised of two major and three minor alternating current (AC) power grids, also called "interconnections." The Western Interconnection stretches from the Pacific Ocean eastward over the Rockies to the Great Plains, and from Baja California, Mexico in the South into Western Canada. (Source: Energy.gov)
Wheeling	Wheeling -- The transmission of electricity by an entity that does not own or directly use the power it is transmitting. Wholesale wheeling is used to indicate bulk transactions in the wholesale market, whereas retail wheeling allows power producers direct access to retail customers. This term is often used colloquially as meaning transmission.
WSCC	WSCC - Western Systems Coordinating Council. The predecessor to WECC.

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Appendix B – Optional Technical Analysis

Executive Summary

Utility System Efficiencies, Inc. (USE) was engaged by the City of Bellevue in February, 2014 to conduct an Optional Technical Analysis (OTA) of the purpose, need, and timing of the Energize Eastside project. Energize Eastside (EE) is Puget Sound Energy's (PSE's) proposed project to build a new electric substation and new higher–capacity (230 kilovolt) electric transmission lines in the East King County area, which encompasses Bellevue, Clyde Hill, Medina, Mercer Island, Newcastle, the towns of Yarrow Point, Hunts Point, and Beaux Arts, and portions of Kirkland, Redmond, and Renton (the Eastside). The transmission lines would extend from an existing substation in Redmond to one in Renton (See Figure 3.1).

The scope of the OTA was to perform an analysis on PSE's study cases to determine the impact of potential forecast variability on the timing of improvements, and was later expanded to evaluate whether regional requirements rather than local requirements might be driving the project need. The OTA examined several hypothetical scenarios by conducting analysis on PSE's study cases. It looked at the effect of a) reducing load growth in the *Eastside* area to 1.5%, b) reducing load growth in *PSE's portion of King County* to 0.25% while keeping the Eastside growth the same, c) increasing power output of existing Puget Sound area generation, and d) reducing the Northern Intertie[46] flow to zero (no transfers to Canada). Although d) is not actually possible due to extant treaties, it was modeled to examine if regional requirements might be driving the need. In the winter cases, the OTA also combined scenarios c) and d). Finally, the OTA looked at the impact of an Extreme Winter forecast.

IF THE LOAD GROWTH RATE WAS REDUCED, WOULD THE PROJECT STILL BE NEEDED? YES

The OTA results showed that reducing the Eastside average load growth from an average of 2.4%/year to an average of 1.5%/year from winter 2013/14 to winter 2017/18 did not eliminate any overloaded elements; there is still project need. Similarly, reducing PSE's *King County growth rate* (less Eastside) from an average of 0.5 %/year to an average of 0.25%/year from winter 2013/14 to winter 2017/18 did not eliminate any overloaded elements; there is still project need.

IF GENERATION WAS INCREASED IN THE PUGET SOUND AREA, WOULD THE PROJECT STILL BE NEEDED? YES

Results showed that increasing the power output of existing Puget Sound area generation to the levels specified in ColumbiaGrid's July 2010 "Puget Sound Area Generation Modeling Guideline" eliminated one of five overloads in the 2017/18 normal winter, but did not eliminate project need. (This study increased the amount of PSE and SCL generation west of the Cascades from zero to the level identified in the above document. Since the document is confidential (CEII) the generation output is not provided in this report.)

[46] Northern Intertie - transmission interconnection between Washington and British Columbia (Also called Path 3.)

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IS THERE A NEED FOR THE PROJECT TO ADDRESS REGIONAL FLOWS, WITH IMPORTS/EXPORTS TO CANADA (COLUMBIAGRID[47])? Modeling zero flow to Canada, the project is still necessary to address local need.

The Optional Technical Analysis examined this issue by analyzing a reduction in the Northern Intertie flow to zero (no transfers to Canada). Although this scenario is not actually possible due to extant treaties, it was modeled to provide data on the drivers for the EE project, to examine if regional requirements might be driving the need. The results showed that in winter 2017/18, even with the Northern Intertie adjusted to zero flow, the Talbot Hill 230/115 kV transformer #2 is still overloaded by several contingencies. This indicates there is a project need at the local level.

The OTA results showed that all studied scenarios resulted in at least one equipment overload in normal winter 2017/18 with 100% conservation, indicating project need.

Analysis and Findings

The OTA studied five normal winter scenarios and three extreme winter scenarios for winter 2017/18 and winter 2019/20. The OTA also studied five normal summer scenarios for 2018 and 2020. The scenarios were modeled in the powerflow cases. Details on the modeling are not provided due to Critical Energy Infrastructure Information (CEII) restrictions.

Table B.1 lists the overloaded elements for winter 2017/18 for each studied scenario. The scenarios are listed in the second blue row in Table B.1 (the vertically oriented text). The normal winter scenarios are numbered 1-6 (with #1 representing the original PSE case). The extreme weather scenarios are numbered E1-E3.

Normal winter results showed:

- Reducing the Eastside average load growth to 1.5% did not eliminate any overloaded elements; there is still project need.
- Reducing PSE's King County growth rate (less Eastside) to 0.25% did not eliminate any overloaded elements; there is still project need.
- Increasing the power output of existing Puget Sound area generation to the levels specified in ColumbiaGrid's July 2010 "Puget Sound Area Generation Modeling Guideline"[48] eliminated one of five overloads, but did not eliminate project need.
- Reducing the Northern Intertie flow to zero (no transfers to Canada) eliminated all but one overload; there is still local project need.
- Reducing the Northern Intertie flow to zero (no transfers to Canada) AND Increasing the Puget Sound area generation to ColumbiaGrid's July 2010 "Puget Sound Area Generation Modeling Guideline" eliminated all but one overload; there is still project need.

Extreme winter results increased the overload levels and/or caused overloads on additional elements. Although the normal winter results showed only one overload when the Northern Intertie flow was reduced to zero, the extreme winter case showed four overloads.

[47] ColumbiaGrid (single word) is a regional transmission planning organization with a footprint encompassing Oregon, Washington, parts of Idaho and Montana.
[48] Confidential (CEII) document that provides modeling values (MW levels of generation) for applicable generators.

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Table B.1: Winter 2017/18, 100% Conservation - Overloaded Elements

Northern Intertie: South to North Overloaded Element (Transmission Line or Transformer)	2017/18 Normal Winter 100% Conservation						2017/18 Extreme Winter, 100% Cons.		
	1) Original PSE Case	2) Reduce Eastside load growth to 1.5%	3) Reduce PSE's King County growth to 0.25%[49]	4) Increase Puget Sound area generation	5) Set Load transfers to Canada = 0 (North. Intertie = 0)	6) Combination of Scenario 4 and & 5	E1) Original PSE Case adjusted for extreme weather	E2) Set Load transfers to Canada = 0 (North. Intertie = 0)	E3) Scenario E2 + Increase Puget Sound area generation
Talbot Hill - Lakeside #1 115 kV line	OL	OL	OL	OL			OL		
Talbot Hill - Lakeside #2 115 kV line	OL	OL	OL	OL			OL		
Talbot Hill 230-115 kV transformer #1	OL	OL	OL	OL			OL	OL	OL
Talbot Hill 230-115 kV transformer #2	OL	OL	OL	OL	OL	OL	OL	OL	OL
Talbot Hill-Boeing Renton-Shuffleton 115 kV line	OL	OL	OL				OL		
Sammamish 230/115 kV transformer #1								OL	OL
Sammamish 230/115 kV transformer #2								OL	OL

OL = Overload of Emergency Rating. Source: OTA Results

Table B.2 lists the overloaded elements for winter 2019/20 for each studied scenario. The scenarios are listed in the second blue row (the vertically oriented text).

The 2019/20 winter results showed the same overloaded elements as 2017/18. The overloads in the base cases and in the load reduction cases were more severe in 2019/20. The overload levels in the generation dispatch and Northern Intertie=0 scenarios were mixed; some overloads were more severe in 2019/20, but some were slightly less. Nevertheless, project need was shown in all cases. Extreme winter results increased the overload levels over normal winter and/or caused overloads on additional elements.

Table B.2: Winter 2019/20, 100% Conservation - Overloaded Elements

Northern Intertie: South to North Overloaded Element (Transmission Line or Transformer)	2019/20 Normal Winter 100% Conservation						2019/20 Extreme Winter, 100% Cons.		
	1) Original PSE Case	2) Reduce Eastside load growth to 1.5%	3) Reduce PSE's King County growth to 0.25%[50]	4) Increase Puget Sound area generation	5) Set Load transfers to Canada = 0 (North. Intertie = 0)	6) Combination of Scenario 4 and & 5	E1) Original PSE Case adjusted for extreme weather	E2) Set Load transfers to Canada = 0 (North. Intertie = 0)	E3) Scenario E2 + Increase Puget Sound area generation
Talbot Hill - Lakeside #1 115 kV line	OL	OL	OL	OL			OL		
Talbot Hill - Lakeside #2 115 kV line	OL	OL	OL	OL			OL		
Talbot Hill 230-115 kV transformer #1	OL	OL	OL				OL	OL	OL
Talbot Hill 230-115 kV transformer #2	OL	OL	OL	OL	OL	OL	OL	OL	OL
Talbot Hill-Boeing Renton-Shuffleton 115 kV line	OL	OL	OL				OL		
Sammamish 230/115 kV transformer #1									OL
Sammamish 230/115 kV transformer #2								OL	OL

OL = Overload of Emergency Rating. Source: OTA Results

[49] Excluding Eastside load
[50] Excluding Eastside load

Table B.3 lists the overloaded elements for summer 2018 for each studied scenario. The scenarios are listed in the second green row. The normal summer scenarios are numbered 1-5 (with #1 representing the original PSE case). There is no extreme weather summer forecast.

The 2018 normal summer results showed:

- Reducing the Eastside average load growth did not eliminate any overloaded elements; there is still project need.
- Reducing PSE's King County growth rate (less Eastside) did not eliminate any overloaded elements; there is still project need.
- Increasing the Puget Sound area generation to ColumbiaGrid's July 2010 "Puget Sound Area Generation Modeling Guideline" eliminated one of six overloads, but did not eliminate project need.
- Reducing the Northern Intertie flow to zero (no transfers to Canada) eliminated all the summer overloads; however, there is still a winter overload which means there is still local project need.

Table B.3: Summer 2018, 100% Conservation - Overloaded Elements

Northern Intertie: North to South Overloaded Element (Transmission Line or Transformer)	2018 Summer (86°F) 100% Conservation				
	1) Original PSE Case	2) Reduce Eastside load growth	3) Reduce PSE's King County growth	4) Increase Puget Sound area generation	5) Set Load transfers to Canada = 0 (Northern Intertie = 0)
Sammamish 230/115 kV Xfmr #1	OL	OL	OL	OL	
Sammamish 230/115 kV Xfmr #2	OL	OL	OL	OL	
Novelty Hill 230/115 kV Xfmr #2	OL	OL	OL		
BPA Monroe – Novelty Hill 230 kV	OL	OL	OL	OL	
Beverly Park - Cottage Brook 115 kV line	OL	OL	OL	OL	
Sammamish – BPA Maple Valley 230 kV line	OL	OL	OL	OL	

OL = Overload of Emergency Rating. Source: OTA Results

The 2020 summer results (Table B.4) showed the same overloaded elements as 2018. The overloads were more severe in 2020, with the exception of the Beverly Park – Cottage Brook 115 kV line which was either unchanged or reduced by less than 0.1%.

Table B.4: Summer 2020, 100% Conservation - Overloaded Elements

Northern Intertie: North to South Overloaded Element (Transmission Line or Transformer)	2020 Summer (86°F) 100% Conservation				
	1) Original PSE Case	2) Reduce Eastside load growth	3) Reduce PSE's King County growth	4) Increase Puget Sound area generation	5) Set Load transfers to Canada = 0 (Northern Intertie = 0)
Sammamish 230/115 kV Xfmr #1	OL	OL	OL	OL	
Sammamish 230/115 kV Xfmr #2	OL	OL	OL	OL	
Novelty Hill 230/115 kV Xfmr #2	OL	OL	OL		
BPA Monroe – Novelty Hill 230 kV	OL	OL	OL	OL	
Beverly Park - Cottage Brook 115 kV line	OL	OL	OL	OL	
Sammamish – BPA Maple Valley 230 kV line	OL	OL	OL	OL	

OL = Overload of Emergency Rating. Source: OTA Results

Stakeholder Questions related to the OTA

Q56. The study must as clearly, but non-technically as possible, define will happens regarding power flow to and from Canada.

A *See the OTA in Appendix B. Sensitivities were performed where power flow to and from Canada were reduced to zero. These cases still showed overloads so there is clearly a local need. Some overloads were eliminated when flows were reduced to zero, which indicates that flows to and from Canada also have an impact on the need.*

Q57. Clarify Eastside vs. regional needs. What load is causing the problem? Local or regional?

A *Local. The Optional Technical Analysis results showed that in winter 2017/18, even with the Northern Intertie adjusted to zero flow, the Talbot Hill 230/115 kV transformer #2 is still overloaded by several contingencies. This indicates there is a project need at the local level. See the full Appendix B for further detail.*

Q58. I am concerned that the need is not just for Bellevue and the Eastside but more for Bonneville Power, Snohomish Power, Seattle City Light -- the Columbia Grid. I would ask the consultants to provide a simple quantitative and pie chart breakout of the need that each stakeholder has in "Energize Eastside".

A *See Q56.*

Q59. Provide a quantitative analysis and pie charts (both historical and futuristic) showing a breakout of the need (demand and reliability) for each of the members of the Columbia Grid.

A *The Optional Technical Analysis results showed that in winter 2017/18, even with the Northern Intertie adjusted to zero flow, the Talbot Hill 230/115 kV transformer #2 is still overloaded by several contingencies. These results indicate there is a project need at the local level.*

Q60. Given the scenario and contingency driving the EE project, how much regional load will flow through the line?

A *See Q61 below.*

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Q61. What percentage of North-South flow-through load (to Canada/California) will be carried on EE during an N-1-1 event (failure of BPA bulk main PLUS a second transmission line failure?

A *The OTA studied a scenario with flows to Canada at 1500 MW and a scenario with flows to Canada set to 0 MW. Under the worst contingency condition (N-1-1), the reduction in flow on the Talbot Hill - Lakeside lines was 22.5%. Under the worst contingency condition (again N-1-1), the reduction in flow on the Talbot Hill 230/115 kV transformer was 2.6%. These results are before EE and reflect the effects on the current transmission system serving the EE area. As you can see from these results, the impact of flows to Canada on the Talbot Hill 230/115 kV transformer (the main driver of the need for EE) is almost insignificant.*

Q62. Was the system studied with generation on the west side?

A *Yes, the OTA studied a scenario with generation on the west side.*

Q63. Is EE a "BLENDED PROJECT" to satisfy the needs of Columbia Grid, BPA grid reinforcement (Monroe-Echo Lake bottleneck), Columbia River treaty "Canadian Entitlement" curtailments, Seattle City Light load needs, as well as PSE load growth?

A *The term "Blended Project" is not clear. However, the OTA results do show that there is a need for a project to satisfy local needs. A review of ColumbiaGrid documentation indicates that EE will also help satisfy a regional need which is why EE was included in the recommended transmission solution from ColumbiaGrid Puget Sound Area transmission planning activity.*

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Appendix C – End-Use Data and IRP

End-use data is evaluated in Integrated Resource Planning, where a utility examines both Supply-Side and Demand-Side options with the objective of providing reliable and least-cost electric service to its customers while addressing applicable environmental, conservation and renewable energy requirements. Because energy efficiency is generally a low-cost resource, the IRP tends to incorporate energy efficiency as a utility system resource and reduce the need for additional Supply-Side resources.

PSE commissioned The Cadmus Group, Inc. (Cadmus) to conduct an independent study of Demand-Side Resources (DSR) in the PSE service territory as part of its biennial integrated resource planning (IRP) process. The study considered energy efficiency, fuel conversion, Demand Response, and distributed generation. PSE also considered distribution efficiency.

Energy efficiency looked at naturally occurring conservation, which occurs due to normal market forces such as technological change, energy prices, improved energy codes and standards, and efforts to change or transform the market. This includes gradual efficiency increases due to replacing or retiring old equipment in existing buildings and replacing it with units that meet minimum standards at that time. It also includes new construction which reflects current state specific building codes, and improvements to equipment efficiency standards that are pending and will take effect during the planning horizon.

Fuel Conversion considered opportunities to substitute natural gas for electricity through replacements of space heating systems, water heating equipment, and appliances.

Demand Response options seek to reduce peak demand during system emergencies or conditions of extreme market prices. It may also be used to improve system reliability and could potentially help to balance variable-load resources such as wind energy.

Washington State's Renewable Portfolio Standard (RPS) law requires conservation potential be developed using Northwest Power & Conservation Council (NWPCC) methodology, and conservation targets are based on IRP with penalties for not achieving them. It requires PSE to meet specific percentages of its load with renewable resources or renewable energy credits (RECs) by specific dates.

The Energy Independence and Security Act (EISA, 2007) provides for minimum federal standards for lighting and other appliances beginning in 2012. It also sets standards for increasing the production of clean renewable fuels, increasing the efficiency of buildings and vehicles, and more.

Cadmus compiled technical, economic, and market data from the following sources:

- PSE Internal Data: Historical and projected sales and customers, historic and projected DSR accomplishments, and hourly load profiles
- 2010 Residential Characteristic Survey (PSE Service Territory)
- 2008 Fuel Conversion Survey (PSE Service Territory)

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- 2007 Puget Sound-Area Regional Compact Fluorescent Light (CFL) Saturation Study
- NEEA's 2009 Commercial Building Stock Assessment (CBSA)
- Building Simulations for the residential sector, employing separate models for customer segments and construction vintage
- Pacific Northwest Sources. Technical information included on hourly end-use load shapes (to supplement building simulations), commercial building and energy characteristics. Information on measure savings, costs, and lives
    - The Northwest Power and Conservation Council (Council)
    - The Regional Technical Forum (RTF)
    - The Northwest Energy Efficiency Alliance (NEEA)
- Sources to characterize measures, assess baseline conditions, and benchmark results against other utilities' experiences
    - The California Energy Commission's Database of Energy Efficiency Resources (DEER)
    - ENERGY STAR
    - The Energy Information Administration
    - Annual and evaluation reports on energy-efficiency and Demand Response programs from various utilities

Only new opportunities for conservation are captured in the DSR value and thousands of measures were evaluated. Conservation programs included Energy Efficiency, Fuel Conversion, Distributed Generation, Demand Response and Distribution Efficiency (voltage reduction and phase balancing[51]). Lighting savings in the 2013 IRP assume the availability of a technology meeting the minimum requirements of EISA, and that savings from Compact Fluorescent Lamp (CFL) installations will remain available[52]. (Cadmus estimated that 33% of sockets have CFLs before the 2013 IRP measures are selected.) EISA accounts for 31% of residential DSR and 26% of commercial DSR. DSR targets are reviewed by the Conservation Resource Advisory Group and the Integrated Resource Plan Advisory Group.

The 2013 IRP identified market achievable, technically feasible Demand-Side measures. These measures (over four thousand) were combined into bundles[53] based on levelized cost[54] for inclusion in the generation optimization analysis. The effect of the bundles is to reduce load, so the costs to achieve the savings must be added to the cost of the electric portfolios.

The optimization analysis identifies the economic potential (cost-effective level) of DSR bundles that would work well in planning for generation requirements. (For example, solar energy has a different impact on the summer peak than on a winter peak.) The optimization model developed and tested different portfolios, combining Supply-Side Resources with Demand-Side bundles, to find the lowest cost combination of resources that a) met capacity need b) met renewable resources/RECs need, and c) included as much conservation as was cost effective. (Once the capacity and renewable resources/RECs needs are met, the decision to include additional

[51] Phase balancing: Balancing the single-phase load among the three phases so that unbalanced load isn't driving the peak load value.
[52] LED lighting: The LED programs were not specifically identified in the 2013 IRP. The LED technology and availability is different today than it was when the 2013 IRP study began. PSE is planning on including LED lighting in the 2015 IRP.
[53] An example bundle is the set of measures that cost between $28/MWh and $55/MWh.
[54] Levelized Cost - An economic assessment of the cost to build and operate a power-generating asset over its lifetime divided by the total power output of the asset over that lifetime. It is also used to compare different methods of electricity generation in cost terms on a comparable basis.

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conservation bundles is simply whether that next bundle of measures increases the cost or decreases it.)

The optimization analysis results in the final set of cost effective measures, which are identified as the "100% conservation" set.

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Appendix D – Ask the Consultant

A key purpose of the ITA and the OTA was to provide an increased level of understanding of the purpose, need and timing of the EE project to the City Council and to community stakeholders. Over the course of the project, dozens of questions were received from various stakeholders. The City engaged such comments through an online outreach feature called 'Ask the Consultant.' In addition to this outreach the City initiated separate interviews with key stakeholders and USE staff. City staff filtered all Ask the Consultant stakeholder comment through the various Tasks in the Scope of Services and submitted the need-related comments to USE for report inclusion. Other comments were directed as appropriate to other comment venues including for example to the scoping process for the Environmental Impact Statement (EIS) the Integrated Resource Plan (IRP) process. That filtering is documented in the chart below.

A Q&A discussion is documented at the end of each section of the ITA.

See Attached Table 1.

Date	Name	Question or Comment	Directed to:
1/27	Plummer	Industry standards, IRP, average yearly loads	Extensive reference to lack of industry wide standards; paragraph 4 and 5 to ITA
1/22	Marsh	Questions for ITA consultant: Overview, Real need, distribution of peak use, Eastside vs regional needs, reliability	Skype session
1/28	Marsh	Questions for ITA consultant: extreme winter study case, other adjustments modeled, System Cap.	Role of Case Study Assumption, clarify reference to Needs Assessment Section 6, connection between CSA and CDF to ITA
1/30	Sweet	Data center consolidation comment	ITA
2/6	Plummer	Quantitative reliability metrics	ITA
2/9	Lander	Choice of USE and communications	Communications response
1/15	Osterberg/ Laughlin	E3 and Cadmus Study, declining revenue, blended project	EIS
2/3	Borgmann	12 questions: forecast, growth rates, Columbia Grid role, used and useful comparison, alternatives	1, 2, 7, 8, 12 to ITA 3 ? to ITA, comments to EIS 5 ? to ITA, comments to EIS 6 ? to ITA, comments to EIS 7- 2nd set? to EIS 4, 9, 10, 11 to EIS
2/9	Kim	2 comments on tech study and CDF chart; 2 questions on growth forecast disparity, show project stakeholder pie chart	1 and 2 to EIS 3 and 4 to ITA

2/10	McCray	4 questions: Load projection, options, trend down, Chang proposal	1 and 3 to ITA 2 and 4 (Chang) to EIS
2/10	Marsh	Circumstances of all-time peak usage occurrence	EIS
2/10	Marsh	PSE and SCL electricity trends	EIS
2/11	Alford	comment on tech study and CDF chart; questions on growth forecast disparity, show project stakeholder pie chart	See Kim comment
2/11	Mozer	Magnitude and timing of EE, alternatives, Canada powerflow	ITA (1) and EIS (2)
2/12	Andersen	4 questions: SCL capacity, Peak load information, use of temperature in modelling, distributed generation, use of peaking turbine generation	New Q1 to EIS Add 1 Q4 not in ITA scope Add 2 Q7 not in ITA scope Add 3 Q15 DSR and DG in ITA modelling, cost info not in scope Add 4 Q19 to EIS
2/12	Merrill	7 questions: Reasonableness of PSE conclusions, rational look, Eastside Customer demand, use of actual data, replacement, outages	1, 3, 5, 6 to ITA 2, 4, 7 to EIS
2/12	Hansen	Bridle Trails Subarea infrastructure reliability	EIS or ERS implementation
2/12	Halvorson	Customer Demand Forecast and Columbia Grid need pie chart	ITA
2/12	Marsh	7 questions: Top assumptions and parameters of the load forecast, economic projections, Spring District, increased efficiency, local government actions, regional transmission flow, regional grid	ITA

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Appendix E – Transmission Planning Standards TPL-001-4

See attached Table 1.

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Appendix F – Utility System Efficiency, Inc. (USE) Qualifications

R. Peter Mackin, P.E.
Vice President of Analytical Services

ACADEMIC BACKGROUND
M.S., Electrical Engineering, Montana State University, 1982
B.S., Civil Engineering, Montana State University, 1981

PROFESSIONAL EXPERIENCE
Peter Mackin has over 33 years of power system planning and computer application development experience and has been involved in WSCC/WECC planning and operating activities since 1985. In April of 2006, Mr. Mackin joined Utility System Efficiencies, Inc. (USE) as Vice President of Analytical Services. At USE, among other duties, Mr. Mackin has directed and performed system studies to meet the requirements of the WECC Project Rating Review Process, assisted developer clients with interconnection applications, and supervised a wind integration study for FERC.

While employed at Navigant Consulting, Inc., Mr. Mackin performed several transmission and resource integration studies for the Alberta Electric System Operator (AESO) as well as generation interconnection studies and transmission feasibility analyses for other clients. Mr. Mackin was a member of the NERC Version 0 and Phase III/IV Standards drafting teams. In addition, Mr. Mackin provided expert witness testimony at FERC in Docket No. ER01-1639-006.

While employed by the California Independent System Operator (CAISO), Mr. Mackin performed or reviewed system planning studies for Reliability Must Run generation requirements, new generator interconnection studies, as well as Participating Transmission Owner annual Transmission Assessments. In addition, Mr. Mackin helped develop the CAISO's New Facility Interconnection Policy and Long-Term Grid Planning Policy. Mr. Mackin provided expert witness testimony regarding six new generation projects before the California Energy Commission.

While employed by Pacific Gas and Electric Company (PG&E), Mr. Mackin was the lead transmission planning engineer performing transient stability simulations for the 500 kV California – Oregon Transmission Project. In addition, Mr. Mackin performed, supervised or reviewed studies to determine simultaneous import capabilities into California from the Pacific Northwest and the Desert Southwest. For two years, he served as chairman of the work group that undertook these studies. This work group was comprised of utilities from California, the Northwest, and the Desert Southwest.

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Jennifer Geer, P.E.
Principal Power Systems Engineer

ACADEMIC BACKGROUND
B.S., Electrical Engineering, University of New Mexico, 1985

PROFESSIONAL EXPERIENCE
Ms. Geer has over 25 years of electric utility industry experience and has extensive background in the transmission and distribution areas, including transmission planning and generation interconnection studies, distribution planning and forecast development and approval, outage analysis, reliability analysis, project development, and project management. Ms. Geer has also provided training in many of these areas. Ms. Geer joined Utility System Efficiencies, Inc. (USE) in 2009. At USE, Ms. Geer's focus has been on generation interconnection studies, transmission planning and project development.

Prior to joining USE, Ms. Geer was a member of San Diego Gas and Electric's Transmission Planning Department. Though part of their generation interconnection team, she was also involved in studies to determine the need and benefit of new transmission projects on the existing system, examining different route and voltage options.

While running Geer and Geer Engineering, Ms. Geer developed a procedure to determine if a new substation was needed; part of this procedure involved developing long term forecasts for the relevant areas. She also led teams to optimize substation site selection based on both engineering and non-engineering issues, and provided project management for a long term transmission study that was used to determine client company strategy. In addition, Ms. Geer developed or reviewed many distribution projects, trained engineers and leads on distribution planning, developed a training manual, conducted process mapping of distribution functions, and analyzed visibility and accuracy of distribution accounting.

While employed by San Diego Gas & Electric (SDG&E), Ms. Geer forecasted distribution loads, identified issues and alternatives, and developed circuit and substation projects. Ms. Geer also conducted distribution reliability studies to improve performance indices and developed training documents on multiple topics. She reviewed the entire set of distribution circuit forecasts and proposed distribution capital projects for San Diego Gas & Electric in later years, and provided feedback and/or modification as needed. Ms. Geer also developed checklists and forms to assist in forecasting, project development and new business engineering review, and trained engineering personnel on distribution planning procedures.

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City of Bellevue

DATE: 07/31/2015

TO: Energize Eastside EIS File – 14-139122-LE

FROM: David Pyle, Senior Environmental Planner – 425-452-2973

SUBJECT: Energize Eastside EIS Team Review of Project Need

PSE has represented that there is a need to construct a new 230 kV bulk electrical transmission corridor and associated electrical substations on the eastside of Lake Washington to supply future electrical capacity and improve eastside electrical grid reliability. Preliminary discussion between potentially affected jurisdictions and PSE indicated that the proposal is likely to have probable significant adverse environmental impacts, and issuance of a Washington State Environmental Policy Act (State Environmental Policy Act (SEPA) Threshold Determination of Significance was deemed appropriate as outlined in Chapter 197-11-360 WAC.

Following PSE's identification of this essential electrical infrastructure link, and to address the potential for significant environmental impacts, the utility submitted application for processing of an Environmental Impact Statement (EIS) with the City of Bellevue, who assumed the role of lead agency. Subsequent to this initiating action, several steps have been taken to begin processing the required EIS. The EIS is now underway and the EIS project team has been in review of information provided by PSE and collected during the process.

To better understand PSE's project proposal, the EIS project team has obtained clearance to access un-redacted sensitive (protected in accordance with industry security protocol) utility planning and operations information used by PSE in developing the Energize Eastside project proposal. The EIS project team, represented by Stantec (electrical system planning and engineering sub-consultant working in support of the Energize Eastside EIS effort), has reviewed this background information and studied the process used by PSE to establish a need for the proposed Energize Eastside project. A report from Stantec summarizing the findings is attached.

Although validation of the need for the proposed Energize Eastside project is not considered as a component of the EIS process under the requirements of SEPA, review of the need for the project is important in developing a thorough understanding of the project objectives and technical requirements to accurately identify feasible and reasonable project alternatives[1]. The EIS process is not to be used to reject or validate the need for a proposal. Rather, the EIS process is intended to identify and disclose potential significant adverse environmental impacts associated with a specific proposal.

[1] WAC 197-11-786 - Reasonable alternative.
"Reasonable alternative" means an action that could feasibly attain or approximate a proposal's objectives, but at a lower environmental cost or decreased level of environmental degradation. Reasonable alternatives may be those over which an agency with jurisdiction has authority to control impacts, either directly, or indirectly through requirement of mitigation measures.

Stantec

Memo

To:	Mark Johnson Program Manager ESA | NW Community Development Director	From:	Keith DeClerck Tucson, ArizonaTucson, Arizona
File:	Energize Eastside	Date:	July 31, 2015

Reference: Energize Eastside Project

The purpose of this memorandum is to summarize my findings regarding Puget Sound Energy's (PSE) electrical system needs that support the purpose and need for PSE's proposed Energize Eastside project. It memorializes the issues we have discussed in depth with the principal jurisdictions reviewing the project (the Cities) as we examined PSE's project criteria and possible alternatives to the 230 kV transmission system improvements that PSE has proposed for consideration in the Phase 1 Draft Environmental Impact Statement (EIS). I have prepared this memo at ESA's request to support a plain-language description of the purpose and need for the Energize Eastside project that can be used in the EIS that ESA is preparing. I understand that ESA and the Cities also want to understand the purpose and need for the project and the constraints PSE is working with so that you can make informed choices about what alternatives to evaluate in the EIS.

My Background

As an electrical engineer with more than 25 years of experience in both Industrial and utility environments, I understand the concerns on both sides of the meter. Specific to this project I have over 14 years of experience in transmission and distribution power flow simulations and have conducted and published extensive power flow studies in several of the states included in the Western Electricity Coordinating Council (WECC) region. I have critical infrastructure security clearance for viewing FERC data, and have experience reviewing such data. In addition, I have conducted transmission adequacy studies and renewable generation interconnection studies in several other North American Electric Reliability Corporation (NERC) regions across the United States. My experience in load forecasting and transmission planning, coupled with the fact that I have never worked for or have been under contract to PSE, allows me to provide a knowledgeable, independent view of the project purpose and need.

Documents Reviewed

In preparing this memo, I reviewed the unredacted versions of the following documents prepared by PSE and Quanta Technology (Quanta):

- *Eastside Needs Assessment Report, Transmission System, King County,* dated October 2013;
- *Supplemental Eastside Needs Assessment Report, Transmission System, King County,* dated April 2015;
- *Eastside Transmission Solutions Report, King County Area,* dated October 2013; and
- *Supplemental Eastside Transmission Solutions Report, King County Area,* dated April 2015.

I also reviewed the *Independent Technical Analysis of Energize Eastside for the City of Bellevue, WA (Version 1.3)* dated April 28, 2015 by Utility System Efficiencies, Inc. (USE). Although PSE's findings are the focus of this assessment, I found the USE report to be helpful in exploring other facets of the proposed need and verifying my own conclusions.

Reference: Energize Eastside Project

In the process of reviewing these documents I also referred to many other documents prepared by federal and regional agencies and by PSE.

Findings

Based on my expertise, I found that the PSE needs assessment was overall very thorough and applied methods considered to be the industry standard for planning of this nature. Based on the information that the needs assessment contains, I concur with the conclusion that there is a transmission capacity deficiency in PSE's system on the Eastside that requires attention in the near future. For purposes of this memo, "Eastside" refers to the central portion of King County roughly located between the cities of Redmond to the north and Renton to the south.

The transmission capacity deficiency is complex. It arises from growing population and employment, changing consumption patterns, and a changing regulatory structure that requires a higher level of reliability than what was required in the past. PSE has concluded that the only effective and cost-efficient solution is to site a new 230 kV transformer in the center of the Eastside, fed by new 230 kV transmission lines from the north and south. While that conclusion seems simple and straightforward, it is the product of an analysis that considered dozens of options and thousands of potential scenarios that the power system could encounter.

The population of the Eastside is expected to grow at a rate of approximately 1.2% annually over the next decade, and employment is expected to grow at an annual rate of approximately 2.1%. Because of the nature of expected development, PSE projects that electrical demand will grow at a rate of 2.4% annually. Without adding at least 74 MW of transmission capacity or local peak period generation to the Eastside, a deficiency could develop as early as winter of 2017 - 2018 or summer of 2018, putting customers at risk of load shedding (power outages). It is impossible to place a single number on the projected deficiency because it varies by season (winter vs. summer) and by other assumptions that are made in the planning process. However, as the load continues to grow, the risk and extent of the load shedding required increases.

Four components must be understood in order to have a basic understanding of the nature of this expected capacity deficiency:

- Study Parameters
- Load Forecast
- Corrective Action Plans
- Regional Compliance

Study Parameters

PSE started with the WECC database model for load forecasting, distribution, and transmission. The model encompasses all utilities in the western United States, western Canada, and northern Mexico. This model is updated yearly by all entities in the WECC region and reflects the overall system configuration and load forecasts for each utility. This overall model does not always reflect the specific details of a utility's transmission and distribution system. Therefore, PSE added specific details about its system configuration on the Eastside to enhance the accuracy of the results. This includes PSE's 115 kV substations and transmission lines, and other equipment operating at lower voltage. In the model, forecasted electrical load is distributed by substation, based on historical load data for those locations. This model was used for most of the study results.

In addition, system sensitivity cases (i.e. scenarios) were conducted using various levels of energy conservation, extreme weather temperatures, power generation patterns, and expected "intertie" flows between PSE and its interconnected neighbors. These scenarios were used to evaluate stresses on the system that can reasonably be expected. The scenarios generally involve trying to operate the system during these extreme weather periods with one or two system components taken offline either because of planned maintenance, or because of an emergency such as damage caused by a storm or vandalism. Scenarios provide insight as to the strengths and weaknesses of the system. Because weaknesses represent vulnerable aspects of the system, specific information about them is not released to the general public.

This procedure is a typical method of study and consistent with standard accepted practice for the industry. Extreme weather conditions examined are relatively high likelihood events, that is, conditions expected in one out of every two years.

Results from both summer and winter conditions were reported. This is because although the Eastside has historically had its highest electrical demand during the winter, recent trends show that summer usage is growing rapidly and will eventually lead to similar or even greater levels of demand as peak winter days. This is discussed further under Load Forecast.

Load Forecast

The load forecast is central to determining the need for the project. The primary contributing factors to the growth in load are as follows:

- Local residential consumption due to population growth; and
- Local growth in commercial and industrial electrical consumption due to both the quantity and types of local businesses that are growing.

PSE prepared a Needs Assessment in 2013 and a Supplemental Needs Assessment in 2015. The methodology used in the Supplemental Needs Assessment increased the accuracy of the results by breaking down the systemwide forecast into county-by-county forecasts and a sub-county area forecast for the Eastside. Both the 2013 and the 2015 reports show that Eastside growth is expected to be relatively strong, with peak loads projected to grow by approximately 2.4% per year over the next 10 years (2014 - 2024) driven mainly by new development in the commercial and high-density residential sectors.

Table 2-2 in the Supplemental Needs Assessment compares the load growth forecast from the 2013 assessment and the 2015 assessment. The 2015 supplemental forecast showed a slight reduction in PSE's overall peak load projections for winter 2017 - 2018 of 46 MW (0.9% of total) as compared to the 2013 projections, which is due to a slower than expected recovery in the housing sector. Similarly, Eastside load projections for winter 2017 - 2018 decreased by 11 MW (1.6% of total) as compared to the previous forecast. Although the new forecast slightly extends the time before system components on the Eastside will have reached capacity, the conclusion regarding the need in the long run has not changed.

PSE has traditionally been a winter-peaking utility, meaning that the highest demand periods typically have occurred in winter when cold weather drives the demand for heating. Both Needs Assessment reports indicate that, in addition to growing winter peak load demand, summer loads

on the Eastside are growing even more rapidly, to a point where they also pose transmission capacity deficiency issues.

In the 2015 Supplemental Needs Assessment report, the 2018 summer load projections for the Eastside were 12 MW (2.2% of total) lower than the previous forecast. However, by 2018 the supplemental assessment shows that approximately 74 MW of customer load is at risk of load shedding (shutting off or limiting power to customers) in order to maintain a reliable and secure transmission system. Ultimately, the result of having both a winter and summer peak deficiency leads to more hours of the year when the system is vulnerable to excess loading.

As with the previous forecast, PSE's supplemental forecast was based on historical data that were modified for such variables as energy conservation programs, economic data, population growth trends, and population and employment growth forecasts from the Puget Sound Regional Council (PSRC). Also included into the final shape of the forecast were any expected community development increases in load that have been identified by PSE customer relations and/or PSE local area distribution planning staff as being of significant size. These would be considered block loads and their addition is a typical practice in utility forecasting. In the model, block loads were added to the forecast for the substation that would serve those loads at 100% for the first three years, 50% for the next three years, and 0% after six years. Even though there are no standards for adding block loads of this type, this staged approach allows the forecast to capture any immediate sizable increases while tapering off and allowing the data available on employment and population provided by the other forecasting agencies to shape the outer years. This approach is a reasonable way to capture any significant near-term load increases without skewing the entire forecast.

In my opinion, the one area where PSE used an approach to load growth that was not typical of most utilities was in looking at the effect of its conservation programs. PSE used a conservation level of 100% in its load forecast, which assumes PSE will be able to achieve all of its planned conservation goals. Although PSE has a highly successful conservation program at present, this is more optimistic than most utilities are when making load forecasts, since conservation programs are typically voluntary. Using this as an expectation, anything short of that level of conservation would increase load levels and accelerate the timeframe for the deficiency to develop. The demand-side reduction program is described in PSE's *Integrated Resource Plan* (2013) including the methods used in determining the achievable levels of conservation. My review did not include a review of the methodology or results used in that analysis, although it appears to consider a wide range of factors that should be considered when establishing conservation goals.

In summary, PSE's load forecasting analysis applied methods and assumptions that are standard practice for the utility industry. My only concern is that the approach taken on conservation could result in understating the potential capacity deficiency if PSE were to fall short of its conservation goals.

Corrective Action Plans (CAPs)

An unwanted side effect from transforming power or transmitting power across power lines is the effect of thermal heating. Similar to water encountering friction in a hose, electrons face resistance in the conductor or transformer. Many individuals have felt this phenomenon when attempting to change a light bulb after it has been on for a period of time. Electrical transformation and delivery

can cause extreme heat. As electrical system components heat up due to these thermal stresses, they reach a point where physical damage can occur if the temperatures are too high.

System operators monitor the load, which is in direct correlation to the heating of equipment. If the load gets too high, operators must reduce (shed) load, either automatically or manually, from the equipment. This reduces the loading and allows the destructive temperatures to decrease to a safe level. This heating can occur in any system component (transformers, conductors, generators etc.). If the operator does not shed load the equipment will eventually fail due to the excess heat, and no load will be able to be served by that system component until it is replaced. For some components this could take weeks or months to accomplish due to equipment availability, shipment requirements and the time it takes to install and test the component.

Corrective action plans (CAPs) are instructions to PSE transmission operators to take particular actions during certain events to prevent destruction of system components and maintain appropriate voltage levels to all customers. Equipment overheating mainly triggers those actions. Overheating is typically due to high "steady state" load levels during peak load times (i.e., running the system near full capacity for several hours or days, such as during a cold snap or hot spell), or increases in load on a particular piece of equipment due to an outage of another transmission system component. Outages can occur due to unforeseen events such as storms, or during routine maintenance, when pieces of equipment need to be isolated from the system for personnel safety. CAPs are used by all electrical utilities as temporary fixes that can be implemented for short periods in lieu of increasing the capacity of the system.

The electrical transmission system is basically a link between generation (supply of electrical power) and load (demand for electricity). Unless the load is turned off or generation is unavailable, the transmission system will continue to try to deliver electricity to the load even if certain parts of the system are overheating. Operators must be constantly aware of system loading parameters to prevent components of the system from being destroyed by overheating. Once destroyed, the component may be out of service for weeks or months while being repaired, and customers may be adversely affected for the duration. CAPs are sometimes administered manually by the operator, or automatically by control systems in more critical cases where immediate action is deemed appropriate.

CAPs limit the adverse effects to equipment, but during the period that a CAP is being implemented, the electrical supply system is left in a more vulnerable state with fewer components to carry the load. Regardless of whether a CAP has been initiated by normal load levels, an unexpected outage, or a maintenance outage, there is a higher probability during a CAP that any further system upset could leave large areas of the Eastside and thousands of customers without power. As the load for the Eastside increases, and as the problem becomes not only a winter but summer peak issue, the number of hours per year when CAPs must be implemented will increase, meaning the length of time that the system is vulnerable also increases. Therefore, from a functional standpoint the system becomes less reliable in regard to normal load and unexpected system outages. From a maintenance standpoint the system becomes harder to operate and maintain its components in good condition. For example, PSE currently uses CAPs at the Talbot Hill substation to avoid load shedding in winter months.

Reference: Energize Eastside Project

PSE considered CAPs in its Needs Assessment for the Energize Eastside project, recognizing that with growing demand CAPs alone would not be a sustainable solution. CAPs allow PSE transmission operators to temporarily mitigate system problems on the Eastside in order to keep the system operational during certain outages and maintenance procedures. However, each CAP increases the exposure to more widespread customer power outages if any further system upset occurs while the CAP is implemented. As load increases over time, more CAPs are needed for more hours of the year and system reliability decreases. Therefore, CAPs should not be regarded as a long-term solution.

Regional Compliance

Like all major electrical utilities, PSE's electrical supply system does not operate independently of other power providers in the region. The interconnected power system, or bulk electric system (BES) as it is commonly referred to, is intended to be cost and resource effective by allowing excess power generation in one part of the region to supply load in another. In addition, because of the characteristics of electricity, increased system reliability, voltage stability, and performance are achieved by employing an interconnected system.

Several regional agencies in the Northwest oversee the operation of the BES to ensure that it is capable of delivering electricity. These regional agencies are ultimately responsible on a national level to the Federal Energy Regulatory Commission (FERC) and NERC. Among other duties, these regional entities identify additions to the transmission system needed to ensure service to load and meet firm transmission service commitments into the future, while complying with national reliability standards. In order to participate in the benefits of the regional grid, PSE must adhere to these transmission reliability standards.

These standards have become more stringent in recent years, after lessons learned in the cascading blackout that struck the northeastern portion of North America in 2003. Particularly relevant to planning for the Energize Eastside project, the current standards require that the system must be capable of operating safely and reliably with two components being disabled (referred to as N-2 and N-1-1 scenarios), whereas past standards only required that the system operate reliably with one component disabled (referred to as N-1 scenarios).

The Eastside Needs Assessment Report and the Supplemental Eastside Needs Assessment Report mention several other reports prepared by regional agencies, or that PSE prepared in order to comply with these agencies' standards. Each of these reports investigated a range of solutions to meet a particular regional electric system need. Being regional, these studies often encompass several utilities in order to address a particular issue or range of issues.

The Energize Eastside project was discussed as one of the possible solutions in some reports, and it was found to help address regional transmission issues. This should not lead to the conclusion that Energize Eastside was conceived as a means to address these regional needs. It only means that PSE's proposed Energize Eastside 230 kV transmission line would benefit the reliability of the regional grid in addition to addressing the local capacity deficiency on the Eastside. Conversely, other regional solutions these reports investigated would address the regional issue but would not be effective for solving the local transmission capacity deficiency on the Eastside. This is because they were designed only to address the regional issue. Providing support for the electrical needs of the region should not be equated with support for the need identified for the Energize Eastside project.

Reference: Energize Eastside Project

For instance, in the past PSE has utilized various CAPs as mentioned above to meet some of its regional compliance issues for reliability. Yet, as was also indicated above, the enforcement of a CAP is a temporary solution that puts large numbers of Eastside customers at higher risk of a power failure, and the hours of exposure per year continue to increase.

Regional compliance is part of operating an electric utility. There is a tension between what is best for the region and what is best for the local utility.

Summary

Due to increasing load demand, the Eastside is quickly approaching a transmission capacity deficiency. If and when this deficiency develops, PSE's electrical supply system will reach a point where it cannot ensure the level of reliability that it is mandated to provide. Assuming projected growth occurs, the Supplemental Needs Assessment indicates this capacity will be reached as early as winter 2017 - 2018. This is not a prediction that weather conditions and load demand will converge in this time period and require load shedding. Rather, it is a projection that load demand will increase to a point where, if adverse weather conditions occur and one or more components of the system is not operating for any reason, load shedding would be required. Once the threshold is crossed, the physical limitations of the system are such that even the slightest overload will produce overheating that can damage equipment, and larger overloads will produce overheating more quickly. Once equipment is in an overload condition, the options are to let it fail or take it out of service. Both conditions leave the Eastside in a vulnerable state where the system is incapable of reliably serving customer load. At that point further actions may be needed such as load shedding in order to keep the system intact. By the end of the 10-year forecast period, a large number of customers would be at risk, and the load shedding requirement could be as high as 133 MW.

The deficiency is caused by load growth, which is a byproduct of economic growth and population increases in the Eastside area. Addressing the deficiency is difficult because the needed generation to supply this load growth is outside the service area and the available existing pathways to bring that power to the load have reached capacity. The load area in question is situated between two sources: Sammamish substation on the north end (Redmond/Kirkland area) and Talbot Hill substation on the south end (Renton area). These are the only two sites that effectively support this geographical area. Increases or decreases in load that are not directly supplied by these two substations, or power flow to other parts of the system outside the service area, have minimal effect on the ability of these substations to supply load. Only a direct interruption of supply power to or power fed from these two substations will affect the Eastside area. Once the higher voltage (230 kV) is transformed down to a lower voltage (115 kV) at these two substations, the system is limited by the physical capacity of the conductors and transformers that connect those two sources to the load and feed the area.

A simple analogy for the transmission problem on the Eastside would be the water pressure at a residence with a vegetable garden located at the back of the property. In the summer months the vegetable garden needs more water but there isn't enough pressure to deliver an adequate supply. Even if the homeowner increases the size of the hoses or adds more sprinklers, the pressure is divided among them and the flow at each sprinkler reduces to a trickle. To solve the problem the

homeowner must either increase the pressure at the main, or develop another water source (such as a well) near the garden.

For the Eastside the highest load densities are north of I-90 and west of Lake Sammamish. In electrical systems, voltage is the pressure. As with the hoses and sprinklers, the physical limitations of the transformers and conductors dictate that the transformation sites closest to the load center will have best performance. Bringing a higher voltage source into the area and making the transformation to a lower voltage closer to the load increases the pressure at the source (comparable to the analogy of bringing a larger water main with plenty of pressure) and adequate power can flow to all parts of the area. The other solution is to produce a new source of power close to the load center. This would be some type of electrical generation (similar to adding a new well in the garden hose analogy). Other solutions would be less effective.

Energy conservation, technological advancements, and system operational improvements can and will slow the need for these infrastructure improvements. In its planning for Energize Eastside, PSE has assumed that a relatively high level of voluntary energy efficiency measures will be adopted within the Eastside over the coming decade, approximately 110 MW by 2024. The analysis PSE provided shows that even with these measures, the economic and population growth expected by planning agencies and businesses on the Eastside equates to the need for either more energy infrastructure, or at least 163 MW of additional conservation, over and above conservation already planned for the Eastside.

Energy conservation is one way of reducing load. But when increasing load has eclipsed increases in energy conservation and the electrical system is reaching capacity, the only other method is to open transmission lines. That is the purpose of CAPs: to reduce load, and therefore heating, by opening transmission lines. CAPs are temporary measures to help the system supply load. However, CAPs do not solve the long-term capacity issue, and when implemented they leave the system vulnerable to increased outages.

To understand this, the garden example can again be used. The homeowner has two sources of water to the garden, one from a faucet on the north side and one from the south much as Sammamish and Talbot Hill substations feed the Eastside load. It is a particularly hot mid-summer day, and the garden needs extra water. The homeowner connects more hoses to each faucet but realizes that even with the additional hoses and the faucets wide open, there is not enough water pressure to effectively water the garden. The only option is to disconnect a hose or two so that the others will have enough pressure to operate the sprinklers. Only now some of the garden is going without water (similar to load shedding in an electrical system). Also, depending on what is disconnected, large portions of the garden would be vulnerable to losing their water supply if the remaining hoses were damaged. In a garden, it may be possible to keep plants alive by rotating areas where the water is turned off, but in an electrical system, instead of plants it is people who will not have the electricity they need for a period of the day.

This is a simple analogy, but the situation with the Eastside power system is similar, except that instead of sprinklers that won't operate, an overloaded electrical system overheats. During peak load periods, operators use CAPs to turn off (referred to as opening) lines from either Sammamish or Talbot Hill substation to reduce heating on certain system transformers and lines so that they will not be destroyed. They may be able to keep the Eastside area supplied with electricity, but in doing so

large areas of the Eastside may only be fed from one source. If something happens to that source, such as a tree falling into a line, or a car accidentally taking out a pole, or a piece of equipment fails due to fatigue, at that moment the last viable connection to a power source is gone and the lights go out. Even worse, as load continues to grow, or the area hits the coldest winter or hottest summer on record, the operator will be left with a decision: who will have power and who will not. Until the peak period is over, in order to reduce overloads to an acceptable level, large portions of the Eastside area could be left without power. A further possible consequence would be that hospitals, nursing homes, fire departments, police stations and other critical support services must run on emergency power or are without power. In this situation the event has become not just an inconvenience but a hazard.

There are a lot of questions surrounding the probability of these events occurring on the Eastside. Most people are likely unaware of how many times an outage is imminent or narrowly avoided. Attempting to specifically predict these events is nearly impossible because of the number of potential scenarios and permutations. Is it an extreme peak? Are 100% conservation levels being met? Is there a system component out for repair? Has an accident removed a piece of equipment from service? Has a natural or man-made disaster occurred that no one thought would ever happen? Was the forecast wrong and loads grew faster than expected? The permutations are endless.

Regional electrical reliability is important to local communities. Without a reliable regional backbone, energy generated by a wide variety of sources could not be efficiently delivered to the population areas that need it. All the utilities in the Northwest bear some responsibility to keep the transmission system in working order. However, a local utility's main role is its customers and each has a legal duty to provide electricity to customers in its service area.

The local utility has two roles to play. On the community level, it needs to provide an adequate infrastructure of facilities and equipment that can reliably deliver energy to its local customers. As a regional player, the utility provides its customers access to the larger interconnected system while making sure its system is as reliable as its regional neighbors' systems and not a detriment to the whole.

The Energize Eastside project is designed to bring the needed infrastructure to supply the local need. Any regional benefits that it provides would be added benefits of a stronger regional source, but these are not the primary reasons why the project has been proposed. The transmission capacity deficiency is driven primarily by local rather than regional growth. If the entire region surrounding the Eastside was eliminated or disconnected from Sammamish and Talbot Hill substations, and replaced with an independent 230 kV source of power at both ends, the result would be the same. The Eastside 230 -115 kV system as it exists cannot supply the projected load under all circumstances, with the required levels of reliability that the community and neighboring utilities expect.

STANTEC CONSULTING SERVICES INC.STANTEC CONSULTING SERVICES INC.

Reference: Energize Eastside Project

Keith A. DeClerck
Senior Electrical Engineer
Phone: (520) 545-7413
Fax: (520) 750-7474
keith.declerck@stantec.com

c. N. Farah
P. Jaime
J. Theiss
N. Farah
P. Jaime
J. Theiss

ATTACHMENT D

Community Advisory Group Report

PUGET SOUND ENERGY

energize**EASTSIDE**

community advisory group
FINAL REPORT

January 2015

prepared by: ei enviroissues

DSD 000561

Community Advisory Group Final Report

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The Community Advisory Group reviewed and provided feedback on this report.

DSD 000562

Executive summary

The Energize Eastside project will build a new electric substation and higher capacity (230 kV) transmission lines on the Eastside. In order to provide a forum that would generate robust input from diverse community stakeholders, Puget Sound Energy (PSE) convened a Community Advisory Group comprised of 24 representatives from various interests across the Eastside.

The Community Advisory Group's goals were to help identify and assess community values in the context of evaluating which route the new transmission lines should follow, and to develop a route recommendation for PSE's consideration.

Meeting schedule

The Community Advisory Group met eight times between Jan. 22 and Dec. 10, 2014. The advisory group discussed the following topics at each meeting:

- **Jan. 22:** Role of the advisory group and introduction to the project
- **Feb. 12:** Solution selection process and project routing
- **June 4:** Review key findings from the sub-area workshops and Sub-Area Committee meetings
- **June 25:** Review potential route options
- **July 9:** Narrow potential route options and finalize evaluation factors
- **Oct. 1:** Review key findings from the open houses and prepare for route evaluation
- **Oct. 8:** Develop a preliminary route recommendation
- **Dec. 10:** Finalize a route recommendation for PSE's consideration

Additional meeting details are included in section IV (Community Advisory Group activities).

Community outreach

The Community Advisory Group process was supplemented by broad and ongoing community outreach, including public events at key milestones. At outreach events, the community learned about outcomes of the advisory group process to date and submitted feedback that the advisory group considered in their discussions. Key outreach events included:

- **Jan. 29 and 30:** Open House #1
- **March - May:** Six sub-area workshops and three Sub-Area Committee meetings
- **April 21:** Question and Answer Meeting #1
- **July 7:** Question and Answer Meeting #2
- **Sept. 10 and 11:** Open House #2
- **Nov. 12 and 13:** Open House #3

Along with feedback collected at these outreach events, members of the public could also submit input and ask questions via email, voicemail and an online comment form on the project website. To help inform their discussion, the advisory group received monthly public comment summaries of more than 2,300 comments and questions received from the public, as well as summaries of comments received at open houses. Additional activities are detailed in section V (Community involvement).

Recommendation

On Dec. 10, the Energize Eastside Community Advisory Group selected route options Oak and Willow as their final route recommendation for PSE's consideration. Of the 22 advisory group members and four residential association alternates participating in the recommendation discussion, 20 supported the final recommendation.[1]

1 The above count includes the advisory group members and residential association alternates present at the Dec. 10, 2014 meeting, as well as six members and residential association alternates who did not attend the meeting but later provided feedback on the recommendation.

The final recommendation was based on the advisory group's work throughout 2014, including discussion of community feedback collected throughout the year. Six advisory group members and residential association alternates dissented from the recommendation and supported none of the routes.

Next steps

Following the completion of the Community Advisory Group's process, PSE's next steps in 2015 are to:

- Take the Community Advisory Group's recommendation under consideration and make an announcement about routing that balances the needs of customers, the local community, property owners and PSE
- Work directly with property owners and tenants to begin detailed fieldwork to inform environmental review, design and permitting
- Ask for community input on project design, which may include pole height, finish and other design considerations
- Work with the City of Bellevue and other affected jurisdictions and agencies on the project's Environmental Impact Statement (EIS) process

Once these steps are complete, PSE will apply for necessary permits from appropriate agencies and jurisdictions. The project design and permitting phase is expected to run through early 2017. Once fully designed and permitted, project construction is expected to begin in 2017, with project completion planned for 2018.

COMMUNITY ADVISORY GROUP FINAL ROUTE RECOMMENDATION

DSD 000564

I. Introduction

Growth studies presented by Puget Sound Energy (PSE) and third-party experts project that demand for reliable power on the Eastside will exceed capacity as early as the winter of 2017/2018.[1] These studies indicate that without substantial electrical infrastructure upgrades and aggressive conservation efforts, the Eastside's power system will lose redundancy, increasing the risk of more disruptive and longer outages for as many as 60,000 customers.

The Energize Eastside project will build a new electric substation and higher capacity (230 kV) transmission lines on the Eastside. The new 230 kV transmission lines will extend from the existing Sammamish substation in Redmond to the existing Talbot Hill substation in Renton, connecting with a new substation site in between. These upgrades will provide dependable power for Eastside communities for many years to come.

In January 2014, PSE convened a Community Advisory Group comprised of 24 representatives[2] from various interests across the Eastside. The purpose of the advisory group was to provide a forum that would generate robust input from diverse community stakeholders in compliance with comprehensive plan goals and policies, which promote public participation and/or coordinated utility siting. The Community Advisory Group's goals were to help identify and assess community values in the context of evaluating which route the new transmission lines should follow and to develop a final route recommendation for PSE's consideration.

1 Quanta Technology and Puget Sound Energy, *Eastside Needs Assessment Report*, 2013.

2 The Community Advisory Group consisted of 24 members at the beginning of the process; however, two member organizations (King County and Renton Technical College) withdrew without replacement.

Project Manager Jens Nedrud leads Community Advisory Group members on a tour of the project area.

Purpose of report

The purpose of this report is to document the work and summarize the recommendations of the Community Advisory Group convened by PSE to explore community preferences, priorities and concerns and to assess segments that could be combined to form a final route for the Energize Eastside 230kV transmission lines.

II. Project background

PSE's existing Eastside electric system had its last major upgrade in the 1960s. The electric system serves communities between Redmond to the north, Renton to the south, Lake Washington to the west and Lake Sammamish to the east. Power is currently delivered throughout the Eastside region using 115 kV transmission lines that run between two 230 kV substations – one in Redmond and one in Renton (see Figure 1).

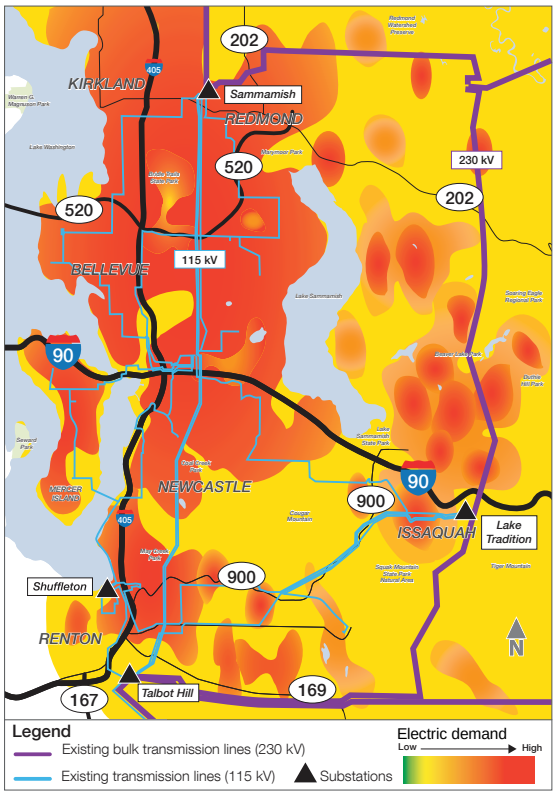
Since the system's last upgrade, the Eastside population has grown from approximately 50,000 to nearly 400,000 people, and this growth trend is expected to continue. Puget Sound Regional Council projections indicate that the Eastside population will grow by more than a third between 2010 and 2040.[1] Not only have Eastside communities grown and prospered, but the way Eastside residents use electricity has changed. Home square footage has increased, requiring more energy for lighting, heating and air conditioning. Additionally, most devices and appliances plugged in today did not exist years ago. Despite improvements in energy efficiency and aggressive conservation efforts, demand for electricity has grown dramatically.

Federal standards require PSE to plan for future forecasted loads and upgrade the system accordingly. Forecasted loads for transmission purposes are based on historical load data as well as a variety of other inputs, including information about weather, regional and national economic growth, demographic changes, conservation, and other customer usage and behavior factors. In 2013, PSE published the *Eastside Needs Assessment*. Prepared with assistance from independent experts, the study demonstrated that the increased demand is already placing a strain on the electric system. As growth continues, the existing system will only become more stressed, increasing the possibility of widespread outages, especially during peak winter loads when customer electricity use is greatest.

To determine a solution, PSE and independent experts conducted multiple independent analyses of the existing system and studied a variety of options to address the growing need on the Eastside, including further reducing demand through conservation, increasing the capacity of existing electric transmission lines, generating energy locally, and building new infrastructure.

After a comprehensive review, PSE determined that a combination of continued conservation and infrastructure upgrades – a new substation and higher capacity 230 kV transmission lines – will meet growing demand on the Eastside and ensure reliable electricity for years to come. [2,3]

Figure 1. The Eastside's electric system and demand



1 Puget Sound Regional Council 2013 Land Use Baseline: Maintenance Release 1 (MR1), update April 2014.

2 Energy + Environmental Economics, *Non-wire Solutions Analysis*, 2014.

3 Quanta Technology and Puget Sound Energy, *Eastside Transmission Solutions Report*, 2013.

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III. About the Community Advisory Group

Purpose

The purpose of the Community Advisory Group was to evaluate the potential route options identified by PSE and independent experts, help PSE better understand community and property owner values and concerns, and determine a route recommendation for PSE's consideration. The Community Advisory Group process and final route recommendation will help PSE evaluate and consider routes that balance the needs of its customers, the local community, property owners and PSE.

Throughout the community outreach process, the Community Advisory Group:

- Developed an understanding of the Energize Eastside project and project need
- Reported back to the constituents they represented on project details, gathered feedback from the interests they represented, and provided ongoing communication between PSE and their constituents throughout the process
- As community representatives, provided advice on ways to address community concerns
- Participated in geographic Sub-Area Committee meetings to identify local concerns and values
- Worked collaboratively and constructively to help consider community and property owner values
- Engaged in a process to evaluate route options
- Determined a final route recommendation for PSE's consideration

The Community Advisory Group codified its purpose, process and guidelines in its Charter (Appendix A), agreed upon by consensus.

Membership

The Community Advisory Group was made up of representatives from various interests, including neighborhood organizations, cities, schools, social service organizations, major commercial users, economic development groups, an environmental organization and a property developer. See Table 1 for members, including which interests each member represented and their specific organization or affiliation.

Learning about the project need and advisory group process at Community Advisory Group Meeting #1 in Bellevue.

Table 1: Community Advisory Group members

Interest	Organization or affiliation	Name
City	City of Bellevue	Nicholas Matz
	City of Kirkland	Rob Jammerman
	City of Newcastle	Tim McHarg
	City of Redmond[1]	Pete Sullivan (primary) Lori Peckol (alternate) Cathy Beam (alternate)
	City of Renton	Gregg Zimmerman
Economic development organization	OneRedmond	Bart Phillips
	Renton Chamber of Commerce	Brent Camann
Environmental organization	Mountains to Sound Greenway	Floyd Rogers
Jurisdiction	King County[2]	David St. John (primary) Mary Bourguignon (alternate)
Major commercial/ industrial user	Overlake Hospital Medical Center	Sam Baxter (primary) Jeff Fleming (alternate)
	Renton Technical College[3]	Steve Hanson
Property developer	Master Builders Association	David Hoffman
Puget Sound Energy	Puget Sound Energy	Andy Swayne
Residential organization (Bellevue)	Somerset Community Association	Steve O'Donnell
	Wilburton Community Association	Robert Shay
	Bridle Trails Community Club	Norm Hansen
Residential organization (Kirkland)	South Rose Hill/Bridle Trails Neighborhood Association	Deirdre Johnson (primary) Jim McElwee (alternate)
Residential organization (Newcastle)	Olympus Neighborhood Association	David Edmonds (primary) Sean McNamara (alternate) Sue Stronk (alternate)
Residential organization (Redmond)	Redmond Neighborhoods	David Chicks
Residential organization (Renton)	Kennydale Neighborhood Association	Darius Richards
School district	Bellevue School District	Jack McLeod (primary) Kyle McLeod (alternate)
	Lake Washington School District	Brian Buck
Social service organization	Coal Creek Family YMCA	Marcia Isenberger (primary) Paul Lwali (alternate)
	Hopelink	Nicola Barnes

1 In October 2014, Pete Sullivan relocated and was unable to attend meetings thereafter, but remained involved in the process.

2 King County was invited to have a staff representative serve on the advisory group. King County staff attended two introductory meetings but then withdrew from the process.

3 In October 2014, Steve Hanson of the Renton Technical College resigned due to lack of availability to participate fully in the process.

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Residential association alternates

To provide an opportunity for additional input and representation from the residential community, four residential association alternates were appointed. These alternates were appointed from different neighborhood associations than the advisory group members representing residential interests. The four residential association alternates included:

- **Scott Kaseburg**, Lake Lanes Community Association (Bellevue)
- **Bill Taylor**, Liberty Ridge Homeowners Association (Renton)
- **Lindy Bruce**, Sunset Community Association (Bellevue)
- **Barbara Sauerbrey**, Woodridge Community Association (Bellevue)

Past members and residential association alternates

Over the course of the advisory group's work, the following membership changed due to varying circumstances:

- **Mark Rigos**, City of Newcastle (replaced by Tim McHarg)
- **Jules Dickerson**, Lake Lanes Community Association (replaced by Scott Kaseburg)
- **Lynn Wallace**, Renton Chamber of Commerce (replaced by Brent Camann)
- **Debra Grant**, Hopelink (replaced by Nicola Barnes)

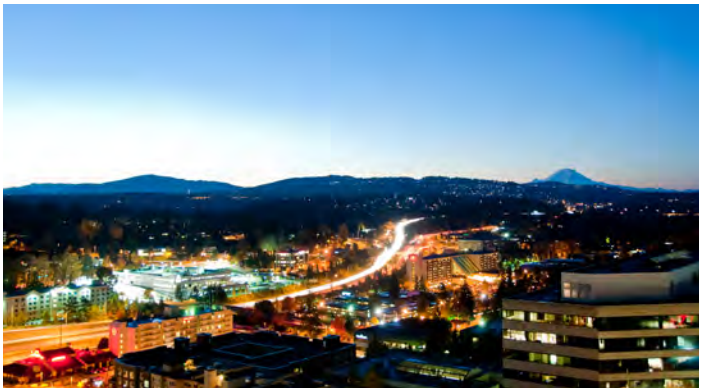
Invited

The following entities were invited and chose not to participate in the Community Advisory Group process, but were informed of project milestones and meetings through postcards and newsletters:

- Muckleshoot Tribe
- Yakama Nation

Aerial view of downtown Renton

Construction in Redmond



Downtown Bellevue at night

IV. Community Advisory Group activities

Meeting schedule

The Community Advisory Group met eight times from January to December 2014. All Community Advisory Group meetings were open to the public and included a period for public comment. For links to advisory group meeting materials, presentations and summaries, see Appendix C.

During this process, PSE hosted three series of public open houses, during which the public could learn about major advisory group milestones and consult with PSE and advisory group representatives. The advisory group used community input from these open houses as well as from sub-area workshops and Sub-Area Committee meetings, community surveys, public comment periods, monthly public comment summaries, and personal communications with constituents to inform their discussions. See Table 2 for a list of advisory group and community meetings held in 2014.

Table 2: 2014 Community Advisory Group and public outreach meeting schedule

Date	Meeting type	Purpose
Jan. 22	Community Advisory Group meeting	Learned about project need and Community Advisory Group process
Jan. 29 & 30	Open House	Broader community learned about the project need, the Community Advisory Group process, and opportunities to get involved
Feb. 12	Community Advisory Group meeting	Learned about PSE's solution selection process and project routing
February – May	Project area tours and sub-area process	Learned about the potential route segments via project area tours provided by PSE; attended sub-area workshops to identify local community values and concerns; determined key findings from sub-areas (See Table 3 for more details)
June 4	Community Advisory Group meeting	Reviewed key findings about the segments gathered at sub-area workshops and Sub-Area Committee meetings; developed community values-based evaluation factors to be used to evaluate the route options
June 25	Community Advisory Group meeting	Reviewed qualitative and quantitative information about the 18 potential route options made by combining route segments
July 9	Community Advisory Group meeting	Narrowed potential route options and finalized evaluation factors
Sept. 10 & 11	Open House	Broader community provided feedback on narrowed route options and weighting of evaluation factors via survey
Oct. 1	Community Advisory Group meeting	Reviewed key findings from September open houses and prepared for a Multi-Objective Decision Analysis evaluation of the routes
Oct. 8	Community Advisory Group meeting	Determined preliminary route recommendation for public review at November open houses
Nov. 12 & 13	Open House	Broader community provided feedback on advisory group's preliminary route recommendation
Dec. 10	Community Advisory Group meeting	Reviewed key findings from the November open houses; finalized route recommendation for PSE's consideration

Key Community Advisory Group discussion topics

The Community Advisory Group discussed many topics over the course of the process. The following topics were most commonly addressed. Descriptions include the advisory group's expressed concerns and PSE's response shared over the course of the advisory group process.

Scope confined to an overhead solution

Some members of the advisory group asked whether PSE would consider other alternatives besides an overhead solution. Those members also asked if considering other alternatives could fall under the advisory group's purview. Before launching the Energize Eastside, PSE studied several different solutions in addition to building the new overhead transmission lines. Those alternatives included reducing demand through conservation, increasing the capacity of PSE's existing electric transmission lines, generating energy locally, and building new infrastructure. However, PSE concluded other solutions were inadequate to solve the problem, and the advisory group was formed to gather feedback on an overhead transmission line solution.

Underground transmission lines

Among the most discussed alternatives to an overhead solution was underground transmission lines. PSE explained that overhead transmission lines are PSE's first option for service due to reliability and affordability. The biggest challenge to underground transmission lines is cost. The construction costs for an overhead transmission line are about $3 million to $4 million per mile, versus $20 million to $28 million per mile to construct the line underground. Per state-approved tariff schedule 80, section 34, the local jurisdiction or customer group requesting underground transmission lines must pay the difference between overhead and underground costs. PSE explained they are willing to sit down with interested communities to discuss undergrounding as an option; however, those communities must decide how to pay for the difference in costs, which must be provided up front.

Submarine cables

Some advisory group members expressed interest in PSE pursuing transmission lines submerged under Lake Washington, and pointed to other submerged transmission projects, such as one in San Francisco. PSE presented research on that project, and noted that it costs an average of $56.2 million per mile, compared to the $3 million to $4 million per mile of overhead transmission. As with undergrounding, according to tariff schedule 80, section 34, the local jurisdiction or customer group requesting submerged transmission lines must pay the difference between overhead and submarine costs.

Batteries

Some advisory group members were interested in learning more about battery technology and local energy storage as an alternative to the project. PSE explained that using batteries instead of building a new substation was considered during the solutions identification process, but the technology has not been used for the type and scale of problem facing the Eastside. Additionally, new transmission lines would still be required to distribute electricity from the battery site to PSE's customers.

Seattle City Light corridor

Some advisory group members also asked PSE about using the Seattle City Light (SCL) utility corridor as an alternative to site the new transmission lines. Early on in the solution identification process, PSE identified the SCL transmission corridor as a potential solution to meet the Eastside's energy needs. PSE asked SCL for permission to use their transmission corridor. However, SCL has told PSE that their corridor is a key component of Seattle City Light's transmission system and not available for PSE's use. A letter from SCL articulating this position is available on the Energize Eastside project website. See Appendix D.

Olympic Pipeline safety

Some advisory group members expressed concern over the safety of building the project near the Olympic Pipeline. PSE explained that building 230 kV lines along the Olympic Pipeline

(owned and operated by British Petroleum (BP)) would be safe. The Olympic Pipeline has coexisted with PSE transmission lines in the Eastside corridor for over fifty years. PSE also has a long history of working closely with BP and is a natural gas pipeline operator itself. PSE and its contractors are very familiar with concerns regarding pipeline safety and employ safe construction practices when performing work in the vicinity of pipelines. If a selected route is comprised of segments that include the Olympic Pipeline, PSE will continue to work with BP to ensure safety during and after construction.

Property values

Some advisory group members expressed concern about the effects on property values as a result of the Energize Eastside project and asked whether property values could be considered as a factor for evaluating route options. Property values are comprised of many factors, including economic outlook and location, as well as proximity to jobs, schools, transportation, parks and other amenities. PSE explained that it does not use property values as a factor when selecting routes out of fairness to and in consideration for customers of all income levels, noting that it is socially inequitable to site infrastructure based on income-related considerations. Similarly, a project's potential effects on surrounding property values are excluded from consideration of impacts to the environment under Washington's State Environmental Policy Act (SEPA).

Electric and magnetic fields

Several advisory group members asked whether exposure to electric and magnetic fields (EMF) had any effect on health. A third-party, board-certified health physicist explained that over the past 45 years, there have been many scientific studies conducted to determine whether EMF from transmission lines (called "power frequency EMF") has any effect on human health. To date, this large body of research does not show that exposure to power frequency EMF causes adverse health effects.

January-February 2014: Learned about the electric system, project need and routing

The Community Advisory Group began their process by learning about the current electrical system, the need for the project and the solution selection process. During this learning period, the advisory group asked PSE questions on a variety of topics, including transmission line siting, other options considered for the project (e.g., battery technology and conservation), and how a solution was determined. PSE's real estate, engineering and system planning staff provided detailed responses to these questions.

Communications Manager Gretchen Aliabadi explains the undergrounding tariff at Community Advisory Group Meeting #3 in Redmond.

PSE explained in detail its process to identify a solution and route options, which included the following steps:

1. **Determine the potential approaches to meet the Eastside's electricity needs:** PSE evaluated the potential of several approaches – conservation, local generation and new infrastructure – to meet the Eastside's electricity needs.
2. **Review approaches to provide enough electricity to meet the Eastside's needs:** Engineers reviewed alternatives to each approach, and found that only new generation on the Eastside or new infrastructure located near the center of high electricity demand could meet the Eastside's needs. Additionally, aggressive conservation goals would need to continue.
3. **Review solutions that best deliver electricity to the Eastside:** Engineers reviewed different generation and electric infrastructure alternatives based on system performance, flexibility and longevity. A new generation facility on the Eastside was eliminated from consideration due to difficulties related to siting and operational limitations. It was determined that the best solution to meet the Eastside's electricity needs was to 1) construct a new 230 kV substation and 2) construct new 230 kV transmission lines connecting the new substation with the two existing substations in Redmond and Renton.
4. **Determine which solutions PSE can move forward with:** PSE eliminated the Seattle City Light Corridor and one of the potential Bellevue substation sites as possible new infrastructure locations. Neither the corridor nor the proposed substation property is owned by PSE and other viable sites for new infrastructure were available.
5. **Review where PSE could build a solution:** Engineers used a computer-based modeling tool to analyze key criteria like geographic barriers, land uses and impacts to the environment. Based on this analysis, route segments were identified that could be combined into various complete route options that connect to potential substations (see Figure 2).[1]
6. **Ask what the public thinks:** PSE asked the public to provide input on the combination of route segments that best serves the Eastside's needs. The Community Advisory Group process was part of a larger public outreach process that also included neighborhood briefings, community meetings at key milestones, question and answer sessions, and an interactive project website.

1 TetraTech, *Eastside 230 kV Project Opportunity and Constraints Study for Linear Site Selection*, 2013.

Figure 2. Potential route segments

March-May 2014: Sub-area process and route segment input

In spring 2014, members of the Community Advisory Group participated in one or more of three Sub-Area Committees focused on the following geographic areas:

- North: Kirkland, Redmond and North Bellevue
- Central: Bellevue
- South: Newcastle and Renton

Sub-Area Committee membership included advisory group members and residential association alternates from the geographic

sub-areas. Invitations to serve on the committees were also extended to a representative from each potentially affected neighborhood association (i.e., those who lived near a potential segment) that did not have a member or residential association alternate on the advisory group.

PSE hosted six sub-area workshops and three Sub-Area Committee meetings across the project area. The three Sub-Area Committees developed findings on specific sub-area values, concerns and considerations about route segments from the workshops conducted in each of the sub-areas. The committees' findings served as a source of information that the Community Advisory Group considered in developing evaluation factors and narrowing the route options. See Table 3 for details on schedule and objectives of the sub-area workshops and Sub-Area Committees.

Discussion about route segments at a Central sub-area workshop in Bellevue.

Discussion about route segments at a South sub-area workshop in Renton.

Table 3: Sub-area workshops schedule and objectives

Dates	Meeting type	Purpose
North: March 19, 2014 Central: March 26, 2014 South: March 27, 2014	Sub-Area Workshop #1	Community members: • Identified key issues and considerations for segments in the sub-area • Brainstormed community values • Requested data that would be helpful to compare segments
North: April 16, 2014 Central: April 23, 2014 South: April 24, 2014	Sub-Area Workshop #2	Community members: • Reviewed data and photo simulations PSE prepared based on requests from Workshop #1 • Used data to score all the route segments individually and as a group • As a group, wrote key messages to the Sub-Area Committee
North: May 7, 2014 Central: May 14, 2014 South: May 15, 2014	Sub-Area Committee meeting	Sub-Area Committees determined key findings from sub-areas to share with the Community Advisory Group

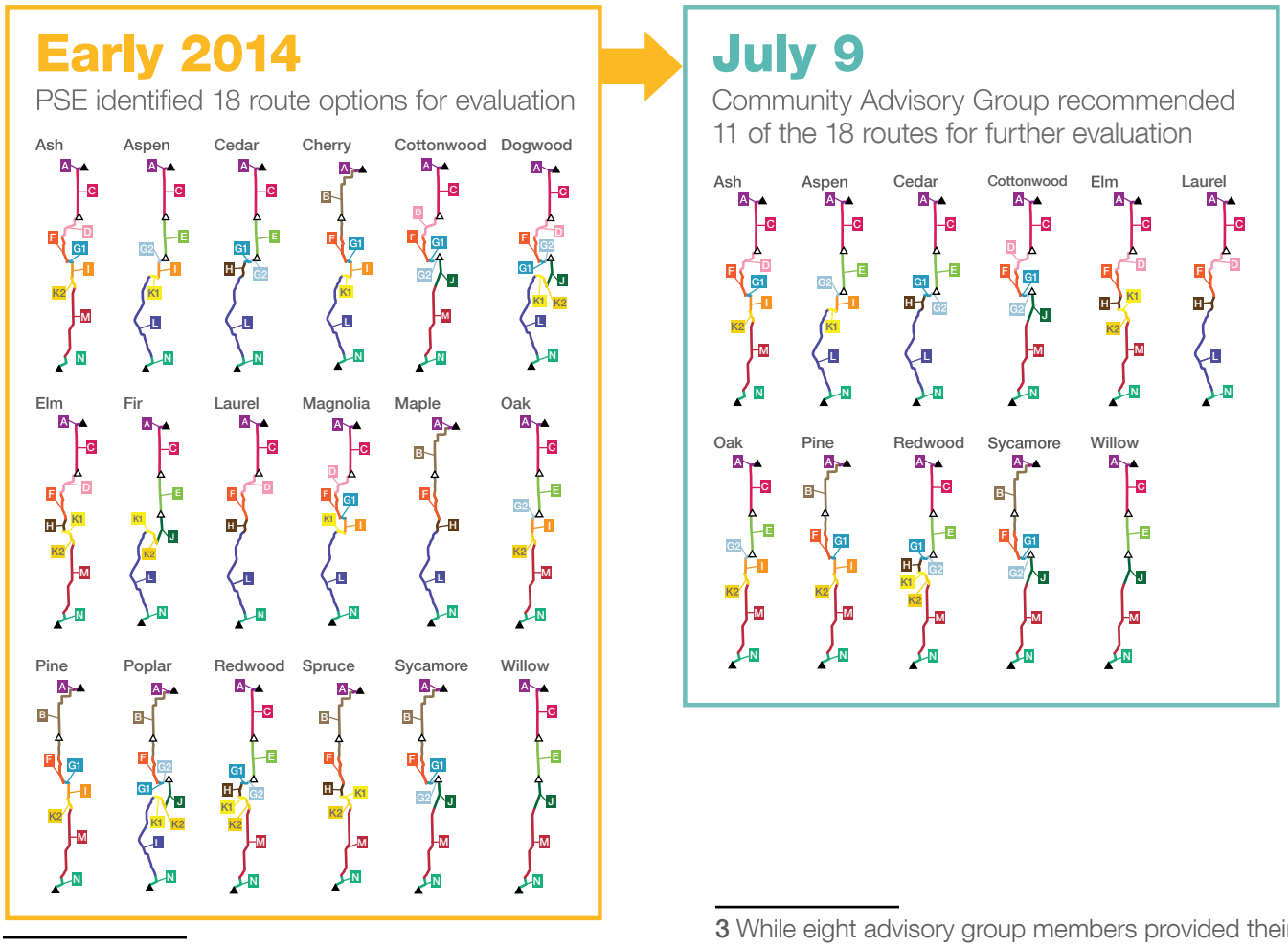
June-July 2014: Narrowed the route options

After segment-specific input was collected through the sub-area process, the Community Advisory Group considered 18 route options made from combining the route segments. (These route options were assigned tree names, such as “Ash,” “Aspen,” and “Cedar,” for easier reference.) The advisory group also identified community values-based evaluation factors.

At their meeting on July 9, the advisory group reviewed the 18 route options and recommended 11 route options for further evaluation.[2] (See Figure 3.) Information that aided their discussion included:

- Feedback from sub-area workshops and Sub-Area Committee meetings, as well as other community input
- Quantifiable data on route options, photo simulations, and information from PSE on route cost, constructability and maintainability
- Results from a blind evaluation of the 18 route options completed by 23 advisory group members
- Initial recommendations submitted before the meeting by eight advisory group members on which route options to remove from further evaluation[3]
- Discussion of route segments and the 18 route options at advisory group meetings

Figure 3: Narrowed route options in July 2014



2 Four advisory group members initially recommended that all or a majority of the 18 routes should move forward for further evaluation.

3 While eight advisory group members provided their initial input before the meeting, all members present at the meeting on July 9 discussed what route options to remove from further evaluation.

October 2014: Evaluated the narrowed route options

The Community Advisory Group used nine evaluation factors (see Table 4), as well as specific route option data, to evaluate the narrowed route options through a process called Multi-Objective Decision Analysis (MODA). MODA is a process for making decisions when there are complex issues involving multiple criteria and multiple parties who may have an interest in the outcome.

Using MODA allows individuals to consider and weight factors and trade-offs while evaluating each alternative (in this case, each route option). Evaluation factors were weighted to reflect the relative importance ascribed to each factor. After scoring each route option for each evaluation factor, the advisory group then discussed the combined group results to help decide on a recommendation. See Figure 4 for a description of the MODA steps and how the advisory group used MODA.

Between Oct. 2 and Oct. 6, 2014, 19 of 24 advisory group members completed individual evaluations of the 11 route options recommended for further evaluation as part of the MODA process. Using online software called Transparent Choice, advisory group members individually scored each route option using each of the nine evaluation factors on a five-point scale. The software then applied two sets of weightings – one determined by the advisory group and another determined by community members who participated in a summer 2014 feedback survey – to the group's averaged scores. See Table 4 for descriptions of the evaluation factors and the two weighting schemes.

Figure 4: Multi-Objective Decision Analysis (MODA)

MODA steps

1. **Factors** - Discuss and agree on evaluation factors
2. **Weighting** - Determine relative importance of each factor and assign corresponding weights
3. **Route options** - Determine route options to evaluate
4. **Scoring** - Score each route option for each weighted factor
5. **Decision** - Discuss results and determine decision

How the Community Advisory Group used MODA

1. **Selected nine evaluation factors** based on community values
2. **Used two sets of weightings** - one determined by the advisory group and a second determined by a community survey
3. **Selected 11 route options** out of 18 to include in the evaluation
4. **Scored** the 11 route options for how well they each met the nine evaluation factors using an online software called Transparent Choice
5. **Considered MODA results** along with community feedback and other sources of information to select four routes as their preliminary route recommendation

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Table 4: Evaluation factors and their weightings determined by the advisory group and a community survey

Evaluation factor	Advisory group weighting	Community survey weighting
Avoids impacts to aesthetics (Pole design and views)	5%	14%
Avoids residential areas (Number of residences)	24%	31%
Avoids sensitive community land uses (Parks and other recreational areas, schools, religious institutions, etc.)	13%	10%
Avoids sensitive environmental areas (Wetlands, wildlife habitat, steep slopes, fault lines, etc.)	7%	12.5%
Least cost to the rate payer (Estimated monthly increase to average residential customer; calculation based on total cost)	14%	7%
Maximizes longevity (When in the future additional 230 kV infrastructure is anticipated based on current technology and growth projections)	9%	4%
Maximizes opportunity areas (Runs along existing utility corridors, railroad right of way, public right of way, etc.)	15%	6%
Protects health and safety (Electric and magnetic fields, Olympic Pipeline, etc.)	9%	9%
Protects mature vegetation (Number of trees greater than four inches impacted)	4%	6.5%
Total	100%	100%

On the following page, Figures 5 and 6 present the MODA results for each route option, first using the advisory group weighting and second the community survey weighting. Within the results bar for each route option, colors represent the evaluation factors and show the advisory group's averaged and weighted score for each factor. A higher number equals a better score. Weighting percentages are shown in the weighting keys.

Figure 5: MODA results - Advisory group weighting

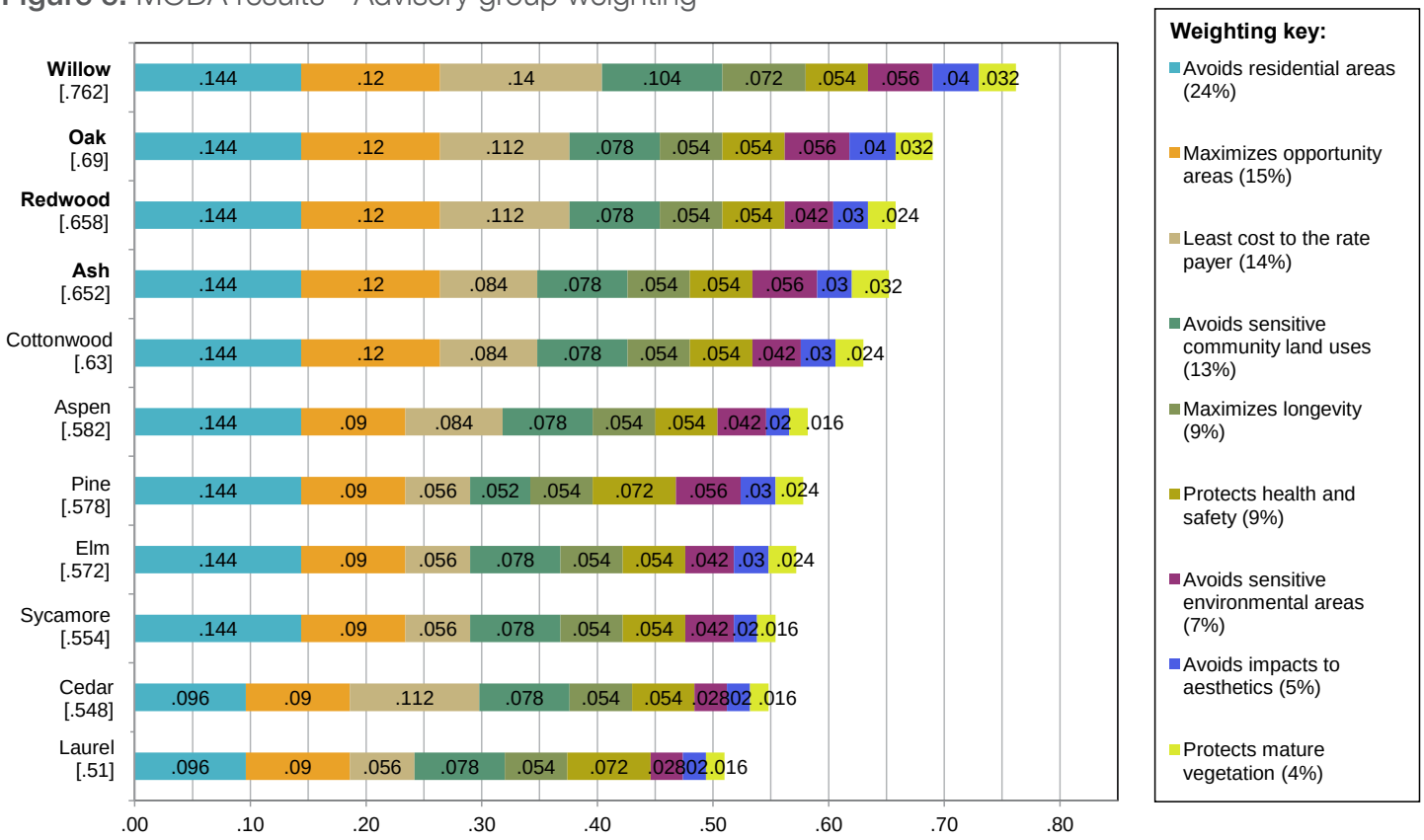
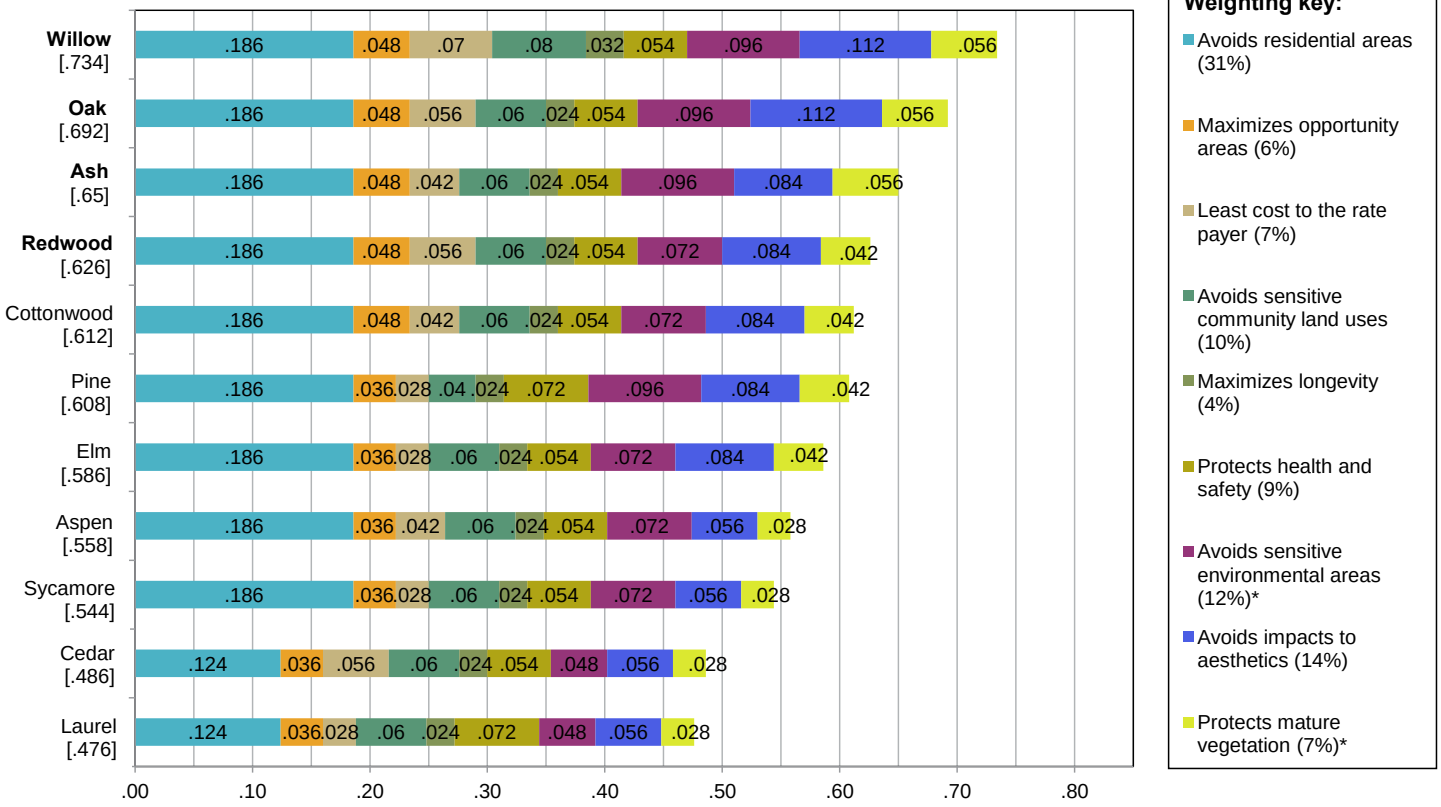


Figure 6: MODA results - Community survey weighting



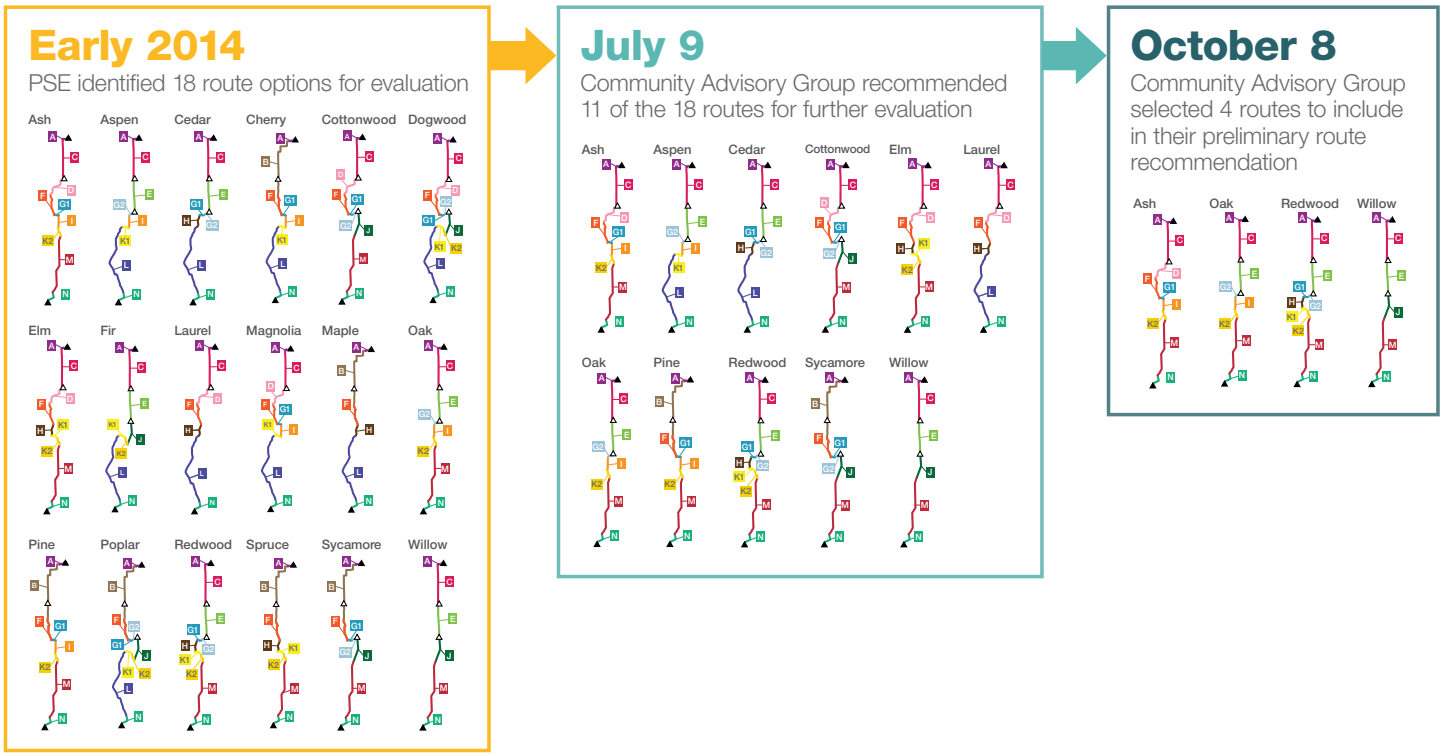
* Note: Transparent Choice, the online MODA software used to compile and calculate results, can only use weighting values that are whole numbers. As a result, the evaluation factors "Avoids sensitive environmental areas" and "Protects mature vegetation" were rounded to the nearest whole number.

October 2014: Preliminary route recommendation

At their Oct. 8 meeting, the advisory group selected four route options – Ash, Oak, Redwood and Willow – as their preliminary route recommendation (see Figure 7).[4] Information sources that helped the group determine their recommendation included:

- Results of the Multi-Objective Decision Analysis (MODA) using evaluation factor weightings from both the advisory group and community survey results
- Feedback from the summer community survey and other community input
- Discussion of the 11 route options at advisory group meetings

Figure 7. Narrowed route options and the preliminary route recommendation in October 2014



4 Of the 18 members present, 15 supported the recommendation, two members abstained and one had a dissenting opinion to include only three routes.

Reviewing results from the blind evaluation at Community Advisory Group Meeting #4b in Renton.

V. Community involvement

In addition to convening the Community Advisory Group, PSE involved the community in the public routing discussion from announcement of the project (December 2013) through the completion of the advisory group process (December 2014) by hosting community meetings, briefing organizations and gathering and responding to comments about the project.

PSE community involvement included:

- More than 240 briefings with individuals, neighborhoods, cities and other stakeholder groups
- 6 public open houses at key project milestones
- 2 online open houses
- 2 question and answer community meetings
- 1 webinar on undergrounding and electric and magnetic fields

Additional project outreach included:

- More than 2,300 comments and questions received from the public, summarized in monthly public comment and open house summaries made available to the advisory group
- 6 project newsletters and postcards sent to more than 50,000 residents and business owners
- Attendance at more than 60 community events
- A traveling kiosk displaying project updates throughout the Eastside
- Project update emails to distribution list, community organizations and elected officials
- Targeted outreach to traditionally underrepresented populations

Reviewing route option maps at Open House #1 in Renton.

Community Projects Manager Jackson Taylor providing project background at the Bellevue Strawberry Festival.

Public comment at Question and Answer Meeting #1 in Renton.

VI. Recommendation of the Community Advisory Group

On Dec. 10, 2014, the Community Advisory Group selected routes Oak and Willow as their final route recommendation for PSE's consideration (see Figure 8).

With this recommendation, the Community Advisory Group fulfilled their purpose as outlined in their charter:

"Work collaboratively, creatively and constructively to help determine community/property owner values and engage in a process to evaluate route segments and select a recommended route option."

Twenty-two advisory group members and four residential association alternates participated in the recommendation discussion. Twenty supported the final recommendation as follows:[1]

- Ten expressed preference for the Oak route
- Five expressed preference for the Willow route
- Five did not express a preference

Four advisory group members and two residential association alternates[2] – representing Bridle Trails Community Club, City of Newcastle, Liberty Ridge Homeowners Association, Olympus Neighborhood Association, Somerset Community Association, and Sunset Community Association – dissented from the recommendation and supported none of the routes. Refer to Appendix B for the dissenting opinion.

Figure 8. The Community Advisory Group final route recommendation

1 The above count includes the advisory group members and residential association alternates present at the Dec. 10, 2014 meeting, as well as six members and residential association alternates who did not attend the meeting but later provided feedback on the recommendation.

2 Darius Richards (Kennydale Neighborhood Association) and Scott Kaseburg (Lake Lanes Community Association), who supported the final recommendation in the meeting, signed the dissenting report after the meeting.

At the Dec. 10 meeting, advisory group members and residential association alternates who expressed a preference for Oak or Willow discussed several benefits and tradeoffs of each. See Table 4.

Table 4. Route benefits and tradeoffs noted by Community Advisory Group members and residential association alternates with a route preference expressed at the Dec. 10 meeting[3]

Routes	Benefits	Tradeoffs
Oak (Segments: A-C-E-G2-I-K2-M-N)	• Has fewer adjacent residential parcels (524) of the two routes • Has one quarter of adjacent residential parcels (31 in segments G2, I, K2) compared to same portion in Willow (123 in Segment J) and less than half the residences within 600 feet (289 vs. 721) • Avoids residential areas by using Segment I, which is a largely commercial corridor	• Estimated cost is $22 million more than Willow ($176 million total cost; $1.03 estimated monthly increase to an average residential customer) • Requires building infrastructure in new areas (83% of the route is within the existing corridor) • Has a larger number of adjacent residential tax accounts (1,425)
Willow (Segments: A-C-E-J-M-N)	• Has fewer adjacent residential tax accounts (1,422) of the two routes (One advisory group member noted that the difference in residences between Oak and Willow was minor.) • Is the most direct route • Has the highest percentage of route within the existing corridor (100%) • Is the least expensive ($154 million total cost; $0.90 estimated monthly increase to an average residential customer) • Has the greatest longevity (2038)	• Has a larger number of adjacent residential parcels (616) of the two routes • Uses Segment J, which is a view neighborhood

3 For more data on Oak, Willow, and all route options considered by the Community Advisory Group, refer to the complete route options data table on the Energize Eastside project website.

Discussing the final route recommendation at Community Advisory Group Meeting #6 in Bellevue.

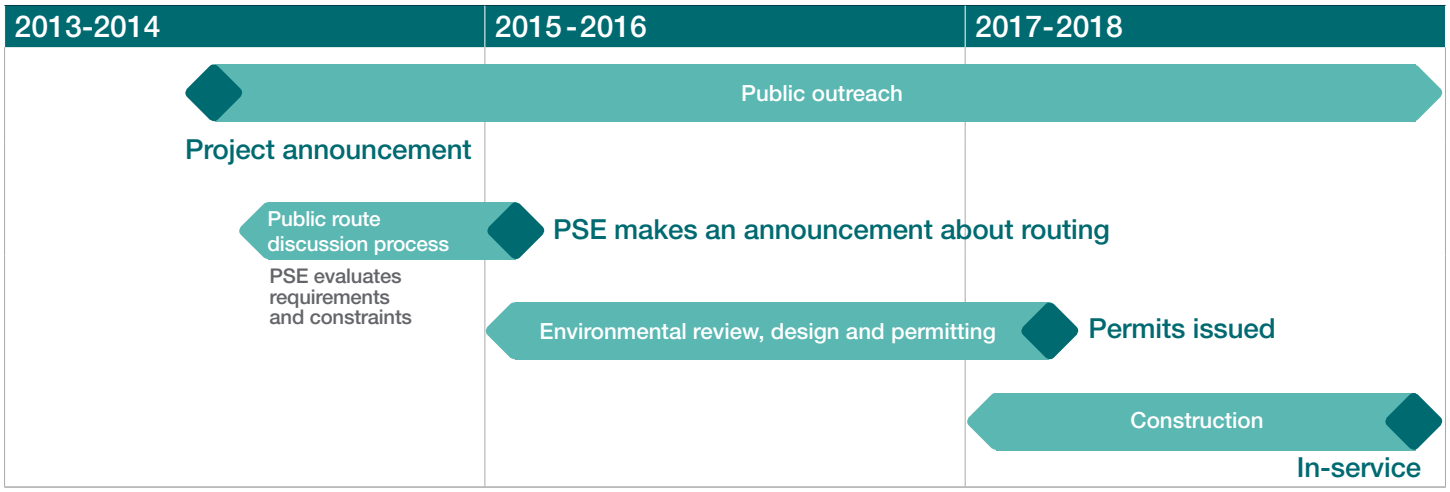
VII. Puget Sound Energy's next steps

Following the completion of the Community Advisory Group's process, PSE's next steps in 2015 are to:

- Take the Community Advisory Group's recommendation under consideration and make an announcement about routing that balances the needs of customers, the local community, property owners and PSE
- Work directly with property owners and tenants to begin detailed fieldwork to inform environmental review, design and permitting
- Ask for community input on project design, which may include pole height, finish and other design considerations
- Work with the City of Bellevue and other affected jurisdictions and agencies on the project's Environmental Impact Statement (EIS) process

Once these steps are complete, PSE will apply for necessary permits from appropriate agencies and jurisdictions. The project design and permitting phase is expected to run through early 2017. Once fully designed and permitted, project construction is expected to begin in 2017, with project completion planned for 2018. See Figure 9.

Figure 9: Project schedule and next steps



Appendices

Appendix A: Community Advisory Group Charter

Appendix B: Minority Report

Appendix C: Community Advisory Group meeting materials, presentations and summaries

Appendix D: Bibliography

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Community Advisory Group Charter

Revised:3/24/14

Purpose

The main purposes of the Community Advisory Group are to:

- Learn about PSE's proposed route segments, PSE's route analysis work to date, and the complexity of identifying the route segments, and to work with PSE to combine segments to develop a Community Advisory Group-recommend route to inform PSE as PSE selects a final route.
- Collaborate with PSE to decide on a community values-based evaluation process that will be used by the Community Advisory Group to consider PSE's various route segments, combine into possible route options, and narrow route options down to a Community Advisory Group-recommended route.
- Provide a forum for the community to give meaningful input on route segments and route options.
- Help PSE better understand community/property owner values as PSE selects the preferred route that balances the needs of their customers, the local community, property owners and PSE.

The Community Advisory Group will:

- Develop an understanding of the Energize Eastside project and project need.
- Report back to the people/groups they represent on project details, gather feedback from the interests they represent and provide ongoing communications between PSE and the group they represent throughout the process.
- Provide advice, as community representatives, on ways to address community concerns.
- Participate in geographic Community Advisory Group Sub-Area Committee meetings to determine recommended route segments.
- Work collaboratively, creatively and constructively to help determine community/property owner values and engage in a process to evaluate route segments and select a recommended route option.
- Partner with PSE to combine route segments into one Community Advisory Group recommended route.

Community Advisory Group Sub-Area Committees

- Sub-Area Committees will consist of Community Advisory Group members and their residential association alternates from each of the geographic sub-areas (North – Kirkland, Redmond and North Bellevue; Central – Bellevue; and South – Newcastle and Renton), as well as a representative from each potentially affected neighborhood association that does not have a member or residential association alternate on the advisory group. Additional community representatives will be invited as needed to ensure comprehensive discussion of issues.
- Community Advisory Group members are expected to attend the Sub-Area Committee meetings for their geographic sub-area. In order to participate in the Sub-Area Committees, members should attend the first two advisory group meetings to ensure they have an understanding of the project.
- Residential association alternates are required to attend the Sub-Area Committees to ensure balanced representation from neighborhoods. Alternates representing other interests are recommended to attend, but it is not required.
- The purpose of the Sub-Area Committees is to have an interest-based conversation on route segments and preferred sub-area options. The outcome of the Sub-Area Committee meetings will

be to develop sub-area segment combination recommendations for the full Community Advisory Group discussion.

PSE staff will:

- Provide information on the area's growth, the need for the project and the factors involved in developing route segments.
- Provide draft materials to Community Advisory Group members one week before meetings.
- Provide technical experts to provide a greater understanding of the topics at hand and inform Community Advisory Group dialogue.
- Consult with the Community Advisory Group, listen carefully and consider advisory group input prior to making final decisions on key technical issues, and explain all decisions made.
- Listen and take into consideration recommendations from the advisory group with regards to providing data and requests for analysis and research to support advisory group deliberations.

Norms for individual work as members of the Community Advisory Group

- We acknowledge our group's diversity and value different points of view. We will respect each other's opinions and will operate in consistently constructive ways.
- We will make every effort to attend meetings, to participate actively, to read and be prepared to discuss information and issues, and to be available for work between formal meetings.
- We will keep an open mind and come to meetings with interests, not entrenched positions. We will share our interests and objectives with all Community Advisory Group members. We will openly explain and discuss the reasons behind our statements, questions and actions.
- We will be responsible for representing the interests and concerns of the community we represent at the table. We will consult with our constituencies on a regular basis concerning the discussions and preferences of the Community Advisory Group.
- We will listen carefully to the views expressed by others, avoid interruptions, and seek ways to reconcile others' views with our own. We will represent information accurately and appropriately.
- We will adhere to the ground rules and respect the procedural guidance and procedural recommendations of the facilitator.

Norms for our work together

Use of time

- We will respect each other's time by being on time. Meetings will begin and end on time, unless otherwise agreed to by the Community Advisory Group members.
- When making our comments, we will consider the time needed for others to share their perspectives.

Recommending a route

- Community Advisory Group members will strive to collectively make reasonable requests and suggestions through a cooperative and collaborative discussion process with PSE. PSE will inform the Community Advisory Group of any areas of flexibility in the route recommendation development process.
- In discussions, suggestions may not represent unanimity. The facilitator is responsible for seeking and probing for group preferences. It is the responsibility of each stakeholder group member to voice dissent if s/he cannot live with any particular suggestion.
- Any recommendations from the Community Advisory Group and sub-area committees will be considered by PSE. PSE will evaluate requirements and constraints, and select a preferred route. PSE is the final decision maker regarding selecting a preferred route.
- If PSE chooses not to move forward with the recommended route as PSE's preferred route for permitting, PSE will explain the reason for its decision.

Facilitator

- We give the facilitator permission to keep the group on track and "table" discussions to keep the group moving.
- We expect the facilitator to help the Community Advisory Group accomplish our purpose in a completely neutral, balanced and fair manner.
- We want the facilitator to:
    - Develop draft meeting agendas.
    - Manage Community Advisory Group meetings and discussions.
    - Consult with Community Advisory Group members between meetings about how to manage the process and address issues of concern.
    - Prepare meeting summaries.

Role of alternates

- Each Community Advisory Group member may have one alternate who will be available to stand in for Community Advisory Group members who are unable to attend meetings. Alternates are encouraged to attend all meetings but will not be asked to participate unless called upon.
- Alternates can participate in the Sub-Area Committee meetings if they have attended both of the initial Community Advisory Group meetings.
- Community Advisory Group members are expected to update alternates between meetings so they can replace members on a moment's notice.

Role of residential association alternates

- Each Community Advisory Group member representing a residential organization may have an appointed residential association alternate that represents a different neighborhood within their city. Residential association alternates are intended to help balance representation from neighborhoods along the route segments.
- Residential association alternates can ask Community Advisory Group members to yield their seat to ask a question or make a comment during Community Advisory Group meetings.
- Residential association alternates serve as members of their geographic Sub-Area Committee and are expected to attend Sub-Area Committee meetings.

Proposed meeting ground rules

- Start / end on time
- Silence cell phones
- Come prepared
- Listen respectfully
- Speak from interests, not positions
- Participate in the process

Norms for our work with others outside the Community Advisory Group

External communications

- All Community Advisory Group meetings shall be open to the public.
- The public will be given the opportunity to comment during each Community Advisory Group meeting. Those wishing to provide public comment to the advisory group will be strongly encouraged to direct their comments towards the issues and topics of focus on the advisory group's agenda.

- We will avoid characterizing the views or opinions of other Community Advisory Group members outside of any advisory group meeting or activity.
- We will accurately describe Community Advisory Group preferences that are conveyed to PSE.
- Community Advisory Group meetings will be announced on the Energize Eastside website, and meeting announcements with date, time and location, will be provided to local blogs and other media outlets for distribution to the broader community.
- Community Advisory Group meeting products, such as agendas, summaries, and PowerPoint presentations will be posted at pse.com/energizeeastside and will be available to advisory group members for distribution to their constituents. Note: Community Advisory Group member names and affiliations will be included in these materials and will be listed on the project website.

Appendix B: Minority Report

Some Community Advisory Group members did not concur with the consensus recommendation. The report of the minority is provided here in the interest of inclusiveness. The Community Advisory Group majority has not reviewed this report; consequently, it has not been verified by the Community Advisory Group majority for consistency with the Community Advisory Group charter or for technical accuracy, either independently or in conjunction with engineering support from Puget Sound Energy. This report reflects only the opinion of its signatories.

Appendix B: Minority Report

Dissenting Report

We, the undersigned members of the "Community Advisory Group" (CAG) for PSE's Energize Eastside project, declare our dissent from the recommendations included in the Final Report of the CAG.

The CAG did not truly represent the wishes of the community for the following reasons:

1. CAG members were selected by PSE, not the community.
2. PSE misrepresented the full purpose of Energize Eastside.
3. PSE did not provide real data establishing the need for the project.
4. PSE did not provide a complete list of alternative solutions, and CAG members weren't allowed to discuss alternatives.
5. The CAG was not given real choices, because some of the route segments were never viable.
6. Few CAG members participated in critical evaluations.
7. The CAG facilitator was not impartial and frequently pressured members to support the group's conclusions.
8. CAG members were not asked to officially endorse the outcome of the CAG process.

The remainder of this report will provide additional detail regarding these eight objections.

1. CAG selection

Composition of the CAG was determined by PSE, not the community. PSE diluted the votes of residential neighborhoods that had the most at stake. Only one quarter of the voting members represented neighborhoods, and many affected neighborhoods had no representative. Some members represented organizations which receive generous donations from the PSE Foundation.

2. The full purpose of Energize Eastside

Documents available from ColumbiaGrid, Seattle City Light, and the Bonneville Power Administration make it clear that Energize Eastside solves three simultaneous problems: 1) load for PSE, 2) load for Seattle City Light, and 3) regional grid reliability for Bonneville Power Administration (a federal agency). According to a 2012 Memorandum of Agreement signed by PSE, SCL, and BPA, transmission lines in the Puget Sound region can become congested when high local needs coincide with high flows of electricity to British Columbia, especially when there are faults on BPA's trunk lines. This is a concern because the United States is obligated to provide electricity to Canada through the Columbia River Treaty. The large scale of the Energize Eastside project addresses both local and international electricity needs. However, Energize Eastside is not the only solution that can do this. It might not even be the most economical solution, when the project's impact on the community is considered. Reduced property values along the entire 18-mile length of the line cause declines in economic activity and tax receipts, which must be compensated by increasing tax rates on other residents, or decreasing support to people who need tax-funded services.

PSE never disclosed the whole purpose of the project to CAG members. The company sought to minimize regional questions by claiming only 3-8% of power flow serves Canada. While this might be true on a normal day, Energize Eastside is designed to handle extraordinary power flows that occur in rare emergency conditions. Without a full disclosure of the scope and purpose of the project, CAG members were not able to accurately represent the views of their constituents regarding the project.

3. Eastside need

PSE illustrates the need for Energize Eastside using a graph titled "Eastside Customer Demand Forecast."[1] This graph has been simplified so it can be easily grasped by the public. It shows demand growing at an average rate of 1.9% per year, crossing the "System Capacity" line in 2017. According to PSE, electricity outages will become more likely after that.

CAG members are well-informed individuals who had months to understand the issues. Therefore, we expected PSE would provide CAG members with more detailed information regarding the need for the project. There are many questions that members had. How has the Eastside's electricity demand grown over time? Why is demand supposedly growing at a much faster rate than population or economic growth? Why is PSE's projection of Eastside's demand growth more than double that of Seattle's or Portland's? Would programs such as Demand Response help mitigate our demand growth?

PSE did not answer these questions, saying that they were outside the scope of the CAG's stated mission. The CAG was formed only to provide recommendations on which route the overhead lines should take through the five Eastside cities. PSE said that community input was not needed regarding any other aspect of the project.

4. Alternative solutions

CAG members also raised questions about alternative solutions. They wondered why alternatives were eliminated from consideration and further discussion of alternatives was not allowed.

We believe it is important to list reasonable and viable alternatives to Energize Eastside here, since these ideas do not appear in the limited Final Report. The alternatives described below address only the Eastside's local need. BPA would have to build its own project to solve Canadian reliability issues, at a lower cost to PSE's customers.

The issue of cost is of critical importance to many CAG members, especially organizations representing low-income residents like Hopelink and the YMCA. It is also of interest to businesses that are sensitive to the cost of electricity. Adding 1-2% to electricity costs for the next 40 years may affect their profitability. Many CAG members would have supported lower-cost alternatives if PSE had allowed them to be explored by the CAG.

a. **Demand-side Resources.** Demand-side Resource (DSR) programs are used by utilities in almost every state to reduce the stresses of peak load service and avoid construction of new generation and transmission infrastructure. In the Northwest, Portland General Electric devotes 14 pages of its latest Integrated Resource Plan to descriptions of various programs, including a curtailment tariff, residential direct load control, critical peak pricing, and conservation voltage reduction. Similar programs were studied in a detailed report created by the Cadmus Group for PSE's most recent IRP[2]. Which of these programs is PSE planning to implement? The IRP says, "Demand response program costs are higher than supply-side alternatives at this time, and PSE does not currently have a program in place." Translation: it's cheaper to burn coal in a plant located in Colstrip, Montana (one of the dirtiest coal plants in the nation) that provides nearly 1/3 of the Eastside's electricity. The economics of cheap coal

[1] http://energizeeastside.com/Media/Default/AbouttheProject/2013_1030_Single_Line_Load_Chart_v3.png
[2] https://pse.com/aboutpse/EnergySupply/Documents/IRP_2013_AppN.pdf

and guaranteed returns for capital improvements like Energize Eastside provide little financial incentive for PSE to pursue DSR programs.

b. **Lake Tradition transformer.** For several years before Energize Eastside was conceived, PSE proposed to meet Eastside demand by adding a new 230/115 kV transformer located at Lake Tradition (near Issaquah). Additional power would be delivered on existing 115 kV lines to the Lakeside substation. PSE now claims that this solution causes other transformers to overload in power flow simulations conducted by the company. However, these simulations include the surge of electricity caused by faults in BPA's trunk lines. If BPA were to solve those problems with their own project, Lake Tradition might become a viable solution with much lower costs and community impacts than Energize Eastside.

c. **Upgrade 115 kV lines.** It's possible to use thicker wire and higher capacity transformers on existing lines to increase capacity by approximately 29%. That is enough to delay further action for at least a decade. During that time, it's likely that technologies such as grid batteries, distributed generation, and increasing efficiency will make other solutions possible. This will be cheaper than Energize Eastside, and better for the environment. Upgrading the lines at their current voltage will spare nearly 8000 mature trees that must be cut or removed along the Oak or Willow routes to accommodate a 230 kV line (according to PSE's counts). There is no record that PSE studied this option. It was never mentioned during CAG meetings.

d. **Gas powered plant.** PSE studied the possibility of meeting Eastside needs using a gas-powered generation plant. They dismissed this option in 3 sentences in their Solutions Study. Two of the potential sites for the plant were judged to be too difficult to permit, although this determination was made solely by the company without input from city officials. A third site was dismissed because it would require construction of transmission lines. Neither the CAG nor the cities were given further details about the costs of such a plant, where the transmission lines would be located, how reliability of local generation compares to remote generation, how it impacts the community, or how it might help reduce use of coal that creates much higher emissions of atmospheric carbon, mercury, and sulfur.

e. **Micro-grids and small turbines.** A national expert says that the Puget Sound area is an ideal place to use small gas turbines to inexpensively and incrementally serve peak loads. There is no record that PSE studied this option.

f. **Grid batteries.** PSE says grid batteries are likely to play an important role in the future. The company already has a pilot battery project in Bainbridge. But according to PSE, batteries are too expensive and too risky to use at this time. The company says it can forecast future demand, but it can't forecast the viability of technology solutions that might address that demand.

We believe that one or more of the above solutions would address Eastside's demand and reliability needs for many years at a lower cost than Energize Eastside, allowing us time to develop clean, sustainable solutions rather than rushing a project that is out of scale for our needs as well as our beautiful scenery.

For completeness, we will mention two other alternatives that CAG members were interested in. Both of these would solve Canadian reliability issues as well as Eastside need, but for a considerably higher price tag:

g. **Underground lines.** We list this alternative because it is the most frequently asked question by the public: "In this day and age, why can't we bury our transmission lines?" PSE has made this option politically impossible, due to a tariff the company proposed to the Washington Utilities and Transportation Commission (and which the UTC subsequently adopted). The tariff requires each community who requests an underground line to bear the high cost of underground infrastructure on their own. With the exorbitant costs estimated by PSE, this is not a realistic option for any community. While this tariff seems reasonable for local distribution lines, we hope its application to regional transmission lines will be revisited by the UTC.

h. **Underwater lines.** There are many examples in the U.S. of high-voltage transmission lines being placed in lakes, rivers, and bays. This technology is maturing rapidly. PSE said they would write a white paper on this alternative. The white paper was not released in time for consideration by the CAG.

5. No real choices

It should be no surprise that the final routes selected by the CAG mostly follow the existing transmission corridor. This is the result PSE expected from the beginning, and was confirmed by a senior PSE engineer who said the process of route selection was needed to help the public feel like they were involved in the project.

In particular, the choice between the L and M segments was a false choice. The L segment was never a legally viable option due to well-known conflicts and impacts. PSE should have known this. It is also highly questionable that the B segment was viable, due to the large amount of new right-of-way that would need to be acquired to construct that segment.

We believe the CAG process was more about PR for PSE than real choices for the community.

6. CAG participation

In several cases, only a few CAG members participated in important evaluations. For example, at the July 9th meeting, it was revealed that only 8 CAG members (less than a third of the CAG membership) participated in an evaluation process to eliminate potential routes. These low participation rates didn't occur because CAG members were lazy or on vacation. Many of the residential representatives refused to participate because they objected to the process.

7. CAG process

The facilitator for the CAG was a contractor hired by PSE, harming the appearance of impartiality. The facilitator appeared to have two goals: 1) produce a route recommendation that isn't too onerous to PSE, and 2) achieve this result using "consensus building" techniques.

Unfortunately, these goals were achieved by pressuring or cajoling CAG members to abandon their preferences and join the consensus view. For example, the facilitator would often say to a reluctant member, "Could you live with the emerging consensus of the group?" Or, "Do you want your name to be listed as the dissenting vote?" There were many times when a dissenting member would reluctantly

give up significant objections to avoid appearing obstinate or going against the other members. An anonymous ballot would have produced a different result than the facilitated outcome.

Do decisions made in this manner truly represent community values? One need only observe the audience at the final CAG meeting to answer that question. At least 90% of the 400-member audience enthusiastically supported dissenting remarks made by members of the CAG. We conclude the recommendations of the CAG do not represent the desires of the community.

This is also evident in the routes that were finally selected. Both the CAG and hundreds of residents voting online agreed that the top factor to be used to judge routes was "Avoids residential areas." For both the CAG and the community, this factor rated significantly higher than any other. However, in the rush to consensus, the CAG ignored the criterion they previously agreed was the most important and focused instead on cost. All of the routes inequitably burden residential neighborhoods with poles as high as 135 feet that are out of scale with residential land use codes.

8. No endorsements

As of December 15, CAG members were not asked to endorse the Final Report with their signatures. We note a stark contrast with the outcome of a different advisory group for a previous PSE project:

> *"We, the members of the Sammamish-Juanita 115 kV Project Stakeholder Advisory Group, affirm and support this recommendations report to Puget Sound Energy. We believe PSE's community-involved siting process for this project has been transparent and reflects community input."*

Why aren't members of our CAG signing a similar statement in support of their recommendations for Energize Eastside? Could members of this CAG sign a positive statement like this in good faith?

Conclusion

Energize Eastside is one possible step towards our energy future. This is a decision that should be made by citizens and their elected representatives, taking into account values such as community impact, environmental impact, cost, reliability, and safety. This decision should not be made by a utility company or an advisory group with little community support.

The undersigned members of the CAG declare our dissent with the CAG's Final Report.
(By signing this document, we are not rescinding the opinions we expressed or votes we cast during CAG meetings, but simply stating our dissent with the overall project and process.)

Norman Hansen CAG, BELLEVUE BRIDLE TRAILS COMMUNITY

Tim McHarg, City of Newcastle

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Darius F. Richards

Steven D. O'Donnell

David T. Evans

Lindy Bruce Sunset Community Assn.

Appendix C: Community Advisory Group Meeting Materials, Presentations, and Summaries

The following links provide all Community Advisory Group meeting materials, presentations and meeting summaries:

Jan. 22, 2014 - Community Advisory Group Meeting #1
Convened the advisory group

Feb. 12, 2014 - Community Advisory Group Meeting #2
Learned about the solution selection process and project routing

June 4, 2014 - Community Advisory Group Meeting #3
Reviewed key findings from the Sub-Area Workshops and Committee Meetings

June 25, 2014 - Community Advisory Group Meeting #4a
Reviewed potential route options

July 9, 2014 - Community Advisory Group Meeting #4b
Narrowied potential route options and finalizing evaluation factors

Oct. 1, 2014 - Community Advisory Group Meeting #5a
Reviewed key findings from the open houses and preparing for route evaluation

Oct. 8, 2014 - Community Advisory Group Meeting #5b
Developed preliminary route recommendation

Dec. 10, 2014 - Community Advisory Group Meeting #6
Finalized route recommendation for PSE to consider

Appendix D: Bibliography

The list below includes key reports developed by PSE and/or third-party experts, the findings of which were shared with the Community Advisory Group. All linked documents are available on the Energize Eastside project website at pse.com/energizeeastside.

Quanta Technology and Puget Sound Energy, *Eastside Needs Assessment Report*, 2013.

- Executive Summary
- Full Report

Quanta Technology and Puget Sound Energy, *Eastside Transmission Solutions Report,* 2013.

- Executive Summary
- Full Report

TetraTech, *Eastside 230 kV Project Opportunity and Constraints Study for Linear Site Selection,* 2013.

- Executive Summary
- Full Report

Energy + Environmental Economics, *Non-wire Solutions Analysis*, 2014.

- Full report

Power Engineers, *Underground Feasibility Study,* 2014.

- Full report
- Appendix A - Aerial Route Drawings (part 1)
- Appendix A - Aerial Route Drawings (part 2)
- Appendix B - Typical Detail Drawings

Additional documents referenced throughout the Final Report:

Puget Sound Regional Council 2013 Land Use Baseline: Maintenance Release 1 (MR1), update April 2014.

Letter from Seattle City Light, June 2, 2014.

Tariff schedule 80, section 34, 2006

Attachment: C
PSE South Bellevue Segment CUP Analysis

Puget Sound Energy - Energize Eastside Conditional Use Permit

Description of Proposal – South Bellevue Segment

Puget Sound Energy, Inc. (PSE) proposes the construction of a new substation in Bellevue (the "Richards Creek substation") and the upgrade of 18 miles of two existing 115 kV transmission lines with 230 kV lines (collectively the "Energize Eastside Project" or the "Project"). The new substation and upgraded lines are needed to address electrical system deficiencies identified during federally-required planning studies. Combined with aggressive conservation, the Project significantly improves reliability for Eastside communities, including the City of Bellevue (City), and will supply the additional electrical capacity needed for current and anticipated growth.

The existing system is not robust enough to maintain reliable service if the entire facility is taken out of service at one time. Therefore, the Energize Eastside Project will be constructed in two phases. This will allow PSE to keep the existing 115 kV facilities partially in service during construction, which will allow PSE to maintain reliable service to all customers during construction. This approach best ensures that PSE continues to deliver reliable electricity to all of PSE's customers during construction. The first phase (the "South Bellevue Segment") is the focus of this application and includes the following components:

- Construction of the Richards Creek substation, a new 230 kV to 115 kV substation in Bellevue. The Richards Creek substation will be constructed directly south of PSE's existing Lakeside Switching Station. Situated on parcel 1024059083, the 8.46 acre substation site is currently used as a PSE pole storage yard.

- Upgrading 3.3 miles (Bellevue Portion) of existing 115 kV lines with 230 kV lines between the Lakeside and Talbot Hill substations. This requires replacing existing wood H-frame poles with steel monopoles. After deliberate review and extensive stakeholder input, PSE proposes to undertake this work in the existing transmission line corridor rather than siting a new corridor through Eastside communities. Within the existing utility corridor, the proposed pole locations for the rebuilt lines will generally be in the same locations as the existing poles. Selective tree removal will also be required within the managed corridor to meet federal vegetation management requirements and PSE standards. Use of the existing corridor (which has housed transmission lines since the 1920s and 30s) minimizes environmental impacts and impacts to adjacent uses to the fullest extent feasible.

The following section demonstrates PSE's compliance with the City of Bellevue's Conditional Use Decision Criteria (LUC 20.30B.140):

A. The conditional use is consistent with the Comprehensive Plan; and

Response: The proposed transmission line replacement and substation construction are consistent with the City's Comprehensive Plan. As stated in the introduction to the Land Use Element of the Comprehensive Plan:

One of the fundamental roles of the Comprehensive Plan is to anticipate, guide, and plan for a growth in a way that helps the city achieve its vision. The plan is a tool to look ahead to the likely growth and ensure that the city's plans for land uses, infrastructure, and services are aligned.

PSE has a statutory duty to provide safe and reliable power at a reasonable cost. *See* RCW 80.28.010(2). The Energize Eastside project is a key electrical infrastructure project needed to bring a 230 kV power source to the Eastside region, including the City of Bellevue, the region's largest city and job center. As required by the state Growth Management Act, one of the elements that must be addressed in the City's Comprehensive Plan is Utilities.

As stated in the Utilities Element, the City must plan for adequate provision of utilities consistent with the goals and objectives of the Comprehensive Plan, *taking into consideration the public service obligation of the utility involved*.

The expansion of the PSE Sammamish to Talbot Hill transmission corridor is shown in the Comprehensive Plan's Map UT-7. PSE is proposing to replace two existing 115 kV transmission lines with two 230 kV transmission lines within the existing corridor. In addition, expansion of the Lakeside substation is also included on the UT-7 map.

The goals outlined in the Utilities Element are:

- *To develop and maintain all utilities at the appropriate levels of service to accommodate the city's projected growth.*
- *To ensure reliable utility service is provided in a way that balances public concerns about infrastructure safety and health impacts, consumer interest in paying a fair and reasonable price for service, potential impacts on the natural environment, and aesthetic compatibility with surrounding land uses.*
- *Utility facilities are permitted and approved by the city in a fair and timely manner and in accord with development regulations, to encourage predictability.*
- *New technology to improve utility services and reliability is balanced with health and safety, economic, aesthetics, and environmental factors.*

As explained in detail below, the following policies support these goals and are applicable to the proposed Energize Eastside transmission line upgrade and substation project:

General Utility System	
UT-3: Use design and construction standards that are environmentally sensitive, safe, cost-effective, and appropriate. **UT-8:** Design, construct, and maintain facilities to minimize their impact on surrounding neighborhoods.	**Response:** The proposed transmission line replacement will have temporary construction impacts on surrounding neighbors as many of the transmission poles are within easements in residential backyards. Construction impacts will be minimized to the greatest extent feasible through use of

	existing or historic access routes that were used for initial pole installation and/or maintenance activities. As required by state law, utility locates will be performed prior to ground disturbing activities to avoid any potential conflicts. Appropriate temporary erosion control measures will be used during work activities. A safe work area will be established around each pole removal and installation location, providing space for placing equipment, vehicles, and materials. PSE also complies with all City codes relating to hours of construction and noise. PSE will work with individual property owners to restore areas impacted during construction to its previous or an improved state. PSE will mitigate in-kind as required by applicable regulations when restoration is not possible. All applicable codes and standards will be followed during design and construction, including electrical, stormwater and erosion control, tree protection, and noise. PSE's proposed use of the existing utility corridor minimizes impacts on surrounding neighborhoods by preventing new impacts. The properties adjacent to the proposed transmission line upgrade already house transmission lines. By locating new poles in proximity to existing pole locations, PSE's proposed line minimizes impacts to surrounding neighborhoods. The Richards Creek Substation has been sited in a Light Industrial zoning district on a parcel that is substantially larger than the substation footprint. This location provides a high level of screening and compatibility with the surrounding land uses.
Utility Coordination	
UT-18: Coordinate with other jurisdictions and governmental entities in the planning and implementation of multi-jurisdictional utility facility additions and improvements.	**Response:** The proposed transmission line upgrade is a linear utility project that crosses through multiple jurisdictions (including the cities of Redmond, Bellevue, Renton and Newcastle; collectively "Partner Cities"). In addition, because some of the early route alternatives crossed through the City of Kirkland, it also participated in the EIS process. The south segment of this project

	will traverse the cities of Bellevue, Renton and Newcastle, while the north half traverses Bellevue and Redmond. Significant outreach and coordination efforts have occurred to inform potentially affected entities about the proposed project, a process reflected in the Phase 1 and Phase 2 Draft Environmental Impact Statements, which were developed co-operatively by the Partner Cities. King County was invited to participate in the EIS process with the Partner Cities, but declined.
General Non City-Managed Utilities	
UT-45: Coordinate with non-city utility providers to ensure planning for system growth consistent with the city's Comprehensive Plan and growth forecasts. **UT-47:** Defer to the serving utility the implementation sequence of utility plan components. **UT-48:** Coordinate with the appropriate jurisdictions and governmental entities in the planning and implementation of multi-jurisdictional utility facility additions and improvements. **(same as UT-18)**	**Response:** PSE meets with the City of Bellevue on an annual basis to share information and understand the City's projected growth and key development projects. Forecasts for capacity needs are based upon anticipated growth. In 2012, the City of Bellevue published an Electrical Reliability Study, which was performed by their third party consultant, Exponent, to ensure that PSE was planning for and providing a reliable power supply to the City. The Exponent study determined that short-term and long-range planning efforts were on target to provide a reliable power supply. Long-term planning at that time forecasted the need to upgrade the existing transmission line. Based upon the findings of the study, the City and PSE conduct an annual electrical reliability workshop to discuss electric system reliability (system performance and metrics) and planned reliability projects. Project construction will be done in two sequential phases to ensure continuous power supply at all times. In 2015, the City of Bellevue commissioned an independent technical analysis of the need for the proposed Energize Eastside transmission line project. The City's consultant, Utility Systems Efficiencies (USE) confirmed that: the project is needed to address the reliability of the electric grid on the Eastside. Consistent with this conclusion, PSE has determined that it must proceed with the permitting and construction of the Energize Eastside Project as soon as

	is feasible. In preparation for the construction of the Energize Eastside Project, PSE has been in close communication with Olympic Pipeline Company to ensure coordination during construction and operation of the Energize Eastside Project. PSE has also coordinated with other utilities, such as the various telecommunications companies, Seattle Public Utilities, and Sound Transit.
UT-60: Work with Puget Sound Energy, telecom providers, state regulatory agencies, and other responsible parties to develop funding tools to enable full mitigation of the neighborhood impacts of deploying electrical and telecommunications infrastructure.	If requested by third party tenant utilities (typically communications), the existing facilities will be transferred to the new poles. Approvals for such changes would be obtained by the cellular operators from the jurisdiction agency. With respect to the Energize Eastside Project, PSE will complete all mitigation required under the City's land use code and applicable law. Alternative funding sources are not needed in this instance.
UT-64: Require the reasonable screening and/or architectural compatible integration of all new utility and telecommunications facilities.	**Response:** The Land Use Code addresses substation screening in LUC 20.20.255.F. Transmission lines are exempt from screening requirements. Richards Creek substation will be substantially screened from surrounding land uses by native vegetation from adjoining properties. The site is surrounded to the north by PSE's existing Lakeside Switch Substation parcel, to the south by King County's Factoria Transfer Station Facility and to the west by a water and wastewater supply company with outdoor storage. There is significant vegetation screening between each of the properties due to the presence of stream and wetland critical areas. The property to the east of the site is upslope and contains a fenced stormwater detention facility that receives stormwater from a multifamily development complex east of the site across 139th Avenue SE. Between the stormwater pond tract and 139th Avenue SE, there are two parcels of heavily forested park land owned by the City of Bellevue. In addition to this permanent screening, PSE is proposing to augment tree removal on the slope between the new substation and the

	eastern property boundary with tree and shrub screening vegetation compliant with the Land Use Code. Transmission poles do not naturally blend in with the surrounding environment. PSE is proposing to offset the aesthetic impacts through pole design and finish selection based on neighborhood context, replacing poles as close to existing pole locations as possible, consolidating two lines on one pole where feasible, reducing the overall number of poles, and designing poles to the minimum height necessary based on topography, site context, and electrical design standards. Different types of finish are available for the replacement steel poles include naturally weathering (Corten), galvanized, or powder coated. Corten is long-lasting and low maintenance. When the steel is exposed to moisture and air, a rust patina forms. As the structure rusts it becomes brown in appearance, and over time the patina darkens in color. Once the patina forms on weathering steel, a natural protective layer prevents corrosion. The use of Corten steel poles is very suitable, and often preferred, within forested areas because of their rust brown finish. Galvanized steel is a common choice for transmission poles because of its durability and low maintenance characteristics. The pole is coated with a layer of zinc that prevents the steel from rusting. Initially, the steel can have a shiny finish, but as the zinc weathers it becomes dull in appearance. Galvanizing provides decades of protection for steel from corrosion. It is gray in color and is better suited for areas with minimal backdrop as to better blend in with the skyscape. Powder Coated steel is used less often. It provides an even and durable low maintenance finish, but the process of powder coating steel is labor intensive and expensive. It is usually reserved for specific areas or for design district mitigation

	purposes. Pole finish will be determined based upon accessibility to the pole, characteristics of the surrounding environment, community preference, and/or environmental restrictions.
UT-68: Encourage the use of utility corridors as non-motorized trails. The city and utility company should coordinate the acquisition, use, and enhancement of utility corridors for pedestrian, bicycle, and equestrian trails and for wildlife corridors and habitat.	**Response:** The proposed transmission line upgrade is located within an existing corridor that was established in the late 1920s and early 1930s and is mostly composed of easements on private property. Residential and commercial development has occurred around the easement areas, limiting public access. Additionally, much of the corridor is within private backyards and is fenced off, preventing connectivity between properties. There are existing areas along the corridor where informal trails have been established on larger parcels. These include south of the Lake Hills Connector behind the Sunset Hills Memorial Park near Kelsey Creek Park and City of Bellevue Utilities and Parks (including Coal Creek Park) parcels in the south Somerset neighborhood. There is an established regional trail in south Bellevue and Newcastle along the SPU waterline corridor adjacent to the PSE transmission corridor. PSE's proposed project will not cause long-term impacts to access to these existing trails.
UT-69: Avoid, when reasonably possible, locating overhead lines in greenbelt and open spaces as identified in the Parks and Open Space System Plan.	**Response:** The existing corridor crosses over City of Bellevue Parks property in some locations. PSE's transmission corridor was established prior to the establishment of the City and prior to the designation of property for public park use. In areas such as Coal Creek Park, the corridor has provided the opportunity for the establishment of an informal trail. By locating the upgraded transmission facilities in the existing corridor, PSE is avoiding any new impacts to parks and open space.
UT-72: Encourage cooperation with other jurisdictions in the planning and implementation of multi-jurisdictional utility facility additions and improvements. Decisions made regarding utility facilities shall be made in a manner consistent with, and complementary to, regional demand and resources, and shall reinforce an interconnected regional distribution network.	**Response:** The proposed transmission line upgrade is a linear utility project that crosses through multiple jurisdictions (including the cities of Redmond, Bellevue, Renton and Newcastle; collectively "Partner Cities"). In addition, because some of the early route alternatives crossed through the City of Kirkland, it also participated in the EIS process. The south segment of this project

	will traverse the cities of Bellevue, Renton and Newcastle. Significant outreach and coordination efforts have occurred to inform potentially affected entities about the proposed project, a process reflected in the Phase 1 and Phase 2 Environmental Impact Statements which were developed co-operatively by the Partner Cities. King County was invited to participate in the EIS process with the Partner Cities, but declined. The purpose of the Energize Eastside project is to bring a new 230 kV power source to the Eastside region to meet capacity and reliability needs as determined through PSE planning studies. The 230 kV power brought into Richards Creek substation will supply existing and future 115 kV transmission lines providing power to the entire Eastside region. All of the Partner Cities, including those directly impacted by construction of the south segment, will experience increased reliability and the transmission system will be better able to meet forecasted increases in electricity demands.
UT-75: Prior to seeking city approval for facilities, encourage utility service providers to solicit community input on siting of proposed facilities which may have a significant adverse impact on the surrounding community.	**Response:** The PSE Energize Eastside team has engaged in public outreach since the project launched in December 2013. In 2014, PSE led a public route discussion process, shared information about the project with the public, and solicited and obtained considerable public input. PSE continues to inform the public about the project and connect with property owners regarding fieldwork efforts through mailers, emails, PSE's website, public testimony to decision-makers, and public meetings. Throughout 2014, PSE worked with a Community Advisory Group (CAG) to identify and consider the values held by the community in evaluating different transmission line route options and potential substation locations. CAG members represented various interests, including potentially affected neighborhood organizations, cities, schools, social service organizations, major commercial users, and economic development groups. The CAG looked at factors used to develop different route options, narrowed the route options

	based on values and constraints, and prepared route option recommendations for PSE's consideration. Throughout the CAG process, PSE held public open houses to inform the public of the CAG's work and hosted additional community meetings and events to share information, respond to questions, and learn more about community values and interests. PSE has also provided numerous presentations and briefings to individual property owners, neighborhood groups, organizations, and other interested stakeholders. PSE regularly informs the public about the project and its development process through mailings, email updates, and a project website. To date, public outreach, and involvement has included: • 22 Community Advisory Group-related meetings, including • 6 public open houses, 2 question and answer sessions, and 2 online open houses at key project milestones • 500+ briefings with individuals, neighborhoods, cities and other stakeholder groups • More than 2,900 comments and questions received • 30+ email updates to more than 1,500 subscribers • 8 project newsletters to 55,000+ households • Ongoing outreach to 500+ property owners, including door-to-door and individual meetings • Participation in 16 EIS-related public meetings
UT-77: Require all utility equipment support facilities to be aesthetically compatible with the area in which they are placed by using landscape screening and/or architecturally compatible details and integration.	The use of the existing utility corridor is the most effective method of ensuring area compatibility, as the proposed route replaces existing equipment rather than creating new corridors. In addition, the replacement of H-frame poles with fewer steel poles helps to reduce visual interference and is arguably an improvement from existing conditions. Pole finishes can also enhance integration with various settings. PSE is working closely with the City to identify City preferences on variables that may further increase

	compatibility with surrounding areas (e.g., pole color and pole height).
Non City-Managed Utilities – Additional Electrical Facilities Policies	
UT-91: Encourage the public to conserve electrical energy through public education.	PSE has led all northwest utilities in energy conservation since 1979. Its energy-efficiency programs have helped PSE customers conserve nearly 5 billion kilowatt-hours of electricity. PSE continues to develop and undertake aggressive conservation programs. More information can be found in PSE's 2014-2015 Biennial Conservation Report, Electric Programs and at: https://pse.com/savingsandenergycenter/About/Pages/default.aspx
UT-94: Require in the planning, siting, and construction of all electrical facilities, systems, lines, and substations that the electrical utility strike a balance between potential health effects and the cost and impacts of mitigating those effects by taking reasonable cost-effective steps.	**Response:** PSE has conducted studies on potential health effects of the proposed transmission line upgrade, which have been peer reviewed by City of Bellevue consultants through the State Environmental Policy Act (SEPA) review and drafting of an Environmental Impact Statement (EIS) for this project. In particular, the EIS looked at electric and magnetic fields (EMF) and pipeline safety. As outlined in the *Phase 2 Draft Environmental Impact Statement* no unavoidable significant adverse impacts were identified that could result from the Energize Eastside project related to health effects.
UT-95: Work with Puget Sound Energy to implement the electrical service system serving Bellevue in such a manner that new and expanded transmission and substation facilities are compatible and consistent with local context and the land use pattern established in the Comprehensive Plan. *Discussion: Where feasible, electrical facilities should be sited within the area requiring additional service. Electrical facilities primarily serving commercial and mixed use areas should be located in commercial and mixed use areas, and not in areas that are primarily residential. Further, the siting and design of these facilities should incorporate measures to mitigate the visual impact on nearby residential areas. These*	**Response:** The Energize Eastside project is required because an additional 230 kV power source is required to serve the Eastside region, inclusive of Bellevue, and meet federal planning requirements. PSE studies have concluded that the power source must be centrally located in the defined Eastside region. The transmission lines will connect the new power source (a new transformer) with existing 230 kV substations in the region in Redmond, at the Sammamish substation, and in Renton, at the Talbot Hill substation. This project will serve all uses in the Eastside service area, including industrial, commercial, residential, and public facilities in the City of Bellevue. Projected electricity demand in the City of Bellevue, which is a population and job center on the Eastside, significantly

considerations should be balanced with the community's need to have an adequate and reliable power supply.	contributed to the need for PSE's proposed project. Thus, the proposed transmission line facilities will serve the areas requiring additional service. The City of Bellevue is made up of a mix of land uses that have developed around the utility corridor that was established in the late 1920s and early 1930s. The corridor is identified in the Utilities Element of the Comprehensive Plan on both Map UT-6 (Existing Facilities) and Map UT-7 (Proposed Facilities). An Alternative Siting Analysis has been completed as required by the City of Bellevue Land Use Code and Comprehensive Plan for transmission corridors identified as sensitive sites. As described in the Phase I DEIS, the proposed Richards Creek Substation will be located in an area zoned as light industrial. Land uses surrounding the substation site include a mix of industrial, institutional, vacant lands, and utility (PSE's Lakeside substation). A private school (Chestnut Hill Academy) is about 325 feet north of the substation site, adjacent to (and just east of) the Lakeside substation. As the proposed substation is adjacent to an existing PSE substation, it is compatible and consistent with local context and the land use pattern which already integrates utilities. Similarly, the proposed transmission lines will be sited in the existing utility corridor and traverses a variety of land uses (including commercial, industrial, multi-family residential, and single family residential districts). The corridor predates the incorporation of the City and the existing land use patterns already integrate the utility facilities, keeping the proposed project compatible and consistent with local context and land use patterns. This conclusion is confirmed by the Phase 2 DEIS, which found that impacts to land use will be "be less-than-significant because [the proposed project] is consistent with city and subarea plans, and would not adversely affect existing or future land use patterns."

	DEIS at 3.1-37.
UT-96: Require siting analysis through the development review process for new facilities, and expanded facilities at sensitive sites, including a consideration of alternative sites and collocation. *Discussion: Sensitive facility sites are those new facilities and existing facilities proposed to be expanded where located in or in close proximity to residentially – zoned districts such that there is potential for visual impacts absent appropriate siting and mitigation. The city will update Map UT-7 to the extent needed to stay current with changes in Puget Sound Energy's system planning.*	**Response:** PSE has prepared a siting analysis as required for expanded facilities at sensitive sites. Please see the Energize Eastside Alternative Siting Analysis - South Phase submitted with the Conditional Use Permit application for this project.
UT-97: Avoid, minimize, and mitigate the impacts of new or expanded electrical facilities through the use of land use regulation and performance standards that address siting considerations, architectural design, site screening, landscaping, maintenance, avoidable technologies, aesthetics, and other appropriate measures.	**Response:** The City of Bellevue and partner jurisdictions of Redmond, Renton, Kirkland, and Newcastle are in the process of completing a Final Environmental Impact Statement (FEIS) that addresses anticipated impacts from the proposed Energize Eastside project. Avoidance, minimization, and potential mitigation measures are discussed in detail in the *Phase 2 Draft Environmental Impact Statement* for the Energize Eastside project. Alternative technologies were analyzed in detail in the *Phase 1 Draft Environmental Impact Statement*. PSE proposes mitigation that fully complies with all of all of the City's code requirements. Mitigation measures include, but are not limited to, revegetation, pole height reduction, and selection of pole finishes that are suitable to the context. PSE is also in discussions with the City to coordinate and ensure that any impact identified during the Partner Cities' State Environmental Policy Act review are avoided, minimized and mitigated to the extent feasible under the law (*i.e.,* any mitigation must be proportionate to identified impacts caused by the proposed project).
UT-98: Discourage new aerial facilities within corridors that have no existing aerial facilities.	**Response:** PSE is proposing to replace two existing aerial 115 kV lines with two 230 kV lines within an existing, established utility corridor. No new aerial facilities are proposed outside the corridor.

UT-99: Work with and encourage Puget Sound Energy to plan, site, build and maintain an electrical system that meets the needs of existing and future development, and provides highly reliable service for Bellevue customers. *Discussion: Providing highly reliable service is a critical expectation for the service provider, given the importance of reliable and uninterrupted electrical service for public safety and health, as well as convenience. Highly reliable service means there are few and infrequent outages, and when an unavoidable occurs in its short duration and customers are frequently updated as to when power is likely to be restored. A highly reliable system will be designed, operated and maintained to keep pace with the expectations and needs of residents and businesses as well as evolving technologies and operating standards as they advance over time.*	**Response:** PSE has prepared two studies that describe the need for the Energize Eastside project: the *Eastside Needs Assessment Report* and the *Supplemental Eastside Needs Assessment Report* (Gentile et al., 2014, 2015). The deficiency in the transmission capacity on the Eastside is based on a number of factors. Key factors include growing population and employment in the Eastside (including significant projected growth in Bellevue), changing power consumption patterns, and changing utility regulations that require a higher standard of reliability. PSE has concluded that the most effective and efficient solution to meet the need objectives is to site a new 230 kV transformer at a central location on the Eastside that will be fed from the Sammamish substation in Redmond from the north and the Talbot Hill substation in Renton from the south. This decision is consistent with the City's comprehensive plan, which requires not just reliable power, but "highly reliable" power. Without adding transmission capacity, a deficiency during peak periods could develop on the Eastside as early as the winter of 2017-2018, with the potential for load shedding (forced power outages) by the summer of 2018. The proposed project is needed to meet the needs of the City's residents and businesses.

Environmental Element

The proposed transmission line replacement and substation project will have impacts on environmental resources within the City of Bellevue.

Environmental Stewardship	
EN-12: Work toward a citywide tree canopy target of at least 40% canopy coverage that reflects our "City in a Park" character and maintain an action plan for meeting the target across multiple land use types including right-of-way, public lands, and residential and commercial uses. **EN-13:** Minimize the loss of tree canopy and natural areas due to transportation and infrastructure projects and mitigate for losses, where impacts are unavoidable.	**Response:** Selective tree canopy will be removed as part of the substation development and transmission line upgrade. Strict federal clearance requirements must be met with the upgrade from a 115 kV transmission corridor to a 230 kV transmission corridor, resulting in additional vegetation management within the existing corridor. Mature vegetation will also be cleared to construct the proposed substation on the Richards Creek substation site and prevent mature vegetation from falling into

	the new substation and causing an outage. Substation-compatible trees and understory will be used to restore areas where tree removal is to occur outside the substation footprint. Additionally, wildlife snags will be created where possible from trees removed. To mitigate for loss of significant trees in the transmission corridor, PSE is proposing mitigation ratios that meet or exceed regulatory standards. PSE will work with individual property owners to replace trees on private property. Where individual property owners decline to have new trees planted onsite, PSE will work with the City to place additional trees offsite. PSE is required by federal standards to maintain safe clearances between vegetation and utility lines. The upgraded transmission lines will have to comply with PSE's 230 kV vegetation management standards, which generally require removal of trees located in the wire zone that have a mature height of more than 15 feet. Taller trees within the transmission right of way may also be affected depending on tree species, tree health, distance from the wires, and topography. PSE has been meeting with property owners along the existing corridor to discuss tree replacement and will continue to work together to develop property-specific landscaping and tree replacement plans. It is anticipated that a number of trees cannot be replaced onsite due to property owners' preferences. In those cases, replacement trees will need to be planted outside the corridor. One benefit of offsite planting is the option to plant larger trees that will contribute to habitat quality and area aesthetics. Offsite options may include city parks, neighborhood groups/HOAs, and developments within the Spring District. PSE will work with the City to identify other offsite areas that would benefit from these trees. PSE's goal is that the proposed project will result in a net increase in the number of trees, which should assist the City in

	achieving its tree cover goals.
Water Resources	
EN-19: Retain existing open surface water systems in a natural state and restore conditions that have become degraded.	**Response:** The substation development will include the replacement of the existing culvert under the access driveway with a fish passable culvert that will enhance drainage and sediment flow within the stream channel. The stream channel will be regraded to assist with sediment transport and create habitat for potential fish species. Habitat will also be enhanced along the stream channel on the Richards Creek substation site. No other natural open surface water systems in Bellevue will be affected by the project.
EN-26: Manage water runoff for new development and redevelopment to meet water quality objectives, consistent with state law.	**Response:** The proposed substation development will occur on a site with existing impervious surface and an associated stormwater detention pond. The new substation development will meet current City of Bellevue Stormwater Engineering Design Standards. The existing pond will be replaced with a stormwater vault to control runoff from the substation site. These measures are protective of state water quality objectives.
Geo Hazards	
EN-30: Regulate land use and development to protect natural topographic, geologic, vegetational, and hydrological features. **EN-39:** Use specific criteria in decisions to exempt specific small, isolated, or artificially created steep slopes from critical areas designation. **EN-40:** Minimize and control soil erosion during and after development through the use of best management practices and other development restrictions.	**Response:** All applicable City of Bellevue land use and clearing regulations, including LUC 20.25H.125 – Performance Standards, will be complied with as part of the Energize Eastside project construction. There will be selective tree removal and 24 poles (20 in buffers and 4 in critical area - south half) will be replaced within geo hazard areas. Per the Bellevue code, areas that do not meet the 10 foot rise or 1,000 square feet threshold (including small engineered or manmade slopes) have been removed from the geo hazard analysis. A temporary erosion and sediment control plan will be developed for the project, including the transmission corridor and substation site. Necessary best management practices (BMPs) will be used as appropriate, including chipping and scattering of removed vegetation. Disturbance will be limited to the minimum necessary within geo hazard areas, including limiting equipment access and disturbance

	areas. All disturbed areas will be restored.
Fish and Wildlife Habitat	
EN-63: Preserve and maintain fish and wildlife habitat conservation areas and wetlands in a natural state and restore similar areas that have been degraded. **EN-67:** Prohibit creating new fish passage barriers and remove existing artificial fish passage barriers in accordance with applicable state law. **EN-70:** Improve wildlife habitat especially in patches and linkages by enhancing vegetation composition and structure, and incorporating indigenous plant species compatible with the site. **EN-71:** Preserve a portion of significant trees throughout the city in order to sustain fish and wildlife habitat.	**Response:** Impacts to fish, wildlife, wetlands and habitat conservation areas are discussed and analyzed in detail in the Critical Areas Report and Biological Evaluations associated with the proposed project. As explained in those documents, limited disturbance is anticipated within fish and wildlife habitat areas and wetlands. Existing poles within wetlands will be replaced outside of wetland areas to the greatest extent feasible. Buffer impacts will be limited to the pole footprint and selective vegetation management activities required by federal clearance standards. The Richards Creek culvert replacement and restoration project will significantly enhance fish passage and habitat along the existing stream channel at the Richards Creek substation site. This will provide linkages to mitigation areas on the adjacent Lakeside substation and King County Transfer Station sites.
Critical Areas	
EN-84: Use science based mitigation for unavoidable adverse impacts to critical areas to protect overall critical areas function in the watershed.	**Response:** The proposed mitigation for wetland and buffer impacts caused by the Energize Eastside project will be mitigated using the best available science in compliance with LUC 20.25H, the City of Bellevue's critical areas code. The Richards Creek culvert replacement and stream restoration will result in measurable habitat improvement to critical area functions and values. Mitigation specifics are presented in the associated Critical Areas Report.

Subareas

The existing transmission corridor crosses through the Richards Valley, Factoria, and Newport Hills Subareas identified in the Comprehensive Plan. The Richards Creek substation site is located within the Richards Valley subarea.

Richards Valley	
General Land Use	
Policy S-RV-1. Enhance the natural environment within the industrial area by encouraging redevelopment to consider natural features in site design, including but not limited to reducing impervious surface,	**Response:** The proposed Richards Creek substation will be located on a site zoned as Light Industrial within the Richards Valley subarea. The site contains wetland and stream critical areas. The substation

improving the functions of wetlands and stream corridors, incorporating natural drainage features, retaining trees, and restoring vegetated corridors.	development will be consolidated on the portion of the site that results in the least impact to critical areas. The existing stream corridor and associated wetlands will be enhanced through the replacement of the existing culvert with a fish passable culvert, which will also improve stream and sediment flow and fish habitat. The corridor will be enhanced with appropriate vegetation to provide stream and wetland habitat improvements. The associated Critical Areas Reports provide additional information.
Natural Determinants	
Policy S-RV-6. Protect and enhance the capability of Richards Creek, Kelsey Creek, and Mercer Slough and their tributaries to support fisheries along with other water-related wildlife. **Policy S-RV-7.** Retain and enhance existing vegetation on steep slopes, within wetland areas, and along stream corridors to control erosion and landslide hazard potential and to protect the natural drainage system.	**Response:** The Richards Creek culvert replacement and stream enhancement project on the Richards Creek substation site will support stream habitat through the replacement of an existing under-sized culvert with a fish passable culvert that will improve stream and sediment flows in the channel. Habitat along the stream will also be improved and will enhance the natural drainage system. Additional description and analysis of landslide hazard potential associated with the project can be found in the Bellevue South Segment Critical Areas Report.
Utilities	
Policy S-RV-20. Use common corridors for new utilities if needed. *Discussion: If new power lines are needed in the Subarea, they should be developed in areas that already contain power lines, rather than causing visual impacts in new areas.*	**Response:** The existing 115 kV transmission lines within the Sammamish-Lakeside-Talbot Hill corridor will be upgraded to 230 kV in lieu of the development of a new corridor. The Richards Creek substation site is also located along the existing corridor.
Policy S-RV-21. Improve the appearance of public streets and power line rights-of-way.	The transmission line corridor within the Richards Creek subarea is located in a Light Industrial land use district. There are currently numerous transmission lines and other utilities in the corridor. PSE will explore opportunities with the City.
Community Design	
Policy S-RV-33. Develop areas designated for light industrial uses with sensitivity to the natural constraints of the sites.	**Response:** The Richards Creek substation will be located within the Light Industrial zoning district. It will be developed on the least sensitive portion of the site, making use of existing disturbed areas and limiting new impacts to critical areas and buffers.
Factoria	
General Land Use	

Policy S-FA-2: Protect single family neighborhoods from encroachment by more intense uses.	**Response:** The transmission line project will upgrade existing transmission lines within an existing transmission corridor, avoiding encroachment into neighboring single-family areas. The vast majority of the area development has occurred around the transmission corridor, which was established in the late 1920s and early 1930s. Any single family neighborhoods adjacent to the proposed line are already adjacent to the existing transmission lines.
Critical Areas	
Policy S-FA-8: Protect and enhance the capability of Sunset Creek, Richards Creek, Coal Creek, and their tributaries to support fisheries and other water related wildlife. **Policy S-FA-9:** Retain and enhance vegetation on steep slopes, within wetland areas, and along stream corridors in order to control erosion, reduce landslide hazard and to protect the natural drainage system.	**Response:** The Richards Creek culvert replacement and stream enhancement project on the Richards Creek substation site will support stream habitat through the replacement of an existing under-sized culvert with a fish passable culvert that will improve stream and sediment flows in the channel. Habitat along the stream will also be improved and will enhance the natural drainage system. Additional description and analysis of landslide hazard potential associated with the project can be found in the Bellevue South Segment Critical Areas Report.
Utilities	
Policy S-FA-24. Encourage the undergrounding of utility distribution lines in areas of new development and redevelopment.	Energize Eastside is a transmission project. Policy S-FA-24 it not applicable as it only applies to distribution lines.
Newport Hills	
General Land Use	
S-NH-8. Protect significant trees and environmentally-sensitive areas (steep slopes, riparian corridors, and wetlands) in accordance with the provisions of the Land Use Code.	**Response:** Selective tree removal will occur within the corridor, including in critical areas, to meet federal clearance requirement for vegetation management. Most disturbance within these areas will be temporary and restored to an equal or better condition. Unavoidable impacts to trees and critical areas will be mitigated in accordance with the provisions of the Land Use Code.
Environment	
S-NH-28. Ensure that all new development and redevelopment includes measures to protect and enhance surface water quality.	**Response:** The transmission line upgrade project will result in little net stormwater runoff. Appropriate BMPs will be used during construction to ensure protection of potentially affected surface water. The wetland rehabilitation and culvert

	replacement proposed in conjunction with the Richards Creek substation will likely have a positive effect on surface water quality.
S-NH-30. Protect and enhance fish and wildlife habitat in environmentally-sensitive areas.	**Response:** Where possible, areas with fish and wildlife habitat will be avoided. If impacts are unavoidable, the appropriate mitigation will be included as required by the Land Use Code.

B. *The design is compatible with and responds to the existing or intended character, appearance, quality of development and physical characteristics of the subject property and immediate vicinity; and*

Response: The Energize Eastside project is compatible with and responds to the existing character, appearance, quality of development and physical characteristics of the subject site and immediate vicinity.

Richards Creek Substation. The property currently serves as a pole storage yard and has a utility corridor with existing transmission lines, water pipelines, and a petroleum pipeline through the center of the site. It is well screened from surrounding uses by mature vegetation. The site is surrounded to the north by PSE's existing Lakeside Switch substation, to the west by industrial development including a water and wastewater supply company, to the south by King County's Factoria Solid Waste Transfer Station, and upslope to the east by a stormwater detention facility tract that is heavily vegetated. The substation use is consistent with the uses in the area and the current use of the site. Located within the Light Industrial (LI) zoning district, the existing site screening will be enhanced with the Richards Creek culvert replacement project and stream restoration and enhancement proposal.

Transmission Line. The transmission line corridor is an existing utility corridor that was established in the late 1920s and early 1930s. The current uses adjacent to the corridor developed over time as areas were annexed into the City and these areas became more dense and populated. The utility corridor is part of the existing character of these areas. PSE is proposing to replace the existing 115 kV transmission poles with steel poles to accommodate 230 kV conductors. The poles will generally be installed in the same location or in close proximity to the existing poles. In most cases, the number of poles will be reduced from four to one or two. The consistency of the proposed transmission lines with other uses in the vicinity was confirmed by the Phase 2 DEIS, which found that impacts to land use will be "be less-than-significant because [the proposed project] is consistent with city and subarea plans, and would not adversely affect existing or future land use patterns." DEIS at 3.1-37.

The DEIS identified potential aesthetic impacts with respect to a limited number of poles located in the Somerset neighborhood. PSE has diligently worked to reduce these aesthetic impacts. For example, the DEIS assessed aesthetic impacts by assuming that all poles

would be a rust/brown color. Alternative pole colors, however, are a powerful and effective tool in reducing contrast with the horizon and aesthetic impacts. PSE accordingly proposes the use of transmission line poles that are either galvanized or powder coated with a light blue or light grey paint to decrease any perceived contrast with the horizon in the Somerset viewshed. Consideration of pole finish will also be evaluated along the entire project to help minimize potential aesthetic impacts. Additional information is provided above under the UT-64 discussion.

PSE has also undertaken additional design work to refine pole placement, reduce the number of poles, decrease pole height and use more streamlined pole designs. Based on this, PSE has determined that pole height in the Somerset area can be reduced from the around 85-foot poles analyzed in the DEIS to approximately 75-foot poles.

In many areas, PSE further proposes using a *delta* conductor configuration that uses less hardware rather than the arguably more impactful rectilinear design assessed in the DEIS. By limiting the area of visual impact and mirroring other natural elements, PSE can effectively mitigate aesthetic impacts and ensure consistency with adjacent uses.

C. *The conditional use will be served by adequate public facilities including streets, fire protection, and utilities; and*

Response: The transmission line upgrade will consist of replacing two existing 115 kV transmission lines within an existing 100-foot wide corridor, with two 230 kV lines in the same corridor. No new permanent access or other public facilities will be required to accommodate the upgraded lines. The proposed substation will be constructed on an existing PSE-owned site within the Light Industrial zoning district north of I-90. The site currently serves as a pole storage yard and is accessed from SE 30th Street. The existing driveway will be realigned to serve the new substation and a new fish passable culvert will be installed under the driveway to assist with stream sediment capacity and flow. The existing transmission corridor and new substation will not require any new permanent access or public facilities or services. Traffic to the new substation will be minimal and will not require additional public facilities.

D. *The conditional use will not be materially detrimental to uses or property in the immediate vicinity of the subject property; and*

Response: ***Richards Creek Substation.*** Bellevue's land use code does not define "materially detrimental." But a recent Division I decision found that "'material' can be defined as '[b]eing both relevant and consequential; crucial.' And 'detrimental' means '[c]ausing damage or harm; injurious.'" *Puget Sound Energy, Inc. v. East Bellevue Community Council*, Case No. No. 74464-0-1 (January 30, 2017). Applying this definition, the new substation will not be materially detrimental to uses or properties in the immediate vicinity of the subject property because it builds on the existing utility facilities and is consistent with the surrounding Light Industrial uses.

The area around the proposed Richards Creek Substation site houses industrial warehouses, PSE's Lakeside substation, an elementary school, a range of commercial building types, and two- to three-story apartment/condo buildings. The site itself is currently used as a pole storage yard and is situated within the Light Industrial zoning district north of I-90 in Factoria. As stated in the DEIS "[o]verall, visual quality is low in the vicinity of the Richards Creek substation site because the built environment dominates the natural environment (except for the undeveloped wooded area to the east) and building form lacks consistency, the built environment consists of an industrial area with different building forms and configurations and large parking lots, and a high presence of utility infrastructure that varies in form (Lakeside substation and 115 kV transmission lines)." DEIS at Table 3.2-1.

The Richards Creek substation will be screened with existing or replacement vegetation, and adjacent to other compatible uses, such as the PSE Lakeside switching substation and the King County Factoria Transfer Station facility. As analyzed in detail in the Partner Cities' Phase 2 DEIS, "[t]here would be no long-term impacts to land use and housing from operation of the substation *because the Richards Creek substation would be compatible with the existing and nearby land uses (industrial) and neighborhood character*." DEIS at 3.1-21. This supports a finding that the proposed substation would not materially damage or harm current uses in the vicinity. In addition, the DEIS concluded that the Richards Creek substation is consistent with future light industrial uses proposed for the parcel. DEIS at 3.1-21. As such, the proposed facility would not be materially harmful to future land uses proposed in the vicinity.

Transmission Line—South Segment. The south segment of the proposed transmission line upgrade will also not be materially detrimental to uses or properties in the immediate vicinity. PSE proposes siting the south segment along the same corridor used by existing transmission lines. This corridor has been established for almost a century. Because adjacent land uses and properties already integrate transmission line facilities, they will not be materially impacted by replacement of the existing transmission line facilities. The consistency of the proposed transmission lines with other uses in the vicinity was confirmed by the Phase 2 DEIS, which found that impacts to land use will "be less-than-significant because [the proposed project] is consistent with city and subarea plans, and would not adversely affect existing or future land use patterns." DEIS at 3.1-37.

With respect to aesthetic impacts to properties in the vicinity of the proposed transmission line, the DEIS describes the south segment as follows:

> Areas with generally high visual quality include the Coal Creek Natural Area (where the natural environment is less disturbed by the built environment) and residential areas away from the existing transmission line that have consistent building height and form. Areas with generally low visual quality are those located along I-90 and residential areas located adjacent to the transmission line. Utilities

> are present, including a 115 kV transmission line, and the utility configuration has consistent form and height along the option.

DEIS at 3.2-13. The DEIS ultimately concludes that, with the exception of the Somerset neighborhood, "[c]ontrast with the existing aesthetic environment would generally be low because the transmission line would be within the existing corridor." DEIS at 3.2-69.

PSE understands that some community groups in Somerset are concerned about the change in height of poles associated with the upgraded transmission line and may argue that this causes a materially detrimental impact to viewscapes that already house poles. A majority of these homes are outside of the "immediate vicinity" of PSE's proposed transmission line upgrade. That said, to limit materially harmful and damaging impacts to *all* of PSE's Bellevue customers, PSE proposes using the existing utility line corridor where transmission lines currently exist.

PSE's engineers continue to work diligently at each pole location to solicit community and property owner feedback on pole design, reduce the height of all poles to the extent technically feasible and safe, and to move pole location when feasible. PSE's engineers have had significant success advancing these goals. For example, proposed pole height in the south segment was reduced from an average of approximately 95 ft (as analyzed in the DEIS) to around 85 ft. These efforts limit perceived impacts, minimize perceived magnitude of change, and ensure that there are no materially detrimental impacts.

Assessment of aesthetic impacts is highly subjective and adaptable (*i.e.*, people become acclimated to a changed aesthetic environment). *See e.g.*, DEIS at 3.2-25 ("Because the value of scenic views and the aesthetic environment is subjective, it is difficult to quantify or estimate impacts."); DEIS at 3.10-1 ("studies have found that the effects on property values… tend to diminish over time after the project is constructed."). One more objective rubric for assessing harm to properties in the vicinity is house values. The Phase I and Phase II of the DEIS confirmed that there would be no materially detrimental impact to house values resulting from PSE's proposed transmission line upgrade. DEIS at 3.10-1—2; *see also*, Energize Eastside Project -- Phase I Draft Environmental Impact Statement at Ch. 10-21—22 (summarizing studies detailing economic impacts of transmission lines on housing values). This is especially significant as the studies reviewed contemplated the siting of a new transmission line, rather than a transmission line upgrade where similar utilities already exist. The DEIS's conclusions on economic impacts provides further evidence that PSE's proposed transmission line upgrade would not be materially harmful to properties in the immediate vicinity.

E. The conditional use complies with the applicable requirements of this Code.

Response: The proposed transmission line upgrade and substation project complies with the applicable requirements of the City of Bellevue code as evidenced through the documentation provided by this Conditional Use application.

LUC 20.20.255.E: Electrical utility facility decision criteria:

1. The proposal is consistent with Puget Sound Energy's System Plan;

Response: The need for additional 230 kV capacity in the Eastside region was identified, and has been included in PSE's Electrical Facilities Plan for King County ("Plan"), since 1993. As explained in the Plan, "[t]he 230 kV sources for the 115 kV system in northeast King County are primarily the Sammamish and Talbot Hill substation. The loads on the 230-115 kV transformers in these stations will be high enough to require new sources of transformation." Additionally, the "Lakeside 230 kV Substation project [now referred to as Energize Eastside] will rebuild two existing 115 kV lines to 230 kV between Sammamish and Lakeside [where PSE proposes the construction of the Richards Creek substation], and between Lakeside and Talbot Hill."

2. The design, use, and operation of the electrical utility facility complies with applicable guidelines, rules, regulations, or statutes adopted by state law, or any agency or jurisdiction with authority;

Response: Performance requirements for any integrated transmission system are heavily regulated at both the federal and regional levels. PSE's regulators include FERC, NERC and WECC (the Federal Energy Regulatory Commission, North American Electric Reliability Corporation and Western Electricity Coordinating Council, respectively).

NERC is the regulatory authority certified by FERC to develop and enforce reliability standards. NERC has delegated the task of monitoring and enforcing the federal reliability standards to WECC, the regional entity that has authority over transmission in the western region.

The NERC standards mandate that certain forecasts and studies must be completed to determine if the system has sufficient capability to meet expected loads now and in the future. When completing transmission planning studies, contingencies are simulated to determine if the electric system meets the mandatory NERC performance requirements[1] for

[1] The transmission planning standards that were in effect in 2012-2013 were: TPL-001-3, TPL-002-0b 2nd Rev (TPL-002-2b), TPL-003-0b 2nd Rev (TPL-003-2b), and TPL-004-2. TPL-001-3, TPL-002-2b, TPL-003-2b, and TPL-004-2 are being retired as they are replaced in their entirety by TPL-001-4. Enforcement of the new standards began January 1, 2015. Visit the NERC website at http://www.nerc.com/pa/Stand/Reliability Standards/TPL-001-4.pdf for more information.

a given set of forecasted demand levels, generation configurations and levels, and multiple system component outages.

Notwithstanding questions of likelihood, federal regulations require that the appropriate planning be undertaken proactively. This conservative planning methodology is implemented to prevent large scale, cascading, transmission system blackouts, like those that have occurred in the recent past (for example, the 2003 Northeast blackout that affected 55 million people in the Northeast and Midwest regions of the United States and Canada).

The PSE transmission planning studies performed in 2013 and 2015 determined that thermal violations on transmission line and transformer equipment might occur under foreseeable scenarios within the next few years. The thermal violations are a result of running scenarios for several component outage contingencies, as required by NERC, that take into consideration peak demand (which is heavily dependent on seasonal temperatures and daily demand profiles) and levels of conservation. In essence, this is a requirement to have redundancy in the transmission system.

2.2.4 FERC FINDINGS AND CONCLUSION

In an effort to stop PSE's Energize Eastside project, a complaint was filed with the Federal Energy Regulatory Commission (FERC) against PSE and other utilities (Attachment A). FERC dismissed all aspects of the complaint, stating:

> "Based on the record before us, we find that Puget Sound [PSE] and the other Respondents complied with their transmission planning responsibilities under Order No. 890 in proposing and evaluating the Energize Eastside Project." (FERC Docket No. EL15-74-000, Order Dismissing Complaint, Issued Oct. 21, 2015.)

The FERC response also concluded:

> "We agree with Puget Sound [PSE] and ColumbiaGrid that the Energize Eastside Project was properly classified a Single System Project because it was designed to address Puget Sound's projected inability to serve its own customers, ColumbiaGrid's Puget Sound Area Study Team did not find any Material Adverse Impacts associated with the project, and ColumbiaGrid included the project as a Single System Project in its most recent 2015 Biennial Plan. Accordingly, we find that the Energize Eastside Project was proposed and evaluated in accordance with the then-applicable transmission planning requirements." (FERC Docket No. EL15-74-000, Order Dismissing Complaint, Issued Oct. 21, 2015.)

3. *The applicant shall demonstrate that an operational need exists that requires the location or expansion at the proposed site;*

Response: The Richards Creek substation is essentially an expansion of the Lakeside substation, which is mapped as a "non-sensitive" site in the City's Comprehensive Plan (Map UT-7). Normal practice is to have the 230 kV station co-located with the adjoining 115 kV station; however, due to topographic and environmental considerations located south of the Lakeside substation, expanding the station in that direction would be challenging. Therefore, placing the two stations on separate parcels was determined to be the most effective approach. Since the two yards have separate access points, they are required to have different names for operational and emergency purposes.

Using the existing transmission line corridor provides the shortest path between the Sammamish substation in the north and the Talbot Hill substation in the south to the Lakeside substation area. Operationally, replacing the existing 115 kV lines with 230 kV lines utilizes an existing corridor without the need for creating a new one through areas that do not have transmission lines today.

4. *The applicant shall demonstrate that the proposed electrical utility facility improves reliability of the system as a whole, as certified by the applicant's licensed engineer;*

Response: In total, five separate studies performed by four separate parties have confirmed the need to address Eastside transmission capacity (20.20.255.E.4; D.3.b & c):

- Electrical Reliability Study by Exponent, 2012 (City of Bellevue);
- Eastside Needs Assessment Report by Quanta Services, 2013 (PSE);
- Supplemental Eastside Needs Assessment Report by Quanta Services, 2015 (PSE);
- Independent Technical Analysis by Utility Systems Efficiencies, Inc., 2015 (City of Bellevue); and
- Review Memo by Stantec Consulting Services Inc., 2015 (EIS consultant)

All of these studies are provided in the Alternative Siting Analysis. These studies were reviewed and confirmed by Jens Nedrud, Manager of System Planning, a WA State licensed engineer. See Attachment B (containing PSE's Certification of Need).

PSE transmission planning studies demonstrate that, under certain contingencies, the delivery system on the Eastside could not continue to meet reliability requirements without significant infrastructure upgrades.

The Needs Assessment reports published in 2013 and 2015 and performed pursuant to the mandatory federal transmission planning standards, identified four major areas of concern:

1. Overload of PSE facilities in the Eastside area. Studies identified potential overloading of transformers at Sammamish and Talbot Hill substations, and several 115 kV transmission lines routing power to the Eastside area are at risk of overloading under certain conditions.
2. Small margin of error to manage risks from inherent load forecast uncertainties. PSE's planning studies rely in large part on load forecast data. Imbedded in PSE's load forecasts are several factors that include elements of risk. These include conservation, weather and block loads.
    - Conservation: To date, PSE customers have achieved 100 percent of the company's conservation goals, which are very aggressive within the industry. If 100 percent of conservation goals are not achieved, then the transmission system capacity will be surpassed sooner than expected.
    - Weather: PSE's load forecast assumes "every other year" cold weather. (Some utilities take a more conservative approach, using the coldest and hottest weather in five or ten years, as inputs to system performance studies[2].) If the region experiences weather extremes outside of those used in PSE's planning studies, electricity demand will surpass the transmission system capacity sooner than expected.
    - Block loads: These include large development projects that add significant load to the system. If block load growth increases more than anticipated, demand for electricity will surpass the transmission capacity sooner than expected.
3. Increased use and expansion of Corrective Action Plans (CAPs) to keep the system compliant. CAPs are a series of operational steps used to prevent system overloads or loss of customers' power. They are a short-term fix to alleviate potential operational conditions that could put the entire grid at risk. They protect against large-scale, cascading power outages; however, they can put large numbers of customers at increased risk of power outages. For example, to prevent winter overloads on the Talbot Hill transformer banks, PSE is already using CAPs, which increases outage risk to customers. As growth continues, additional CAPs will be needed. By Federal standards, CAPs are not intended to be long-term solutions to system deficiencies.
4. Impacts to interconnections identified by ColumbiaGrid. Though the need for Energize Eastside is driven by local demand, because the electric system is interconnected for the benefit of all, it is a federal requirement to study all electric transmission projects to ensure there are no material adverse impacts to the reliability or operating characteristics of PSE's or any surrounding utilities' electric systems. ColumbiaGrid, the regional planning entity, produces a Biennial Transmission Expansion Plan that addresses system needs in the Pacific Northwest, including the PSE system.

    PSE's 2015 Supplemental Needs Assessment Report confirmed the winter deficit findings in the 2013 Needs Assessment Report, stating that:

[2] For example, ISO-NE plans to a 90/10 or one in ten year weather forecast.

By winter of 2017-18, there is a transmission capacity deficiency on the Eastside that impacts PSE customers and communities in and around Kirkland, Redmond, Bellevue, Issaquah, Newcastle, and Renton along with Clyde Hill, Medina, and Mercer Island... ***By winter of 2019-20, at an Eastside load level of approximately 706 MW, additional CAPs are required that will put approximately 63,200 Eastside customers at risk of outages.***

The 2015 Needs Assessment also confirmed that by summer of 2018, there would be a transmission capacity deficiency on the Eastside that impacts PSE customers and communities in and around Kirkland, Redmond, Renton, Bellevue, Issaquah and Newcastle along with Clyde Hill, Medina and Mercer Island. **By summer of 2018, CAPs will be required to manage overloads under certain N-1-1 contingencies, and the use of these CAPs will place approximately 68,800 customers at risk and could require 74 MW of load shedding, affecting approximately 10,900 customers at a time.**

Based on the 2015 Needs assessment, if the Energize Eastside project gets delayed until after the summer of 2018, load shedding may be used as a corrective action plan to meet the mandatory reliability requirements defined by NERC. This could result in PSE having to turn the power off to tens of thousands of customers under certain forecasted conditions and would be necessary to prevent more widespread outages beyond the Eastside area. To further study this, in 2015 PSE commissioned Nexant to simulate three scenarios of rotating outages that could be needed if no action is taken to upgrade the Eastside's transmission system. Nexant's Energize Eastside Outage Cost Study determined that if PSE must use corrective action plans that include rolling blackouts, more than 130,000 customers could be impacted as early as the summer of 2018, at a cost of tens of millions of dollars to the local economy.

Load shedding is not a practice that PSE or many other responsible utilities use (unless absolutely necessary). Since load shedding adversely impacts residential, commercial and industrial customers, and surrounding cities, towns and neighboring communities, it is necessary and good utility practice to coordinate with cities, towns, municipal officials and emergency services, and to publicly inform those affected.

The City of Bellevue contracted with Utility System Efficiencies, Inc. (USE) to perform an independent technical analysis (ITA) of the purpose, need and timing of the Energize Eastside project, and this study confirmed the capacity deficiency in the Eastside area. The ITA was performed to verify the project need and PSE's study methods, as these were questioned by a small public opposition group.

The ITA concluded that "PSE used reasonable methods to develop its forecast showing the Eastside area growing at a higher level [faster pace] than the county or system level". Additionally, the ITA addressed common questions about the project, including:

- Is the Energize Eastside project needed to address the reliability of the electric grid on the Eastside? **The ITA determined, "YES."**
- If the load growth rate was reduced, would the project still be needed? **The ITA determined, "YES."**
- If generation was increased in the Puget Sound area, would the project still be needed? **The ITA determined, "YES."**
- Is there a need for the project to address regional flows, with imports/exports to Canada ? **The ITA determined that by modeling zero flow to Canada, the project is still necessary to address local need**.

5. *For proposals located on sensitive sites as referenced in Figure UT.5a of the Utility Element of the Comprehensive Plan, the applicant shall demonstrate:*
   a. *Compliance with the alternative siting analysis requirements of subsection D of this section;*

   See PSE's Alternative Siting Analysis.

   b. *Where feasible, the preferred site alternative identified in subsection D.2.d of this section is located in the land use district requiring additional service and residential land use districts are avoided when the proposed new or expanded electrical utility facility serves a nonresidential land use district;*

   As explained in the five studies assessing the need for Energize Eastside, PSE's proposed transmission line upgrade is responsive to projected growth in the Eastside generally and the City of Bellevue specifically.

6. *The proposal shall provide mitigation sufficient to eliminate or minimize long-term impacts to properties located near the electrical utility facility.*

   The Phase 1 and Phase 2 DEISs identified limited unavoidable significant adverse impacts. PSE is committed to implementing avoidance, minimization, and mitigation identified through the SEPA review process where feasible to avoid and address any significant adverse impacts. PSE is committed to fully complying with all mitigation required in the City's code and permit conditions. Specifically, PSE will mitigate those impacts identified in the Critical Areas Report, as well as tree impacts that are necessary to meet federal transmission line operational standards. PSE will work with affected property owners, the City, and other stakeholders to replace trees in the most effective manner that meets the permit conditions.

F. *Design Standards:*
In addition to the requirements set forth in Part 20.30B LUC, Part 20.30E LUC, Part 20.25B LUC (if applicable), and other applicable provisions of this section, all proposals to locate or expand an electrical utility facility shall comply with the following:

1. *Site Landscaping. Electrical utility facilities shall be sight-screened as specified in LUC 20.20.520.F.2 or as required for the applicable land use district. Alternatively, the provisions of LUC 20.20.520.J may be used, provided this subsection does not apply to transmission lines as defined in LUC 20.50.018.*

   Response: The proposed project in the South Bellevue Segment consists of a transmission line corridor and substation site. This requirement is not applicable within the transmission line corridor. At the Richards Creek substation site, LUC 20.20.520.F.2 requires 15 feet of Type I landscaping on all sides of the substation, subject to restrictions on landscaping within critical areas. The substation site contains wetland and stream critical areas on the north, south, and western portions of the site.

   As part of the Conditional Use Permit submittal, PSE has submitted a landscape plan proposing the required landscape screen along the eastern side of the substation with a combination of proposed replacement trees and existing understory vegetation. The screen will be elevated above the existing substation due to a retaining wall and screens the substation from undeveloped property that is forested and contains a stormwater detention facility that serves multi-family development further east across 139th Ave SE.

   LUC 20.20.520.F.6 states that if a proposal is located within the Critical Area Overlay District, the Director shall waive the planting requirement of F.2 and shall require the use of native vegetation within the critical area or critical area buffer in lieu of landscape development if the width of the existing vegetation is at least twice that as required under F.2. Supplemental plantings can be added to achieve the required width. Existing critical areas along the north side of substation are within the transmission corridor that leads to PSE's existing Lakeside switching station. Critical areas located to the south and west of the proposed substation will be enhanced as part of the Richards Creek culvert replacement and restoration portion of the substation project.

2. *Fencing. Electrical utility facilities shall be screened by a site-obscuring fence not less than eight feet in height, provided this subsection does not apply to transmission lines as defined in LUC 20.50.018. This requirement may be modified by the City if the site is not considered sensitive as referenced in Figure UT.5a [UT-7] of the Utility Element of the Comprehensive Plan, is adequately screened by topography and/or existing or added vegetation, or if the facility is fully enclosed within a structure. To the maximum extent possible, all electrical utility facility components, excluding transmission lines, shall be screened by either a site-obscuring fence or alternative screening.*

   Response: This criterion is only applicable to the Richards Creek substation portion of the project and not the transmission corridor. The Richards Creek substation site on Figure UT.5a (now Map UT-7 in the Comprehensive Plan) is a non-sensitive site. Additionally, the site is sufficiently screened by critical area vegetation (existing and proposed enhancement) and based on the site topography, location at the end of a public street, and the proposed location of the substation footprint setback in the hill to the east, it is unlikely the substation will be noticeably visible from outside the substation property.

3. *Required Setback. The proposed (including required fencing) shall conform to the setback requirement for structures in the land use district.*

   Response: The required structure setbacks for the Light Industrial zoning district are:

	Required	Proposed
Front	15 feet	280 feet
Rear	15 feet	63 feet
Side	15 feet	168 feet /87 feet

4. *Height limitations. For all electrical utility facility components, including transmission lines, the City may approve a request to exceed the height limit for the underlying land use district if the applicant demonstrates:*
   a. The requested increase is the minimum necessary for the effective functioning of the electrical utility facility; and

   Response: The request to exceed the height limit is the minimum necessary for the effective and safe functions of the transmission lines. The existing corridor is located within different zoning districts throughout the City, including residential, commercial, and industrial. The replacement pole height will need to increase over the current pole height. NESC provides minimum clearance requirements for conductors from the ground based on operating temperature and loading to account for sag. These safety standards also require increased separation between the three conductors necessary for each circuit, when the voltage is increased from 115 kV to 230 kV. This increased conductor separation adds height to the poles. Poles are designed to meet the minimum height, the required safety and design standards, and ensure effective functioning of the transmission line during all operational conditions.

   b. Impacts associated with the electrical utility facility have been mitigated to the greatest extent technically feasible.

   Response: As stated in Decision Criterion E6 above and the Alternative Siting Analysis, the location of the new transmission line minimizes impacts to adjacent properties by using an existing transmission line corridor that was established more than eighty years ago. The site selected for the substation is located in a Light Industrial zoning district on a large property that provides a greater opportunity for natural and enhanced screening. Additionally, extensive engineering, which included design and operational parameters, was undertaken to minimize pole height to the extent possible. This approach also allowed for a reduction in EMF, which in turn allowed for the lowest AC interaction with other utilities that share the corridor. Flexibility of pole finish has been accounted for in an effort to help minimize the contrast of the replacement poles with the dominant background.

ATTACHMENT A
FERC Order

153 FERC ¶ 61,076
UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

Before Commissioners: Norman C. Bay, Chairman;
Philip D. Moeller, Cheryl A. LaFleur,
Tony Clark, and Colette D. Honorable.

Coalition of Eastside Neighborhoods for Sensible Energy,
Citizens for Sane Eastside Energy,
Larry G. Johnson,
Glenna F. White, and
Steven D. O'Donnell

v. Docket No. EL15-74-000

Puget Sound Energy,
Seattle City Light,
Bonneville Power Administration, and
ColumbiaGrid

ORDER DISMISSING COMPLAINT

(Issued October 21, 2015)

1. In this order, we dismiss a complaint (Complaint) filed by the Coalition of Eastside Neighborhoods for Sensible Energy, Citizens for Sane Eastside Energy, and individuals Larry G. Johnson, Glenna F. White, and Steven D. O'Donnell (collectively, Complainants) against Puget Sound Energy (Puget Sound), Seattle City Light, a department of the City of Seattle (Seattle), Bonneville Power Administration (Bonneville), and ColumbiaGrid (collectively, Respondents).

I. Background

2. Puget Sound, Seattle, and Bonneville are members of ColumbiaGrid, a non-profit membership corporation whose purpose is to coordinate the operation, use, and expansion of the Pacific Northwest transmission system. Currently, however,

Puget Sound is the only Respondent that is an enrolled member in the ColumbiaGrid transmission planning region, established by certain parties to comply with Order No. 1000.[1] Puget Sound is planning to construct a transmission project consisting of approximately 18 miles of electric transmission lines and associated substation upgrades between the Cities of Redmond and Renton in the State of Washington (Energize Eastside Project). Specifically, the Energize Eastside Project will add a 230/115 kV transformer near Puget Sound's Lakeside Substation and rebuild the existing Sammamish-Lakeside-Talbot 115 kV lines to convert them to 230 kV lines. The exact location of the rebuilt 230 kV transmission lines will be determined after the completion of the state Environmental Impact Statement and local land use permitting processes, which are currently underway. The Energize Eastside Project will be located completely within Puget Sound's service territory. Puget Sound is planning to construct the project in order to accommodate projected local load growth that Puget Sound projects will create local transmission capacity deficiencies in the area beginning by the winter of 2017-18.

3. On June 9, 2015, Complainants filed the Complaint pursuant to section 206 of the Federal Power Act (FPA)[2] and Rule 206 of the Commission's Rules of Practice and Procedure.[3] Complainants allege that the Energize Eastside Project was promoted and implemented by Respondents in a manner that violates Order Nos. 890[4] and 1000. Complainants also assert that Respondents have violated Order No. 2000,[5] "contractual

[1] *Transmission Planning and Cost Allocation by Transmission Owning and Operating Public Utilities*, Order No. 1000, FERC Stats. & Regs. ¶ 31,323 (2011), *order on reh'g*, Order No. 1000-A, 139 FERC ¶ 61,132, *order on reh'g and clarification*, Order No. 1000-B, 141 FERC ¶ 61,044 (2012), *aff'd sub nom. S.C. Pub. Serv. Auth.* v. *FERC*, 762 F.3d 41 (D.C. Cir. 2014) (Order No. 1000).

[2] 16 U.S.C. § 824e (2012).

[3] 18 C.F.R. § 385.206 (2015).

[4] *Preventing Undue Discrimination and Preference in Transmission Service*, Order No. 890, FERC Stats. & Regs. ¶ 31,241, *order on reh'g*, Order No. 890-A, FERC Stats. & Regs. ¶ 31,261 (2007), *order on reh'g*, Order No. 890-B, 123 FERC ¶ 61,299 (2008), *order on reh'g*, Order No. 890-C, 126 FERC ¶ 61,228 (2009), *order on clarification*, Order No. 890-D, 129 FERC ¶ 61,126 (2009) (Order No. 890).

[5] *Regional Transmission Organizations*, Order No. 2000, FERC Stats. & Regs. ¶ 31,089 (1999), *order on reh'g*, Order No. 2000-A, FERC Stats. & Regs. ¶ 31,092 (2000), *aff'd sub nom. Pub. Util. Dist. No. 1 v. FERC*, 272 F.3d 607 (D.C. Cir. 2001) (Order No. 2000).

obligations they have entered into with the Commission that incorporate the provisions and policies set forth in those Orders," and the terms of their Open Access Transmission Tariffs (Tariffs).[6]

4. Complainants argue that the Energize Eastside Project is a Bulk Electric System facility, as defined in Order No. 773,[7] based on the Commission's "bright line" test, because it is a 230 kV project.[8] They further argue that because the project meets more than one regional need – it is intended to meet both Puget Sound's local load needs and to provide additional transmission capacity to support 1,500 MW of power flow north to Canada in order to satisfy Bonneville's obligation to deliver power to Canada under the terms of the Columbia River Treaty[9] – it was subject to the requirements of Order No. 1000 and should have gone out to bid to third parties.[10]

5. Complainants argue that, under Order No. 1000, ColumbiaGrid was required to initially determine whether there is a transmission need on the regional system that would require a project such as the Energize Eastside Project. Complainants assert that, if ColumbiaGrid determined that there was such a need, it needed to inform its members and other interested stakeholders, allow them to propose solutions to resolve the transmission need, and then study those proposals and the associated load flow studies. Complainants further argue that, if ColumbiaGrid determined that the preferred solution met the goals of more than one entity, it needed to determine a fair allocation of the costs of the project.[11] Complainants assert that this process was not followed because Puget Sound alone determined that the Energize Eastside Project was necessary and

[6] Complaint at 1-2.

[7] *Revisions to Electric Reliability Organization Definition of Bulk Electric System and Rules of Procedure*, Order No. 773, 141 FERC ¶ 61,236 (2012) (Order No. 773).

[8] Complaint at 6.

[9] *Id.*, J. Richard Lauckhart Aff. at P 18.

[10] *Id.* at 2, 6.

[11] *Id.*, J. Richard Lauckhart Aff. at PP 20-22.

conducted the associated load flow studies,[12] and ColumbiaGrid did not determine any regional cost allocation.[13]

6. Complainants conclude that Respondents have violated the regional planning process required by Order Nos. 890 and 1000 because they have violated the "single utility" rule, failed to properly ascertain the regional need for the Energize Eastside Project, failed to conduct their own environmental assessment of the project, and did not conduct industry-standard load flow studies to determine whether the Energize Eastside Project might be duplicative, less efficient, and more costly than better alternatives.[14]

7. In particular, Complainants assert that Order No. 1000's "single utility" rule required the Respondents to study the regional system as if a single utility owned all relevant generating, transmission, and distribution facilities.[15] Complainants argue that Respondents have not complied with this requirement because Puget Sound did not ask ColumbiaGrid to conduct regional power flow studies for the Energize Eastside Project, but instead, conducted inappropriate power flow studies of its own to determine if the project was necessary.[16] Complainants contend that if these studies were performed on a single utility basis, they would have logically looked at using existing Seattle transmission lines to address the transmission capacity deficiency.[17] Complainants note that Seattle allegedly refused to allow Puget Sound to use those lines because Seattle preferred to reserve those lines for its own use to meet its operating needs.[18]

8. Complainants argue that Respondents also circumvented the requirements of Order No. 1000 because ColumbiaGrid did not evaluate the potential negative environmental impacts of the Energize Eastside Project on its own[19] and Respondents

[12] *Id.*, J. Richard Lauckhart Aff. at P 25.

[13] *Id.*, J. Richard Lauckhart Aff. at P 22.

[14] *Id.* at 2-3.

[15] *Id.*, J. Richard Lauckhart Aff. at P 49.

[16] *Id.*, J. Richard Lauckhart Aff. at P 25.

[17] *Id.* at 7.

[18] *Id.*, J. Richard Lauckhart Aff. at P 47, n.16; Attachment K.

[19] *Id.* at 8.

chose the Energize Eastside Project without giving any consideration to its environmental impacts or considering the environmental impacts of alternatives.[20]

9. Complainants also allege that the load flow studies Puget Sound conducted were flawed. In particular, they argue that the studies should not have included 1,500 MW of firm transmission to Canada because the transmission system has operated for over 50 years without the ability to deliver 1,500 MW to Canada.[21] Complainants contend that the Columbia River Treaty envisioned the construction of a new transmission line in order to facilitate the delivery of power to Canada that was contemplated in the treaty, but that Bonneville and its counterparty to the treaty, the British Columbia Hydro and Power Authority (BC Hydro), chose not to build this line. Complainants argue that, as a result, Bonneville put in place an operating procedure to curtail flows to Canada anytime such flows might cause overloads on transmission lines in western Washington. Thus, Complainants assert that the transmission system has operated without the ability to deliver the 1,500 MW of treaty power to Canada. Complainants argue, therefore, that the load flow studies for the Energize Eastside Project should have been conducted with no flow between Canada and the United States.[22]

10. In addition, Complainants assert that Puget Sound's load flow studies were flawed because they did not include 1,435 MW of output from eight Puget Sound-controlled natural gas generators located in western Washington. Complainants state that a load flow study performed by Utility Systems Efficiencies, Inc. (Utility Systems) for the City of Bellevue included some, but not nearly all, of this output. Complainants argue that this omission creates inappropriate results in the Puget Sound and Utility Systems load flow studies.[23]

11. Complainants also assert that Puget Sound's 2013 Integrated Resource Plan shows that it needs an additional 1,500 MW of generating capacity by 2018 in order to cover estimated peak load and provide an appropriate level of reserves. Complainants argue that Puget Sound has not determined where it will obtain this additional 1,500 MW of supply and that, therefore, Puget Sound will need to run all of its resources to cover peak load in 2018, including the natural gas plants that were excluded from the Puget Sound and Utility Systems load flow studies. Complainants contend that, as a result, the load

[20] *Id.*, J. Richard Lauckhart Aff. at P 75.

[21] *Id.* at 4.

[22] *Id.*, J. Richard Lauckhart Aff. at PP 78-86.

[23] *Id.*, J. Richard Lauckhart Aff. at PP 37-44.

flow studies need to include the natural gas plants that were excluded from the Puget Sound and Utility Systems load flow studies.[24] Complainants also note that Puget Sound's 2013 Integrated Resource Plan did not address the possibility of building additional generating units in the area of the Energize Eastside Project to accomplish the dual objective of contributing to the need for 1,500 MW of additional generating capacity and addressing a potential transmission problem in the area.[25]

12. Complainants describe several alternatives to the Energize Eastside Project that they allege could be put in place at a lower cost and with lower environmental impact than the Energize Eastside Project.[26] Complainants also assert that ColumbiaGrid and its member utilities are not acting in compliance with Order No. 1000 because they have yet to agree on a ColumbiaGrid Planning and Expansion Functional Agreement (Planning Agreement) that brings them into compliance with Order No. 1000. Complainants acknowledge that the Planning Agreement and subsequent amendments have been accepted by the Commission, but they assert that ColumbiaGrid and its member utilities have not agreed on an Order No. 1000-compliant Planning Agreement because Bonneville has not yet made a compliance filing to fully conform its Tariff to the Commission's *pro forma* Tariff, as modified by Order No. 1000.[27]

13. Complainants request that the Commission order ColumbiaGrid to perform transparent and industry-standard load flow studies to determine whether the Energize Eastside Project meets a local transmission need and whether a more efficient, less expensive, and less environmentally destructive alternative exists.[28] Complainants assert that Puget Sound, Bonneville, and Seattle have already committed to have ColumbiaGrid perform such studies in their Order Nos. 890 and 1000 compliance filings and in the Planning Agreement.[29]

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[24] *Id.*, J. Richard Lauckhart Aff. at PP 90-92.

[25] *Id.*, J. Richard Lauckhart Aff. at PP 102-103.

[26] *Id.* at 5; J. Richard Lauckhart Aff. at PP 47, 95-104.

[27] *Id.*, J. Richard Lauckhart Aff. at PP 6-9; 11-15.

[28] *Id.* at 7.

[29] *Id.* at 5.

14. Complainants ask that the Commission order Puget Sound to "cease and desist from any further activity with respect to [the Energize Eastside Project], including seeking permits for it" once Complainants' requested load flow studies "show conclusively there is no local load reliability issue that would justify [the Energize Eastside Project] being built."[30]

15. Complainants further request that the Commission order Seattle and Bonneville to cooperate in restarting the project selection process at the ColumbiaGrid level, cooperate in properly performed load flow studies, and to not engage in any further acts that are subversive of the Order Nos. 890 and 1000 processes.[31]

16. Additionally, Complainants request that the Commission order Puget Sound, Bonneville, and Seattle to provide an Order No. 1000-compliant Planning Agreement. Complainants ask that, if these entities fail to provide an Order No. 1000-compliant Planning Agreement, the Commission direct them to form a Regional Transmission Organization (RTO) or Independent System Operator (ISO) to ensure Order Nos. 890 and 1000 compliance. Finally, Complainants state that, because ColumbiaGrid's method for selecting its board members is not fully compliant with the "independence" requirements set out in Order No. 2000, the selection method should be considered in consolidation with ColumbiaGrid's ongoing Order No. 1000 compliance proceeding in Docket No. ER15-429-000, *et al.*[32]

II. Notice and Responsive Pleadings

17. Notice of the Complaint was published in the *Federal Register*, 80 Fed. Reg. 34,631 (2015), with answers, protests, and interventions due on or before June 29, 2015. Avista Corporation (Avista) filed a timely motion to intervene and comments. Puget Sound and ColumbiaGrid filed a joint motion to dismiss and answer. Bonneville filed a motion to dismiss Bonneville as a Respondent. Seattle filed a motion to dismiss and answer. Powerex Corp. (Powerex) filed a motion to intervene out-of-time.

18. On July 13, 2015, Complainants filed answers and, separately, a motion for order of default against Bonneville. On July 27, 2015, Seattle filed an answer to Complainants' answer. On July 28, 2015, Bonneville filed an answer to Complainants' answer and an answer to Complainants' motion for order of default. On August 11, 2015, Puget Sound

[30] *Id.* at 7.

[31] *Id.* at 8.

[32] *Id.*

submitted supplemental information to its motion to dismiss and answer and Complainants submitted a letter objecting to the inclusion of that supplemental information in the record.

A. Puget Sound and ColumbiaGrid Motion to Dismiss and Answer

19. Puget Sound and ColumbiaGrid argue that the Complaint should be dismissed because Complainants have failed to satisfy the Commission's rules for structuring a complaint, set forth in Rule 206 of the Commission's Rules of Practice and Procedure.[33] Specifically, Puget Sound and ColumbiaGrid assert that the Complaint does not "clearly identify the action or inaction which is alleged to violate applicable statutory standards or regulatory requirements,"[34] or "explain how the action or inaction violates the applicable statutory standards or regulatory requirements"[35] because the Complaint does not cite any particular portion or provision of Order Nos. 890 or 1000 that Respondents have allegedly violated. Puget Sound and ColumbiaGrid note that Order Nos. 890 and 1000 require the development of an Attachment K to Puget Sound's Tariff that satisfies those orders and thus, Attachment K, not Order Nos. 890 and 1000, defines the planning process that Puget Sound must carry out. Puget Sound and ColumbiaGrid further state that Puget Sound's Attachment K relies on the planning obligations set forth in the Planning Agreement, which was first approved by the Commission in 2007 and is used by ColumbiaGrid to facilitate the coordinated planning of multi-system transmission projects.[36] Puget Sound and ColumbiaGrid argue that the Complaint also does not cite any provision of Attachment K or the Planning Agreement that Respondents have allegedly violated. They assert that the Commission has previously dismissed complaints for failing to comply with these requirements.[37]

20. Puget Sound and ColumbiaGrid also argue that the Complaint fails to set forth the "business, commercial, economic or other issues presented by the action/inaction as such relate to or affect the Complainants,"[38] and to make a "good faith effort to quantify the

[33] Puget Sound and ColumbiaGrid Answer at 7.

[34] 18 C.F.R. § 385.206(b)(1) (2015).

[35] 18 C.F.R. § 385.206(b)(2) (2015).

[36] Puget Sound and ColumbiaGrid Answer at 4, 8.

[37] *Id.* at 7-8 (citing *Citizens Energy Task Force v. Midwest Reliability Org.*, 144 FERC ¶ 61,006, at P 38 (2013)).

[38] *Id.* at 9 (citing 18 C.F.R. § 385.206(b)(3) (2015)).

financial impact or burden (if any) created for the complainant as a result of the action or inaction."[39] Rather, Puget Sound and ColumbiaGrid state that Complainants generally assert that the Energize Eastside Project is "more costly" than their preferred alternatives, but they do not provide any information on the cost of the proposed alternatives. In fact, Puget Sound and ColumbiaGrid contend that Complainants merely assert that unnamed realtors have informed Complainants that their homes (whose number and present value are also unspecified) may decrease in value if the Energize Eastside Project is constructed and then argue, without further support, that local taxes will increase if the project is built.[40]

21. Puget Sound and ColumbiaGrid allege that the Complaint has also failed to indicate "the practical, operational, or other nonfinancial impacts imposed as a result of the action or inaction, including, where applicable, the environmental, safety or reliability impacts of the action or inaction."[41] Puget Sound and ColumbiaGrid assert that the Complaint merely states that the Energize Eastside Project is "environmentally unsound and hazardous" without any support other than noting that the project will be co-located with an existing pipeline and require routine tree-cutting.[42]

22. Puget Sound and ColumbiaGrid also note that Complainants are required to state "the specific relief or remedy requested,"[43] but that some of the relief requested in the Complaint cannot be granted. They explain that Complainants request that the Commission order Puget Sound to cease and desist from any further activity with respect to the Energize Eastside Project, including seeking permits for it; however, transmission construction, siting, and permitting fall within the purview of state and local jurisdictions, so it would be beyond the scope of the Commission's jurisdiction to direct Puget Sound to refrain from seeking state and local permits for the project.[44]

[39] *Id.* at 9-10 (citing 18 C.F.R. § 385.206(b)(4) (2015)).

[40] *Id.*

[41] *Id.* at 10 (citing 18 C.F.R. § 385.206(b)(5) (2015)).

[42] *Id.*

[43] *Id.* at 11 (citing 18 C.F.R. § 385.206(b)(7) (2015)).

[44] *Id.*

23. In addition, Puget Sound and ColumbiaGrid assert that Complainants do not have standing to bring a complaint regarding Attachment K or the Planning Agreement; Attachment K describes the process by which Puget Sound coordinates with its transmission customers, neighboring transmission providers, affected state authorities, and other stakeholders, and Complainants do not fall within any of those categories because they are merely landowners in the area where the Energize Eastside Project will be built. Similarly, Puget Sound and ColumbiaGrid assert that Complainants are third-party non-signatories to the Planning Agreement and therefore do not have standing to bring a complaint regarding the Planning Agreement.[45]

24. Puget Sound and ColumbiaGrid argue that Complainants' allegations should be dismissed as impermissible collateral attacks on Commission Order Nos. 890, 1000, and 2000. They contend that Complainants' allegation that ColumbiaGrid's method for selecting its board members does not comply with the "independence" requirements set out in Order No. 2000 and Complainants' request that the Commission order Respondents to form an RTO or ISO are not relevant to whether Puget Sound complied with its transmission planning obligations. Puget Sound and ColumbiaGrid argue that, because ColumbiaGrid is not an RTO, the Order No. 2000 "independence" requirements are not applicable. Puget Sound and ColumbiaGrid also assert that Order No. 2000 did not mandate the creation of RTOs, and Order Nos. 890 and 1000 did not impose any specific requirements for the structure in which public utilities must implement the planning provisions that were to be incorporated into Attachment K. Therefore, they argue that Complainants' assertions regarding ColumbiaGrid's method for selecting its board members and their request that the Commission order Respondents to form an RTO or ISO are impermissible collateral attacks on Order Nos. 890, 1000, and 2000.[46]

25. Puget Sound and ColumbiaGrid also contend that Complainants collaterally attack Order Nos. 890 and 1000, and the Commission's orders accepting Puget Sound's compliance filings made pursuant to those orders, when they assert that the Energize Eastside Project should have gone out to bid to third parties and that Puget Sound should be required to abandon the project if new studies show there is no load reliability issue. Puget Sound and ColumbiaGrid assert that there is no requirement in Attachment K of Puget Sound's Tariff or the Planning Agreement that Puget Sound request bids or issue a request for proposals prior to any construction of a transmission facility. They also contend that the inclusion of any project, including the Energize Eastside Project, in a

[45] *Id.* at 11-13.

[46] *Id.* at 13-14.

ColumbiaGrid transmission plan is not a condition precedent to Puget Sound's decision to build a project.[47]

26. Puget Sound and ColumbiaGrid further argue that the Complaint should be dismissed for a lack of jurisdiction as it applies to ColumbiaGrid. They assert that the Commission has found that ColumbiaGrid does not own, operate, or control jurisdictional facilities necessary to qualify it as public utility under the FPA, and, therefore, ColumbiaGrid is not subject to section 206 of the FPA.[48]

27. In answering the Complaint, Puget Sound and ColumbiaGrid argue that, if the Commission considers the substantive issues raised by the Complaint, the Complaint must be rejected because Complainants have not demonstrated that Puget Sound has failed to comply with its Commission-approved transmission planning process contained in Attachment K of the Puget Sound Tariff and the Planning Agreement, nor have they demonstrated that the Respondents have violated Orders Nos. 890 and 1000.[49]

28. In support, Puget Sound and ColumbiaGrid assert that the Energize Eastside Project was originally conceived in 2006 and pre-dates the Order No. 1000 amendments to Attachment K of Puget Sound's Tariff; therefore, the Energize Eastside Project was subject to the Order No. 890 transmission planning requirements, not the Order No. 1000 requirements. They note that the Commission held that the Order No. 1000 requirements "apply to the evaluation or reevaluation of any transmission facility that occurs *after* the effective date of the public utility transmission provider's filing adopting the transmission planning and cost allocation reforms of the pro forma [Tariff] required by this Final Rule."[50] They state that Puget Sound's Order No. 1000 amendments to Attachment K of its Tariff did not take effect until January 1, 2015, and, therefore, that Complainants' allegations regarding supposed non-compliance with Order No. 1000 are inapposite.[51]

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[47] *Id.* at 15-16.

[48] *Id.* at 19.

[49] *Id.* at 19-20.

[50] *Id.* at 20-21 (citing Order No. 1000, FERC Stats. & Regs. ¶ 31,323 at P 65) (emphasis added).

[51] *Id.*

29. Moreover, Puget Sound and ColumbiaGrid argue that Puget Sound complied with its then-applicable Order No. 890 transmission planning requirements for the Energize Eastside Project. They state that, pursuant to Puget Sound's Attachment K that was approved following Order No. 890, Puget Sound was required to develop an annual 10-year plan that identified new transmission facilities and facility replacements or upgrades that it was planning over the next 10 years. They explain that, pursuant to the then-applicable Planning Agreement, Puget Sound was required to advise ColumbiaGrid of any "Single System Projects" that it was planning on its system and submit those proposed projects to ColumbiaGrid. Puget Sound and ColumbiaGrid assert that Puget Sound complied with these requirements.[52]

30. Puget Sound and ColumbiaGrid state that, in accordance with Puget Sound's Order No. 890-compliant Attachment K, Puget Sound identified the Energize Eastside Project in each of its annual 10-year plans from 2009 to 2014, and posted all of those annual plans on its Open Access Same-Time Information System. They explain that Puget Sound notified ColumbiaGrid of the Energize Eastside Project as a Single System Project, as required by the Planning Agreement, and that ColumbiaGrid subsequently included the Energize Eastside Project in its Biennial Transmission Expansion Plans.[53]

31. Puget Sound and ColumbiaGrid argue that, contrary to Complainants' arguments, their studies properly included the 1,500 MW of transmission capacity associated with Bonneville's obligation to return power to Canada under the Columbia River Treaty. They assert that, when studying energy flows on the transmission system, transmission planners study the paths upon which energy flows rather than the contract paths upon which energy is commercially transacted and scheduled. They state that all flows of energy in the Puget Sound region, such as flows related to Bonneville's obligation to deliver power to Canada, affect the flows of energy on parallel transmission facilities like Puget Sound's facilities. Puget Sound and ColumbiaGrid argue that, to ensure transmission system reliability, Puget Sound's and ColumbiaGrid's studies considered a range of possible operating conditions, including one where Bonneville schedules 1,500 MW of energy on its contract path, and the effect those operating conditions have on Puget Sound's underlying transmission facilities. They assert that these assumptions are consistent with prudent utility practice because Bonneville's legal obligation to Canada exists, and it must be accounted for and anticipated in planning studies.[54]

[52] *Id.* at 21-22.

[53] *Id.* at 27-28.

[54] *Id.* at 6, n.20.

32. Puget Sound and ColumbiaGrid argue that the Energize Eastside Project was properly classified a Single System Project. They state that Puget Sound's then-applicable Attachment K defines a Single System Project as "any modification of a single Transmission System that[:] (i) is for the purpose of meeting a Need that impacts only such single Transmission System; (ii) does not result in Material Adverse Impacts on any transmission system; and (iii) is included as a Single System Project in a Plan."[55] They explain that the Energize Eastside Project meets a "Need" that impacts only a single transmission system. They state that a "Need" is defined to include a projected inability of a transmission owner to serve its network load, native load customer obligations, or other existing long-term firm transmission obligations. Puget Sound and ColumbiaGrid assert that, in reports from 2013 and 2015, Puget Sound identified a need for transmission supply on Puget Sound's system in order to serve Puget Sound customers.[56]

33. Puget Sound and ColumbiaGrid state that Puget Sound introduced the Energize Eastside Project into ColumbiaGrid's existing Puget Sound Area Study Team transmission expansion planning process and the study team adopted the Energize Eastside Project in the team's expansion plan, without any finding of Material Adverse Impacts on any transmission system.[57] Puget Sound and ColumbiaGrid maintain that the Energize Eastside Project was included as a Single System Project in a "Plan." They state that "Plan" is defined as "at any time the then current Biennial Plan, as then revised by any Plan Updates." They assert that ColumbiaGrid explicitly included the Energize Eastside Project as a Single System Project in its most recent 2015 Biennial Plan.[58]

34. Puget Sound and ColumbiaGrid contend that ColumbiaGrid also complied with its remaining transmission planning responsibilities with respect to the Energize Eastside Project. They note that, in accordance with the Planning Agreement, ColumbiaGrid is required to develop a Biennial Plan, which must include those Single System Projects on a transmission system that have been submitted for inclusion in the Biennial Plan. Puget Sound and ColumbiaGrid assert that ColumbiaGrid has complied with this obligation because Puget Sound properly submitted the Energize Eastside Project to ColumbiaGrid

[55] *Id.* at 23 (citing Puget Sound Attachment K § A.51; Planning Agreement § 1.51).

[56] *Id.* at 24-25.

[57] *Id.* at 25-27.

[58] *Id.* at 27.

for consideration, and ColumbiaGrid included the project as a Single System Project in its Biennial Plans.[59]

35. Finally, Puget Sound and ColumbiaGrid argue that, even assuming *arguendo* that the Energize Eastside Project is subject to the Order No. 1000 amendments to the Puget Sound Tariff and the Planning Agreement, the Commission has made clear that Order No. 1000 "do[es] not require that the transmission facilities in a public utility transmission provider's local transmission plan be subject to approval at the regional or interregional level, unless that public utility transmission provider seeks to have any of those facilities selected in the regional transmission plan for purposes of cost allocation."[60] Puget Sound and ColumbiaGrid assert that the Energize Eastside Project is a local load-serving project and that none of the Respondents is seeking to include the project in the regional plan for purposes of cost allocation; therefore, the Energize Eastside Project would not be subject to Order No. 1000's regional approval process.[61]

B. Seattle Motion to Dismiss and Answer

36. Seattle explains that it is a department of the City of Seattle through which the city provides electric utility service. Seattle moves to dismiss the Complaint on the grounds that nothing in Order Nos. 890 or 1000 prevents a utility from building facilities in its service territory that are needed to serve load. Seattle also asserts that Complainants' references to Order No. 2000 are irrelevant to their claims because Order No. 2000 details the requirements applicable to RTOs, and there are no RTOs in the Energize Eastside Project's region.[62]

37. More specifically, Seattle argues that, in Order No. 890, the Commission expressly disavowed any intention to dictate which investments a utility would undertake, finding that "the planning obligations imposed in this Final Rule do not address or dictate which investments identified in a transmission plan should be undertaken by transmission providers."[63] Seattle further notes that Attachment K to the Puget Sound Tariff reflects the same concept, as the Tariff states that it "does not dictate or establish which

[59] *Id.* at 28-29.

[60] *Id.* at 21 (citing Order No. 1000, FERC Stats. & Regs. ¶ 31,323 at P 65).

[61] *Id.*

[62] Seattle Answer at 2-3.

[63] *Id.* at 7 (citing Order No. 890, FERC Stats. & Regs. ¶ 31,241 at P 438).

investments identified in a transmission plan should be performed or how such investments should be compensated."[64]

38. Seattle maintains that Order No. 1000 expressly permits incumbent public utility transmission providers to develop and build local transmission facilities outside of the Order No. 1000 process, provided the project is located solely within the public utility's retail distribution service area, and is not proposed or selected in the regional transmission plan for purposes of cost allocation.[65] Seattle further explains that Order No. 1000 defined a "local transmission facility" as "a transmission facility located solely within a public utility transmission provider's retail distribution service territory or footprint that is not selected in the regional transmission plan for purposes of cost allocation."[66]

39. Seattle asserts that the Energize Eastside Project falls within the Commission's definition of a "local transmission facility" since the transmission line is limited in length to 18 miles, the proposed route for the line sits entirely within Puget Sound's combined electric and gas service area, and Puget Sound has not opted to include the project in the ColumbiaGrid regional cost allocation process under Order No. 1000.[67] Seattle argues that, therefore, the Energize Eastside Project is the type of project the Commission made clear can be developed independently by an incumbent utility, without running afoul of Order No. 1000.[68]

40. Seattle further asserts that Complainants' claim that the Energize Eastside Project is a Bulk Electric System facility under the definition adopted in Order No. 773 is irrelevant. Seattle argues that the applicable scope of the Reliability Standards enforced by the North American Electric Reliability Corporation (NERC) has nothing to do with the scope of the transmission planning process under Order No. 1000.[69]

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[64] *Id.* (citing Puget Sound Tariff, Attachment K, Part II).

[65] *Id.* at 1-2.

[66] *Id.* at 7-8 (citing Order No. 1000, FERC Stats. & Regs. ¶ 31,323 at P 63).

[67] *Id.*

[68] *Id.* at 9.

[69] *Id.* at 10.

41. Finally, Seattle points out that Order No. 1000 has no direct application to entities like Seattle that fall within the definition of a non-public utility under section 201(f) of the FPA.[70] Seattle explains that it is a non-public utility because it is a department of the City of Seattle and the City of Seattle is a city organized under a Charter authorized by the Washington State Constitution.[71] Seattle asserts that, in Order Nos. 890 and 1000, the Commission expressly declined to take action under section 211A of the FPA[72] to require non-public utilities to participate in the Order Nos. 890 and 1000 processes.[73]

C. Bonneville Motion to Dismiss

42. Bonneville argues that it should be dismissed as a Respondent because the Complaint was filed pursuant to section 206 of the FPA, but the Commission has no jurisdiction over Bonneville pursuant to section 206.[74] Bonneville asserts that the Commission and several U.S. Circuit Courts have held that the Commission lacks jurisdiction over Bonneville pursuant to section 206.[75] Bonneville also notes that it is a party to a Memorandum of Agreement with Seattle and Puget Sound that memorializes the parties' plans to construct certain transmission projects, but that a subsequent letter agreement clarified that Bonneville is not participating in the Energize Eastside Project.[76]

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[70] 16 U.S.C. § 824 (2012).

[71] Seattle Answer at 2, 6, 11.

[72] 16 U.S.C. § 824j-1 (2012).

[73] Seattle Answer at 11 (citing Order No. 890, FERC Stats. & Regs. ¶ 31,241 at P 192; Order No. 1000, FERC Stats. & Regs. ¶ 31,323 at PP 815, 821; Order No. 1000-A, 139 FERC ¶ 61,132 at P 778).

[74] Bonneville Motion to Dismiss at 3-4.

[75] *Id.* at 4 (citing *Avista Corp.*, 143 FERC ¶ 61,255, P 2, n.4 (2013) ("[w]e recognize that Bonneville Power is not a public utility under section 201 of the FPA, 16 U.S.C. § 824 (2006), and is not subject to Commission directives made pursuant to FPA section 206;" *Bonneville Power Admin. v. FERC*, 422 F.3d 908, 924 (9th Cir. 2005) (*Bonneville*))).

[76] *Id.* at 2-3.

D. Avista Comments

43. Avista supports the Puget Sound and ColumbiaGrid Answer and reiterates that the Complaint contains no allegations of any violations of any specific provision of Order Nos. 890 and 1000, or of Attachment K to Puget Sound's Tariff.[77] Avista also reiterates that Order No. 1000 planning requirements do not apply to the Energize Eastside Project because the project predates the January 1, 2015 effective date of the Order No. 1000 amendments to Attachment K of Puget Sound's Tariff.[78] Avista further asserts that Complainants' request that the Commission order Puget Sound, Bonneville, and Seattle to file an Order No. 1000-compliant Planning Agreement is moot because the Commission has already conditionally accepted Respondents' Planning Agreement, subject to a further compliance filing that remains pending before the Commission.[79]

E. Complainants Answers and Motion for Order of Default

44. Complainants filed three separate answers to respond to the Puget Sound and ColumbiaGrid Answer, the Seattle Answer, and the Bonneville Motion to Dismiss, as well as a motion for Order of Default against Bonneville. In Complainants' answer to the Puget Sound and ColumbiaGrid Answer, they reiterate that the Energize Eastside Project is not a local load facility because it falls within the Bulk Electric System definition. Complainants also argue that the project should not be considered as a local load facility because its cost will be included in the rate for firm transmission service on the Puget Sound transmission system.[80] Complainants further contend that ColumbiaGrid has agreed to submit itself to the Commission's jurisdiction because it has signed the Planning Agreement and has a Commission-approved rate schedule on file with the Commission.[81] Finally, Complainants reiterate that Puget Sound's load flow studies were flawed because they included 1,500 MW of transmission capacity for Bonneville's delivery of power to Canada.[82]

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[77] Avista Comments at 3-4.

[78] *Id.* at 4.

[79] *Id.* at 5.

[80] Complainants Answer to Puget Sound and ColumbiaGrid Answer at 3-5.

[81] *Id.* at 12.

[82] *Id.* at 13-17.

45. In their answer to the Seattle Answer, Complainants argue that the Energize Eastside Project has been "selected in a regional transmission plan for purposes of cost allocation" because its cost would go into the rate for firm transmission service on the Puget Sound transmission system.[83] Complainants also reiterate that a "single-utility" approach would have identified Puget Sound's use of Seattle's transmission facilities as the solution to meet the need that the Energize Eastside Project is designed to address.[84] Complainants further contend that the Commission has jurisdiction over Seattle pursuant to section 211A of the FPA.[85] In addition, Complainants state that Seattle is subject to sanctions under section 211A because it does not have a Tariff on file with the Commission.[86]

46. In response to the Bonneville Motion to Dismiss, Complainants argue that section 211A of the FPA authorizes the Commission to enforce the requirements of Order No. 890 against even non-public utility transmission providers like Bonneville.[87] Complainants also argue that Bonneville has voluntarily submitted to the Commission's jurisdiction under Order No. 890 in exchange for reciprocity because Bonneville has signed the Planning Agreement and has an Attachment K to its Tariff on file with the Commission.[88]

47. In the motion for Order of Default against Bonneville, Complainants argue that, because Bonneville only moved to dismiss the Complaint and did not answer the Complaint, Bonneville should be considered in default under Rule 213(e) of the Commission's Rules of Practice and Procedure[89] and, as to Bonneville, all relevant facts stated in the Complaint should be deemed admitted.[90]

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[83] Complainants Answer to Seattle Answer at 6.

[84] *Id.* at 11-12.

[85] *Id.* at 13-14.

[86] *Id.* at 3-4.

[87] Complainants Answer to Bonneville Motion to Dismiss at 2, 4-7.

[88] *Id.* at 4, 10.

[89] 18 C.F.R. § 385.213(e) (2015).

[90] Complainants Motion for Order of Default at 1-2.

F. Seattle July 27 Answer

48. Seattle argues that Complainants are incorrect in claiming that Seattle is out of compliance with the Commission's open access policies because it does not have a Tariff on file with the Commission. Seattle asserts that reciprocity does not require Seattle to file its Tariff with the Commission. Seattle explains that it satisfies the reciprocity condition by offering to provide transmission service under the terms of its publicly-available Tariff, but it is not required to file that Tariff with the Commission.[91]

49. Seattle also argues that Complainants are wrong in asserting that there is a basis for proceeding against Seattle under section 211A of the FPA. Seattle asserts that the Complaint was framed as a complaint under section 206, which has no application to Seattle, a non-public utility under section 201(f).[92]

G. Bonneville July 28 Answers

50. Bonneville reiterates that the Complaint was filed under section 206 of the FPA, which does not apply to Bonneville, and that the Complaint fails to allege any violation on the part of Bonneville that falls within the Commission's jurisdiction. In response to Complainants' argument that section 211A authorizes the Commission to enforce the requirements of Order No. 890 against Bonneville, Bonneville argues that Complainants have not made any arguments that fall within the Commission's section 211A authority. Bonneville states that section 211A(b)(2) authorizes the Commission to issue a rule or order requiring an unregulated transmission utility, such as Bonneville, to provide transmission services "on terms and conditions (not relating to rates) that are comparable to those under which the unregulated transmitting utility provides transmission services to itself and that are not unduly discriminatory or preferential."[93] However, Bonneville argues that Complainants do not make any allegation of non-comparable or discriminatory effects as required by section 211A. Bonneville asserts that, moreover, Complainants are not current or potential transmission customers of Bonneville, and thus could not have been denied any service on Bonneville's system or be treated differently than any other of Bonneville's customers.[94]

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[91] Seattle July 27 Answer at 3-4.

[92] *Id.* at 5.

[93] Bonneville July 28 Answer at 3-4 (citing 16 U.S.C. § 824j-1(b)(2) (2012)).

[94] *Id.* at 4.

51. Bonneville also disputes that it has voluntarily submitted itself to the Commission's jurisdiction. It states that, in *Bonneville*, the U.S. Court of Appeals for the Ninth Circuit rejected an argument that Bonneville had submitted itself to Commission jurisdiction by agreeing to abide by certain tariffs, and found that the Commission cannot exercise jurisdiction beyond what is authorized in the statute, regardless of whether the jurisdiction is exercised without objection or even with the consent of the relevant parties.[95]

52. Bonneville also filed an answer to Complainants' motion for Order of Default. Bonneville states that Rule 213(e) of the Commission's Rules of Practice and Procedure does not require the Commission to find an entity in default for failing to answer a complaint, but instead provides that any person failing to answer a complaint "may" be considered in default and the relevant facts "may" be deemed admitted as to that person. Bonneville argues that it should not be considered in default because the Commission's lack of jurisdiction over Bonneville under section 206 is well settled and, thus, it would be a waste of Bonneville's and the Commission's resources to require Bonneville to answer the Complaint. If the Commission finds that it has jurisdiction over Bonneville in this case, Bonneville requests that the Commission deny the motion for Order of Default and allow Bonneville additional time to file an answer.[96]

H. Subsequent Pleadings

53. On August 11, 2015, Puget Sound filed a letter providing supplemental information to the factual assertions in its answer. On the same day, Complainants filed a letter asking the Commission not to make Puget Sound's letter part of the record.

III. Discussion

A. Procedural Matters

54. Pursuant to Rule 214 of the Commission's Rules of Practice and Procedure, 18 C.F.R. § 385.214 (2015), Avista's timely, unopposed motion to intervene serves to make it a party to this proceeding. Pursuant to Rule 214(d) of the Commission's Rules of Practice and Procedure, 18 C.F.R. § 385.214(d) (2015), the Commission will grant the late-filed motion to intervene of Powerex, given its interest in the proceeding, the early stage of the proceeding, and the absence of undue prejudice or delay.

[95] *Bonneville*, 422 F.3d at 924.

[96] Bonneville July 28 Answer to Motion for Order of Default at 3-5.

55. Rule 213(a)(2) of the Commission's Rules of Practice and Procedure, 18 C.F.R. § 385.213(a)(2) (2015), prohibits an answer to an answer unless otherwise ordered by the decisional authority. We will accept the answers in this case because they provided information that assisted us in our decision-making process.

B. Substantive Matters

56. We will dismiss the Complaint with respect to Bonneville, Seattle, and ColumbiaGrid because the Complaint was filed pursuant to section 206 of the FPA, and Bonneville, Seattle, and ColumbiaGrid are not subject to the Commission's section 206 jurisdiction. Section 201 of the FPA specifies the scope of the Commission's jurisdiction under subchapter II of the FPA, which includes section 206. Section 201(f) provides that, "[n]o provision in this subchapter shall apply to, or be deemed to include, the United States, a State or any political subdivision of a State. . . or any agency, authority, or instrumentality of . . . the foregoing . . .unless such provision makes specific reference thereto."[97] Bonneville is a federal power marketing administration within the United States Department of Energy[98] and Seattle is a city organized under a Charter authorized by the Washington State Constitution;[99] section 206 of the FPA does not make any specific reference to include entities such as Bonneville or Seattle. Therefore, Bonneville and Seattle are not subject to the Commission's jurisdiction under section 206 of the FPA. The Commission has also found that ColumbiaGrid does not own, operate or control jurisdictional facilities necessary to qualify it as public utility under the FPA; thus, it is not subject to the Commission's jurisdiction under section 206 of the FPA.[100] Accordingly, we dismiss the Complaint against Bonneville, Seattle, and ColumbiaGrid.

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[97] 16 U.S.C. § 824(f).

[98] *See, e.g.*, Bonneville Motion to Dismiss at 3; *Avista Corp*., 143 FERC ¶ 61,255, at P 2, n.4 (2013) ("We recognize that Bonneville Power is not a public utility under section 201 of the FPA…and is not subject to Commission directives made pursuant to FPA section 206.").

[99] *See* Seattle Answer at 11.

[100] *See ColumbiaGrid*, 119 FERC ¶ 61,007, at PP 16, 27 (2007) ("NIPPC argues that the Commission should find that ColumbiaGrid is subject to the Commission's jurisdiction because ColumbiaGrid will perform certain jurisdictional services… We also disagree with assertions raised by NIPPC regarding the jurisdictional status of ColumbiaGrid… The current Planning Agreement does not cause ColumbiaGrid to own, operate or control jurisdictional facilities").

57. Complainants argue that the Commission has jurisdiction over Bonneville and Seattle in this matter pursuant to section 211A of the FPA.[101] We disagree. Section 211A provides that the Commission may issue a rule or order requiring an unregulated transmitting utility, such as Bonneville or Seattle, to provide transmission services "(1) at rates that are comparable to those that the unregulated transmitting utility charges itself; and (2) on terms and conditions (not relating to rates) that are comparable to those under which the unregulated transmitting utility provides transmission services to itself and that are not unduly discriminatory or preferential."[102] In Order No. 890, the Commission did not adopt a generic rule implementing section 211A with respect to all non-jurisdictional unregulated transmitting utilities[103] or invoke its authority under section 211A to require such non-jurisdictional entities to participate in the Order No. 890 planning processes, but instead found that it could exercise such authority on a "case-by-case" basis if there is an appropriate record.[104] Complainants have provided no basis for the Commission to exercise its authority under section 211A. The Complaint does not allege that Respondents are providing non-comparable, discriminatory, or preferential transmission services. Moreover, the Complaint does not allege that the Complainants are current or potential transmission customers of any Respondent; therefore, Complainants could not have received non-comparable or discriminatory transmission service from any Respondent, or have been treated differently from any other of Respondents' transmission customers.[105]

58. Complainants also argue that Bonneville, Seattle, and ColumbiaGrid have agreed to submit themselves to the Commission's jurisdiction because they are parties to the Planning Agreement and have tariffs or rate schedules on file with the Commission.[106]

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[101] *See* Complainants Answer to Bonneville Motion to Dismiss at 3-7; Complainants Answer to Seattle Answer at 13-14.

[102] 16 U.S.C. § 824j-1(b).

[103] Order No. 890, FERC Stats. & Regs. ¶ 31,241 at P 192.

[104] *Id.* P 441.

[105] *See id.* P 192 ("A *potential customer* may file an application with the Commission seeking an order compelling the unregulated transmitting utility to provide transmission service that meets the standards of FPA section 211A.") (emphasis added).

[106] *See, e.g.*, Complainants Answer to Puget Sound and ColumbiaGrid Answer at 12; Complainants Answer to Seattle Answer at 13-15; Complainants Answer to Bonneville Motion to Dismiss at 10.

Complainants assert that it is "commonplace" and "axiomatic" in the law that "a party not otherwise subject to the jurisdiction of a governmental entity can nevertheless agree to submit itself to that jurisdiction."[107] However, courts have found that the Commission cannot exercise jurisdiction or authority that is not authorized by statute, even if the relevant parties voluntarily participated in Commission-approved markets and the parties consent to the jurisdiction.[108]

59. We also will dismiss the Complaint with respect to the remaining Respondent, Puget Sound. Rule 206 of the Commission's Rules of Practice and Procedure provides that a complaint must "[c]learly identify the action or inaction which is alleged to violate applicable statutory standards or regulatory requirements"[109] and "[e]xplain how the action or inaction violates applicable statutory standards or regulatory requirements."[110] We find that the Complaint fails to meet these requirements because the Complaint does not cite any specific provision of any Commission order or regulation, or any specific provision of the Puget Sound Tariff or Planning Agreement, that Respondents have allegedly violated. Instead, Complainants make vague allegations that Respondents have violated Order Nos. 890, 1000, and 2000, as well as the Puget Sound Tariff and Planning Agreement, without citing any specific provision of those orders, the Tariff, or the Planning Agreement that Respondents have allegedly violated. Thus, Complainants have not identified the "applicable statutory standards or regulatory requirements," that Respondents have allegedly violated. We cannot conclude that the Complaint has sufficiently identified the behavior that allegedly violates the applicable standards or requirements, or that it has sufficiently explained how there is such a violation, when Complainants have not even identified the applicable standards or requirements.

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[107] *See, e.g.*, Complainants Answer to Puget Sound and ColumbiaGrid Answer at 12; Complainants Answer to Bonneville Motion to Dismiss at 10.

[108] *See, e.g.*, *Bonneville*, 422 F.3d 908, 924 ("[The Commission] cannot exercise jurisdiction or authority unless authorized by statute, regardless of whether the jurisdiction is exercised without objection or even with the consent of the relevant parties. . .Similarly, [the Commission] cannot expand its statutory authority to reach governmental entities/non-public utilities through § 206(b) simply because such entities voluntarily participated in markets approved by [the Commission] that involved [Commission]-jurisdictional wholesale sales of electric energy in interstate commerce.").

[109] 18 C.F.R. § 385.206(b)(1).

[110] 18 C.F.R. § 385.206(b)(2).

60. The Commission has previously dismissed complaints for failing to comply with these requirements. For example, in a case involving a complaint that alleged a violation of a NERC Reliability Standard, the Commission dismissed the complaint, finding that, "[i]f a complaint regarding an alleged violation of a Reliability Standard is to meet the threshold requirements of Rule 206, then the complaint must, at a minimum, set forth the specific provision of the Reliability Standard that is at issue."[111] The Complaint here similarly fails to provide that minimum level of specificity because it simply makes broad reference to Order Nos. 890, 1000, and 2000, the Puget Sound Tariff, and the Planning Agreement, and does not set forth any specific provision that is at issue.

61. In addition to the Complaint's procedural deficiencies, Complainants have not met their burden of proof under section 206 of the FPA to demonstrate that the Respondents' actions with respect to the Energize Eastside Project have violated any applicable requirement or are otherwise unjust, unreasonable, or unduly discriminatory, or preferential. Rather, contrary to Complainants' vague allegations that the Respondents have violated Order Nos. 890 and 1000, the record before us shows that Puget Sound and the other Respondents have complied with the applicable transmission planning requirements in those orders.

62. We agree with Puget Sound and ColumbiaGrid that the Energize Eastside Project was properly evaluated under the then-applicable Order No. 890 transmission planning requirements. The Commission has stated that Order No. 1000 does "not require that the transmission facilities in a public utility transmission provider's local transmission plan be subject to approval at the regional or interregional level, unless that public utility transmission provider seeks to have any of those facilities selected in the regional transmission plan for purposes of cost allocation."[112] The Commission has further explained that "Order No. 1000 does not prevent an incumbent transmission provider from meeting its reliability needs or service obligations by choosing to build new transmission facilities that are located solely within its retail distribution service territory or footprint and that are not selected in a regional transmission plan for purposes of cost allocation."[113] The record before us shows that the Energize Eastside Project is located completely within Puget Sound's service territory, that it was included in Puget Sound's local transmission plan to meet Puget Sound's reliability needs, and that neither Puget Sound, nor any other eligible party, requested to have the project selected in the

[111] *Citizens Energy Task Force v. Midwest Reliability Org.*, 144 FERC ¶ 61,006, at P 39 (2013).

[112] Order No. 1000-A, 139 FERC ¶ 61,132 at P 190.

[113] *Id.* P 425.

regional transmission plan for purposes of cost allocation;[114] therefore, the project is not subject to the Order No. 1000 regional approval process, and is instead subject to the Order No. 890 transmission planning requirements.

63. Based on the record before us, we find that Puget Sound and the other Respondents complied with their transmission planning responsibilities under Order No. 890 in proposing and evaluating the Energize Eastside Project. As required by the Attachment K of Puget Sound's Tariff that was approved following Order No. 890, Puget Sound identified the Energize Eastside Project in its annual 10-year plans. Puget Sound also notified ColumbiaGrid of the Energize Eastside Project as a Single System Project, as required by the then-applicable Planning Agreement, and ColumbiaGrid subsequently included the Energize Eastside Project in its Biennial Transmission Expansion Plans.[115] We agree with Puget Sound and ColumbiaGrid that the Energize Eastside Project was properly classified a Single System Project because it was designed to address Puget Sound's projected inability to serve its own customers, ColumbiaGrid's Puget Sound Area Study Team did not find any Material Adverse Impacts associated with the project, and ColumbiaGrid included the project as a Single System Project in its most recent 2015 Biennial Plan. Accordingly, we find that the Energize Eastside Project was proposed and evaluated in accordance with the then-applicable transmission planning requirements.

64. Complainants argue that the Energize Eastside Project has been "selected in a regional transmission plan for purposes of cost allocation," and therefore is subject to the Order No. 1000 regional approval process, because its cost would go into the transmission rate for firm transmission service on the Puget Sound transmission system.[116] However, Complainants' argument confuses two separate issues. The regional cost allocation contemplated in Order No. 1000 involves allocating the costs of a transmission facility across a region. Including the cost of the Energize Eastside Project in Puget Sound's rate for firm transmission service on its system affects only Puget Sound's transmission rate and does not mean that the project was "selected in a regional transmission plan for purposes of cost allocation."

[114] *See, e.g.*, Puget Sound and ColumbiaGrid Answer at 5, 21; Seattle Answer at 9.

[115] Puget Sound and ColumbiaGrid Answer at 27-28.

[116] *See* Complainants Answer to Seattle Answer at 6.

65. Complainants also assert that development of the Energize Eastside Project should have gone out to bid to third parties pursuant to Order No. 1000.[117] However, Complainants are incorrect because Order No. 1000 does not require project developers to be selected using a competitive bidding process[118] and there is no requirement in Puget Sound's Tariff or the Planning Agreement that Puget Sound issue a request for proposals or request bids prior to any construction of a transmission facility.

66. Complainants request that the Commission order Puget Sound "to cease and desist from any further activity with respect to [the Energize Eastside Project], including seeking permits for it."[119] Regardless of Complainants' arguments, we could not grant this requested relief because much of the "activity with respect to" the project, such as transmission siting and permitting, is not subject to the Commission's jurisdiction.

67. Complainants argue that the Energize Eastside Project is not a local load-serving project that is exempt from Order No. 1000 because it is a Bulk Electric System facility, as defined in Order No. 773.[120] This argument is inapposite. The Bulk Electric System definition was developed by NERC for use in determining the scope of NERC Reliability Standards and related obligations. Specifically, the definition of Bulk Electric System includes transmission facilities that are 100 kV or higher, with exceptions, such as local distribution facilities.[121] Order No. 1000 does not require that transmission planning regions use this Bulk Electric System definition to determine whether a transmission project is subject to the Order No. 1000 regional planning process. Instead, Order No. 1000 provides public utilities with the option to "use flexible criteria in lieu of 'bright line' metrics when determining which transmission projects are in the regional

[117] *See, e.g.*, Complaint at 2.

[118] Order No. 1000, FERC Stats. & Regs. ¶ 31,323 at PP 259, 321 & n.302 ("[T]he public utility transmission providers in a region may, but are not required to, use competitive solicitation to solicit projects or project developers to meet regional needs…[T]he Commission declines to adopt commenter suggestions to mandate a competitive bidding process for selecting project developers.").

[119] Complaint at 7.

[120] *See, e.g., id.* at 6; Complainants Answer to Puget Sound and ColumbiaGrid Answer at 4-5.

[121] Order No. 773, 141 FERC ¶ 61,236 at PP 45, 52, 56.

transmission plan."[122] Consistent with this option, ColumbiaGrid's regional planning process does not use the voltage of a transmission project as a threshold metric to determine whether the project should be in the regional plan. Nevertheless, the Energize Eastside Project is not subject to the Order No. 1000 regional approval process because it is located completely within Puget Sound's service territory, it was included in Puget Sound's local transmission plan to meet Puget Sound's reliability needs, and neither Puget Sound, nor any other eligible party, requested to have the project selected in the regional transmission plan for purposes of cost allocation. Whether or not the Energize Eastside Project falls within the Bulk Electric System definition does not affect this conclusion.

68. Complainants discuss alleged flaws in the load flow studies that Puget Sound conducted for the Energize Eastside Project. However, Complainants do not demonstrate that the studies violated any applicable transmission planning requirements or were otherwise unjust, unreasonable, or unduly discriminatory or preferential. Complainants do not cite anything that would require Puget Sound to use the study inputs and assumptions that Complainants prefer instead of the inputs and assumptions that Puget Sound used. Complainants state, without citation, that Puget Sound was obligated to ask ColumbiaGrid to conduct power flow studies for the project pursuant to a 2012 Order No. 1000 compliance filing.[123] They also assert that the studies did not comply with the "single utility" rule set forth in Order No. 1000.[124] However, as discussed above, any Order No. 1000 requirements are not applicable to the Energize Eastside Project. Beyond this, Complainants merely assert that Puget Sound's load flow studies were not "industry-standard," produced "tortured results," and used "undisclosed and dubious inputs."[125] Complainants do not explain what the "industry-standard" for such load flow studies is, and do not cite to anything demonstrating that Puget Sound's study inputs and assumptions were flawed beyond Complainants' mere allegations that they are

[122] Order No. 1000, FERC Stats. & Regs. ¶ 31,323 at P 223; Order No. 1000-A, 139 FERC ¶ 61,132 at P 283 (affirming that public utility transmission providers, in consultation with stakeholders, may apply either flexible criteria or bright-line metrics when determining which transmission facilities are in the regional transmission plan).

[123] *See* Complaint, J. Richard Lauckhart Aff. at P 25.

[124] *See id.* at 7, J. Richard Lauckhart Aff. at PP 49-50.

[125] *See id.* at 2-3; J. Richard Lauckhart Aff. at P 25.

flawed.[126] Moreover, Puget Sound has demonstrated that its needs assessments identified a transmission capacity deficiency, that the Energize Eastside Project was included in its annual transmission plans to address the deficiency beginning in 2009, that the project was reviewed by ColumbiaGrid's Puget Sound Area Study Team and not found to have any Material Adverse Impacts, and was included in ColumbiaGrid's Biennial Transmission Plans.[127] Accordingly, we do not believe that Complainants' allegations that Puget Sound's load flow studies were flawed provide any basis for the Commission to grant any of Complainants' requested relief.

69. Complainants also allege that ColumbiaGrid's method for selecting its board members is not fully compliant with the "independence" requirements set out in Order No. 2000. This allegation is inapposite because the Order No. 2000 "independence" requirements apply to RTOs, and ColumbiaGrid is neither an RTO nor ISO.[128] Accordingly, the "independence" requirement of Order No. 2000 does not apply to ColumbiaGrid.

70. Finally, Complainants request that the Commission order Puget Sound, Bonneville, and Seattle to provide the Commission with an Order No. 1000-compliant Planning Agreement, or, in the alternative, order those entities to form an RTO to ensure Order No. 890 and Order No. 1000 compliance.[129] Order No. 2000 encouraged the voluntary formation of RTOs, but did not require entities to form RTOs.[130] Therefore, Order No. 2000 does not support Complainants' argument that the Commission can order Puget Sound, Bonneville, and Seattle to form an RTO or ISO. Additionally, Complainants' request that the Commission order those Respondents to file an Order No. 1000-compliant Planning Agreement is also misplaced. Respondents have already

[126] *CAlifornians for Renewable Energy, Inc. v. Pac. Gas & Elec. Co.*, 142 FERC ¶ 61,143, at P 18 (2013) ("rather than bald allegations, [complainants] must make an adequate proffer of evidence including pertinent information and analysis to support its claims.") (quoting *Ill. Mun. Elec. Co. v. Cent. Ill. Pub. Serv. Co.*, 76 FERC ¶ 61,084, at 61,482 (1996)).

[127] *See, e.g.*, Puget Sound and ColumbiaGrid Answer at 5, 26-27.

[128] *See, e.g., id.* at 14; Avista Comments at 3, n.5.

[129] *See* Complaint at 8.

[130] Order No. 2000, FERC Stats. & Regs. ¶ 31,089 at 30,995 ("we find it appropriate in this instance to adopt an open collaborative process that relies on voluntary regional participation to design RTOs.").

filed the Planning Agreement with the Commission to facilitate compliance with Order No. 1000 and the Commission has conditionally accepted the Planning Agreement, subject to a further compliance filing, which remains pending before the Commission.[131] Any concerns that Complainants have regarding the compliance of Respondents' Planning Agreement with Order No. 1000 are more properly considered in that proceeding. Moreover, Complainants Coalition of Eastside Neighborhoods for Sensible Energy and Citizens for Sane Eastside Energy have filed a motion to intervene and protest in that ongoing proceeding,[132] and have not explained why timely resolution of their concerns regarding Order No. 1000 compliance cannot be achieved in that forum.[133]

71. Given our determinations above, we will deny Complainants' motion for Order of Default against Bonneville. As Bonneville notes, Rule 213 does not require the Commission to find an entity in default for failing to answer a complaint, but provides that the Commission "may" make such a finding.[134] Given that the Commission does not have section 206 jurisdiction over Bonneville in this proceeding, we find that Bonneville is not in default for not answering the Complaint.

[131] *See Avista Corp.*, 151 FERC ¶ 61,127, at P 2 (2015).

[132] Coalition of Eastside Neighborhoods for Sensible Energy, *et al.*, Motion to Intervene and Protest, Docket No. ER15-429-001, *et al.* (filed July 6, 2015).

[133] *See* 18 C.F.R. § 385.206(b)(6) (2015) (providing that a complaint must "[s]tate whether the issues presented are pending in an existing Commission proceeding or a proceeding in any other forum in which the complainant is a party, and if so, provide an explanation why timely resolution cannot be achieved in that forum.").

[134] 18 C.F.R. § 385.213(e) ("[a]ny person failing to answer a complaint *may be* considered in default, and all relevant facts stated in such complaint *may be* deemed admitted.") (emphasis added).

The Commission orders:

(A) The Complaint is hereby dismissed, as discussed in the body of this order.

(B) Complainants' motion for Order of Default is hereby denied, as discussed in the body of this order.

By the Commission.

(S E A L)

Nathaniel J. Davis, Sr.,
Deputy Secretary.

Attachment B
Certification of Need

PUGET SOUND ENERGY

Puget Sound Energy
P.O. Box 97034
Bellevue, WA 98009-9734
PSE.com

July 20, 2017

Heidi Bedwell
Environmental Planning Manager
City of Bellevue
450 110th Avenue NE
Bellevue, WA 98009-9012

Re: Reliability Certification for Energize Eastside 230-kV Project (LUC 20.20.255.E)

Dear Ms. Bedwell,

Puget Sound Energy, Inc. (PSE) hereby certifies that the proposed electrical utility facility referenced above improves reliability to the customers served and reliability of the system as a whole.

The 2013 Eastside Needs Assessment confirmed that by winter of 2017-18, there is a transmission supply need on the Eastside of Lake Washington which impacts PSE customers and communities in and around Kirkland, Redmond, Bellevue, and Newcastle along with Clyde Hill, Medina, and Mercer Island. The 2015 Needs Assessment reconfirmed that, by winter of 2017-18, there is a transmission capacity deficiency on the Eastside. The supply need focuses on the two 230 kV supply injections into central King County at Sammamish Substation in the north and Talbot Hill Substation in the south. Rigorous comprehensive reliability assessments have been performed under the mandatory North American Electric Reliability Corporation's (NERC) Transmission Planning Standards (TPL-standards) and the WECC Reliability Standards to determine if any potential adverse impacts to the reliability of delivery of electricity exist on the PSE transmission system. In addition to the mandatory reliability standards, PSE also adheres to PSE's Transmission Planning Guidelines which describe how to plan and operate PSE's electric transmission system. These guidelines are in place to encourage the optimal use of the transmission system for service to loads and generators while complying with the mandatory standards. These guidelines also support transfers between utilities, when applicable, to support economic use of available resources.

To address this deficiency, PSE plans to build a new 230-115 kV substation in the Bellevue area with a 230-115 kV transformer and upgrade the existing 115-kV lines to 230-kV lines to provide a reliable source to the new substation. The new substation will allow existing 115 kV lines to distribute the power into Eastside communities. This would provide increased capacity and reliability for more than 100,000 customers in the Bellevue, Redmond, Kirkland, Newcastle, Clyde Hill, Medina, Mercer Island, Renton and Issaquah areas.

Completing this infrastructure upgrade would eliminate PSE's reliance on corrective action plans (CAPs). These CAPs could include intentional shedding of the load under certain conditions when re-dispatching the generation and/or sectionalizing the transmission system would not help in reducing the load beyond

capacity limitations of the transmission equipment. Thus, ensuring reliable service to all the Eastside customers and beyond by preventing a large area outage.

Should you have further questions, please feel free to contact Brad Strauch, Energize Eastside Infrastructure Program Manager at 425-456-2556 or bradley.strauch@pse.com.

Sincerely,

Jens Nedrud, PE
Manager, System Planning
PUGET SOUND ENERGY

Attachment: D
Independent Technical Analysis of Energize Eastside (USE 2015)

Independent Technical Analysis of Energize Eastside

for the

City of Bellevue, WA

April 28, 2015
Version 1.3

Prepared by
Utility System Efficiencies, Inc.

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DSD 000665

1. Executive Summary

Utility System Efficiencies, Inc. (USE) was engaged by the City of Bellevue in December 2014 to conduct an independent technical analysis of the purpose, need, and timing of the Energize Eastside project. Energize Eastside (EE) is Puget Sound Energy's (PSE's) proposed project to build a new electric substation and new higher–capacity (230 kilovolt) electric transmission lines in the East King County area, which encompasses Bellevue, Clyde Hill, Medina, Mercer Island, Newcastle, the towns of Yarrow Point, Hunts Point, and Beaux Arts, and portions of Kirkland, Redmond, and Renton (the Eastside). The transmission lines would extend from an existing substation in Redmond to one in Renton (See Figure 3.1).

The goals of the technical analysis were to determine:

- Is there a need for this project to address growth in Bellevue? In answering this question, the analysis included determining if PSE's load forecast is reasonable, and if their studied contingencies were reasonable. Here, reasonable is defined as just, rational, appropriate, ordinary, or usual in the circumstances.[1] If the actions or data are consistent with industry practice, it is deemed reasonable.
- Is the EE project needed to address the reliability of the electric grid on the Eastside? This question assesses the purpose of the project and its timing. In other words, is the need a local issue?
- Is there a need for the project to address regional flows, with imports/exports to Canada (ColumbiaGrid[2])? This question is examined in Appendix B, Optional Technical Analysis.

This independent technical analysis (ITA) included reviewing EE documentation, examining the forecast and growth assumptions, reviewing historical demand (MW load) of the area, reviewing weather volatility, and assessing potential variability from the forecast assumptions used in the EE study. The ITA reviewed PSE's forecasting methodology, the major elements that made up the forecast, and decisions made in the forecasting procedure (including choices on what elements or variables to include). The ITA compared PSE's forecast variables with typical industry forecast variables. The ITA also looked at the assumptions that PSE used in electrically modeling the Energize Eastside area, including generation assumptions, local loads, and regional flows. The ITA reviewed PSE's powerflow cases[3] to determine whether the modeling in the cases was consistent with the forecast, and whether the outage scenarios resulted in PSE's identified transmission deficiency.

The optional technical analysis (OTA) at Appendix B examined several hypothetical scenarios, called sensitivity studies. The OTA looked at the effect of a) reducing load growth in the Eastside area, b) reducing load growth in King County while keeping the Eastside growth the same, c) increasing Puget Sound area generation, and d) reducing the Northern Intertie[4] flow to zero (no transfers to Canada). Reduced Northern Intertie flow was examined only to assess the relative impact of local need

[1] http://www.nolo.com/dictionary/reasonable-term.html
[2] ColumbiaGrid (single word) is a regional transmission planning organization with a footprint encompassing Oregon, Washington, parts of Idaho and Montana.
[3] powerflow case: Computer model of the electric grid representing a snapshot in time with a specific scenario of electric load, generation, and equipment, including what is in service and what isn't.
[4] Northern Intertie - transmission interconnection between Washington and British Columbia (also called Path 3.)

DSD 000666

versus regional need and does not reflect a realistic planning scenario. The OTA also looked at the impact of an Extreme Winter forecast.

A key purpose of the ITA and the OTA was to provide an increased level of *understanding* of the purpose, need and timing of the EE project to the City Council and community stakeholders. Over the course of the project, dozens of questions were received from various stakeholders. City staff filtered stakeholder comment through the Task's scope, and submitted the need related questions to USE (Other comments as appropriate were directed to the Environmental Impact Statement (EIS) process, the Integrated Resource Plan[5] (IRP) process, etc.). A Q & A discussion is included at the end of each section of the ITA. All questions analyzed are also set forth in Appendix D.

Disclaimer: This report seeks to describe the findings in terms that a non-expert can understand. Thus, some descriptions or definitions may not be exact, in an effort to make the general concept clear. However, some questions received required a higher level of technical detail. Again, the effort was made to simplify the explanations while still providing a helpful response. A glossary is provided in Appendix A.

Results:

IS THERE A NEED FOR THIS PROJECT TO ADDRESS GROWTH IN BELLEVUE? YES.

The ITA examined the forecasting methodology used by PSE in its 2014 forecast, completed in February 2015. The 2014 forecast methodology provided improved visibility of where growth was occurring within PSE's service area. The PSE forecast shows a growing peak load demand[6] of 2.4% per year for years 2014 – 2024.

The typical utility industry forecast is composed of 1) weather normalization[7], 2) economic and demographic data, 3) application of end-use data[8] including conservation and efficiency measures, and 4) adjustment for large specific load additions (such as for a new building).

The ITA concludes that PSE has followed industry practice in forecasting its demand load, incorporating the four major components of forecasting:

- PSE incorporated weather normalizing. The variables used in the weather normalizing process were typical based on industry practice.
- PSE used typical data set elements and multiple data sources for its economic/demographic data as shown in Table 6.1, acquiring data at the county level, and for the Eastside area at the census track level, in order to differentiate growth rates within the service territory. Data on jobs and

[5] Integrated Resource Plan - A comprehensive and long-range road map for meeting the utility's objective of providing reliable and least-cost electric service to its customers while addressing applicable environmental, conservation and renewable energy requirements. A process used by utility companies to determine the mix of Supply-Side Resources and Demand-Side Resources that will meet electricity demand at the lowest cost. The IRP is often developed with input from various stakeholder groups.

[6] MW demand

[7] Weather normalization is a process that adjusts actual energy (MWh) or demand (peak MW) values to what would have happened under normal weather conditions. Normal weather conditions are expected on a 50 percent probability basis (i.e., there is a 50 percent probability that the actual peak realized will be either under or over the projected peak).

[8] End-use: How is the electricity being used? What appliances are used? What efficiency measures are employed? What load can be controlled or interrupted? Utilities and cities can influence electric end-use through Demand-Side Management technologies and practices, city code changes, efficiency programs or incentives, awareness campaigns, et cetera. The end-use data is generally limited to new DSR measures. Historical end-use data is generally not captured due to the difficulty in acquiring it (surveys, etc.).

employment in the Eastside region were obtained by PSE from the Puget Sound Regional Council and the WA State Office of Financial Management, and included census tract level analysis. PSE employed regression analysis[9] at this step, an industry standard computer analysis technique, to determine the forecast before new conservation measures and block load adjustments. (The computerized regression analysis was not analyzed as part of this study, but the technique is a computerized estimation of the best fit of the variables to the given data.)

- PSE acquired/developed significant end-use data via their IRP process, including over four thousand Demand Side Resources (DSR) measures, incorporated National and State requirements on conservation and RPS, and optimized the achievable, technical measures with a resultant 100% Conservation scenario which projects 135 MW of winter peak DSR by 2031.
- PSE gathered block load data (major projects) and utilized short-term forecast adjustments (1-year ramp in based on certificates of occupancy and 2-year ramp-out) to account for the impact on demand.

No forecast is perfect, but by following industry practice, the ITA concludes that PSE used reasonable methods to develop the forecast. PSE's resultant forecast shows the Eastside area growing at a higher level than at the county and system level, and these growth rates are based on the data it received.

PSE is applying the Northwest US practice (as does Seattle City Light (SCL)) of basing projects on a normal 50/50 forecast (actual load will be more than forecast half the time, and less than forecast half the time). This 50/50 forecast is less conservative than scenarios utilized by many other electric utilities elsewhere in the country. Basing projects on an adverse weather scenario is more conservative, but seeks to ensure that the lights stay on given the adverse weather event.

IS THE EE PROJECT NEEDED TO ADDRESS THE RELIABILITY OF THE ELECTRIC GRID ON THE EASTSIDE?
YES.

Although the new 2014 forecast resulted in an 11 MW decrease in the Eastside area's 2017/18 winter forecast, the reduced loading still resulted in several overloaded transmission elements in winter 2017/2018, which drive the project need.

Although the corrective action plan (CAP) required in the 2017/18 winter to avoid facility overload doesn't require dropping load (turning off customers' power), by winter 2019/20 approximately 63,200 customers are at risk of losing power. In addition, by summer 2018, studies show that customers will be at risk of outages and load shedding[10] due to CAPs used to mitigate transmission overloads. Despite the possibility of an in-service date shift to summer 2018 from winter 2017/18, balancing a six month delay in a complex and multi-year EIS process (which can have its own delays) against the risk of an adverse winter and less realized conservation (which could increase 2017/18 winter loading to a point where customers are at risk of load

[9] Regression analysis is a statistical process for estimating the relationships among variables. It seeks to determine the strength of the relationship between one dependent variable (usually denoted by Y) and a series of other changing variables (known as independent variables). It is also known also as curve fitting or line fitting because a regression analysis equation can be used in fitting a curve or line to data points. It includes many techniques for modeling and analyzing variables.

[10] Load shedding - An intentional electrical power shutdown to a portion of the system (customers experience an outage) to protect the network from a greater impact or from potential damage.

shedding), suggests it is reasonable to maintain the schedule for the existing project in-service date.

Several hypothetical scenarios were studied as part of the Optional Technical Analysis (OTA). Each one showed overloads in the 2017/18 timeframe, indicating project need in order for PSE to meet federal regulatory requirements for system reliability. The OTA results showed that reducing the Eastside area growth from 2.4% to 1.5% per year in the period from winter 2013/14 to winter 2017/18 still resulted in project need. Reducing PSE's King County growth while keeping the Eastside growth the same similarly resulted in a project need. Turning on additional generation in the Puget Sound area also resulted in a project need. (See Appendix B.)

IS THE PROJECT NEEDED TO ADDRESS REGIONAL GRID POWER FLOWS, SPECIFICALLY POWER FLOWS ON THE NORTHERN INTERTIE (TO AND FROM CANADA)? The project is necessary to address local need.

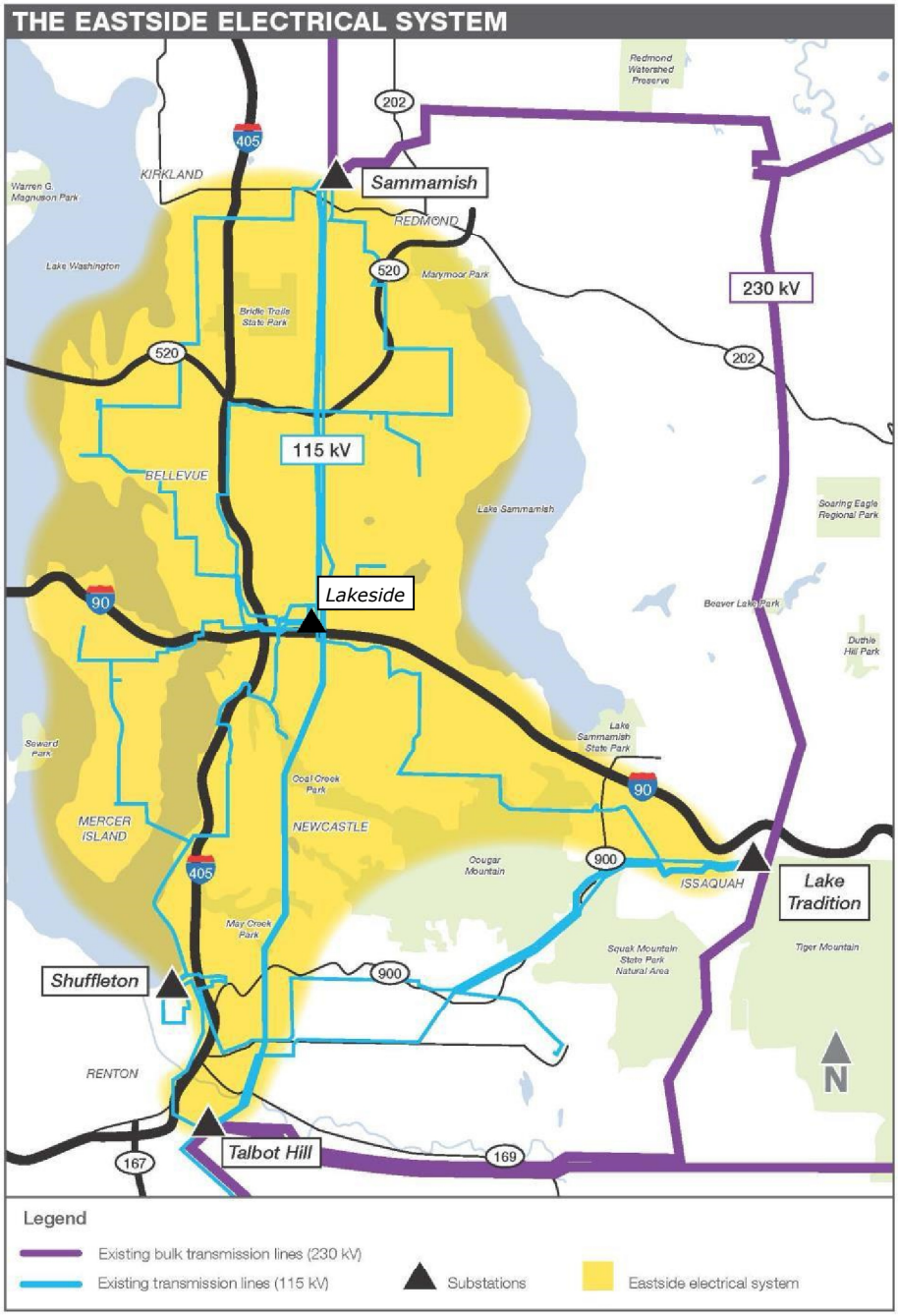
The Optional Technical Analysis examined this issue by reducing the Northern Intertie[11] flow to zero (no transfers to Canada). Although this scenario is not actually possible due to extant treaties, it was modeled to provide data on the drivers for the EE project, to examine if regional requirements might be driving the need. The results showed that in winter 2017/18, even with the Northern Intertie adjusted to zero flow, the Talbot Hill 230/115 kV transformer #2 would still be overloaded by several contingencies (several different outage scenarios). Again, the projected overloads indicate a project need at the local level to meet reliability regulations. (See Appendix B for more details.)

[11] Northern Intertie - transmission interconnection between Washington and British Columbia (Also called Path 3.)

2. Eastside Area

The Eastside area is highlighted in yellow below, and was defined electrically as the area served by the 115 kV transmission lines that connect with the Lakeside Transmission Substation. Geographically it is bounded by Lake Washington and Lake Sammamish. The area is also north of PSE's Talbot Hill Substation and south of PSE's Sammamish Substation.

Figure 3.1: Eastside Area (Figure provided by PSE)



3. 2013 Eastside Needs Assessment Report

This section is included in the ITA report because PSE's 2013 Needs Assessment report is public whereas there is no updated PSE report documenting the 2014 forecast results as of the date of this writing.

The "Eastside Needs Assessment Report", published in October 2013 by PSE, focused on the central King County portion of PSE's service territory. It was based on PSE's corporate forecast which was published in June 2012. The study determined that there was a transmission capacity deficiency in the Eastside area that would develop by the winter of 2017/2018.

Key Assumptions in PSE's 2013 Study:

- System load levels used the PSE corporate forecast published in June 2012.
- Area forecasts were adjusted by substation to account for expected community developments as identified by PSE customer relations and distribution planning staff.
- Generation dispatch patterns reflected reasonably stressed conditions to account for generation outages as well as expected power transfers from PSE to its interconnected neighbors.
- Winter peak Northern Intertie transfers were 1,500 MW exported to Canada.
- Summer peak westside Northern Intertie transfers were 2,850 MW imported from Canada.

Per PSE's 2013 study report, specific areas of concern for the 2017/2018 winter are shown in Table 4.1 below. The table lists the overloaded elements within each category of contingency.

Each of the three contingency types (N-1, N-1-1, and N-2) shown below are part of the required study process and are defined in the report glossary.

Table 4.1: PSE's 2013 Study Report: 2017/2018 Overloaded Elements

	2017/2018 Normal Winter (23° F) 100% Conservation		
	Type of Contingency		
Transmission Line or Transformer	N-1	N-1-1	N-2
Talbot Hill - Lakeside #1 115 kV line		OL	OL
Talbot Hill - Lakeside #2 115 kV line		OL	OL
Talbot Hill 230-115 kV transformer #1		OL	
Talbot Hill 230-115 kV transformer #2		OL	
Talbot Hill-Boeing Renton-Shuffleton 115 kV line		OL	
Shuffleton – O'Brien 115 kV line			
Shuffleton – Lakeside 115 kV line			

OL = Overload of Emergency Rating.

PSE's 2013 Needs Assessment report drove many need-related Stakeholder questions about the forecast, the weather scenarios, the regional scenarios, exports and imports to Canada, the outage contingencies studied and whether they were needed, the probability of having the issues, etc. PSE develops a new forecast every two years, and in February 2015, PSE completed their new forecast with actuals through 2014. They have since restudied the situation with the new forecast. The remainder of this ITA report will relate the questions received to the new forecast and the new results.

4. Energy versus Demand

Forecasts are developed for both energy and demand. A useful analogy is to compare energy to a car odometer and demand to a car speedometer.

- Energy (kWh) is analogous to an odometer reading, which is a cumulative measure of total miles traveled over time. Energy is a cumulative measure of total power produced or consumed over time.

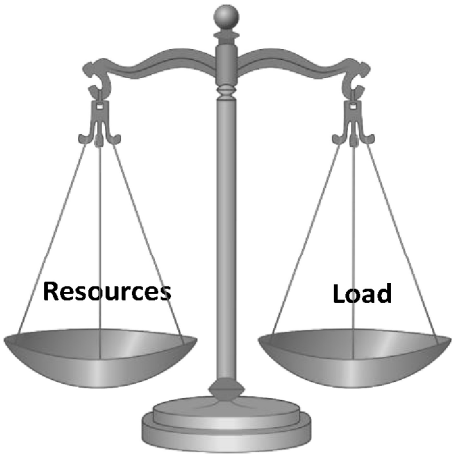
Demand (kW) is analogous to a speedometer reading, which shows a snapshot of the speed at a precise moment. Demand is a snapshot of power required or power used. Peak demand is the highest demand that will be required at any particular moment during a period of time. An odometer doesn't indicate how fast someone drives, but does indicate how much driving has been done. Similarly, an energy forecast (kWh) indicates increases or decreases in the use of electricity, but doesn't indicate peak usage (kW).

Bellevue's Resource Conservation Manager (RCM) program stats on declining energy use are reflecting a decline in the average use per customer. The DSM programs, solar, etc. are showing success with this decline. But, that is one piece of the story - the energy piece on a per customer basis. The number of customers continues to increase, and the aggregate peak usage (peak demand), is continuing to increase. Growth in peak demand drives the size and amount of infrastructure required and drives the issue of grid reliability.

5. Typical Electric Forecast Elements

The typical utility industry forecast is composed of four main parts which will each be further explained later in this section: 1) adjustment for weather, 2) economic and demographic data, 3) application of end-use data, including energy efficiency and conservation effects, and 4) adjustment for large specific load additions (such as for a new building).

Resource planning is a related activity which provides direction on some of the forecasting elements. Resource planning (ensuring there are sufficient generation and conservation/efficiency resources to serve the customer load) requires a load forecast to know how much load one must serve. The resources must balance the load.



National Level

There are NERC Reliability Standards which pertain to the collection of data necessary to analyze the resource needs to serve peak demand while maintaining a sufficient margin to address operating events. One Standard (NERC MOD-021-1) requires that "forecasts shall each clearly document how the Demand and energy effects of DSM programs (such as conservation, time-of-use rates, interruptible Demands, and Direct Control Load Management) are addressed." Another Standard (NERC MOD-019-0.1) requires "forecasts of interruptible demands and Direct Control Load Management (DCLM) data".

State Level

There are state requirements for resource planning, which identifies generation resources and conservation/efficiency measures to serve the customer load. State Law (RCW 19.280.030), identifies the requirements of a resource plan, and states that the integrated resource plan must include:

> "(1)(a) A range of forecasts, for at least the next ten years or longer, of projected customer demand which takes into account econometric data[12] and customer usage;"

[12] Econometrics is the application of mathematics and statistical methods to economics. The data to which it is applied is called econometric data. Econometrics tests hypotheses and forecasts future trends by applying statistical and mathematical theories to economics. It's concerned with setting up mathematical models and testing the validity of economic relationships to measure the strengths of various influences.

> "(1) (b) An assessment of commercially available conservation and efficiency resources. Such assessment may include, as appropriate, high efficiency cogeneration, demand response and load management programs, and currently employed and new policies and programs needed to obtain the conservation and efficiency resources;"

Item 1(a) above requires econometric and end-use data in the forecast. Item 1(b) requires that the forecast account for conservation and efficiency resources. Both are industry practices.

Resources consist of Supply-Side Resources (conventional generation plants, renewables, etc.) and Demand-Side Resources (resources that reduce the demand (load)).

5.1. Simplified Description of the Forecasting Procedure

1) WEATHER NORMALIZING.

The North American Electric Reliability Corporation (NERC[13]) provides direction at the national level for normalizing the demand (MW) forecast to account for weather impact.

> "The fundamental test for determining the adequacy of the Bulk Electric Power System (BEPS) is to determine the amount of resources and the certainty of these resources to be available to serve peak demand while maintaining a sufficient margin to address operating events. This test requires the collection and aggregation of demand forecasts on a normalized basis. This is defined as a forecast that has been adjusted to reflect normal weather conditions and is expected on a 50 percent probability basis, also known as a 50/50 forecast (i.e., there is a 50 percent probability that the actual peak realized will be either under or over the projected peak). This forecast can then be used to test against more extreme conditions." [14]

Normalizing the forecast seeks to remove the variation in load due to weather related factors including the temperature at the time of the peak, the temperature on the days prior to the peak, whether the peak occurred on a weekend, a weekday, a holiday, etc. Reactions to these variables vary throughout the United States, yet for a localized area there will be a typical reaction that can be calculated. These are addressed when normalizing the forecast. For example, many office buildings use less power on the weekend or on a holiday. Moreover, some residential customers will put up with a short cold or hot spell, but if it lasts "too long", they will be more likely to increase their use of heating or air conditioning.

[13] NERC: North American Electric Reliability Corporation. NERC is a not-for-profit international regulatory authority whose mission is to assure the reliability of the bulk power system in North America. NERC develops and enforces Reliability Standards as one of its duties. NERC's area of responsibility spans the continental United States, Canada, and the northern portion of Baja California, Mexico.
[14] NERC, Normalizing "NERC | MOD C White Paper | April 24, 2014", page 5 http://www.nerc.com/pa/Stand/Project%20201004%20Demand%20Data%20MOD%20C/MOD_C_White_Paper_Redline_20140424.pdf

In addition to calculating the normalized peaks, industry also typically calculates an adverse or extreme peak. Many utilities utilize a 90/10 forecast[15] to justify projects, some use an 80/20 forecast to justify projects. Utilities in the Northwest area of the United States typically base their projects on the normal (50/50) forecast, although they develop a 95/05 forecast (1-in-20) for reference.

A typical industry source for the weather data is a National Oceanic and Atmospheric Administration (NOAA) weather station. Some utilities may have their own weather recording data.

Stakeholder Questions on weather adjustment

Q1. Please explain weather adjustment. Is it reasonable/appropriate?

- A *Please see the above discussion.*
- A *Weather adjustment is reasonable and appropriate, and is required by NERC.*

2) DEVELOP A MATHEMATICAL RELATIONSHIP (EQUATION) BETWEEN A) THE ECONOMIC AND DEMOGRAPHIC DATA AND B) EITHER ENERGY USAGE (KWH) OR ELECTRIC DEMAND (KW).

For each customer class (e.g. industrial, commercial and residential), estimate the relationship between electricity consumption (usage) or demand, and the major variables that affect it (e.g. population, price, economic growth, etc.). This relationship is usually developed first, without accounting for new Demand-Side Resources (DSR), in order to show the effect of the DSR on the forecast.

Econometrics utilizes multiple sources of data. Table 5.1 lists examples of data sets that may be used in the econometric modeling.

Table 5.1: Examples of Data Used in Econometric Models

Example Data Sets used in Econometrics
Household Size
Population
Customer Count by Customer Class
Employment (Manufacturing, Non-Manufacturing, by NAICS Code[16], etc.)
GDP (Gross Domestic Product)
GMP (Gross Metropolitan Product) – a measure of the size of the economy of a metropolitan
Personal Income

[15] 90/10 forecast: 90% probability that the weather will be less severe and a 10% probability that the weather will be more severe. This is also called a 1-in-10 forecast.

[16] NAICS - The North American Industry Classification System (NAICS) is the standard used by Federal statistical agencies in classifying business establishments for the purpose of collecting, analyzing, and publishing statistical data related to the U.S. business economy (Source: Census.gov)

3) ACCOUNT FOR END-USE DATA INCLUDING ENERGY EFFICIENCY AND CONSERVATION EFFECTS (TYPICALLY FROM AN INTEGRATED RESOURCE PLAN (IRP))

End-Use Analysis projects the quantity and use of electricity-using equipment (or a subset of them) to make a forecast or to revise one. *End-use analysis is responsive to consumer changes in kinds of equipment and allows analysis of conservation programs, energy efficiency improvements, building code modifications, increase in household electronics or typical housing square footage, etc. It breaks the data into user sectors and needs an extensive inventory of data. It readily reflects changes in the factors that influence consumption, but requires detailed assumptions on the use going forward.*

Utilities and cities can influence electric end-use through Demand-Side Management technologies and practices, city code changes, efficiency programs or incentives, awareness campaigns, et cetera. Example end-use programs are listed below.

- Residential mass market lighting and appliances
- Residential HVAC replacement
- Residential new construction
- Residential retrofits
- Commercial/Industrial lighting, equipment, HVAC
- Customized programs for larger customers
- Demand Response incentive/enabling programs
- Pricing—interruptible, time of use pricing, real time pricing

Demand-Side Management (DSM) can be broken into two components: energy efficiency and Demand Response. Energy efficiency attempts to permanently reduce the demand for energy in intervals ranging from seasons to years and concentrates on end-use energy solutions. Demand Response is designed to change on-site demand for energy in intervals from minutes to hours, targeting the lowering of electric demand/energy use during peak periods by transmitting changes in prices, load control signals or other incentives to end-users to reflect existing production and delivery costs.

When end-use factors are taken into account in the forecast, there will be multiple variables representing different elements of end-use. Some may offset others. For example, the U.S. Department of Energy noted that "Homes built between 2000 and 2005 used 14% less energy per square foot than homes built in the 1980s and 40% less energy per square foot than homes built before 1950. However, larger home sizes have offset these efficiency improvements."[17]

When utilized, the IRP process is where the end-use data is analyzed. The IRP is a comprehensive and long-range road map and is where a utility examines both Supply-Side and Demand-Side options with the objective of providing reliable and least-cost electric service to its customers while addressing applicable environmental, conservation and renewable energy requirements. Because energy efficiency is generally a low-cost resource, the IRP tends to incorporate energy efficiency as a utility system resource and reduce the need for additional Supply-Side resources.

The end-use data is generally limited to new DSR measures. Historical end-use data is not usually captured due to the difficulty in acquiring it.

[17] "Buildings Energy Data Book", US Department of Energy

4) ADJUST FOR BLOCK LOADS (MAJOR LOAD ADDITIONS)

Known large load additions would be added to or removed from the forecasted load. This could include new large commercial buildings, major customers leaving the area, etc.

The above forecast discussion represents the system forecast, referring to the forecast for the utility's entire service area. A system forecast may be broken into sub-areas at the utility's discretion, or separate forecasts may be developed for sub-areas. Various scenarios may be modeled, to examine higher or lower conservation levels, adverse weather, et cetera.

5.2. Utilizing the System Forecast in Powerflow Cases

In order to conduct studies on the transmission system, the substation loads are calibrated to the system forecast. Once calibrated, the substation loads are modeled in the transmission planning cases for study. Multiple seasons and years may be studied.

6. PSE's Forecast Methodology

PSE updates their load forecasts every two years. In early February 2015, PSE completed their 2014 forecast which included historical data through 2014, and thus included the summer 2014 peak and the winter 2013/2014 peak. This new forecast was based on a new methodology. PSE shifted from a predominately system-wide view to a county by county examination. Particular focus was placed on King County, where the Eastside study area was further separated out from King County using census tract data to develop a separate Eastside forecast. This new forecast methodology provided improved visibility of where growth was occurring and where it wasn't. Consequently, after conferring with the City, USE decided to wait for the new forecast, with its improved visibility of the Eastside area, as well as its more recent actual load information.

The review of PSE's forecast methodology in this report is specific to PSE's 2014 forecast.

6.1. Weather Adjustment (Weather Normalizing)

PSE's 2014 system forecast incorporated weather normalizing consistent with industry practice.

PSE's weather normalizing process tests the following major variables via regression analysis. The regression analysis process selects out the variables that result in the best fit to the data.

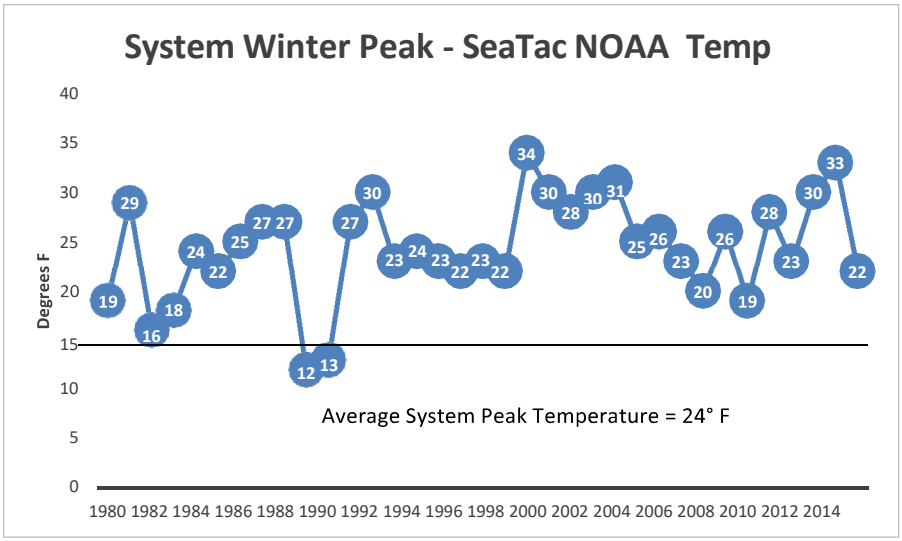
- ☐ Peak hourly load for the month
- ☐ Maximum hourly load on each of the three days prior to the peak day
- ☐ Minimum and maximum temperature on the peak day
- ☐ The minimum temperature on each of the three days prior to the peak day
- ☐ The average temperature on the peak day
- ☐ The average temperature on each of the three days prior to the peak day
- ☐ Temperature 1, 2, and 3 hours before the peak
- ☐ Temperature at the peak hour
- ☐ Total monthly load
- ☐ Average monthly temperature
- ☐ The season the peak occurred in
- ☐ Whether the average temperature on the peak day, or the day before, fell below a certain threshold (cold snap variables)
- Whether it is an El Niño
- ☐ Day of the week

The factors PSE uses to normalize the effect of weather are quite typical for electric forecasting. Some utilities use humidity as a variable, PSE does not. PSE stated it did not consider humidity a significant factor. Realistically, humidity is less likely to be a factor in the winter. Heating the cold air lowers the relative humidity[18], so it feels dryer.

[18] Relative humidity is the amount of water vapor present in air. It is expressed as a percentage of the amount needed for saturation at the same temperature. Thus relative humidity varies with temperature.

PSE utilizes the SeaTac NOAA weather station for weather data. Figure 6.1 shows the historic winter system peak[19] actual temperatures through winter 2013/2014.

Figure 6.1: Historical Temperature Data



PSE has defined their winter season as November 1 – February 28, and the normal temperature at which PSE's winter load peaks is 23° F (normal peak load temperature). PSE also defines an extreme winter peak load that has a probability of occurring once every twenty years and occurs at a temperature of 13° F. Although PSE develops the extreme winter forecast and models the effect, they only use it as an indicator of future deficiencies. PSE does not use the extreme winter forecast to justify transmission projects, they only use the normal forecast to justify projects. (Utilities in the Northwest area, including Seattle City Light (SCL), use the normal forecast for justifying projects. Many utilities outside this area use an adverse forecast to justify projects.)

Comments:

PSE uses a normal peak load temperature of 23° F. The average winter peak load temperature since 2008 is 24°F, though examining a longer span of time may show that it is 23° F. It is likely that a 1° shift upwards in temperature would reduce the normal winter forecast, but it may not be significant. One could say the normal forecast is a bit conservative. On the other hand, PSE does not use any type of adverse weather (anything worse than a 50/50 forecast) to justify a project. Many utilities design their system based on adverse weather, such as a 90/10 or 80/20 scenario where the forecast is exceeded 10% or 20% of the time. Per the Western Electricity Coordinating Council (WECC) Data Collection Manual (2014), NERC has requested that each Balancing Authority provide a 90/10 forecast. In NERC's 2014-2015 Winter Reliability Assessment, it recommends that scenarios should be assessed that reflect severe winter conditions, such as a "… higher-than-normal peak load (e.g. 90/10 forecast)." PSE does study a 95/5 (1 in 20) extreme winter, but does not use it to justify projects

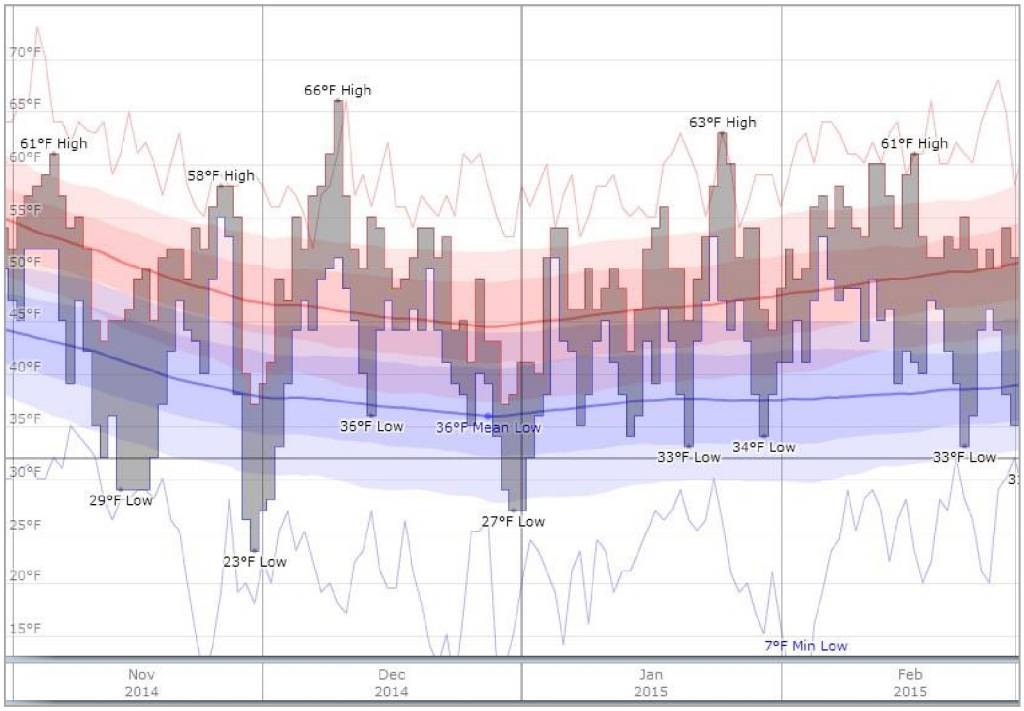
PSE uses one weather station for their service area. Some utilities use more than one weather station to reflect significant weather differences in their service territory.

[19] A system peak refers to the peak demand. In winter, this would be driven by low temperatures.

PSE feels there is not enough weather variation within their service territory to require using more than one weather station. In addition, they expressed concern that the while the SeaTac weather station is very reliable, not all the weather stations are maintained as well and there might be data reliability issues.

Although the 2014/2015 winter peak period ended February 28th, the winter peak data is not yet available. The data verification and normalizing process is not complete and typically occurs mid-year, but it is known that the 2014/15 winter peak was an unusually warm one. Figure 6.2 is taken from Weatherspark.com, and simply shows the highs and lows for each day during the winter season. The very lowest temperature for the entire season was 23°F on November 30th at 2am, per Weatherspark.com. PSE's winter peak (demand) typically occurs either in the morning between 7am and 9am or in the late afternoon/early evening between 4:30pm and 7pm. In either case the winter system peak would have occurred at a warmer temperature. Does this drive any change? At this point, no. It is expected that actual temperatures will not be the same as the defined "normal" temperature. A single data point is unlikely to change a trend. When PSE revises their forecast in two years, they will have two more data points and will recheck the trends through a new regression analysis.

Figure 6.2: Historical Temperature Data 2014/15 Winter Season – Weatherspark.com



6.2. PSE's Econometric Modeling

PSE incorporates economic and demographic data into their forecast, subdivided by customer class, using typical data set elements. See Table 6.1 for the sources of data used in their model.

Table 6.1: Data used in PSE's Economic/Demographic Model

Data Set	Historical Data Frequency	Source of Historical Data	Source of Forecasted Data
County Level Employment			
Labor Force, Employment, Unemployment Rate	Quarterly	US Bureau of Labor Statistics (BLS)	PSE's Economic/Demographic Model
Total Non-Farm Employment Goods Producing & Service Providing Sectors	Monthly	WA State Employment Security Department (ESD), using data from Quarterly Census of Employment & Wages	
County Level Personal Income			
Personal Income, Wages and Salaries	Yearly	US Bureau of Economic Analysis (BEA)	PSE's Economic/Demographic Model
County Level Population and Households			
Population (thousands)	Yearly	US BEA/ WA State Office of Financial Management (OFM)	PSE's Economic/Demographic Model
Households, Single-family & Multi-Family (thousands.)	Annual forecasts	US Census	
Household size, Single- and Multi-family (number)	Quarterly	Building Industry Association of Washington	
Eastside Area by Census Tracts			
Population	Yearly	WA State Office of Financial Management (OFM), 9/28/14	PSRC data, April 2014
Employment	Yearly	PSRC, June 2014	PSRC data, April 2014
US Level Macroeconomy			
GDP ($ x Billions, in year 2000 $), Industrial Production Index	Quarterly	Moody's	Moody's
Employment (mils.), Unemployment Rate (%)			
Personal Income ($ x Billions) Wages & salary disbursements, Other Income			
CPI (82-84=1.00[20]), consumer expenditures deflator (2000=1.0)			
Housing Starts (millions)			
Population (millions)			
T-bill rate, 3 months (%), Conventional mortgage rage (%)			

The Puget Sound Regional Council (PSRC) intends for the City of Bellevue to be a hub for regional growth. In their Vision 2040 Regional Growth Strategy report, PSRC designated five Metropolitan Cities to serve as the focal point for accommodating population and employment growth. These are Bellevue, Bremerton, Everett, Seattle, and Tacoma. The strategy is for the Metropolitan Cities "… to accommodate 32 percent of regional population growth and 42 percent of regional employment growth by the year 2040." It was also noted that it would be in the spirit of the strategy for them to accommodate an even higher percentage.

In addition, the City of Bellevue provided the following information on expected population and employment growth. "Currently there are an estimated 11,000 residents living in Downtown, and that number is expected to grow to 19,000 by 2030. Currently there are about 45,000 jobs within Downtown and that number is expected to increase to 70,300 by 2030."

Given the above, one could expect a higher growth in the Eastside area than in some of the other areas served by PSE.

[20] The average of the 1982-1984 data is set to 1.00

The following graphs display the historic and forecasted data for population, employment, and customer count, provided by PSE. Data is shown for the PSE service territory, PSE's portion of King County, and Eastside. The graphs for Eastside were developed from data sets at the census tract level. Graphs for these data sets are provided for comparison of growth rates between Eastside, King County and the PSE service territory.

The historic graph data for the PSE system goes back to 2000, and includes Jefferson County up until March 2013. The historic graph data for King County and Eastside only goes back to 2006. The Eastside customer count graphs are missing the actual data for year-end 2013; PSE recently updated their billing system with a new IT company, and not all of their customer reports were available at the time of the 2014 forecast.

Because the system graph data goes back to 2000, it shows the trend prior to the recession. The King County and Eastside graph data only goes back to 2006, so the historical trend is obscured by the recession.

Employment and population are increasing. (Data provided by PSE. See Table 6.1 for original data sources.)

Figure 6.3: Population and Employment - PSE Service Territory

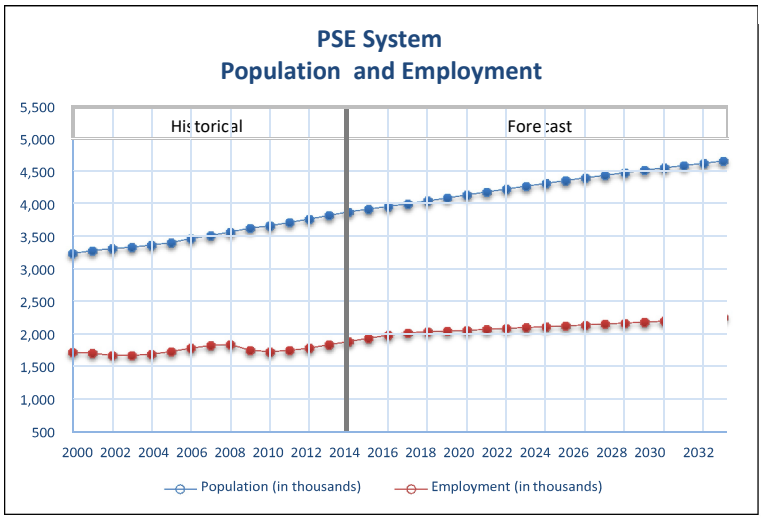


Figure 6.4: Population and Employment – King County

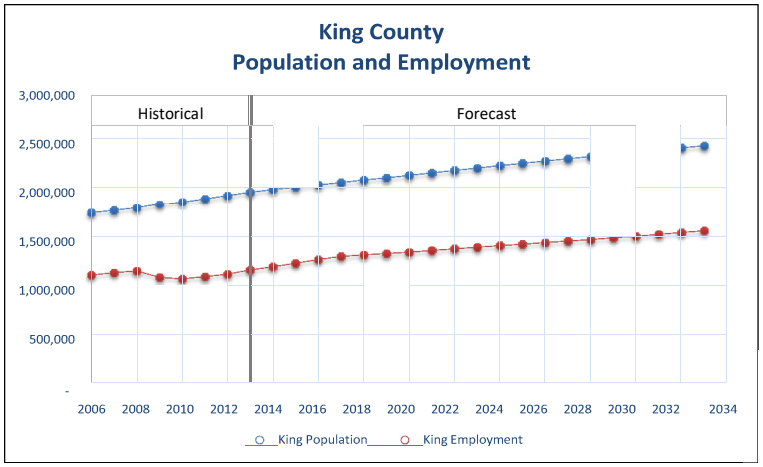
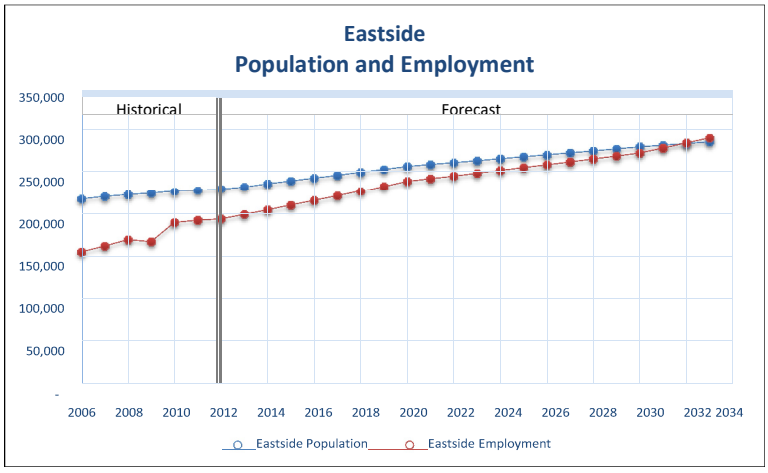
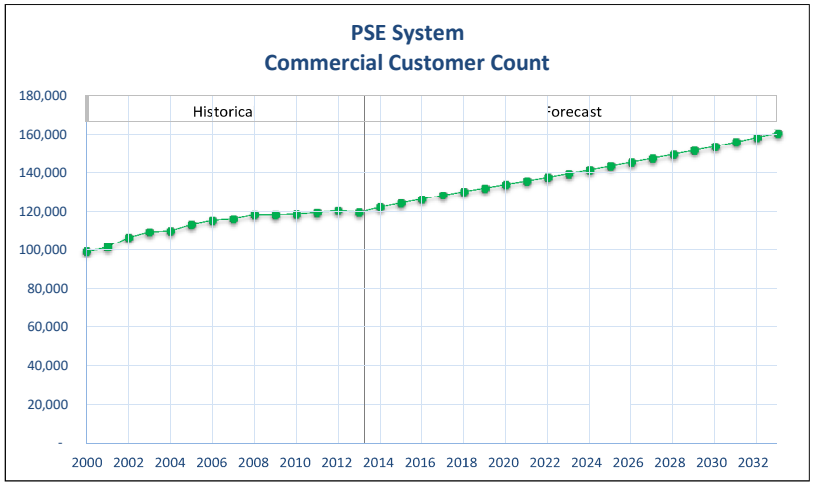


Figure 6.5: Population and Employment – Eastside



Forecasts for the commercial customer counts are increasing.

Figure 6.6: Commercial Customer Count - PSE Service Territory



The PSE system data goes back to 2000 and shows the trend prior to the recession. The King County and Eastside data only goes back to 2006, so the historical trend is obscured by the recession.

Figure 6.7: Commercial Customer Count – King County

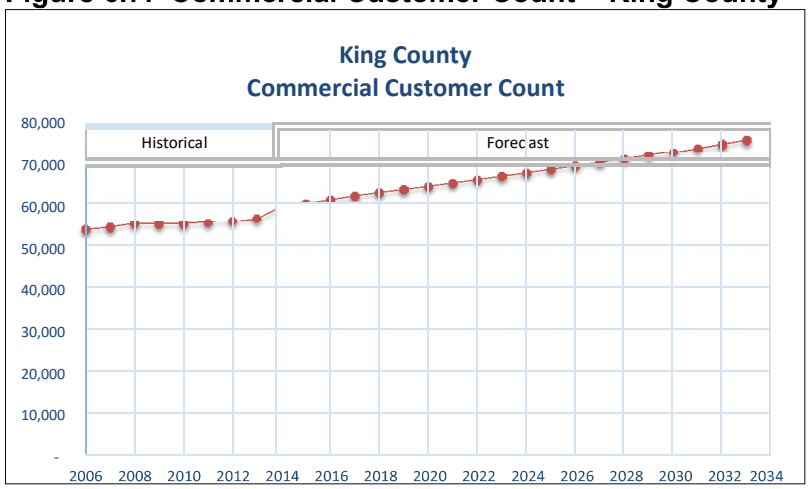
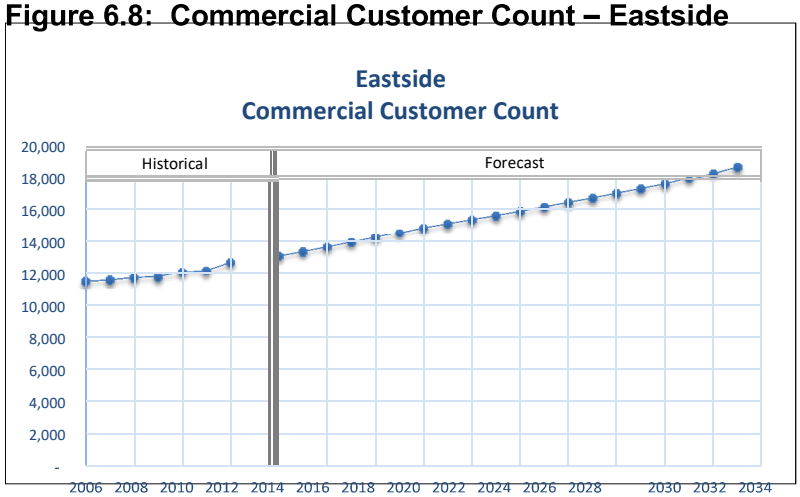
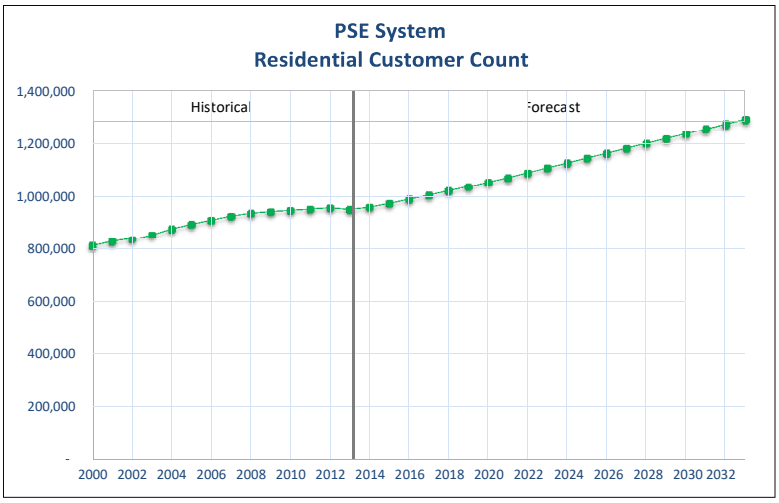


Figure 6.8: Commercial Customer Count – Eastside



Forecasts for the residential customer counts are increasing.

Figure 6.9: Residential Customer Count - PSE Service Territory



The PSE system data goes back to 2000 and shows the trend prior to the recession. The King County and Eastside data only goes back to 2006, so the historical trend is obscured by the recession.

Figure 6.10: Residential Customer Count – King County

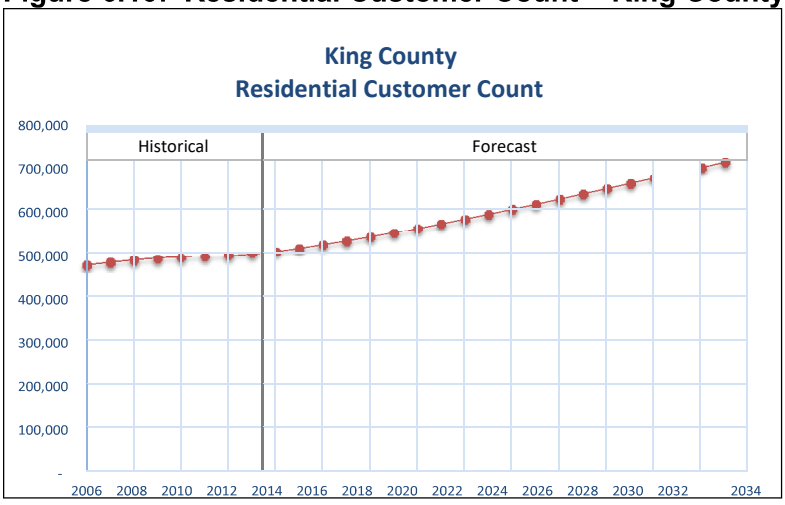
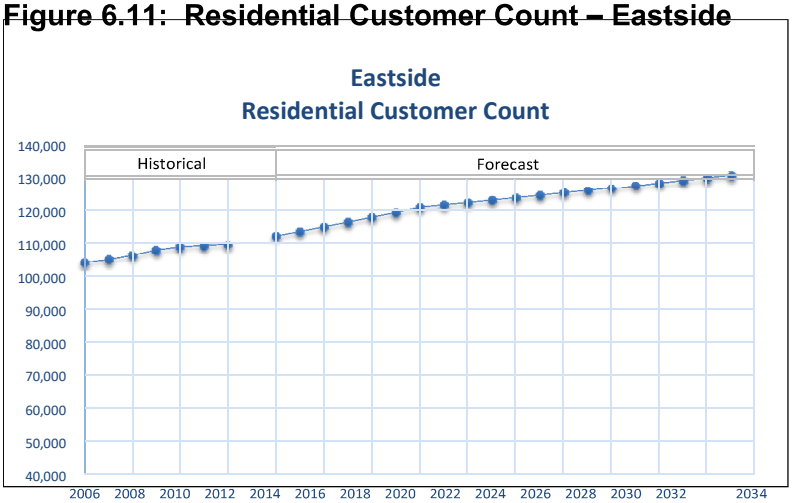
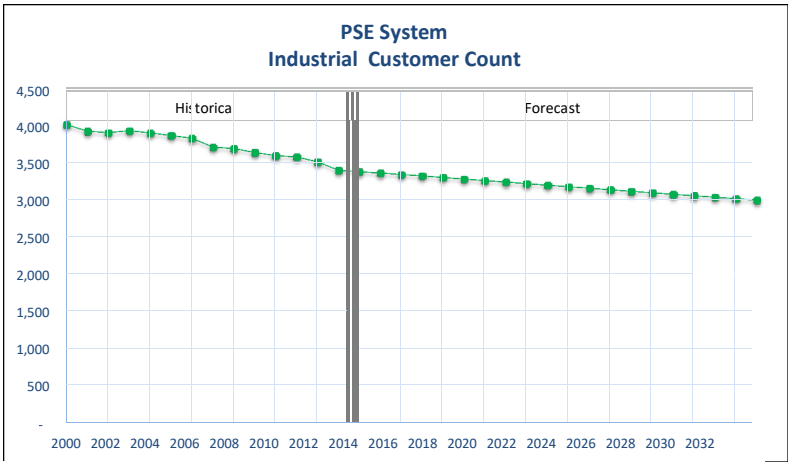


Figure 6.11: Residential Customer Count – Eastside



The industrial customer count is continuing to decline as more industrial customers move out of the area and more commercial moves in.

Figure 6.12: Industrial Customer Count - PSE Service Territory



Industrial customers include warehousing.

Figure 6.13: Industrial Customer Count – King County

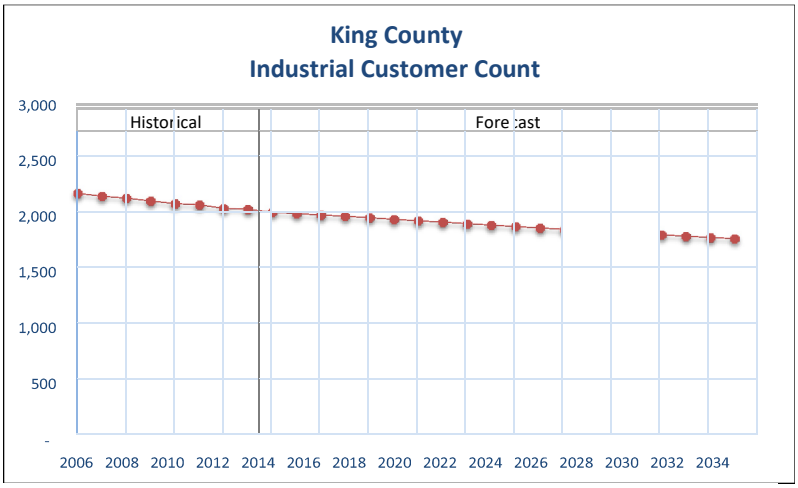
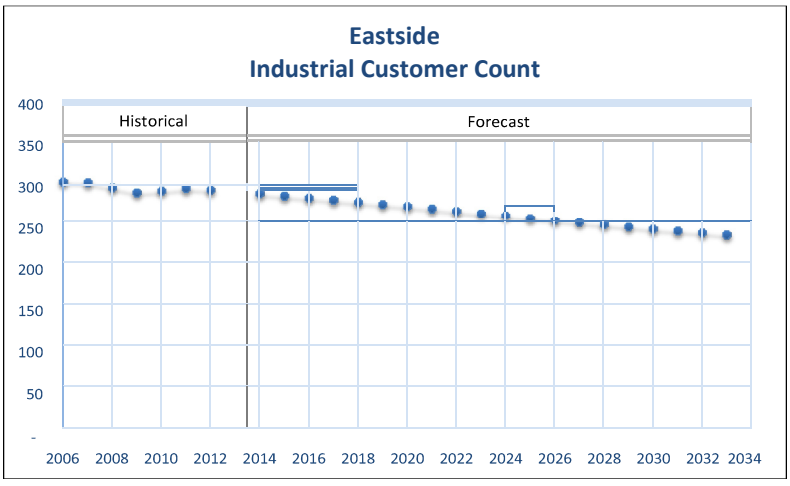


Figure 6.14: Industrial Customer Count – Eastside



6.3. End-Use Data, Including Demand-Side Response and Energy Efficiency

End-use data is evaluated in Integrated Resource Planning. The IRP is where a utility examines both Supply-Side and Demand-Side options with the objective of providing reliable and least-cost electric service to its customers while addressing applicable environmental, conservation and renewable energy requirements. Because energy efficiency is generally a low-cost resource, the IRP tends to incorporate energy efficiency as a utility system resource and reduce the need for additional Supply-Side resources.

Washington State's Renewable Portfolio Standard (RPS) law requires conservation potential be developed using Northwest Power & Conservation Council (NWPCC) methodology, and conservation targets are based on IRP with penalties for not achieving them. It requires PSE to meet specific percentages of its load with renewable resources or renewable energy credits (RECs) by specific dates.

The Energy Independence and Security Act (EISA, 2007) provides for minimum federal standards for lighting and other appliances beginning in 2012. It also sets standards for increasing the production of clean renewable fuels, increasing the efficiency of buildings and vehicles, and more.

PSE commissioned The Cadmus Group, Inc. (Cadmus) to conduct an independent study of Demand-Side Resources (DSR) in the PSE service territory as part of its biennial integrated resource planning (IRP) process. The study considered energy efficiency, fuel conversion, Demand Response, and distributed generation, totaling over four thousand measures. PSE also considered distribution efficiency. The achievable, technically feasibly Demand-Side measures were combined into bundles[21] based on levelized cost[22] for inclusion in the generation optimization analysis. The optimization model developed and tested different portfolios, combining Supply-Side Resources with Demand-Side bundles, to find the lowest cost combination of resources that: a) met capacity need; b) met renewable resources/RECs need; and c) included as much conservation as was cost effective. (Once the capacity and renewable resources/RECs needs are met, the decision to include additional conservation bundles is simply whether that next bundle of measures increases the cost or decreases it.) The final set of cost effective measures is identified as the "100% conservation" set. By 2033, the 100% conservation scenario is projected to reduce PSE's winter system peak by 1226 MW, 209 MW from the EISA programs and 1017 MW from all the other Demand-Side Resources. Only new opportunities are captured.

The table below breaks out the 100% conservation DSR at the King County and Eastside area level. The MW column shows the impact (reduction) to the demand forecast. For the Eastside area, 51 MW of peak DSR is projected by 2017, and 135 MW by 2031. These reductions are incorporated into the 100% Conservation forecast, which is what is being reviewed in this report.

[21] All the bundles are cost bundles, with the exception of a standards bundle (expected effects of codes and standards such as EISA) and a distribution efficiency bundle. An example bundle is the set of measures that cost between $28/MWh and $55/MWh.

[22] Levelized Cost - An economic assessment of the cost to build and operate a power-generating asset over its lifetime divided by the total power output of the asset over that lifetime. It is also used to compare different methods of electricity generation in cost terms on a comparable basis.

Table 6.2: Cumulative DSR Impact (2013 IRP)

King County			Eastside Area		
year	Annual DSR (MWh)	Peak DSR (MW)	year	Annual DSR (MWh)	Peak DSR (MW)
2014	112,730	45	2014	94,667	21
2015	348,463	88	2015	152,559	31
2016	557,863	131	2016	207,980	41
2017	756,295	171	2017	262,563	51
2018	951,360	213	2018	317,493	61
2019	1,147,137	246	2019	386,767	74
2020	1,393,906	309	2020	464,427	86
2021	1,668,547	350	2021	529,013	96
2022	1,902,423	387	2022	585,484	107
2023	2,112,925	421	2023	629,201	110
2024	2,274,243	432	2024	650,086	113
2025	2,351,296	444	2025	672,152	116
2026	2,431,870	457	2026	693,168	120
2027	2,508,352	471	2027	715,397	123
2028	2,589,821	483	2028	734,411	127
2029	2,658,889	494	2029	754,139	130
2030	2,731,640	505	2030	771,869	134
2031	2,798,219	517	2031	793,300	135
2032	2,875,530	532			
2033	2,931,133	533			

Source: PSE

Stakeholder Questions on Demand-Side Response:

Q2. What is the effect of the LED street light program on load?

A *The Eastside load is forecasted at 641 MW under normal conditions (Winter 15/16). The funded street light conversion program would reduce this load by 282 kW and the full conversion would reduce the load by 798 kW. On a percentage basis, the funded conversion would reduce Eastside load by 0.044% and the full conversion would reduce Eastside load by 0.12%. Though not evaluated in the 2013 IRP and thus not part of the 100% conservation measures, there will be limited impact to the overall load in any given year.*

Q3. Does the load forecast take into account local government actions, such as Bellevue's street light and traffic light initiatives?

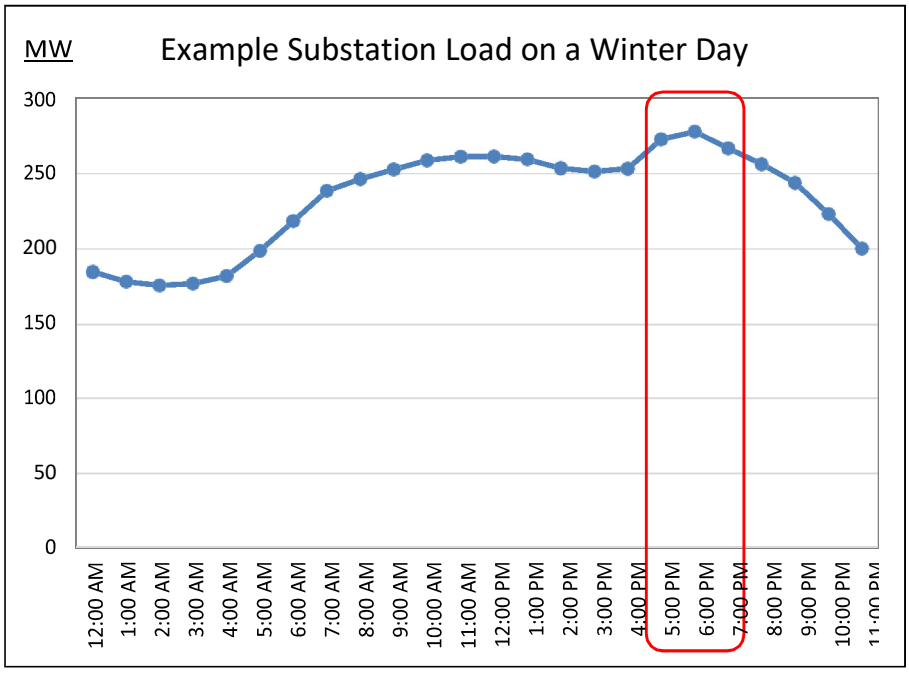
A *The LED programs were not specifically identified in the 2013 IRP. The LED technology and availability is different today than it was when the 2013 IRP study began. PSE is planning on including LED lighting in the 2015 IRP.*

Q4. What is the effect of the planned 289 kW of renewable generation (including Solarize Bellevue, the Bellevue College and the Bellevue Service Center), to the grid?

A *The Eastside load is forecasted at 641 MW under normal conditions (Winter 15/16). The planned 289 kW of renewable generation is nameplate rating, so actual output may be 80-85% of that on a sunny day. For a summer*

peak, the Eastside load could be reduced by 0.04%. For a winter peak, solar output would be significantly less or non-existent. PSE assumes that solar will not be available for the winter peak, since the winter peak usually occurs when it is dark out. The sample graph below reflects a mixed commercial/residential area, with the peak driven by the residential load. (A substation with the peak driven by commercial load could have a different load profile (different peaking curve).)

Figure 6.15: Sample Winter Load Profile



Q5. Is PSE using all the available Demand Response initiatives/opportunities?

A. *Available Demand Response initiatives/opportunities were evaluated as to whether they were achievable and technically feasible. Then PSE used a generation optimization tool to identify the lowest cost combination of resources that a) meet capacity need b) meet renewable resources/RECs need, and c) included as much conservation as was cost effective. (Once the capacity and renewable resources/RECs needs are met, the decision to include additional conservation bundles is simply whether that next bundle of measures increases the cost or decreases it. The IRP has the objective of providing reliable and least-cost electric service to its customers while addressing applicable environmental, conservation and renewable energy requirements. For example, Pacificorp states that the objective of the IRP is "…providing reliable and least-cost electric service to all of our customers while addressing the substantial risks and uncertainties inherent in the electric utility business." Energy Efficient West Virginia states that IRP is a process used by utility companies to determine the mix of resources that will meet electricity demand at the lowest cost.*

Q6. How does efficiency affect energy usage?

A. *Energy efficiency elements were described above. The 2013 IRP identified 521 aMW[23] of market achievable, technically feasible electric energy-efficiency potential by the end of 2033. To gauge achievability, Cadmus relied on customer response to past PSE energy programs, the experience of other utilities offering similar programs, and the Northwest Power and Conservation Council's most recent energy efficiency potential assessment. For the 2013 IRP, PSE assumed achievable electric energy efficiency potentials of 85 percent in existing buildings and 65 percent in new construction. If this potential proves cost-effective and realizable, it would result in a 16% reduction in 2033 forecast retail sales. (Note: this is an energy usage question, not a demand (MW) question. That said, the forecast and need are based on incorporating all of the cost-effective conservation measures (100% Conservation).)*

Q7. Provide details on cost-effective energy efficiency and Demand Response (DR) elements included in the forecast, and how "cost-effective" is determined.

A. *See Tables B-2-1, B-2-2, and B-2-3 (pages 156 – 265) of IRP Appendix N (2013) for a list of the thousands of electric measures studied. Table 13, page 20 provides a summary of the number of energy efficiency measures by customer class. The energy efficiency measures make up the majority of the DSR measures.*

A. *Cost-effective: The short answer is that PSE has an optimization tool that ensures that the capacity needs are met, ensures that the renewable resources/RECs requirements are met, then minimizes total revenue requirements for both Supply-Side and Demand-Side. Those measures it selects are "cost effective". Longer answer: The measures are bundled into similar levelized costs and the optimization tool evaluates the measures in bundles rather than each individually, then the model determines which bundles are cost effective. See IRP Chapter 5 Figure 5-17 for the DSR bundles by cost group and Appendix N Figure 15 for the DSR supply curve. Out of an identified 1226 winter peak MW of achievable, technical potential in the PSE system (*1017 MW + 209 MW EISA), 1007 MW *were identified as cost effective.*

Q8. Do the growth projections account for increased electrical efficiency? What assumptions are made, and do these represent the low, high, or average model outputs?

A. *Yes, the growth projections account for the cost effective efficiency measures.*

A. *See answers to the preceding two questions.*

A. *The forecast represents the base model.*

Q9. Concern expressed with PSE's forecast when considering energy efficiency, renewables, and Demand Response incentives.

A. *Please see above discussion and answers.*

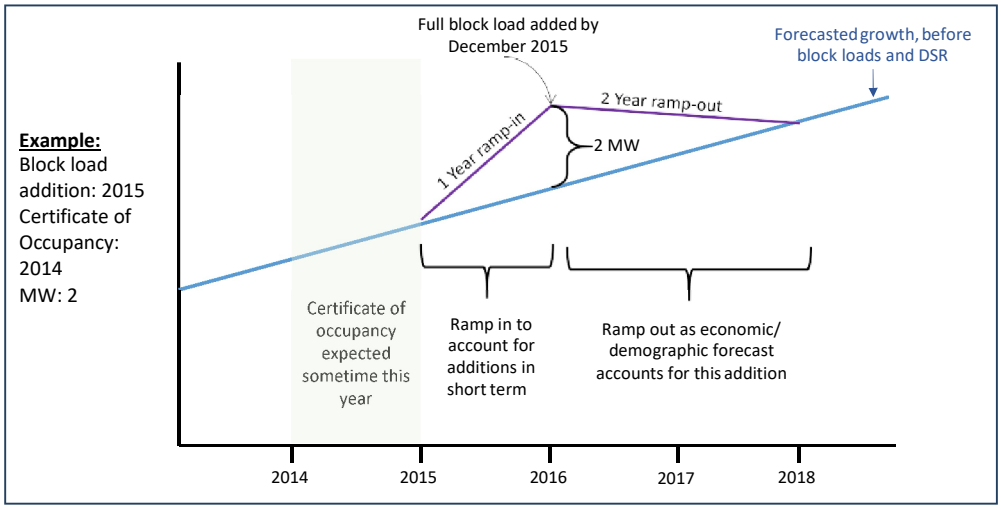
6.4. Major Loads

PSE adjusts its forecast to incorporate major load additions, also called block load additions. The adjustment is a temporary adjustment, as they assume that within a few years the growth built into the load forecast will "catch up" and include the block load additions.

[23] aMW - The average number of megawatt-hours (MWh) over a specified time period; for example, 295,650 MWh generated over the course of one year equals 810 aMW (295,650/8,760 hours). (Source: PSE's 2013 IRP Definitions)

Example: A building has a certificate of occupancy in 2014, with an expected diversified load of 2 MW. PSE will assume it takes a year for the load to fully appear and will add it to the forecast using a one year ramp-in. PSE then ramps the adjustment out over two years, assuming that the growth built into the forecast will take two years to catch up to the block load addition. The block load additions are like bumps on the forecast; they don't change the overall trend, but do create short term changes. See the figure below.

Figure 6.16: Block Load Addition Methodology (from PSE)



PSE acquires data on major load additions from cities as well as directly from developers; some of this data is considered confidential and was not shared. PSE did provide a list of over fifty Eastside Block Load projects (unnamed) with estimated MW load and the expected year when the load would be fully realized. The table below provides a summary by year of this information. The square footage and number of units are reported where known. PSE's Planning group projects a probability of occurrence of 100% for loads anticipated through 2017, 50% for loads anticipated between 2018 and 2020, and 0% for projects after 2020. This probability is multiplied by the expected load before adding into the forecast. The probability factor is a way of addressing the increasing uncertainty of projects in future years.

Table 6.3 does include the City of Bellevue Projects (individually listed in Table 6.4). The Sound Transit East Link project is included in the forecast and accounts for a small portion of the load (approximately 3.5 MW) beginning in the year 2020. Although the East Link web site indicates a 2023 in-service date, PSE's initial expectation is that a small portion of the load will be needed in 2020 and as the project grows they anticipate that Sound Transit's impact on the peak demand will increase. This particular load may be forecasted in advance of need, but it would not impact the 2017/18 HW need for the Energize Eastside project.

Table 6.3: Eastside Total Block Loads by Year

Estimated Completion Year	Assigned Probability	# of Projects	Commercial Sq Footage	# of Multi-family units	MW fully energized this year	MW added to forecast
2014	100%	3	100,000	642	4.4	4.4
2015	100%	9	n/a	1231	5.3	5.3
2016	100%	6	263,000	493	7.0	7
2017	100%	7	2,157,000	1566	25.0	25
2018	50%	4	820,362	n/a	1.0	0.5
2019	50%	6	1,989,340	n/a	21.5	10.75
2020	50%	18	1,316,000	234	16.3	8.15
2021	0%	4	2,010,000	n/a	14.8	0
2022	0%	0	0	0	0.0	0
2023	0%	0	0	0	0.0	0
2024	0%	3	928,000	n/a	8.5	0
2025 and beyond	0%	9	602,000	150	17.8	0

* Square footage and number of units are reported where known.

Table 6.4 lists the thirty-nine major projects identified on the City of Bellevue's website, and is provided to show the significant growth expected in the City of Bellevue. Twelve of the Projects include data on the number of stories (building floors, and seven of these are planning fifteen stories or more.

Table 6.4: City of Bellevue Major Projects (website)

#	Name
Downtown - In Review	
1	Bellevue Square SE Corner Expansion
2	Washington Square Hilton garden Inn
3	Goldsmith Plaza 305
4	Bellevue Center, Phase II
5	415 Office Building
6	Rockefeller Bellevue Tower Phase I
7	Marriott AC Hotel
8	AMCUT
Downtown - Under Construction	
1	Alamo Manhattan Main Street
2	Main Street Gateway / Bellevue Gateway, LLC
3	Marriott Hotel
4	Bellevue at Main / SRM
5	Bellevue Apartments / LIHI
6	Alley 111
7	Bellevue Office Tower
8	Bellevue Park II Apartments
9	Lincoln Square Expansion
10	SOMA Phase II
Downtown - Issued Land Use & Building	
1	The Summit Building C / Bentall
2	103rd Avenue Apartments / HSL Properties
3	Bellevue Center, Phase I
4	Pacific Regent of Bellevue, Phase II
Downtown - In the Pipeline	
1	Evergreen Development Bellevue Tower
2	EROS Properties
3	Fana CBD Master Development Plan
4	Metro 112 Apartment, Phase II
5	17-102nd Avenue NE
6	Eastlink Bellevue Transit Center Station
7	10625 Main Street
8	846 108th Avenue NE
9	Habib Properties
10	Bellevue Plaza
Bel-Red - In Review	
1	Spring District Residential (Land Use Approval)
2	Spring District Office, Bldgs. 16&24 (Building Permit)
3	East Link 130th Station
Bel-Red - Under Construction	
1	GRE Phase I and Phase II
Bel-Red - In the Pipeline	
1	Aegis at Overlake
2	Sherwood Center
3	East Link 120th Station

Projects can shift, developers can change their schedule, but PSE's projected timing of the block loads falls within a realistic range based on current construction schedules and plans, with the possible exception of the East Link project in 2020. However, the East Link timing wouldn't affect the EE timing. PSE's 1-year ramp-in is based on having certificates of occupancy; as long as certificates of occupancy and visual

confirmation of both construction and occupancy rates are utilized, the forecast can be updated each time with the best available information. In addition, some of the block load project information is still limited and doesn't provide a complete picture of the electric load requirements, so assumptions must be made. These situations are also typical and another reason for the need to regularly update block load information which is a typical industry practice. In summary, PSE's block load data appears to fall within a realistic range. Construction is happening. Developers have indicated interest in future projects. Also, PSE applies a probability factor to the estimated loads to try to address the uncertainty of projects with later in-service dates, and all the forecasted impacts of the block loads on the forecast are only temporary bumps, and are ramped out of the forecast so that they don't affect the overall growth trend.

Stakeholder Questions on Major Projects

Q10. Is development like Bellevue's Spring District factored in? Are there numbers that account for the impact of individual projects in downtown Bellevue? What numbers are used to predict the load impact for these projects?

A. *Yes. See Table 6.3 for the summary.*

Q11. A scenario was posed that data centers were consolidating and moving out of the Eastside area, and a question was asked whether PSE had accounted for that in their forecast.

A. *PSE does account for large loads leaving the system or moving from one substation to another, but is not aware of any major changes in data centers. Data centers can be relatively small or quite large. Per PSE, the large data centers generally locate outside the PSE service area, where it is cheaper. PSE's planners have seen no indication of large data center changes. A short, independent web search did not turn up any large data center moves out of the Eastside area.*

6.5. PSE's Forecast

Figures 6.17 – 6.21 depict energy and demand (MWh and MW) forecasts, and growth rates. The peak forecast is affected by conservation programs, and all the graphs assume 100% conservation and a normal winter. PSE's conservation programs are heavily weighted toward the first 10 years of the forecast (2014-2023), with less aggressive conservation occurring in the second 10 years of the forecast (2024-2033). This can result in a slower growth rate in the load forecast for the first 10 years.

PSE reached several key conclusions in comparing the new 2014 forecast (F14) with the prior 2012 forecast (F12), which affects some of the information that PSE had publicly shared showing demand and need for the project. PSE's F14 system forecast assumed a more gradual recovery of the US economy from recession than the prior F12 forecast. The F14 system forecast also used an updated US population growth forecast from the US Bureau of Census which is lower than what was used in F12.

In addition, customer growth and customer counts in the F14 system forecast are lower than in F12 because of slower housing recovery. Finally, peak load growth and peak load levels at the system and King County level are also projected to be lower in F14 versus F12.

The Eastside area is where the load projections increased. Eastside peak loads in the new forecast, based on PSRC's population and employment growth forecasts, are

projected to grow by 2.4% per year[24] in the next 10 years driven by growth in commercial sector and high density residential sector.

Although the F14 forecasted Eastside growth rate increased over the 2012 forecast (F12), the resultant F14 forecast for Eastside reduced the projected 2017/18 normal winter loading by 11 MW. The new F14 forecast, based on census tract level demographic data for the Eastside area, had normalized actual peak loads for winter 2012/13 and 2013/14 which were less than the forecasted peak loads from the F12 forecast, which in turn resulted in lower forecasted peaks for winter 2017/18. Section 8 of the report discusses the impact on the Energize Eastside project need.

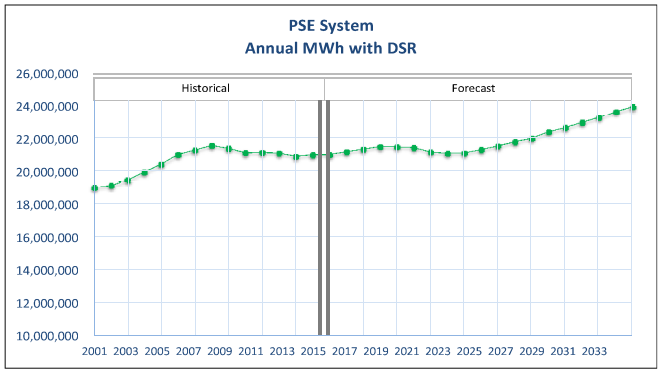
Table 6.5: PSE's Eastside 2017/18 Forecast Comparison

Forecast Development Year	2017/18 Winter Peak
2012	699 MW
2014	688 MW

Figures 6.17 – 6.20 show MWh and MW forecasts for the PSE system, King County, and the Eastside area. The EE project need is based on the MW graph for Eastside. The MWh forecasts do not drive the need, but are shown because of the number of Stakeholder questions received and the uncertainty and/or misconception of what MWh indicate. The MWh forecasts show *usage*, like the odometer, not *peak.* They reflect growth and conservation, but are not directly tied to the peak. The typical behavior or response of a household may be different on the one or two very cold days in a year, as one is getting ready in the morning or coming back from work to a cold house.

Figure 6.17 shows the energy forecast for the PSE system. The forecasted dip in energy is due in part to the aggressive conservation programs that are weighted toward the first 10 years of the forecast (2014-2023). In addition, the block loads are phased in and then phased out over time. Any block loads that come in after 2017 are only given half of the MWh since these projects are less certain to be completed. After 2020 no block loads would be phased in, with a few more years of earlier block loads phasing out.

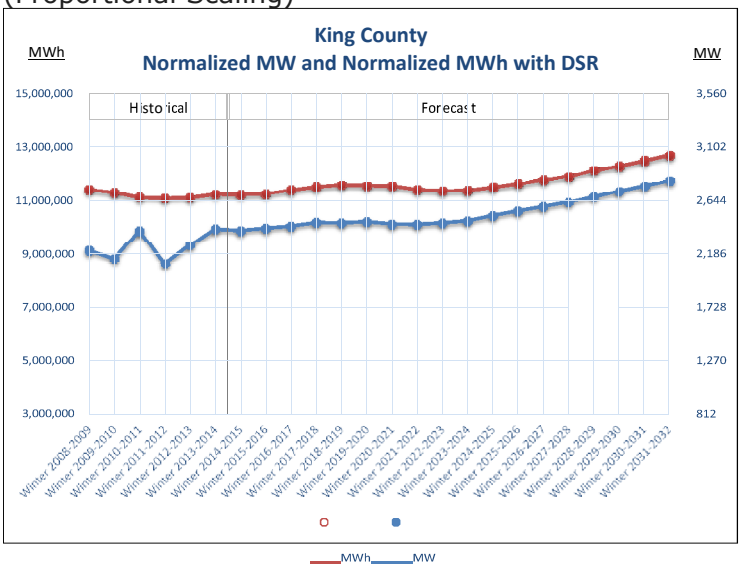
Figure 6.17: PSE's Energy Forecast (MWh) – PSE System



[24] The growth rate is a peak load growth rate and is developed through a regression analysis.

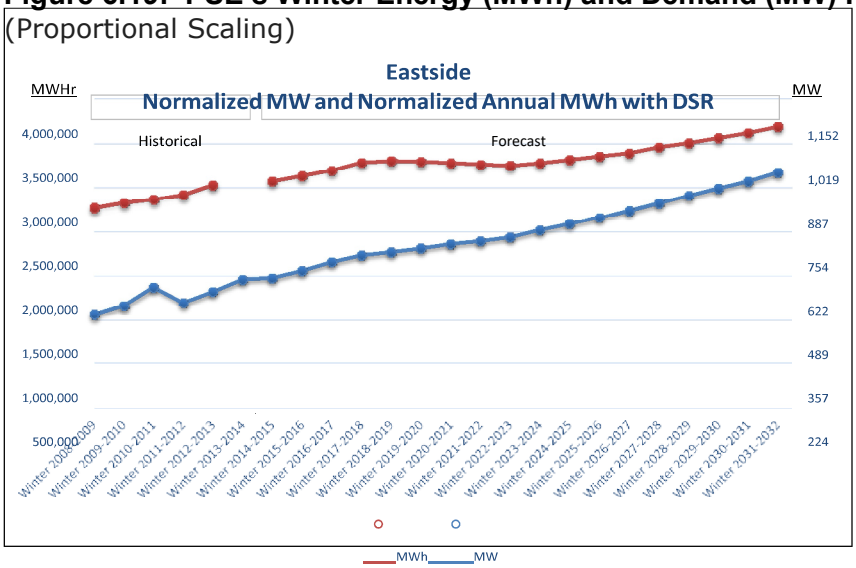
Figure 6.18 shows the energy forecast and demand forecast for King County. King County is forecasted to have a relatively flat energy and demand forecast until approximately winter 2023/2024, at which point both forecasts are increasing. The energy and demand forecasts track fairly closely in King County, but this doesn't mean the same response is expected in other areas.

Figure 6.18: PSE's Energy (MWh) and Demand (MW) Forecasts - King County
(Proportional Scaling)



In the Eastside area, the energy forecast appears to show a stronger impact from conservation compared to the demand forecast. As mentioned previously, the forecasted dip in energy is due in part to the aggressive conservation programs that are weighted toward the first 10 years of the forecast (2014-2023). It is also impacted by the block loads which are phased in and then phased out over time. After 2020 no block loads would be phased in, with a few more years of earlier block loads phasing out.

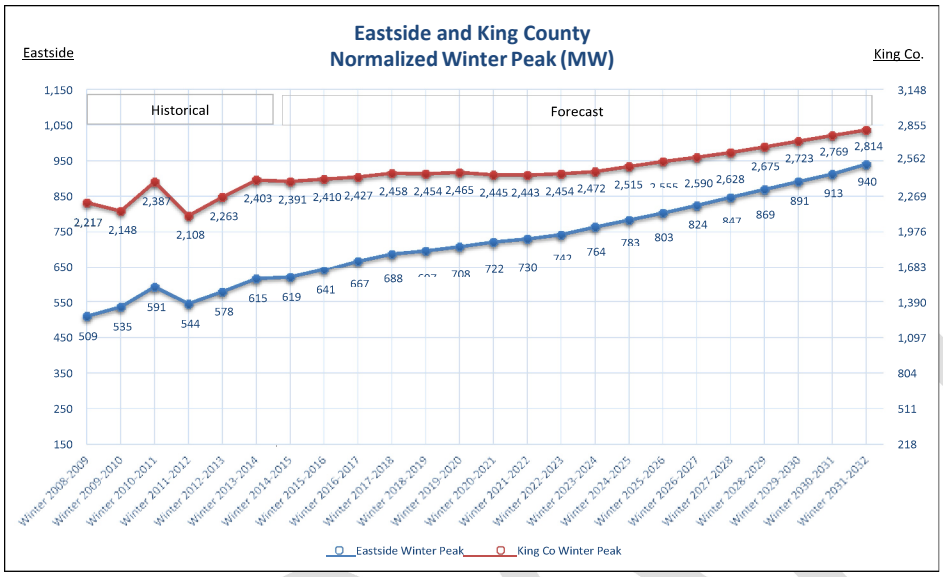
Figure 6.19: PSE's Winter Energy (MWh) and Demand (MW) Forecasts – Eastside
(Proportional Scaling)



The dip is due to a cold snap that lasted several days. Per PSE their weather adjustment does not fully account for the lag effects of longer cold snaps.

Figure 6.20 compares the Eastside and King County winter peak demand forecasts. The Eastside area is forecasted to grow at a faster rate than King County. This is in line with the Vision 2040 Regional Growth Strategy

Figure 6.20: PSE's Winter Demand Forecasts – Eastside and King County, 100% Conservation
(Proportional Scaling)



The 2014 forecast shows a 2.4% growth rate for the Eastside area from 2014-2024 and a 2.5% growth for Eastside between 2014 and 2031. In comparison, the forecast shows a 1% growth rate for King County between 2014 and 2031. The Eastside area is projected to grow significantly faster than King County as a whole, which is in line with the Vision 2040 Regional Growth Strategy report. Whether this growth will be sustained through 2031 is unknown. Note: if the growth rate is calculated from the 2010 actuals through 2017, the growth rate is 2.2% for Eastside and 0.4% for King County. See Figure 6.21 and Figure 6.22.

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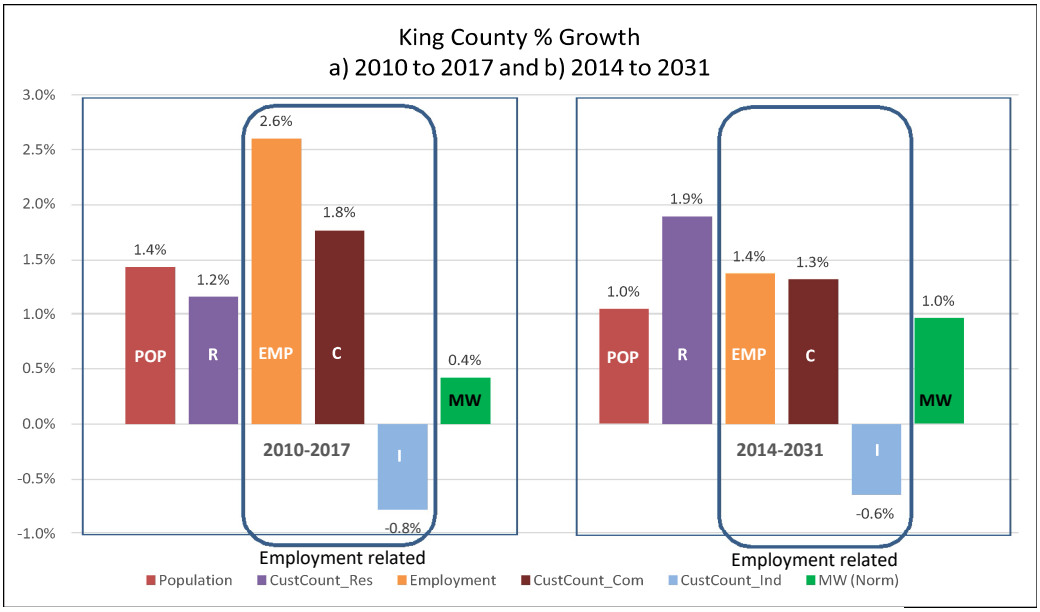
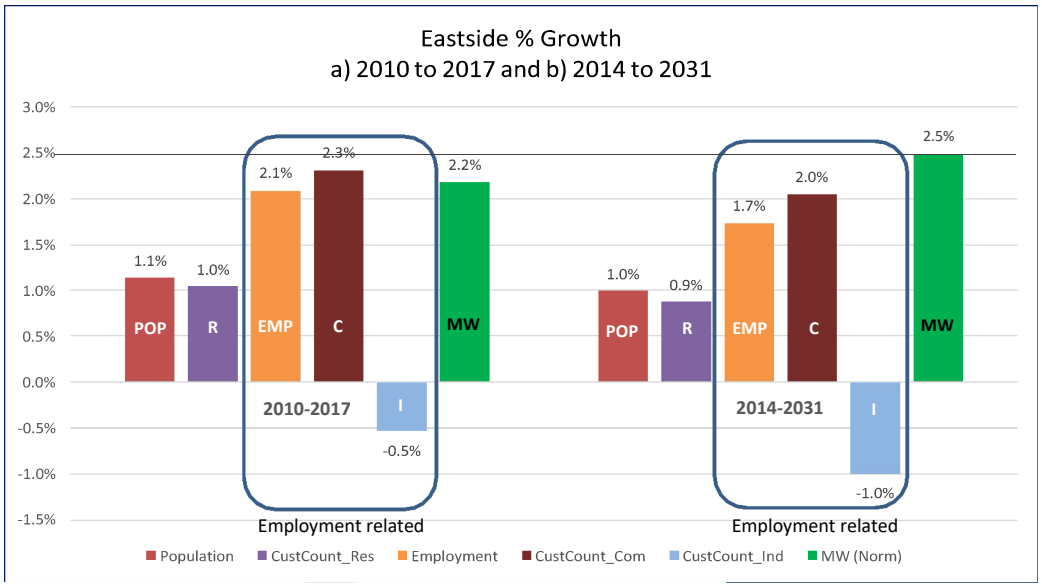
Figure 6.21: Growth Rates – King County



See Table 6.1 for original data sources. Numbers provided by PSE.

Figure 6.22: Growth Rates – Eastside Area



See Table 6.1 for original data sources. Numbers provided by PSE.

<u>Stakeholder Questions related to Actuals (Historical Data)</u>

Q12. What are the ACTUAL numbers for 2012, 2013 and 2014?

A. *Actual numbers for employment, population and customer count are shown in Section 6.2. Actual numbers (normalized) for MWh and MW are shown in Section 6.5.*

Q13. Please show historical loads.

A. *See preceding question.*

Q14. What is the source of the actuals?

A. *See Table 6.1*

Q15. Would like graph showing load history (back to 2000) and forecast.

A. *See Section 6.5*

Q16. Please include 2014/15 winter peak data.

A. *The data is not yet available for the 2014/15 winter peak. See Figure 6.2 and the paragraph above it.*

Q17. Please provide the unadjusted and temperature adjusted historical peaks.

A. *Temperature adjusted historical peaks are shown in Section 6.5. See the beginning of Section 5 and Section 5.1 for why unadjusted peaks are not used.*

Q18. What have been the highest actual aggregate winter peak loads on Eastside feeders and distribution lines …? How would they relate to PSE's forecast of future loads?

A. *The aggregate peaks for the Eastside area are captured in the historical data shown in Figure 6.19.*

A. *The historic loads are included in the regression analysis which results in the forecast of future loads.*

6.6. Summary Analysis of PSE's Forecasting

PSE has followed industry practice in forecasting their demand load.

- ☐ PSE included the major components of a typical system forecast: weather normalizing, use of econometric data, incorporating end-use data (including conservation and DSR measures), and making adjustments for block (major) loads.
- ☐ The variables used in the weather normalizing process were typical based on industry practice.
- ☐ PSE used typical data set elements and multiple data sources for economic/demographic data as shown in Table 6.1, acquiring data at the county level, and for the Eastside area at the census track level, in order to differentiate growth rates within its service territory.
- ☐ PSE employed regression analysis at this step, an industry standard computer analysis technique, to determine the forecast before Demand Side Resources (DSR) and block load adjustments. (The computerized regression analysis was not analyzed as part of this study, but the technique is a computerize estimation of the best fit of the variables to the given data. The equations are considered proprietary by PSE.)
- ☐ PSE acquired/developed significant end-use data via their IRP process on over four thousand DSR measures, incorporated National and State requirements on conservation and RPS, and optimized the achievable, technical measures with a resultant 100% Conservation scenario which projects 135 MW of Eastside winter peak DSR by 2031.
- ☐ PSE gathered block load data (major projects) and utilized short-term forecast adjustments (1-year ramp in based on certificates of occupancy and 2-year ramp-out) to account for the impact. The block load impact was further adjusted by applying a probability factor based on the projected block load in- service date, with 100% through 2017, 50% from 2018 to 2020, and 0% after 2020. The in-service date accuracy and the ramp-in timing of one year is harder to evaluate. Projects can shift, developers can change their schedule, but PSE's projected timing of the block loads falls within a realistic range based

on current construction schedules and plans, with the possible exception of the East Link project in 2020 which wouldn't affect the EE timing. PSE's 1-year ramp-in is based on having certificates of occupancy; as long as certificates of occupancy and visual confirmation of both construction and occupancy rates are utilized, the forecast can be updated each time with the best available information. In addition, some of the block load project information is still limited and doesn't provide a complete picture of the electric load requirements, so assumptions must be made. This is also typical and another reason for the need to regularly update block load information which is a typical industry practice. In summary, PSE's block load data appears to fall within a realistic range. Construction is happening. Developers have indicated interest in future projects. Also, PSE applies a probability factor to the estimated loads to try to address the uncertainty of projects with later in-service dates, and all the forecasted impacts of the block loads on the forecast are only temporary bumps, and are ramped out such that they don't affect the overall growth trend.

No forecast is perfect, but by following industry practice, PSE used reasonable methods to develop the forecast. PSE's resultant forecast shows the Eastside area growing at a higher level than at the county and system level, and that is based on the data PSE received.

Comments on weather adjustment:

PSE is applying the Northwest US practice (as does SCL) of basing projects on a normal 50/50 forecast, which by definition should be exceeded half the time, and using a 95/5 (1-in-20) extreme weather scenario for reference (but not for developing projects). Although a regional industry standard, many other US utilities base projects on an adverse weather scenario, such as a 90/10 or 80/20. Basing projects on an adverse weather scenario is more conservative, but seeks to ensure that the lights stay on given the adverse weather event. These statistically less frequent assumptions would result in a higher load forecast, and if adopted as a policy on which to base projects, would require the system to be designed to withstand it.

Based on historical temperature data, one could suggest that PSE's forecast use a normal temperature of 24°F rather than 23°F for winter normalizing (see Figure 6.1), but: a) the 24°F average is based on a relatively short span of time, and b) the forecast used to propose projects is a normal 50/50 forecast and is expected to be exceeded given an adverse weather event. If PSE were to adopt an adverse weather policy on which to base projects, then it could make sense to re-evaluate the "normal" winter peak temperature; however, since the system demand is based on the less conservative 50/50 load forecast, using 23°F for the normal temperature is a reasonable assumption because it results in a slightly higher system demand than using 24°F.

Stakeholder Questions related to Forecast Methodology

Q19. Questions on heat map. Request to create a more accurate map.

A. *USE attempted to make a replacement heat map. One can obtain usage (kWh) data at a detailed level, but that doesn't show the peak demand which drives the project need - analogy of the odometer and speedometer. USE created a map of substation peak demand, using spatial interpolation*

between the substations, but the accuracy wasn't sufficient for the granularity of detail that is desired. The substations aren't necessarily located right where the heaviest load is. USE didn't feel the result gave a sufficiently clear representation of the area load and so did not include it.

Q20. What are the industry standards for forecasting? Compare to PSE forecast.

A. *See Sections 5 & 6 for standard industry practice.*

Q21. There appear to be no industry wide standards for the development of utility load forecasts, but there do appear to be standards for Integrated Resource Plans. RCW 19.280 State IRP, WAC 480-100-238. Clarify term "conservation" and why it is used for customer load reductions.

A. *Yes, the industry standards have concentrated on the IRP process, but within that are requirements relating to some of the forecast elements. There are typical industry practices.*

A. *100% Conservation is defined as the cost-effective, achievable, technical DSR measures. See the Section 5 introduction and Section 6.3.*

Q22. Is PSE using population growth as a parameter? If so, at what granularity are the growth projections made? In other words, are growth projections used for individual cities, or is the Eastside treated as a whole, with one forecast governing the whole area?

A. *Population is used as a parameter.*

A. *Forecasts were developed at the system level, at the county level, and for the Eastside area. The Eastside forecast was developed using census tract data.*

Q23. We would like to understand economic projections as well. Is economic growth projected for each city, or only for the whole Eastside? What numbers were used?

A. *Economic projections were made at the system level, at the county level, and for the Eastside area. Graphs were provided for some of the major elements (Section 6.2 and 6.5).*

Q24. Does the load forecast anticipate changes in regional transmission flow, such as south-north transmissions to Canada?

A. *The load forecast is based on load. Transmission flows are irrelevant to the forecast. The link between forecast and transmission flows comes from modeling the substation load data, which was correlated to the load forecast, into a powerflow case. The powerflow case is where regional flow scenarios can be modeled. (See Appendix B, Optional Technical Analysis for study results of this scenario. It showed that even with no power flowing to Canada on the Northern Intertie (which is an unrealistic hypothetical scenario but modeled to answer the local vs. regional question), there is still a project need.*

Q25. What other factors governing the regional grid is the load forecast taking into account?

A. *See preceding answer.*

Q26. Is it possible that the industry-standard methodology which PSE uses to forecast load growth has not evolved to reflect the realities of the current electricity marketplace? Are there any newer methodologies, or modifications to existing methodologies, which better reflect the realities of the modern electricity marketplace?

A. *This question is outside the scope of this study; however, the IRP process continues to get attention, and frequently includes input from stakeholders, which is where Demand-Side Resources are evaluated and feed into the forecast process.*

Q27. Is PSE's load projection reasonable? Are they the needs of Eastside or the needs or BPA, etc.? Are the loads PSE is projecting based on a farfetched combination of circumstances that are unlikely to actually happen?

A. *The load projections and need determination are based on a normal weather forecast with 100% conservation. The 2014 forecast methodology and inputs are reasonable. See Section 6.6. See Section 7 for discussion on standards.*

Q28. Is PSE's forecast based on good data, independently verified?

A. *Yes, PSE has followed industry practice in forecasting their demand load. See section 6.6.*

Q29. Why is PSE projecting load growth when their public documents (e.g. 10k) show they are selling less electricity?

A. *The referenced 10k report is based on energy, which like an odometer reading shows usage, not peak demand. As noted previously, average use behavior is not necessarily winter peak behavior; the trends don't have to match. In addition, the data in the report is not adjusted for weather. See figures in Section 6.5 for current forecasts.*

Q30. Provide justification/rational/definition for the System Capacity line on PSE's "Customer Demand Forecast".

A. *System Capacity: Occurs when the load (Eastside Area) just hits the rating limit of the critical contingency condition(s). The System Capacity line can shift depending on where load grows (if not homogenous). The contingency analysis is dictated by national standards. Using the same methodology as the 2013 report, a winter Eastside system capacity range of 688-708 MW has been identified based on the 2014 load forecast powerflow results (see Figure 8.1).*

Q31. How does PSE justify an Eastside growth rate of 1.7% to 2%?

A. *PSE used reasonable methods to develop the 2014 forecast by following industry practice (see Section 6.6). The forecast is built from the data inputs via regression analysis. The 2014 demand forecast shows a 2.4% growth rate for the Eastside area from 2014-2024 and a 2.5% growth for Eastside between 2014 and 2031. In comparison, the forecast shows a 1% growth rate for King County between 2014 and 2031. The Eastside area demand is projected to grow significantly faster than King County as a whole, which is in line with the land use* Vision 2040 Regional Growth Strategy *report. Whether the forecasted demand growth will be sustained through 2031 is unknown. Note: if the growth rate is calculated from the 2010 actuals through 2017, the growth rate is 2.2% for Eastside and 0.4% for King County. See Figure 6.18 and Figure 6.19.*

A. *Note: SCL's "demand" forecast growth of 0.5% noted in their latest IRP update is actually an energy forecast. SCL's actual demand forecast from December 2013 to December 2034 has an estimated compound annual growth rate (CAGR) of 1.2%, based on an estimated 1180 MW in December 2013 and using their IRP demand graph as reference. PSE has a CAGR of 2.4% from winter 2013/14 to winter 2031/32 based on an estimated 615 MW in winter 2013/14.*

Q32. What is the magnitude and timing of the need for EE? An updated peak load forecast is needed to resolve serious questions about the load forecast used by PSE to justify the project as now proposed.

A. *In early February 2015, PSE completed their 2014 forecast which included historical data through 2014, and thus included the summer 2014 peak and the winter 2013/2014 peak. See the top of Section 6 for discussion on the new forecast methodology.*

Q33. Please explain PSE's "Eastside Customer Demand Forecast" chart. A detailed quantitative analysis for the years is needed on this chart. There have been several credible articles stating electrical usage is not growing but is flat, even declining in the United States. This trend is apparent over several years and is due to conservation and technological changes in production, usage and storage. How does Energize Eastside explain this disparity? Also, solar energy has been increasing on the Eastside.

A. *Please see discussions in Section 6.2 on the economic and demographic data sources, the Vision 2040 Regional Growth Strategy, and Section 6.4 on Major Loads. Please see Section 4 on Energy vs. Demand and Q4 on potential impact of solar on a winter peak.*

Q34. PSE's energy use (MWh) trend and # of customer trend is similar to SCL, yet PSE's load forecast (MW) shows a significantly higher growth % than SCL. Explain. National electricity use is declining as is regional (Pacific Northwest Utilities Conference Committee (PNUCC)). Why is PSE's forecast increasing? Explain why electricity use in Bellevue is so different from other cities.

A. *Please see Q31 and Q33 answers.*

Q35. Please explain PSE's "Eastside Customer Demand Forecast" chart. Show peak demand for Bellevue. Show retail sales to customers, off-system sales and electricity delivered to transmission only customers. Concern over accuracy of trend.

A. *See preceding answer. See Figures in Section 6.5.*

A. *There are no off-system sales within the Eastside area; this would not affect the Eastside forecast. There are transmission only customers in King County outside of the Eastside area, but since the off-system sales customers are not PSE's customers, they wouldn't affect that forecast either.*

Q36. Is it true that PSE's "Eastside Customer Demand Forecast" graph is based on a hypothetical "grid-flow modeling scenario" … rare winter peak …

A. *No. It is based on normal winter weather. The hypothetical outage scenarios are part of the industry mandated contingency analysis. Please see the weather normalizing discussion in Section 5 and see Section 7 on Standards, regarding the required contingency analysis.*

7. Electric Utility Reliability Standards

7.1. EPAct 2005

On August 14, 2003, large portions of the Midwest and Northeast United States and Ontario, Canada, experienced an electric power blackout. The outage affected an area with an estimated 50 million people and 61,800 megawatts (MW) of electric load in the states of Ohio, Michigan, Pennsylvania, New York, Vermont, Massachusetts, Connecticut, New Jersey and the Canadian province of Ontario. The blackout began a few minutes after 4:00 pm Eastern Daylight Time (16:00 EDT), and power was not restored for 4 days in some parts of the United States. Parts of Ontario suffered rolling blackouts for more than a week before full power was restored. Estimates of total costs in the United States range between $4 billion and $10 billion (U.S. dollars). In Canada, gross domestic product was down 0.7% that August, there was a net loss of 18.9 million work hours, and manufacturing shipments in Ontario were down $2.3 billion (Canadian dollars).[25]

Partially in response to this blackout, Section 1211 was added to the Energy Policy Act of 2005 (EPAct 2005). EPAct 2005 became law on August 8, 2005. Section 1211 of the EPAct 2005 requires that the Federal Energy Regulatory Commission (FERC) certify an Electric Reliability Organization (ERO) to establish and enforce reliability standards for the bulk-power system[26], subject to FERC review. On July 20, 2006, FERC certified the North American Electric Reliability Corporation (NERC) as the ERO for the continental U.S. under the Federal Power Act Section 215.

From the NERC website (www.nerc.com):

> "NERC is a not-for-profit international regulatory authority whose mission is to assure the reliability of the bulk power system in North America. NERC develops and enforces Reliability Standards; annually assesses seasonal and long-term reliability; monitors the bulk power system through system awareness; and educates, trains, and certifies industry personnel. NERC's area of responsibility spans the continental United States, Canada, and the northern portion of Baja California, Mexico. NERC is the electric reliability organization for North America, subject to oversight by the Federal Energy Regulatory Commission and governmental authorities in Canada. NERC's jurisdiction includes users, owners, and operators of the bulk power system, which serves more than 334 million people."

Because of changes brought about by EPAct 2005, the NERC standards that were previously voluntary are now mandatory and all users of the Bulk Power System (BPS) must comply with these standards. There are currently 1426 requirements in 143 reliability standards either subject to enforcement or subject to future enforcement.

[25] http://energy.gov/sites/prod/files/oeprod/DocumentsandMedia/BlackoutFinal-Web.pdf, pg. 1
[26] In this report, the terms Bulk Power System (BPS) and Bulk Electric System (BES) will be used interchangeably. While the definitions are slightly different, for the purposes of this report and for determining the need for the Energize Eastside Project, these two terms can be treated as the same.

7.2. Reliability Standards Applicable to Energize Eastside[27]

NERC Reliability Standard TPL-001-4[28] (Transmission System Planning Performance Requirements) is the Reliability Standard most relevant to the need for the Energize Eastside Project. TPL-001-4 Requirement 1 and Requirement 7 are currently subject to enforcement. Requirements 2-6 and 8 are not currently subject to enforcement but will be subject to enforcement on January 1, 2016. The enforcement date for Requirements 2-6 and 8 is before the planned in-service date of the Energize Eastside Project. Therefore, the Energize Eastside Project will be subject to the newer requirements before the project goes into service. In addition, the newer requirements are in many cases more stringent than the existing requirements. For the above reasons, this report will limit its discussion to the newer TPL-00104 Requirements and will not discuss the currently enforceable requirements of TPL-001-0.1, TPL-002-0b, TPL-003-0b, and TPL-004-0a[29].

Another Reliability Standard that can have an impact on the need for the Energize Eastside Project is FAC-008-3[30] (Facility Ratings). TPL-001-4 and FAC-008-3 are discussed in more detail below.

TPL-001-4 requires that each Planning Coordinator and Transmission Planner[31] perform an annual transmission assessment of its portion of the Bulk Electric System[32] (BES). This assessment must model, among other things, system peak load, known commitments for Firm Transmission Service and Interchange, and the planning events (contingencies) listed in Table 1 of TPL-001-4[33].

TPL-001-4 requires the development of a Corrective Action Plan (CAP)[34] whenever the transmission assessment determines that the system cannot meet the performance requirements listed in Table 1. In other words, once a performance requirement specified in TPL-001-4 cannot be met (e.g., an overload is found), a need has been determined.

FAC-008-3 is applicable to both Transmission Owners and Generation Owners[35]. FAC-008-3 requires each Transmission Owner and Generation Owner to have a facility[36]

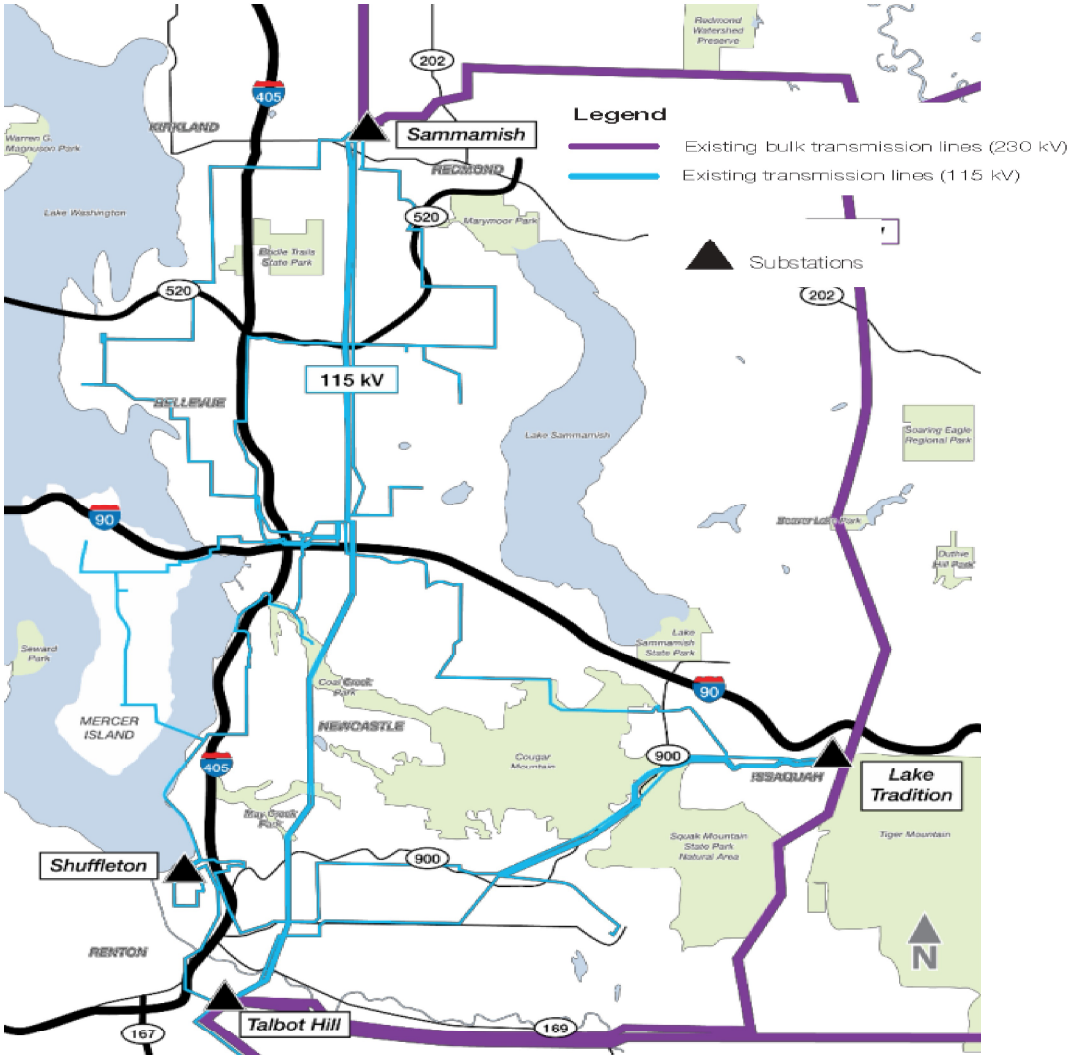
[27] capitalized terms in this section refer to terms that are defined in the NERC Glossary
[28] http://www.nerc.com/files/TPL-001-4.pdf
[29] Reliability Standards TPL-001-0.1, TPL-002-0b, TPL-003-0b, and TPL-004-0a are being replaced by TPL-001-4.
[30] http://www.nerc.com/files/FAC-008-3.pdf
[31] Puget Sound Energy is registered with NERC as both a Planning Coordinator and a Transmission Planner.
[32] The Bulk Electric System (BES) definition is fairly long and involved (see http://www.nerc.com/pa/RAPA/BES%20DL/BES%20Definition%20Approved%20by%20FERC%203-20-14.pdf), but for the purposes of this report, the BES can be considered to be all networked transmission elements with an operating voltage of 100 kV or higher. Radial facilities are generally not considered to be part of the BES even if they are operated at voltages of 100 kV or higher.
[33] Table 1 is provided in Appendix RPM-1 of this report.
[34] Corrective Action Plans as used in the TPL-001-4 Reliability Standard are not the same as the Corrective Action Plans described by PSE in the Eastside Needs Assessment Report (October 2013). In TPL-001-4, a Corrective Action Plan may include operational measures (such as switching existing facilities in or out) and/or the addition of new facilities. In the Eastside Needs Assessment Report, Corrective Action Plans only refer to operational measures.
[35] Puget Sound Energy is registered with NERC as both a Transmission Owner and a Generation Owner.
[36] A facility is a set of electrical equipment that operates as a single Bulk Electric System Element (e.g., a line, a generator, a shunt compensator, transformer, etc.)

rating[37] methodology[38] that is consistent with manufacturer ratings, standards developed through an open process, or a practice that has been verified by testing, performance history, or engineering analysis. The intent of this Reliability Standard is to ensure that facility ratings are based upon sound engineering practices and are consistent across a utility's service area.

7.3. Critical Contingencies for the Energize Eastside Project

Figure 7.1 below is a sketch of the Eastside area transmission network[39]. The area between Sammamish and Talbot Hill is the area of where a number of overloads have been seen in planning studies.

Figure 7.1: Eastside Area Transmission Sketch



[37] A facility rating is the maximum or minimum voltage, current, frequency, or power flow through a facility that does not violate the applicable equipment rating of any equipment comprising the facility.
[38] A facility rating methodology is a procedure that is used to establish the facility ratings for all of a utilities facilities.
[39] From the Energize Eastside website: energizeeastside.com

The specific contingencies that cause facility rating violations on specific elements of the power system are CEII[40] and cannot be disclosed in a public document. However, the general types of contingencies that cause overloads on various facilities can be disclosed. Below is a list of the general types of contingencies that are causing overloads on the PSE eastside transmission system.

- Overlapping outages of two transformers (N-1-1) (P6),
- Overlapping outages of two transmission lines (N-1-1) (P6),
- Overlapping outages of one transmission line and one transformer (N-1-1) (P6), and
- Simultaneous outage of two transmission lines (N-2) (P7).

As discussed above, the NERC TPL-001-4 Reliability Standard requires that a Corrective Action Plan (CAP) be developed whenever the system does not meet the performance requirements specified in the standard. A CAP can include: new facilities such as transmission lines; adjustments to operating procedures (such as opening a switch at the end of a transmission line); or a combination of both new facilities and operating procedures.

7.4. Normal vs. Emergency Ratings

A "*normal rating"* is the limit at which a transmission facility can operate indefinitely (i.e., 24/7/365 for the life of the project, which in some cases could be over 50 years). An "*emergency rating"* is only available for use for a short period of time and using an emergency rating usually involves a loss of usable life for the facility. This loss of usable life is caused by the increased temperatures that the facility is subject to when loaded to its emergency limit. The higher temperatures can cause insulation in transformer banks to degrade or overhead conductors to weaken and/or sag. In some cases an emergency rating may have a lifetime limit on the number of hours it can be used (e.g., 100 hours). Once that lifetime limit is reached, a facility will not be able to exceed its normal rating or it may need to be replaced. An emergency rating cannot be used for normal overloads that might occur due to load growth or a sudden increase in load due to extreme weather. Given a typical lifetime limit of 100 hours, an emergency rating would only be good for a little over 4 days under normal (non-contingency) conditions. Therefore, an emergency rating can only be used under contingency (outage/equipment failure) conditions.

In addition to the differences between normal and emergency ratings, there are typically different ratings for summer and winter conditions. Because equipment ratings are based in part on thermal limits of the equipment (as noted above) and the ambient temperatures expected during winter are less than the ambient temperatures seen during summer, normal and emergency winter ratings are almost always higher than the respective normal and emergency ratings for summer.

PSE utilizes different normal and emergency facility ratings for summer and winter conditions, consistent with industry practice.

[40] CEII - Critical Energy Infrastructure Information CEII is protected information whose release could compromise the reliability of the BES. Each individual utility decides what information they deem to be CEII. The specific contingencies that cause overloads on the elements documented in the public Energize Eastside study reports are considered to be CEII by PSE. Other utilities also consider information such as this to be CEII.

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7.5. Transmission Reliability vs. Distribution Reliability

Transmission outages currently cause about 5% of the customer outage duration on PSE's system in the Energize Eastside area. The remaining 95% of the customer outage duration are caused by distribution outages (see Table 7.1) below[41]. As can be seen from Table 7.1, the City of Bellevue's transmission related customer outage performance is much better than the rest of the Energize Eastside area (less than 1% of the customer outage minutes were due to transmission outages).

2014 Total Outages					
Energize Eastside Area (includes City of Bellevue)					
	# of Outages	# of Customers Impacted	Total Customer Minutes	Customers Impacted Per Outage	Outage Minutes Per Customer Per Outage
Transmission outages	6	35,614	2,521,995	5936	11
All other outages	1182	120,074	47,481,181	102	0.33
Total outages for EE	1188	155,688	50,003,176		
Transmission outage percentage of total	0.5%	22.9%	5.0%		
City of Bellevue					
	# of Outages	# of Customers Impacted	Total Customer Minutes	Customers Impacted Per Outage	Outage Minutes Per Customer Per Outage
Transmission outages	3	18,939	224,327	6313	4
All other outages	745	61,963	29,964,379	83	0.65
Total outages for COB	748	80,902	30,188,706		
Transmission outage percentage of total	0.4%	23.4%	0.7%		

Table 7.1 also shows some additional pertinent information regarding the relative severity of transmission outages versus distribution outages. The number of customers affected by a transmission outage in this example is over 50 times greater than the number affected by a distribution outage. In addition, the outage duration per customer per outage is much longer for transmission outages than for distribution outages. This difference is one reason why transmission reliability is required to be so high. While the risk of an outage is low, the consequences of that outage can be quite large.

[41] This data from PSE indicates that the Energize Eastside area has fewer customer outage minutes due to transmission outages (as a fraction of the total outage minutes) than other utilities in the U.S.

The reason mentioned above is the same reason why the nuclear industry designs back-up systems for the reactor core cooling system with multiple layers of redundancy. Nuclear plants are typically designed with two sources of off-site (grid) power. If one source fails, the other can be used to supply the plant cooling load. In addition, just in case both off-site power sources are out, the plant has backup diesel generators that are capable of supplying the cooling system load. Just in case the primary diesel generators fail, there is a redundant set of diesel generators to step in if necessary. Then for additional protection, battery backup is provided in case the offsite grid power and both sets of diesel generators fail. The reason for this extreme level of redundancy is because even though the risk of a failure of four levels of cooling system power supply is incredibly small, the consequence of a failure is extremely large.

In addition to the Northeast blackout discussed above, two other major blackouts have occurred in the Western Interconnection in the last two decades. These two blackouts are discussed below.

On July 2, 1996 at 1424 MDT a disturbance occurred that ultimately resulted in the Western Systems Coordinating Council (WSCC) system (the Western Interconnection) separating into five unconnected load and generation subsystems. This disturbance resulted in the loss of 11,850 MW of load and affected 2 million people in the West. Customers were affected in Arizona, California, Colorado, Idaho, Montana, Nebraska, Nevada, New Mexico, Oregon, South Dakota, Texas, Utah, Washington, and Wyoming in the United States; Alberta and British Columbia in Canada; and Baja California Norte in Mexico. Outages lasted from a few minutes to several hours. Electric service was restored to most customers within 30 minutes, except on the Idaho Power Company (IPC) system, a portion of the Public Service Company of Colorado (PSC), and the Platte River Power Authority (PRPA) systems in Colorado, where some customers were out of service for up to six hours. On portions of the Sierra Pacific Power Company (SPP) system in northern Nevada, service restoration required up to three hours.

On August 10, 1996 a major disturbance occurred in the Western Interconnection (Western Systems Coordinating Council, WSCC) at 1548 PDT resulting in the Interconnection separating into four unconnected load and generation subsystems. Conditions prior to the disturbance were marked by high summer temperatures (near or above 100 degrees Fahrenheit) in most of the Region, by heavy exports (well within known limits) from the Pacific Northwest into California and from Canada into the Pacific Northwest, and by the loss of several 500 kV lines in Oregon. The California–Oregon Intertie (COI) (Pacific Northwest to California) north to south electricity flow was within parameters established by recent studies initiated as a result of the July 2-3, 1996 disturbance (see above). The flow on the AC system between the Pacific Northwest and California was about 4,350 MW and the flow on the Pacific DC Intertie (PDCI) (a DC system) was 2,848 MW. This disturbance resulted in the loss of over 28,000 MW of load and affected 7.5 million people in the West. Customers were affected in Arizona, California, Colorado, Idaho, Montana, Nebraska, Nevada, New Mexico, Oregon, South Dakota, Texas, Utah, Washington, and Wyoming in the United States; Alberta and British Columbia in Canada; and Baja California Norte in Mexico. Outages lasted from a few minutes to as long as nine hours.

Both of the above outages occurred prior to the implementation of mandatory Reliability Standards. The purpose of the mandatory Reliability Standards is to maintain the reliability of the BES and to help prevent major outages like these from

happening again. As previously noted, even though the probability of outages like these is very small, the consequences of this type of outage are very large. Therefore, the Reliability Standards require the examination of contingencies that to a lay person seem to be highly unlikely.

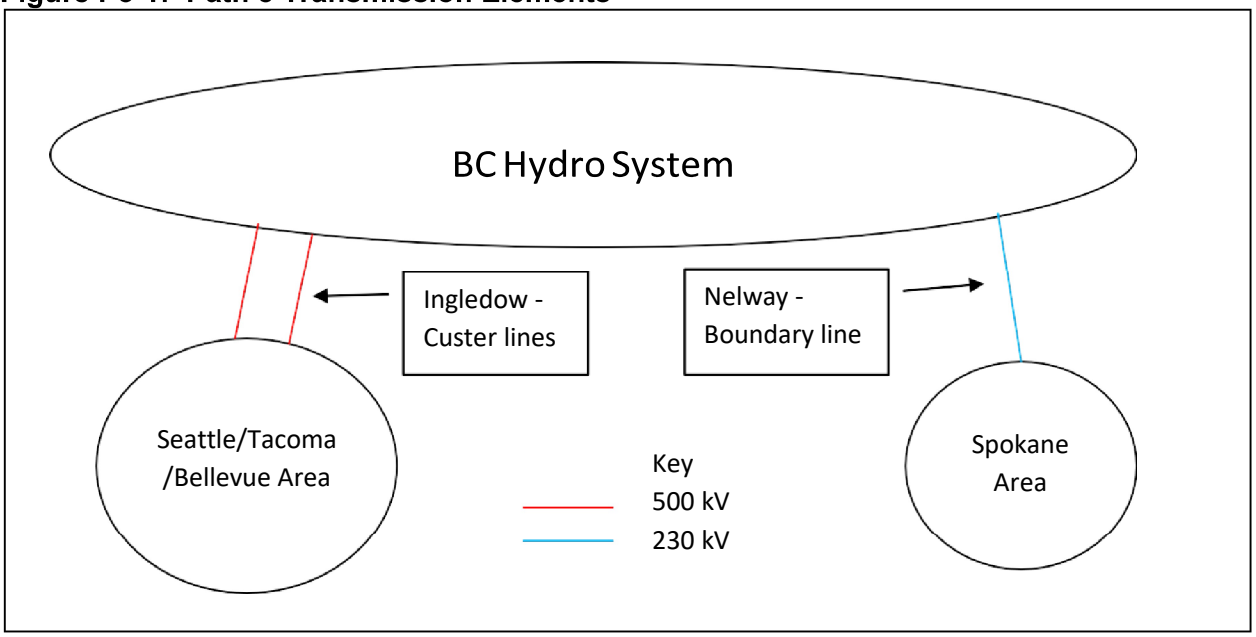
In general, the probability of a single contingency (N-1) is at least once every three years. The probability of multiple contingencies such as N-1-1 or N-2 is somewhere between once every three years and once every 30 years. (See Section 8 and Appendix B for analysis of this subject.)

7.6. Path 3 Issues

Path 3 is the transmission interconnection between Washington and British Columbia. Path 3 consists of three transmission circuits (see Figure P3-1):

1. Ingledow - Custer 500 kV #1,
2. Ingledow - Custer 500 kV #2, and
3. Nelway - Boundary 230 kV #1.

Figure P3-1: Path 3 Transmission Elements



It should be noted when discussing Path 3 that sometimes the Nelway - Boundary 230 kV line is referred to as the Path 3 eastside intertie. This term should not be confused with eastside as it is used in the context of the Energize Eastside project. The Path 3 eastside intertie is located near Spokane, WA and is over 250 miles away from the area under consideration for the Energize Eastside project.

Path 3 has a non-simultaneous rating of 3150 MW north to south and 3000 MW south to north. Known commitments for Firm Transmission Service and Interchange on Path 3 are 2300 MW north to south and 1500 MW south to north.

The planning cases PSE used to study the need for the Energize Eastside project had Path 3 flow at 3150 MW north to south in the summer base cases and 1500 MW south to north in the winter base cases.

<u>Stakeholder Questions related to Standards and Reliability</u>

Q37. 2013 Needs Assessment report, page 43. The "3d" sensitivity, modeling 2021-2022 extreme Weather with 100% conservation. Explain why this scenario, which had 845 MW predicted Eastside load, showed no overload for N-0 yet 845 MW is above PSE's "current system capacity" line in their 2013 report. Clarify what PSE's capacity line represents.

A. *PSE's capacity line is the load level at which overloads will just begin to occur under contingency situations. Because the scenario being referred to in this question is "N-0" (or no contingency), there are no overloads. The reason for there being no overloads is that up to two additional pieces of equipment are in service to carry power to the load.*

Q38. Too much transmission reliability?

A. *The requirement for transmission reliability is discussed in the section on NERC Reliability Standards. Because the Reliability Standards are mandatory, meeting these standards provides just adequate reliability.*

Q39. How are EE "need" and "reliability" related? How many outages in the next 10 years (2017-2027) are anticipated to be avoided by implementation of EE, due to transformer limitations or otherwise stressing system capacity due to local Eastside growth (excluding unpredictable weather events)?

A. *EE need is related to reliability by the requirement that when overloads occur during a planning assessment under the contingencies that are required to be run (see the discussion of TPL-001-4 in the Independent Technical Analysis), there is by definition a need. This need is not necessarily EE, but something must be done to mitigate the overloads seen in the planning assessment. The question of how many outages may be avoided by implementation of EE is not relevant to the question of need. The Reliability Standards require that a defined set of contingencies be run on the system model. If overloads or other violations are found, then a Corrective Action Plan must be produced. The fact that a Corrective Action Plan is needed demonstrates that there is a need.*

Q40. What is the probability of an N-1-1?

A. *The probability of an N-1-1 is not a factor that is considered in determining if there is a need for a project. However, typically the probability of an N-1-1 is between 0.33 and 0.033 outages per year or once in 3 years to once in 30 years.*

Q41. One of the rationales advanced by PSE for the new transmission lines was to increase the 'reliability' of PSE's transmission system and/or the reliability of PSE's "system" that supplies electricity to Bellevue and other east side communities.

A. *Energize Eastside is a project designed to mitigate overloads found in planning studies that used projected future load growth. Therefore, a better way to look at EE is that it will maintain the current reliability that exists today and prevent it from getting worse.*

Q42. Task 8 of USE's 'scope of services' states that USE will develop a formal, written evaluation of the need for PSE's Energize Eastside (EE) project, including an assessment of the " … impacts to electrical system reliability …" Please describe (or provide in the report) a schematic/line-diagram of the "electrical system" that USE evaluated to assess the "reliability" of the "electrical system"; and describe the quantitative reliability measures/metrics that were used in performing the evaluation of the impact of PSE's EE project on the "electrical system" reliability.

A. *The electrical system modeled was the entire Western Interconnection that extends from the Pacific Ocean on the west east to Colorado and from British Columbia and Alberta in the north south to Arizona and a portion of northern Mexico. The studies concentrated on the Puget Sound area, but included all facilities in the entire Western Interconnection. USE did not assess the impacts of PSE's EE project on electric system reliability. Our work scope was limited to investigating the need for EE. Therefore, we investigated the accuracy of PSE's latest load forecast (2014) and ran studies using the system model without EE in it to see if problems occurred that would require a project like EE to solve. In performing this*

investigation, we addressed the impacts of PSE's assumptions regarding load growth and regional transfers on the system without EE to determine if there was a need for a project like EE. The Optional Technical Assessment (OTA) (Appendix B) looked at the sensitivity of modified assumptions regarding load growth, westside generation levels, and regional transfers on the need for a project like EE. Determining the preferred project to mitigate the problems found in the studies of the system without EE is one of the purposes of the EIS process, but this determination is beyond the scope of the ITA and the OTA.

Q43. Why is an N-1-1 outage scenario (rare) used to determine need?

A. *Because N-1-1 contingencies must be simulated in the planning assessments required by the mandatory NERC TPL-001-4 Reliability Standard.*

Q44. Questions about reliability, outages, contingency analysis.

A. *As noted in responses to other questions, probability of an outage is not considered in determining need using the NERC TPL-001-4 Reliability Standard. When performing a planning assessment all outages need to be simulated and if there are any overloads or other violations, then a Corrective Action Plan must be developed. What is included in this Corrective Action Plan will vary depending on the type of outage and what sort of mitigation is allowed for that outage in the TPL-001-4 Reliability Standard. However, need is established as soon as a Corrective Action Plan needs to be developed.*

Q45. We ask the consultant to forecast how many outages in the next five years (2016 – 2020) would be avoided by implementation of Energize Eastside.

A. *Please see the responses above.*

Q46. Is it true that PSE's "Eastside Customer Demand Forecast" graph is based on a hypothetical "grid-flow modelling scenario" in which a rare winter peak electricity demand event occurs on the Eastside at exactly the same time that there are two major and simultaneous equipment outages on nearby transmission lines?

A. *The demand forecast is independent of any equipment outages. The current system capacity line is determined by studies of system performance under multiple contingency scenarios with models that incorporated forecasted peak load. These studies are required to be run in this manner by the Requirements in the NERC TPL-001-4 Reliability Standard.*

Q47. Are PSE's conclusions reasonable?

A. *See the conclusions section of the Independent Technical Analysis and the Executive Summary of the OTA (Appendix B).*

8. Assessment of PSE's Identified Drivers for the Eastside Project (PSE's Results)

This section addresses PSE's findings based on their new 2014 normal winter forecast, with 100% conservation.

Table 8.1 shows the new forecasted loads for Eastside that were utilized in the powerflow cases; three normal winter and three normal summer cases were studied by PSE. The winter forecasts between 2017/18 and 2023/24 show Eastside growing, while King County otherwise declines. The ITA confirmed that the load values in Table 1 matched the new forecast and were modeled[42] in the cases.

Table 8.1: PSE's King County and Eastside Forecasted Loads in Studied Years

Forecast Development Year	King County (excluding Eastside)	Eastside
Normal Winter		
2017/18	1881	688
2019/20	1867	708
2023/24	1817	764
Normal Summer		
2018	1379	538
2020	1385	561
2024	1399	618

The ITA also confirmed the Northern Intertie (Path 3) transfers matched PSE's modeling plan (Table 8.2), and that PSE's winter generation dispatch scenario of "no PSE and SCL generation west of the Cascades" was modeled in the winter cases, as per Table 4.4 in the October 2013 Eastside Needs Assessment Report.

Table 8.2: Northern Intertie Flows

Northern Intertie	Flow Direction
Normal Winter	
3150 MW	South to North
Normal Summer	
1500 MW	North to South

Source: PSE. Verified by ITA.

Tables 8.3 and 8.4 list the overloaded elements that PSE identified based on the new 2014 forecast. The ITA confirmed these overloaded elements drive the need for an Eastside project by simulating the contingencies (outages) in the powerflow cases provided by PSE.

[42] The aggregate Eastside load matched the numbers in Table 8.1.

Table 8.3: PSE Projected Normal Winter, 100% Conservation – Overloaded Elements

South to North Flow	Type of Contingency and Season								
	2017/18 Winter (23°F) 100% Conservation			2019/20 Winter (23°F) 100% Conservation			2023/24 Winter (23°F) 100% Conservation		
Transmission Line or Transformer	N-1	N-1-1	N-2	N-1	N-1-1	N-2	N-1	N-1-1	N-2
Talbot Hill - Lakeside #1 115 kV line		OL			OL			OL	
Talbot Hill - Lakeside #2 115 kV line		OL			OL			OL	
Talbot Hill 230-115 kV transformer #1		OL			OL			OL	
Talbot Hill 230-115 kV transformer #2		OL			OL			OL	
Talbot Hill-Boeing Renton-Shuffleton 115 kV line		OL			OL			OL	

OL= Overload of Emergency Rating. Source: PSE Results. ITA verified overloaded elements driving project need.

Table 8.4: PSE Projected Normal Summer, 100% Conservation - Overloaded Elements

North to South Flow	Type of Contingency and Season								
	2018 Summer (86°F) 100% Conservation			2020 Summer (86° F) 100% Conservation			2024 Summer (86° F) 100% Conservation		
Transmission Line or Transformer	N-1	N-1-1	N-2	N-1	N-1-1	N-2	N-1	N-1-1	N-2
Sammamish 230/115 kV Xfmr[43] #1		OL			OL			OL	
Sammamish 230/115 kV Xfmr #2		OL			OL			OL	
Novelty Hill 230/115 kV Xfmr #2		OL			OL			OL	
BPA Monroe – Novelty Hill 230 kV	OL		OL	OL		OL	OL		OL
Beverly Park - Cottage Brook 115 kV line		OL			OL			OL	
Sammamish – BPA Maple Valley 230 kV line				OL			OL		

OL= Overload of Emergency Rating. Source: PSE Results. ITA verified overloaded elements driving project need.

Figure 8.1 utilizes the 2014 load forecast and was supplied by PSE. Two system capacity lines for the Eastside area reflect where the powerflow results indicated violations of the mandatory performance requirements that put customer's reliability at risk. The powerflow results show a range of need for the Eastside area between 688 MW in winter 2017/18 and 708 MW in winter 2019/20. These levels were chosen by PSE because at 688 MW system elements are overloaded, and by 708 MW they are not only overloaded but 63,200 customers are at risk of losing power, which is a more severe situation. Further detail is noted below.

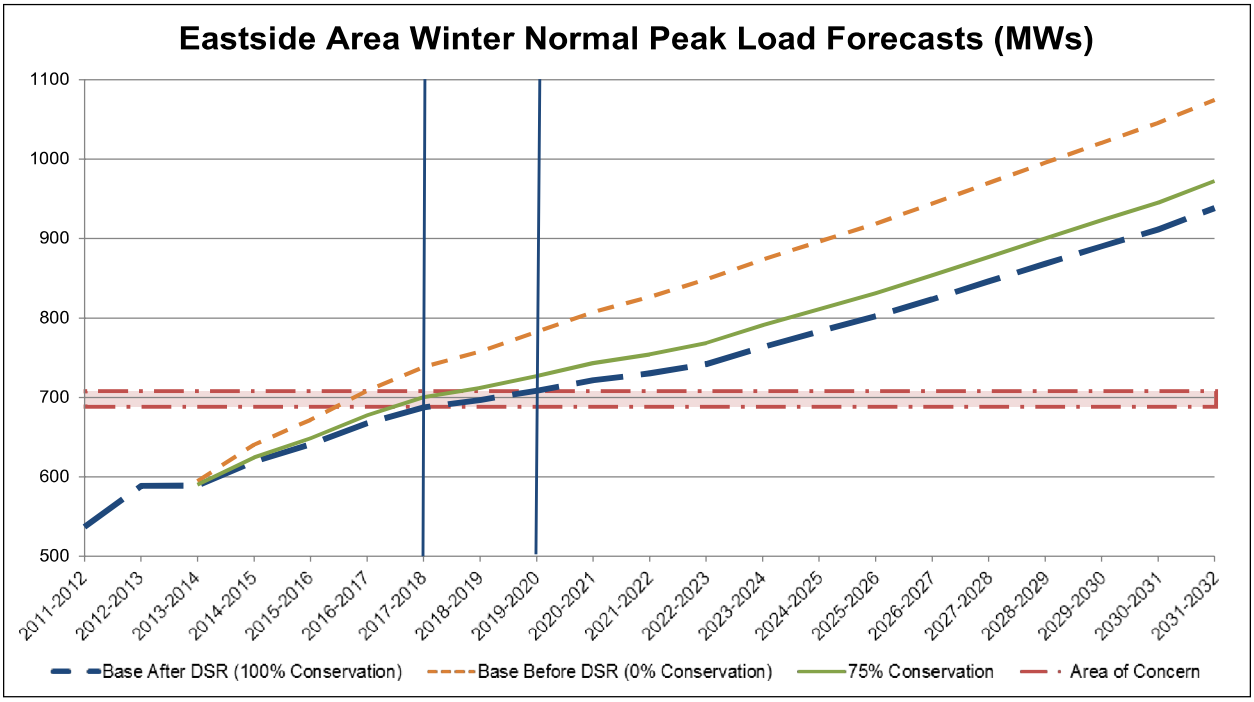
- In winter 2017/18 system elements would be overloaded requiring Corrective Action Plans (CAPs) for the Category C overloads. Zero customers are at risk of losing power by the CAPs[44].

[43] Xfmr = Transformer

[44] CAPs are implemented to protect system equipment from overload and resulting loss of equipment life or damage. CAPs can result in the forced reduction of load (intentionally causing customer outages) to bring

- By winter 2019/20, the CAPs radialize[45] existing loop service such that approximately 63,200 customers are at risk of losing power.
- By winter 2023/24, 16,800 customers are at risk from load shedding (intentional outage to customers to protect the system equipment), with another 52,000 customers at risk of losing power.

Figure 8.1: PSE's Graph of System Capacity, 2014 Forecast, 100% Conservation



In sum, PSE's need date for the Energize Eastside project remains as winter 2017/18. The following issues were identified by PSE and forecast levels and overloads were confirmed by the ITA:

- Transmission system elements will be over their capacity, and will require the use of CAPS to mitigate transmission overloads.
- Although the CAPS do not drop customer load in winter 2017/18, by winter 2019/20 approximately 63,200 customers are at risk of losing power. Intentionally dropping firm load for an N-1-1 or N-2 contingency to meet its federal planning requirements is not a practice that PSE endorses. This view is not unique amongst utilities. The CAISO Planning Standards states that "Increased reliance on load shedding … would run counter to historical and current practices, resulting in general deterioration of service levels."
- The forecast uses a 1 in 2 year weather forecast. Colder weather will result in higher load levels in winter 2017/18.
- 100% conservation may not be achieved which would result in a higher load level in winter 2017/18. Even if 100% conservation is achieved, it may not be in the appropriate locations and correct magnitudes.

the equipment loading below the emergency rating. This would only be used as a stopgap measure until system reinforcements (new equipment, etc.) are completed. CAPs as used here is a subset of CAPs defined in the NERC Reliability Standards. See Section 7 on Standards.

[45] Radialize: Convert from loop service to radial service (only one source).

- By the summer of 2018, studies show that customers will be at risk of outages and load shedding using CAPS to mitigate transmission overloads.

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9. Regional Issues related to EE

Note: All ColumbiaGrid regional documentation of Energize Eastside refers to the project by its terminals: Sammamish-Lakeside-Talbot. The following text refers to Energize Eastside as the Project.

Background

ColumbiaGrid is a regional transmission planning organization with a footprint encompassing Oregon, Washington, parts of Idaho and Montana. A planning team was formed with all Puget Sound area transmission owners and operators as planning participants within a year after the creation of ColumbiaGrid in 2007 to address the beginning curtailments of firm service in the Puget Sound area. Since 1997 and prior to the formation of this team, BPA had been planning to address these needs with a major 500kV line project from Monroe to Echo Lake, but construction had not started. The study team was able to identify a collection of projects to achieve the planning objectives with a cumulative scope less than the 500kV project.

The ColumbiaGrid Puget Sound Area transmission planning activity created 150 document postings on the team website that provide a detailed history of the work that led up to the regional plan. Of the 150 postings, three postings provide the information sufficient to describe the Project's role in regional objectives. The three postings are final reports and are all publicly available. These documents are:

- Transmission Expansion Plan for the Puget Sound Area (October 20,2010)
- Updated Recommended Transmission Expansion Plan for the Puget Sound Area to Support Winter South-to-North Transfers (October 28, 2011)
- Updated Transmission Expansion Plan for the Puget Sound Area to Support Summer North-to-South Transfers (February 21, 2013)

Project Specific Information

The following Project specific regional information was obtained from the above documentation.

1. Either the Project or reconductoring BPA's and SCL's Maple Valley-SnoKing 230kV lines is needed, but not both.
2. The Project or rebuilding SCL's Bothell-SnoKing 230kV lines is needed, but not both. The Bothell-SnoKing lines still need to be reconductored with the Project, but rebuilding is avoided.
3. If the Project voltage level is 115kV, the Project does not achieve the regional objectives. With that scenario, the regional objectives will be achieved by reconductoring the Maple Valley-SnoKing 230kV lines and the Bothell-SnoKing 230kV lines will need to be rebuilt.
4. The Project at 230kV is identified as the preferred alternative because of its dual purpose for regional objectives and local load service. If the Maple Valley-SnoKing 230kV lines had been reconductored prior to development of the Project, there would have been unnecessary redundancy developed in the transmission infrastructure, assuming that the Project voltage level needed to be 230kV.

ColumbiaGrid determined that the Energize Eastside project at 230 kV is the preferred alternative of all the options studied because of its dual purpose for regional objectives and local load service.

Stakeholder Questions related to Regional vs. Local Need

Q49. What is the connection between the need for EE and Columbia Grid (CG) technical objectives?

A *The CG technical objective is to identify effects of multiple systems that prevent fulfillment of firm transmission commitments. Mitigating transmission effects that do not involve multiple systems is not within the CG mandate. After the effects are identified, the multiple system owners are convened as a team facilitated by CG to identify mitigating alternatives and select the preferred alternative. The proposed 230kV scope of EE is identified by the CG facilitated team as a preferred alternative to reconductoring SCL's Maple Valley-SnoKing 230kV lines. EE at 230kV also changes the SCL scope of rebuilding the Bothell-SnoKing 230kV lines to reconductoring these lines.*

Q50. How are the technical needs of Columbia Grid prioritized and what criteria are used for evaluation and prioritization?

A *CG performs system assessments to determine forecasted transmission constraints to serving firm transmission commitments. A constraint that affects more than one member is the criteria for creating a study team, facilitated by CG, composed of the affected members. The study team mandate is to determine the mitigating alternatives and select the preferred alternative. Each study team determines their own evaluation and prioritization criteria. In the Puget Sound Area Study Team (PSAST), the criteria is a qualitative combination of cost and a planning metric (i.e. Transmission Curtailment Risk Measure or TCRM).*

Q51. Who has regulatory oversight of Columbia Grid?

A *There is no government regulatory oversight of CG. The oversight is by CG members, who have their own government regulatory oversight at state and federal levels. CG has no construction authority. The only CG authority is determining cost allocation, but this authority is only used if members do not agree on the cost allocation for a project they agree to implement.*

Q52. Is EE an "OPEN ACCESS" project?

A *No. An "Open Access" project provides new requested transmission service. This project provides service for existing firm obligations. (The longer answer is as follows: This answer assumes that "Open Access" refers to a transmission service request under a transmission provider's Open Access Transmission Tariff (OATT). These transmission service requests are for new transmission service that involve study requirements, facility addition determinations, and FERC pricing policies. Since EE is for load growth that falls under existing transmission service, it isn't "open access" because it is not new transmission service. .*

Q53. How are the merits of each need evaluated independently and which need takes priority?

A *The CG PSAST team evaluated the regional, multi-system needs for bulk power transfers independent of local load service needs. The local load service need is evaluated by the single systems. If a single system project (e.g. EE at 230kV) affects multi-system power transfer needs, then it is included in the multi-system evaluation. Firm commitments, regardless of bulk power transfers or local load service, are equal priority to be addressed and issues mitigated.*

Q54. Please describe how the need for EE and Power Wheeling are connected. What are PSE's power wheeling objectives for EE, and how much of the EE need is based on the ability to participate in additional power wheeling?

- A *Wheeling is the transportation of electric power over transmission lines by an entity that does not own or directly use the power it is transmitting.*
- A *(from PSE's Energize Eastside website, based on 2012 forecast) "PSE makes no profit on wheeling power. All revenue obtained from wheeling contracts is passed directly back to our customers in the form of lower rates. PSE does have contracts to wheel power across the region; those contracts bring in revenue of roughly $28 million a year. One hundred percent of this revenue is returned to our customers in the form of a rate reduction. As we stated in our presentation, 92-97% of the power flows on the Energize Eastside line will deliver electricity to local Eastside customers. The power flow studies show that the power used for regional purposes on the Energize Eastside project is 3 to 8% - not 38% (as was incorrectly stated at the meeting). This is the natural consequence of connecting a transmission line into an interconnected system."* June, 2014 http://energizeeastside.com/Media/Default/CAG/Meeting3/2014_0609_CAGLetter_SCL.pdf

Q55. Is any of the capacity of the planned EE 230 kV line, or the existing 115 kV lines between Sammamish and Talbot Hill, allocated for transmission contracts to BC Hydro or CA? If so, what %? What are PSE's power wheeling objectives for Energize Eastside? Does existing or planned/potential wheeling affect the Project capacity?

- A. *No/None. PSE makes no profit from wheeling contracts. See Q56.*
- A. *Per PSE, Project capacity is not affected by existing or planned/potential wheeling.*

10. Conclusion

The independent technical analysis (ITA) determined that PSE used reasonable methods to develop the 2014 forecast by following industry practice (See section 6.6.). The ITA reviewed PSE's powerflow cases and verified PSE's modeling of the updated load forecast, the Northern Intertie transfers, and the identified winter generation dispatch.

The ITA verified the following key result:
Although the new 2014 forecast resulted in an 11 MW decrease in the Eastside area's 2017/18 winter forecast, the reduced loading still resulted in overloaded transmission elements that drive the project need to address Eastside system reliability issues.

Although the CAP required in the 2017/18 winter to avoid facility overload doesn't drop load, by winter 2019/20 approximately 63,200 customers are at risk of losing power. In addition, by summer 2018, studies show that customers will be at risk of outages and load shedding due to CAPs used to mitigate transmission overloads. One might argue to delay the Energize Eastside project six months until summer 2018 when PSE studies show that customers will be at risk of outages and load shedding. However, balancing a six month delay in a complex and multi-year EIS process, which can have its own delays, against the risk of an adverse winter or less realized conservation (which could increase 2017/18 winter loading to a point where customers are at risk of load shedding) suggests it is reasonable to maintain the schedule for the existing project in-service date.

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Appendix A – Glossary

AC	Alternating Current
aMW	aMW - The average number of megawatt-hours (MWh) over a specified time period; for example, 295,650 MWh generated over the course of one year equals 810 aMW (295,650/8,760 hours). (Source: PSE's 2013 IRP Definitions)
Balancing Authority (BA)	Balancing Authority (BA) -- an entity that manages generation, transmission, and load; it maintains load-interchange-generation balance within a geographic or electrically interconnected Balancing Authority area, and it supports frequency in real time. The responsibility of the PSE Balancing Authority is to maintain frequency on its system and support frequency on the greater interconnection. To accomplish this, the PSE BA must balance load with generation on the system at all times. When load is greater than generation, a negative frequency error occurs. When generation is greater than load, a positive frequency error occurs. Small positive or negative frequency deviations are acceptable and occur commonly during the course of normal operations, but moderate to high deviations require corrective action by the BA. Large frequency deviations can severely damage electrical generating equipment and ultimately result in large-scale cascading power outages. Therefore, the primary responsibility of the BA is to do everything it can to maintain frequency so that load will be served reliably. (Source: PSE 2013 IRP)
BES	BES - Bulk Electric System - Unless modified by the inclusion and exclusion lists in the full definition that is available in the NERC Glossary of Terms (http://www.nerc.com/files/glossary_of_terms.pdf), all Transmission Elements operated at 100 kV or higher and resources connected at 100 kV or higher. The BES does not include facilities used in the local distribution of electric energy. (Source: NERC Glossary of Terms)
BPS	BPS - Bulk Power System - A) facilities and control systems necessary for operating an interconnected electric energy transmission network (or any portion thereof); and (B) electric energy from generation facilities needed to maintain transmission system reliability. The term does not include facilities used in the local distribution of electric energy. (Source: NERC Glossary of Terms)
CAP	CAP - Corrective Action Plan - A list of actions and an associated timetable for implementation to remedy a specific problem. (Source: NERC Glossary of Terms)
COI	COI - California–Oregon Intertie - The three 500 kV AC electric transmission lines between southern Oregon and northern California.
CPI	Consumer Price Index (CPI) – A measure that examines the weighted average of prices of a basket of consumer goods and services, such as transportation, food and medical care. The CPI is calculated by taking price changes for each item in the predetermined basket of goods and averaging them; the goods are weighted according to their importance. (Source: Investopedia)
Critical Energy Infrastructure Information (CEII)	Critical Energy Infrastructure Information (CEII) Regulations –- Established by the Federal Energy Regulatory Commission (FERC). "CEII is specific engineering, vulnerability, or detailed design information about proposed or existing critical infrastructure (physical or virtual) that: Relates details about the production, generation, transmission, or distribution of energy; Could be useful to a person planning an attack on critical infrastructure; Is

	exempt from mandatory disclosure under the Freedom of Information Act; and Gives strategic information beyond the location of the critical infrastructure." (Source: FERC)
DC	Direct Current
Demand (Utility)	Demand (Utility) – The level at which electricity or natural gas is delivered to users at a given point in time. Electric demand is expressed in kilowatts. (Source: CEC Glossary)
Demand-Side Resources (DSR)	Demand-Side Resources (DSR) - Resources that reduce the demand. (As opposed to Supply-Side Resources)
Demographic	Demographics - Studies of a population based on factors such as age, race, sex, economic status, level of education, income level and employment, among others. Demographics are used by governments, corporations and non-government organizations to learn more about a population's characteristics for many purposes, including policy development and economic market research. (Source: Investopedia.com)
Direct Control Load Management (DCLM)	Direct Control Load Management (DCLM) - Demand-Side Management that is under the direct control of the system operator. DCLM may control the electric supply to individual appliances or equipment on customer premises. DCLM as defined here does not include Interruptible Demand. (Source: NERC Glossary)
Distribution System	Distribution System - An electric power distribution system is the final stage in the delivery of electric power; it carries electricity from the transmission system to individual consumers. (Source: Wikipedia)
Econometric Data	Econometric Data – Data sets to which econometric analyses are applied.
Econometrics	Econometrics – The application of mathematics and statistical methods to economics. Econometrics tests hypotheses and forecasts future trends by applying statistical and mathematical theories to economics. It's concerned with setting up mathematical models and testing the validity of economic relationships to measure the strengths of various influences.
EPAct 2005	EPAct 2005 – The federal Energy Policy Act of 2005
ERO	ERO - Electric Reliability Organization
Firm Transmission Service	Firm Transmission Service – 1) Transmission service available at all times during a period covered by an agreement. 2) The highest quality (priority) service offered to customers under a filed rate schedule that anticipates no planned interruption. (Source: NERC)
GO	GO - Generator Owner
Interruptible Load or Interruptible Demand	Interruptible Load or Interruptible Demand - Demand that the end-use customer makes available to its Load-Serving Entity via contract or agreement for curtailment. (Source: NERC Glossary)
IRP	Integrated Resource Plan - A comprehensive and long-range road map for meeting the utility's objective of providing reliable and least-cost electric service to its customers while addressing applicable environmental, conservation and renewable energy requirements. A process used by utility companies to determine the mix of Supply-Side Resources and Demand-Side Resources that will meet electricity demand at the lowest cost. The IRP is often developed with input from various stakeholder groups. Also Integrated Resource Planning.

Levelized Cost	Levelized Cost - An economic assessment of the cost to build and operate a power-generating asset over its lifetime divided by the total power output of the asset over that lifetime. It is also used to compare different methods of electricity generation in cost terms on a comparable basis.
MW	MW - Megawatt - A unit of power equal to one million watts or one thousand kilowatts.
N-1	N-1 - Loss of a single element such as a generator, a transmission line, or a transformer (P2)
N-2	N-2 - Simultaneous loss of two elements due to a single event. For example, loss of two transmission lines on a common tower due to failure of the tower (P6)
N-1-1	N-1-1 - Loss of a single element such as a generator, a transmission line, or a transformer followed by a system readjustment such as generation redispatch, then loss of a second element such as a generator, a transmission line, or a transformer (P7)
Native load	Native load – 1. The cumulative load (power requirement) of a utility's retail customer base. 2. The end-use customers that the Load-Serving Entity is obligated to serve. (NERC Glossary) http://www.energy.ca.gov/glossary/glossary-d.html
NAICS	NAICS - The North American Industry Classification System (NAICS) is the standard used by Federal statistical agencies in classifying business establishments for the purpose of collecting, analyzing, and publishing statistical data related to the U.S. business economy (Source: Census.gov)
NERC	NERC - North American Electric Reliability Corporation
Northern Intertie	Northern Intertie - transmission interconnection between Washington and British Columbia (Also called Path 3.)
Off-system sales	Off-system sales – Sales by a utility to a customer outside of its current traditional market.
PC	PC - Planning Coordinator
PDCI	PDCI - Pacific Direct Current Intertie
PJM	PJM – PJM Interconnection is a regional transmission organization (RTO) that coordinates the movement of wholesale electricity in all or parts of Delaware, Illinois, Indiana, Kentucky, Maryland, Michigan, New Jersey, North Carolina, Ohio, Pennsylvania, Tennessee, Virginia, West Virginia and the District of Columbia.
Personal Consumption Expenditure Deflator (PCE Deflator)	Personal Consumption Expenditure Deflator (PCE Deflator) - Measures the average change over time in the price paid for all consumer purchases, thus measures changes in the cost of living. (Source: Investopedia)
Powerflow	Powerflow - a numerical analysis of the flow of electric power in an interconnected system. It can refer to the analysis program, or to a simulation
RE	RE - Regional Entity.
Regression Analysis	Regression analysis is a statistical process for estimating the relationships among variables. It seeks to determine the strength of the relationship between one dependent variable (usually denoted by Y) and a series of other changing variables (known as independent variables). It is also known also as curve fitting or line fitting because a regression analysis equation can be used in fitting a curve or line to data points. It includes many techniques for modeling and analyzing variables.

Renewable energy credits (RECs)	Renewable energy credits (RECs) - A REC represents the property rights to the non-power qualities of renewable electricity generation, such as environmental and social qualities. A REC, and its associated attributes and benefits, can be sold separately from the underlying physical electricity associated with a renewable-based generation source. At the point of generation, both product components can be sold together or separately, as a bundled or unbundled product. (Source: US EPA)
Renewable Portfolio Standard (RPS)	Renewable Portfolio Standard (RPS) – A regulatory mandate to increase production of energy from renewable sources such as wind, solar, biomass and other alternatives to fossil and nuclear electric generation. It's also known as a renewable electricity standard. (Source: National Renewable Energy Laboratory - NREL)
Substation	Substation – Substations transform voltage from high to low or from low to high. They also perform other functions, such as limiting outages, protecting equipment, et cetera.
Supply-Side Resources	Supply-Side Resources – Conventional generation plants, renewable generation, etc. (as opposed to Demand-Side Resources).
TO	TO - Transmission Owner
TP	TP - Transmission Planner
Weather Normalizing	Weather normalization is a process that adjusts actual energy or peak outcomes to what would have happened under normal weather conditions. Normal weather conditions are expected on a 50 percent probability basis, also known as a 50/50 forecast (i.e., there is a 50 percent probability that the actual peak realized will be either under or over the projected peak).
WECC	WECC - Western Electricity Coordinating Council. WECC has been approved by the Federal Energy Regulatory Commission (FERC) as the Regional Entity for the Western Interconnection. The North American Electric Reliability Corporation (NERC) delegated some of its authority to create, monitor, and enforce reliability standards to WECC through a Delegation Agreement.
Western Interconnection	Western Interconnection - North America is comprised of two major and three minor alternating current (AC) power grids, also called "interconnections." The Western Interconnection stretches from the Pacific Ocean eastward over the Rockies to the Great Plains, and from Baja California, Mexico in the South into Western Canada. (Source: Energy.gov)
Wheeling	Wheeling -- The transmission of electricity by an entity that does not own or directly use the power it is transmitting. Wholesale wheeling is used to indicate bulk transactions in the wholesale market, whereas retail wheeling allows power producers direct access to retail customers. This term is often used colloquially as meaning transmission.
WSCC	WSCC - Western Systems Coordinating Council. The predecessor to WECC.

Appendix B – Optional Technical Analysis

Executive Summary

Utility System Efficiencies, Inc. (USE) was engaged by the City of Bellevue in February 2014 to conduct an Optional Technical Analysis (OTA) of the purpose, need, and timing of the Energize Eastside project. Energize Eastside (EE) is Puget Sound Energy's (PSE's) proposed project to build a new electric substation and new higher–capacity (230 kilovolt) electric transmission lines in the East King County area, which encompasses Bellevue, Clyde Hill, Medina, Mercer Island, Newcastle, the towns of Yarrow Point, Hunts Point, and Beaux Arts, and portions of Kirkland, Redmond, and Renton (the Eastside). The transmission lines would extend from an existing substation in Redmond to one in Renton (See Figure 3.1).

The scope of the OTA was to perform an analysis on PSE's study cases to determine the impact of potential forecast variability on the timing of improvements, and was later expanded to evaluate whether regional requirements rather than local requirements might be driving the project need. The OTA examined several hypothetical scenarios by conducting analysis on PSE's study cases. It looked at the effect of a) reducing load growth in the *Eastside* area to 1.5%, b) reducing load growth in *PSE's portion of King County* to 0.25% while keeping the Eastside growth the same, c) increasing power output of existing Puget Sound area generation, and d) reducing the Northern Intertie[46] flow to zero (no transfers to Canada). Although d) is not actually possible due to extant treaties, it was modeled to examine if regional requirements might be driving the need. In the winter cases, the OTA also combined scenarios c) and d). Finally, the OTA looked at the impact of an Extreme Winter forecast.

IF THE LOAD GROWTH RATE WAS REDUCED, WOULD THE PROJECT STILL BE NEEDED? YES

The OTA results showed that reducing the Eastside average load growth from an average of 2.4%/year to an average of 1.5%/year from winter 2013/14 to winter 2017/18 did not eliminate any overloaded elements; there is still project need. Similarly, reducing PSE's *King County growth rate* (less Eastside) from an average of 0.5 %/year to an average of 0.25%/year from winter 2013/14 to winter 2017/18 did not eliminate any overloaded elements; there is still project need.

IF GENERATION WAS INCREASED IN THE PUGET SOUND AREA, WOULD THE PROJECT STILL BE NEEDED? YES

Results showed that increasing the power output of existing Puget Sound area generation to the levels specified in ColumbiaGrid's July 2010 "Puget Sound Area Generation Modeling Guideline" eliminated one of five overloads in the 2017/18 normal winter, but did not eliminate project need. (This study increased the amount of PSE and SCL generation west of the Cascades from zero to the level identified in the above document. Since the document is confidential (CEII) the generation output is not provided in this report.)

[46] Northern Intertie - transmission interconnection between Washington and British Columbia (Also called Path 3.)

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IS THERE A NEED FOR THE PROJECT TO ADDRESS REGIONAL FLOWS, WITH IMPORTS/EXPORTS TO CANADA (COLUMBIAGRID[47])? Modeling zero flow to Canada, the project is still necessary to address local need.

The Optional Technical Analysis examined this issue by analyzing a reduction in the Northern Intertie flow to zero (no transfers to Canada). Although this scenario is not actually possible due to extant treaties, it was modeled to provide data on the drivers for the EE project, to examine if regional requirements might be driving the need. The results showed that in winter 2017/18, even with the Northern Intertie adjusted to zero flow, the Talbot Hill 230/115 kV transformer #2 is still overloaded by several contingencies. This indicates there is a project need at the local level.

The OTA results showed that all studied scenarios resulted in at least one equipment overload in normal winter 2017/18 with 100% conservation, indicating project need.

Analysis and Findings

The OTA studied five normal winter scenarios and three extreme winter scenarios for winter 2017/18 and winter 2019/20. The OTA also studied five normal summer scenarios for 2018 and 2020. The scenarios were modeled in the powerflow cases. Details on the modeling are not provided due to Critical Energy Infrastructure Information (CEII) restrictions.

Table B.1 lists the overloaded elements for winter 2017/18 for each studied scenario. The scenarios are listed in the second blue row in Table B.1 (the vertically oriented text). The normal winter scenarios are numbered 1-6 (with #1 representing the original PSE case). The extreme weather scenarios are numbered E1-E3.

Normal winter results showed:

- Reducing the Eastside average load growth to 1.5% did not eliminate any overloaded elements; there is still project need.
- Reducing PSE's King County growth rate (less Eastside) to 0.25% did not eliminate any overloaded elements; there is still project need.
- Increasing the power output of existing Puget Sound area generation to the levels specified in ColumbiaGrid's July 2010 "Puget Sound Area Generation Modeling Guideline"[48] eliminated one of five overloads, but did not eliminate project need.
- Reducing the Northern Intertie flow to zero (no transfers to Canada) eliminated all but one overload; there is still local project need.
- Reducing the Northern Intertie flow to zero (no transfers to Canada) AND Increasing the Puget Sound area generation to ColumbiaGrid's July 2010 "Puget Sound Area Generation Modeling Guideline" eliminated all but one overload; there is still project need.

Extreme winter results increased the overload levels and/or caused overloads on additional elements. Although the normal winter results showed only one overload when the Northern Intertie flow was reduced to zero, the extreme winter case showed four overloads.

[47] ColumbiaGrid (single word) is a regional transmission planning organization with a footprint encompassing Oregon, Washington, parts of Idaho and Montana.
[48] Confidential (CEII) document that provides modeling values (MW levels of generation) for applicable generators.

Table B.1: Winter 2017/18, 100% Conservation - Overloaded Elements

Northern Intertie: South to North Overloaded Element (Transmission Line or Transformer)	2017/18 Normal Winter 100% Conservation						2017/18 Extreme Winter, 100% Cons.		
	1) Original PSE Case	2) Reduce Eastside load growth to 1.5%	3) Reduce PSE's King County growth to 0.25%[49]	4) Increase Puget Sound area generation	5) Set Load transfers to Canada = 0 (North. Intertie = 0)	6) Combination of Scenario 4 and & 5	E1) Original PSE Case adjusted for extreme weather	E2) Set Load transfers to Canada = 0 (North. Intertie = 0)	E3) Scenario E2 + Increase Puget Sound area generation
Talbot Hill - Lakeside #1 115 kV line	OL	OL	OL	OL			OL		
Talbot Hill - Lakeside #2 115 kV line	OL	OL	OL	OL			OL		
Talbot Hill 230-115 kV transformer #1	OL	OL	OL	OL			OL	OL	OL
Talbot Hill 230-115 kV transformer #2	OL	OL	OL	OL	OL	OL	OL	OL	OL
Talbot Hill-Boeing Renton-Shuffleton 115 kV line	OL	OL	OL				OL		
Sammamish 230/115 kV transformer #1								OL	OL
Sammamish 230/115 kV transformer #2								OL	OL

OL = Overload of Emergency Rating. Source: OTA Results

Table B.2 lists the overloaded elements for winter 2019/20 for each studied scenario. The scenarios are listed in the second blue row (the vertically oriented text).

The 2019/20 winter results showed the same overloaded elements as 2017/18. The overloads in the base cases and in the load reduction cases were more severe in 2019/20. The overload levels in the generation dispatch and Northern Intertie=0 scenarios were mixed; some overloads were more severe in 2019/20, but some were slightly less. Nevertheless, project need was shown in all cases. Extreme winter results increased the overload levels over normal winter and/or caused overloads on additional elements.

Table B.2: Winter 2019/20, 100% Conservation - Overloaded Elements

Northern Intertie: South to North Overloaded Element (Transmission Line or Transformer)	2019/20 Normal Winter 100% Conservation						2019/20 Extreme Winter, 100% Cons.		
	1) Original PSE Case	2) Reduce Eastside load growth to 1.5%	3) Reduce PSE's King County growth to 0.25%[50]	4) Increase Puget Sound area generation	5) Set Load transfers to Canada = 0 (North. Intertie = 0)	6) Combination of Scenario 4 and & 5	E1) Original PSE Case adjusted for extreme weather	E2) Set Load transfers to Canada = 0 (North. Intertie = 0)	E3) Scenario E2 + Increase Puget Sound area generation
Talbot Hill - Lakeside #1 115 kV line	OL	OL	OL	OL			OL		
Talbot Hill - Lakeside #2 115 kV line	OL	OL	OL	OL			OL		
Talbot Hill 230-115 kV transformer #1	OL	OL	OL				OL	OL	OL
Talbot Hill 230-115 kV transformer #2	OL	OL	OL	OL	OL	OL	OL	OL	OL
Talbot Hill-Boeing Renton-Shuffleton 115 kV line	OL	OL	OL				OL		
Sammamish 230/115 kV transformer #1									OL
Sammamish 230/115 kV transformer #2								OL	OL

OL = Overload of Emergency Rating. Source: OTA Results

[49] Excluding Eastside load
[50] Excluding Eastside load

Table B.3 lists the overloaded elements for summer 2018 for each studied scenario. The scenarios are listed in the second green row. The normal summer scenarios are numbered 1-5 (with #1 representing the original PSE case). There is no extreme weather summer forecast.

The 2018 normal summer results showed:

- Reducing the Eastside average load growth did not eliminate any overloaded elements; there is still project need.
- Reducing PSE's King County growth rate (less Eastside) did not eliminate any overloaded elements; there is still project need.
- Increasing the Puget Sound area generation to ColumbiaGrid's July 2010 "Puget Sound Area Generation Modeling Guideline" eliminated one of six overloads, but did not eliminate project need.
- Reducing the Northern Intertie flow to zero (no transfers to Canada) eliminated all the summer overloads; however, there is still a winter overload which means there is still local project need.

Table B.3: Summer 2018, 100% Conservation - Overloaded Elements

Northern Intertie: North to South Overloaded Element (Transmission Line or Transformer)	2018 Summer (86°F) 100% Conservation				
	1) Original PSE Case	2) Reduce Eastside load growth	3) Reduce PSE's King County growth	4) Increase Puget Sound area generation	5) Set Load transfers to Canada = 0 (Northern Intertie = 0)
Sammamish 230/115 kV Xfmr #1	OL	OL	OL	OL	
Sammamish 230/115 kV Xfmr #2	OL	OL	OL	OL	
Novelty Hill 230/115 kV Xfmr #2	OL	OL	OL		
BPA Monroe – Novelty Hill 230 kV	OL	OL	OL	OL	
Beverly Park - Cottage Brook 115 kV line	OL	OL	OL	OL	
Sammamish – BPA Maple Valley 230 kV line	OL	OL	OL	OL	

OL = Overload of Emergency Rating. Source: OTA Results

The 2020 summer results (Table B.4) showed the same overloaded elements as 2018. The overloads were more severe in 2020, with the exception of the Beverly Park – Cottage Brook 115 kV line which was either unchanged or reduced by less than 0.1%.

Table B.4: Summer 2020, 100% Conservation - Overloaded Elements

Northern Intertie: North to South Overloaded Element (Transmission Line or Transformer)	2020 Summer (86°F) 100% Conservation				
	1) Original PSE Case	2) Reduce Eastside load growth	3) Reduce PSE's King County growth	4) Increase Puget Sound area generation	5) Set Load transfers to Canada = 0 (Northern Intertie = 0)
Sammamish 230/115 kV Xfmr #1	OL	OL	OL	OL	
Sammamish 230/115 kV Xfmr #2	OL	OL	OL	OL	
Novelty Hill 230/115 kV Xfmr #2	OL	OL	OL		
BPA Monroe – Novelty Hill 230 kV	OL	OL	OL	OL	
Beverly Park - Cottage Brook 115 kV line	OL	OL	OL	OL	
Sammamish – BPA Maple Valley 230 kV line	OL	OL	OL	OL	

OL = Overload of Emergency Rating. Source: OTA Results

Stakeholder Questions related to the OTA

Q56. The study must as clearly, but non-technically as possible, define will happens regarding power flow to and from Canada.

A *See the OTA in Appendix B. Sensitivities were performed where power flow to and from Canada were reduced to zero. These cases still showed overloads so there is clearly a local need. Some overloads were eliminated when flows were reduced to zero, which indicates that flows to and from Canada also have an impact on the need.*

Q57. Clarify Eastside vs. regional needs. What load is causing the problem? Local or regional?

A *Local. The Optional Technical Analysis results showed that in winter 2017/18, even with the Northern Intertie adjusted to zero flow, the Talbot Hill 230/115 kV transformer #2 is still overloaded by several contingencies. This indicates there is a project need at the local level. See the full Appendix B for further detail.*

Q58. I am concerned that the need is not just for Bellevue and the Eastside but more for Bonneville Power, Snohomish Power, Seattle City Light -- the Columbia Grid. I would ask the consultants to provide a simple quantitative and pie chart breakout of the need that each stakeholder has in "Energize Eastside".

A *See Q56.*

Q59. Provide a quantitative analysis and pie charts (both historical and futuristic) showing a breakout of the need (demand and reliability) for each of the members of the Columbia Grid.

A *The Optional Technical Analysis results showed that in winter 2017/18, even with the Northern Intertie adjusted to zero flow, the Talbot Hill 230/115 kV transformer #2 is still overloaded by several contingencies. These results indicate there is a project need at the local level.*

Q60. Given the scenario and contingency driving the EE project, how much regional load will flow through the line?

A *See Q61 below.*

Q61. What percentage of North-South flow-through load (to Canada/California) will be carried on EE during an N-1-1 event (failure of BPA bulk main PLUS a second transmission line failure?

A *The OTA studied a scenario with flows to Canada at 1500 MW and a scenario with flows to Canada set to 0 MW. Under the worst contingency condition (N-1-1), the reduction in flow on the Talbot Hill - Lakeside lines was 22.5%. Under the worst contingency condition (again N-1-1), the reduction in flow on the Talbot Hill 230/115 kV transformer was 2.6%. These results are before EE and reflect the effects on the current transmission system serving the EE area. As you can see from these results, the impact of flows to Canada on the Talbot Hill 230/115 kV transformer (the main driver of the need for EE) is almost insignificant.*

Q62. Was the system studied with generation on the west side?

A *Yes, the OTA studied a scenario with generation on the west side.*

Q63. Is EE a "BLENDED PROJECT" to satisfy the needs of Columbia Grid, BPA grid reinforcement (Monroe-Echo Lake bottleneck), Columbia River treaty "Canadian Entitlement" curtailments, Seattle City Light load needs, as well as PSE load growth?

A *The term "Blended Project" is not clear. However, the OTA results do show that there is a need for a project to satisfy local needs. A review of ColumbiaGrid documentation indicates that EE will also help satisfy a regional need which is why EE was included in the recommended transmission solution from ColumbiaGrid Puget Sound Area transmission planning activity.*

Appendix C – End-Use Data and IRP

End-use data is evaluated in Integrated Resource Planning, where a utility examines both Supply-Side and Demand-Side options with the objective of providing reliable and least-cost electric service to its customers while addressing applicable environmental, conservation and renewable energy requirements. Because energy efficiency is generally a low-cost resource, the IRP tends to incorporate energy efficiency as a utility system resource and reduce the need for additional Supply-Side resources.

PSE commissioned The Cadmus Group, Inc. (Cadmus) to conduct an independent study of Demand-Side Resources (DSR) in the PSE service territory as part of its biennial integrated resource planning (IRP) process. The study considered energy efficiency, fuel conversion, Demand Response, and distributed generation. PSE also considered distribution efficiency.

Energy efficiency looked at naturally occurring conservation, which occurs due to normal market forces such as technological change, energy prices, improved energy codes and standards, and efforts to change or transform the market. This includes gradual efficiency increases due to replacing or retiring old equipment in existing buildings and replacing it with units that meet minimum standards at that time. It also includes new construction which reflects current state specific building codes, and improvements to equipment efficiency standards that are pending and will take effect during the planning horizon.

Fuel Conversion considered opportunities to substitute natural gas for electricity through replacements of space heating systems, water heating equipment, and appliances.

Demand Response options seek to reduce peak demand during system emergencies or conditions of extreme market prices. It may also be used to improve system reliability and could potentially help to balance variable-load resources such as wind energy.

Washington State's Renewable Portfolio Standard (RPS) law requires conservation potential be developed using Northwest Power & Conservation Council (NWPCC) methodology, and conservation targets are based on IRP with penalties for not achieving them. It requires PSE to meet specific percentages of its load with renewable resources or renewable energy credits (RECs) by specific dates.

The Energy Independence and Security Act (EISA, 2007) provides for minimum federal standards for lighting and other appliances beginning in 2012. It also sets standards for increasing the production of clean renewable fuels, increasing the efficiency of buildings and vehicles, and more.

Cadmus compiled technical, economic, and market data from the following sources:

- PSE Internal Data: Historical and projected sales and customers, historic and projected DSR accomplishments, and hourly load profiles
- 2010 Residential Characteristic Survey (PSE Service Territory)
- 2008 Fuel Conversion Survey (PSE Service Territory)

- 2007 Puget Sound-Area Regional Compact Fluorescent Light (CFL) Saturation Study
- NEEA's 2009 Commercial Building Stock Assessment (CBSA)
- Building Simulations for the residential sector, employing separate models for customer segments and construction vintage
- Pacific Northwest Sources. Technical information included on hourly end-use load shapes (to supplement building simulations), commercial building and energy characteristics. Information on measure savings, costs, and lives
    - The Northwest Power and Conservation Council (Council)
    - The Regional Technical Forum (RTF)
    - The Northwest Energy Efficiency Alliance (NEEA)
- Sources to characterize measures, assess baseline conditions, and benchmark results against other utilities' experiences
    - The California Energy Commission's Database of Energy Efficiency Resources (DEER)
    - ENERGY STAR
    - The Energy Information Administration
    - Annual and evaluation reports on energy-efficiency and Demand Response programs from various utilities

Only new opportunities for conservation are captured in the DSR value and thousands of measures were evaluated. Conservation programs included Energy Efficiency, Fuel Conversion, Distributed Generation, Demand Response and Distribution Efficiency (voltage reduction and phase balancing[51]). Lighting savings in the 2013 IRP assume the availability of a technology meeting the minimum requirements of EISA, and that savings from Compact Fluorescent Lamp (CFL) installations will remain available[52]. (Cadmus estimated that 33% of sockets have CFLs before the 2013 IRP measures are selected.) EISA accounts for 31% of residential DSR and 26% of commercial DSR. DSR targets are reviewed by the Conservation Resource Advisory Group and the Integrated Resource Plan Advisory Group.

The 2013 IRP identified market achievable, technically feasible Demand-Side measures. These measures (over four thousand) were combined into bundles[53] based on levelized cost[54] for inclusion in the generation optimization analysis. The effect of the bundles is to reduce load, so the costs to achieve the savings must be added to the cost of the electric portfolios.

The optimization analysis identifies the economic potential (cost-effective level) of DSR bundles that would work well in planning for generation requirements. (For example, solar energy has a different impact on the summer peak than on a winter peak.) The optimization model developed and tested different portfolios, combining Supply-Side Resources with Demand-Side bundles, to find the lowest cost combination of resources that a) met capacity need b) met renewable resources/RECs need, and c) included as much conservation as was cost effective. (Once the capacity and renewable resources/RECs needs are met, the decision to include additional

[51] Phase balancing: Balancing the single-phase load among the three phases so that unbalanced load isn't driving the peak load value.
[52] LED lighting: The LED programs were not specifically identified in the 2013 IRP. The LED technology and availability is different today than it was when the 2013 IRP study began. PSE is planning on including LED lighting in the 2015 IRP.
[53] An example bundle is the set of measures that cost between $28/MWh and $55/MWh.
[54] Levelized Cost - An economic assessment of the cost to build and operate a power-generating asset over its lifetime divided by the total power output of the asset over that lifetime. It is also used to compare different methods of electricity generation in cost terms on a comparable basis.

conservation bundles is simply whether that next bundle of measures increases the cost or decreases it.)

The optimization analysis results in the final set of cost effective measures, which are identified as the "100% conservation" set.

Appendix D – Ask the Consultant

A key purpose of the ITA and the OTA was to provide an increased level of understanding of the purpose, need and timing of the EE project to the City Council and to community stakeholders. Over the course of the project, dozens of questions were received from various stakeholders. The City engaged such comments through an online outreach feature called 'Ask the Consultant.' In addition to this outreach the City initiated separate interviews with key stakeholders and USE staff. City staff filtered all Ask the Consultant stakeholder comment through the various Tasks in the Scope of Services and submitted the need-related comments to USE for report inclusion. Other comments were directed as appropriate to other comment venues including for example to the scoping process for the Environmental Impact Statement (EIS) the Integrated Resource Plan (IRP) process. That filtering is documented in the chart below.

A Q&A discussion is documented at the end of each section of the ITA.

See Attached Table 1.

Date	Name	Question or Comment	Directed to:
1/27	Plummer	Industry standards, IRP, average yearly loads	Extensive reference to lack of industry wide standards; paragraph 4 and 5 to ITA
1/22	Marsh	Questions for ITA consultant: Overview, Real need, distribution of peak use, Eastside vs regional needs, reliability	Skype session
1/28	Marsh	Questions for ITA consultant: extreme winter study case, other adjustments modeled, System Cap.	Role of Case Study Assumption, clarify reference to Needs Assessment Section 6, connection between CSA and CDF to ITA
1/30	Sweet	Data center consolidation comment	ITA
2/6	Plummer	Quantitative reliability metrics	ITA
2/9	Lander	Choice of USE and communications	Communications response
1/15	Osterberg/ Laughlin	E3 and Cadmus Study, declining revenue, blended project	EIS
2/3	Borgmann	12 questions: forecast, growth rates, Columbia Grid role, used and useful comparison, alternatives	1, 2, 7, 8, 12 to ITA 3 ? to ITA, comments to EIS 5 ? to ITA, comments to EIS 6 ? to ITA, comments to EIS 7- 2nd set? to EIS 4, 9, 10, 11 to EIS
2/9	Kim	2 comments on tech study and CDF chart; 2 questions on growth forecast disparity, show project stakeholder pie chart	1 and 2 to EIS 3 and 4 to ITA

2/10	McCray	4 questions: Load projection, options, trend down, Chang proposal	1 and 3 to ITA 2 and 4 (Chang) to EIS
2/10	Marsh	Circumstances of all-time peak usage occurrence	EIS
2/10	Marsh	PSE and SCL electricity trends	EIS
2/11	Alford	comment on tech study and CDF chart; questions on growth forecast disparity, show project stakeholder pie chart	See Kim comment
2/11	Mozer	Magnitude and timing of EE, alternatives, Canada powerflow	ITA (1) and EIS (2)
2/12	Andersen	4 questions: SCL capacity, Peak load information, use of temperature in modelling, distributed generation, use of peaking turbine generation	New Q1 to EIS Add 1 Q4 not in ITA scope Add 2 Q7 not in ITA scope Add 3 Q15 DSR and DG in ITA modelling, cost info not in scope Add 4 Q19 to EIS
2/12	Merrill	7 questions: Reasonableness of PSE conclusions, rational look, Eastside Customer demand, use of actual data, replacement, outages	1, 3, 5, 6 to ITA 2, 4, 7 to EIS
2/12	Hansen	Bridle Trails Subarea infrastructure reliability	EIS or ERS implementation
2/12	Halvorson	Customer Demand Forecast and Columbia Grid need pie chart	ITA
2/12	Marsh	7 questions: Top assumptions and parameters of the load forecast, economic projections, Spring District, increased efficiency, local government actions, regional transmission flow, regional grid	ITA

Appendix E – Transmission Planning Standards TPL-001-4

See attached Table 1.

Appendix F – Utility System Efficiency, Inc. (USE) Qualifications

R. Peter Mackin, P.E.
Vice President of Analytical Services

ACADEMIC BACKGROUND
M.S., Electrical Engineering, Montana State University, 1982
B.S., Civil Engineering, Montana State University, 1981

PROFESSIONAL EXPERIENCE
Peter Mackin has over 33 years of power system planning and computer application development experience and has been involved in WSCC/WECC planning and operating activities since 1985. In April of 2006, Mr. Mackin joined Utility System Efficiencies, Inc. (USE) as Vice President of Analytical Services. At USE, among other duties, Mr. Mackin has directed and performed system studies to meet the requirements of the WECC Project Rating Review Process, assisted developer clients with interconnection applications, and supervised a wind integration study for FERC.

While employed at Navigant Consulting, Inc., Mr. Mackin performed several transmission and resource integration studies for the Alberta Electric System Operator (AESO) as well as generation interconnection studies and transmission feasibility analyses for other clients. Mr. Mackin was a member of the NERC Version 0 and Phase III/IV Standards drafting teams. In addition, Mr. Mackin provided expert witness testimony at FERC in Docket No. ER01-1639-006.

While employed by the California Independent System Operator (CAISO), Mr. Mackin performed or reviewed system planning studies for Reliability Must Run generation requirements, new generator interconnection studies, as well as Participating Transmission Owner annual Transmission Assessments. In addition, Mr. Mackin helped develop the CAISO's New Facility Interconnection Policy and Long-Term Grid Planning Policy. Mr. Mackin provided expert witness testimony regarding six new generation projects before the California Energy Commission.

While employed by Pacific Gas and Electric Company (PG&E), Mr. Mackin was the lead transmission planning engineer performing transient stability simulations for the 500 kV California – Oregon Transmission Project. In addition, Mr. Mackin performed, supervised or reviewed studies to determine simultaneous import capabilities into California from the Pacific Northwest and the Desert Southwest. For two years, he served as chairman of the work group that undertook these studies. This work group was comprised of utilities from California, the Northwest, and the Desert Southwest.

Jennifer Geer, P.E.
Principal Power Systems Engineer

ACADEMIC BACKGROUND
B.S., Electrical Engineering, University of New Mexico, 1985

PROFESSIONAL EXPERIENCE
Ms. Geer has over 25 years of electric utility industry experience and has extensive background in the transmission and distribution areas, including transmission planning and generation interconnection studies, distribution planning and forecast development and approval, outage analysis, reliability analysis, project development, and project management. Ms. Geer has also provided training in many of these areas. Ms. Geer joined Utility System Efficiencies, Inc. (USE) in 2009. At USE, Ms. Geer's focus has been on generation interconnection studies, transmission planning and project development.

Prior to joining USE, Ms. Geer was a member of San Diego Gas and Electric's Transmission Planning Department. Though part of their generation interconnection team, she was also involved in studies to determine the need and benefit of new transmission projects on the existing system, examining different route and voltage options.

While running Geer and Geer Engineering, Ms. Geer developed a procedure to determine if a new substation was needed; part of this procedure involved developing long term forecasts for the relevant areas. She also led teams to optimize substation site selection based on both engineering and non-engineering issues, and provided project management for a long term transmission study that was used to determine client company strategy. In addition, Ms. Geer developed or reviewed many distribution projects, trained engineers and leads on distribution planning, developed a training manual, conducted process mapping of distribution functions, and analyzed visibility and accuracy of distribution accounting.

While employed by San Diego Gas & Electric (SDG&E), Ms. Geer forecasted distribution loads, identified issues and alternatives, and developed circuit and substation projects. Ms. Geer also conducted distribution reliability studies to improve performance indices and developed training documents on multiple topics. She reviewed the entire set of distribution circuit forecasts and proposed distribution capital projects for San Diego Gas & Electric in later years, and provided feedback and/or modification as needed. Ms. Geer also developed checklists and forms to assist in forecasting, project development and new business engineering review, and trained engineering personnel on distribution planning procedures.

Attachment: E
Vegetation Management

Vegetation Management

The Federal Energy Regulatory Commission (FERC) has certified the National Energy Regulatory Corporation (NERC) as the electric reliability organization who establishes legally enforceable mandatory standards for the U.S. bulk power system. PSE is required by NERC standards to maintain safe clearances between vegetation and utility lines. Specifically, NERC FAC-003-4 (*Transmission Vegetation Management*) sets forth the vegetation management requirements for transmission lines operated above 200 kV. Under the standard, PSE must manage vegetation to prevent encroachments into the Minimum Vegetation Clearance Distance (MVCD) of its applicable line(s). Since the Energize Eastside Project entails replacing the existing 115 kV lines with 230 KV lines, the upgraded transmission lines must comply with the NERC standard and PSE's 230 kV vegetation management standard, which generally require the removal of trees with an expected mature height of more than 15 feet from the wire zone. Management of trees within the transmission right of way may also be required depending on tree species, tree health, distance from the wires, and topography.

The following maps and table illustrate the location, tree tag number, species, diameter, and general condition of the regulated trees in the area between the Richards Creek/Lakeside substations and the Newcastle City limits (South Bellevue Segment). Generally, vegetation impacts were calculated according to the following criteria:

- Remove all trees within the proposed wire zone (WZ) and managed right-of-way (MROW) with a maximum potential height[1] (MPH) that exceeds 15 feet or where 20 feet of vertical clearance is provided beneath the vertical curvature of the lowest wire.
- Remove all trees within the legal ROW and outside of the MROW, but within the Maintained legal right of way, with a maximum potential height exceeding 70 feet.
- Remove all dead and dying trees[2].

Based on the above parameters, it is estimated that there are approximately 550 trees that do not meet the NERC and PSE vegetation management standards. It is important to note that these trees are located within an existing and managed transmission line corridor and that more than 80 percent of those trees are in poor to fair condition. Additionally, the tree inventory field work was completed on October 13, 2016, and includes trees that may have been removed by others since that time.

PSE has been meeting with property owners along the existing corridor to discuss tree replacement and will continue to work together to develop property-specific landscaping and tree replacement plans. There are anticipated to be a number of trees that cannot be replaced onsite due to property owners' preferences. In those cases, replacement trees will need to be outside the corridor. One benefit of offsite planting is that larger trees may be planted and, potentially, clustered. Larger, clustered trees contribute to higher habitat quality and area aesthetics. Offsite options to pursue include city parks, neighborhood groups/HOAs, and developments within the Spring District. PSE will work with the City to identify other offsite areas that would benefit from these trees.

[1] Maximum potential height assigned by species. When feasible during field assessment, arborists identified cultivars and varietals through observation and nursery tag information, if found.
[2] Trees rated as dead or dying based on visual field assessment by arborist field crews.

PSE EE230 - OUTREACH MAP: TREE REMOVAL AND RETENTION

Existing Easement Boundary[PSE]
City Limit[KC]
Parcel Boundary[COB] - *white outline*

Wire Zone[PSE]
Wires [PSE]
Existing Poles to Remain[PSE]
Existing Poles to be Removed[PSE]
Proposed Pole Footprints[PSE]

Trees to Retain[TWC]
Trees to Remove[TWC]
Dead / Dying Trees[TWC]
Canopy to be Removed[TWC]
Canopy to Remain[TWC]

DSD 000742

1

0 10 20
Feet

Data sources: Puget Sound Energy (PSE), The Watershed Company (TWC), City of Bellevue (COB), and King County (KC). Aerial imagery from PSE, 2011.

PSE EE230 - OUTREACH MAP: TREE REMOVAL AND RETENTION

Existing Easement Boundary[PSE]
City Limit[KC]
Parcel Boundary[COB] - *white outline*

Wire Zone[PSE]
Wires [PSE]
Existing Poles to Remain[PSE]
Existing Poles to be Removed[PSE]
Proposed Pole Footprints[PSE]

Trees to Retain[TWC]
Trees to Remove[TWC]
Dead / Dying Trees[TWC]
Canopy to be Removed[TWC]
Canopy to Remain[TWC]

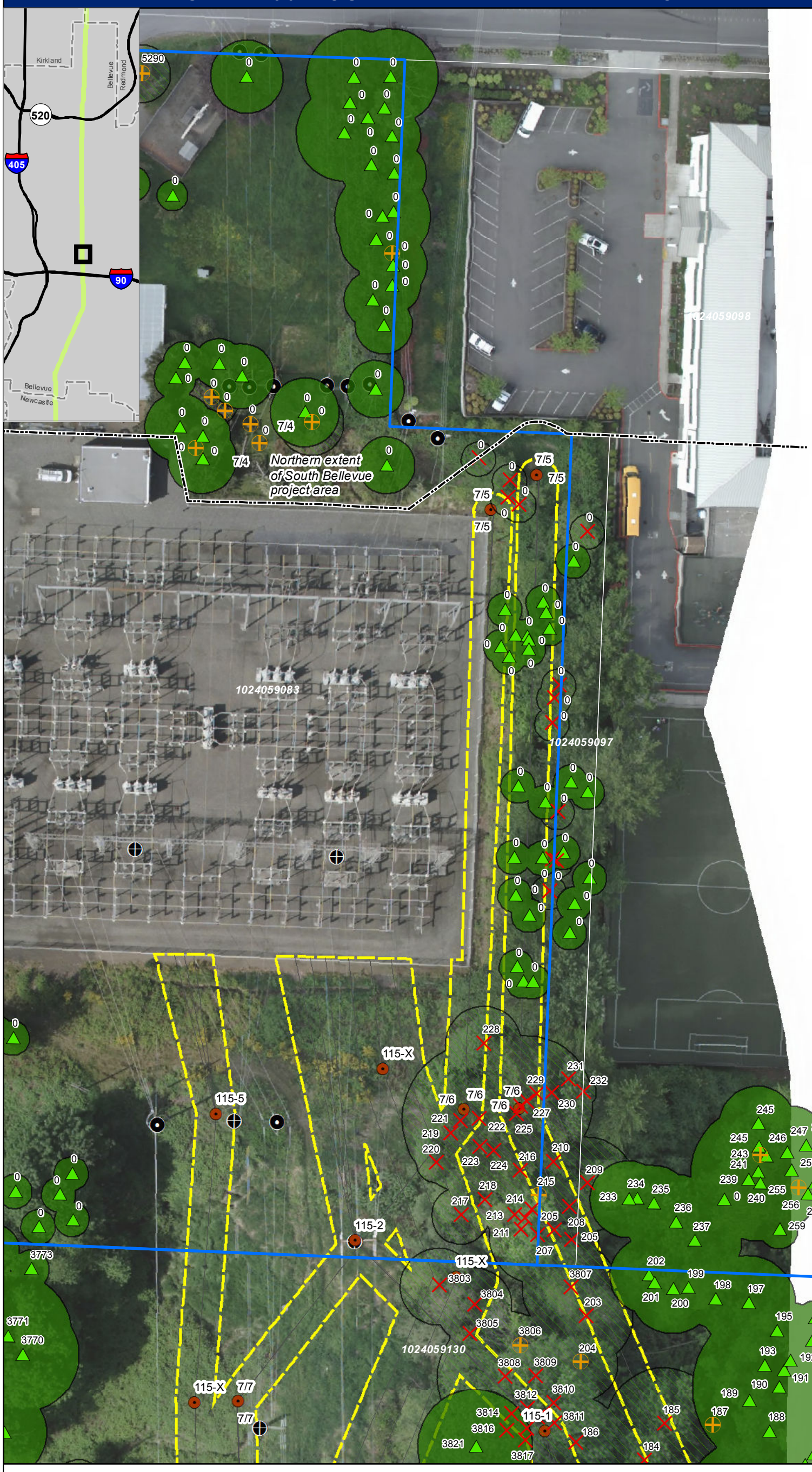
DSD 000743

2

0 20 40
Feet

Data sources: Puget Sound Energy (PSE), The Watershed Company (TWC), City of Bellevue (COB), and King County (KC). Aerial imagery from PSE, 2011.

PSE EE230 - OUTREACH MAP: TREE REMOVAL AND RETENTION



Existing Easement Boundary[PSE]
City Limit[KC]
Parcel Boundary[COB] - *white outline*

Wire Zone[PSE]
Wires [PSE]
Existing Poles to Remain[PSE]
Existing Poles to be Removed[PSE]
Proposed Pole Footprints[PSE]

Trees to Retain[TWC]
Trees to Remove[TWC]
Dead / Dying Trees[TWC]
Canopy to be Removed[TWC]
Canopy to Remain[TWC]

DSD 000744

3

0 20 40
Feet

Data sources: Puget Sound Energy (PSE), The Watershed Company (TWC), City of Bellevue (COB), and King County (KC). Aerial imagery from PSE, 2011.

PSE EE230 - OUTREACH MAP: TREE REMOVAL AND RETENTION

Existing Easement Boundary[PSE]
City Limit[KC]
Parcel Boundary[COB] - *white outline*

Wire Zone[PSE]
Wires [PSE]
Existing Poles to Remain[PSE]
Existing Poles to be Removed[PSE]
Proposed Pole Footprints[PSE]

Trees to Retain[TWC]
Trees to Remove[TWC]
Dead / Dying Trees[TWC]
Canopy to be Removed[TWC]
Canopy to Remain[TWC]

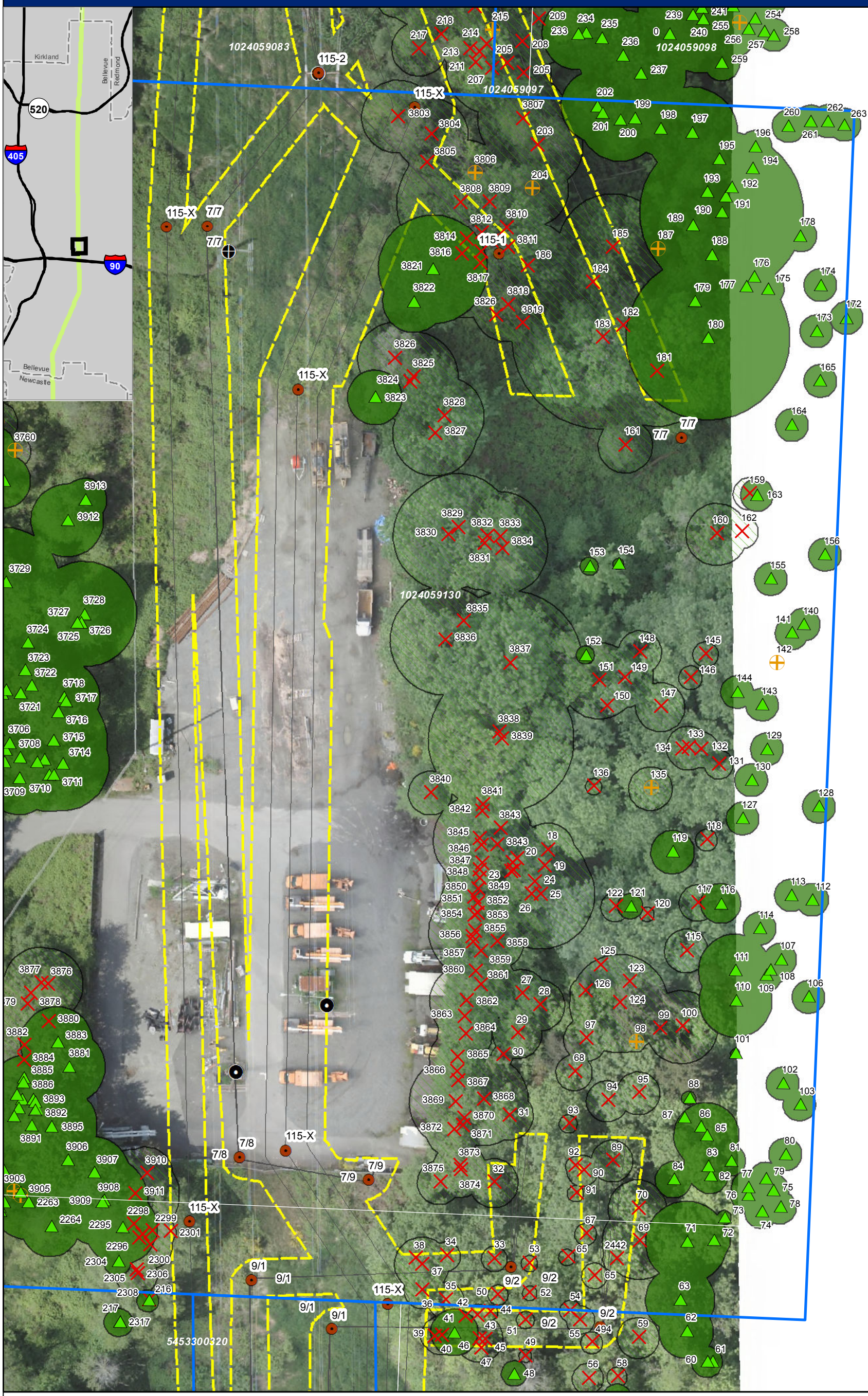
DSD 000745

4

0 20 40
Feet

Data sources: Puget Sound Energy (PSE), The Watershed Company (TWC), City of Bellevue (COB), and King County (KC). Aerial imagery from PSE, 2011.

PSE EE230 - OUTREACH MAP: TREE REMOVAL AND RETENTION



Existing Easement Boundary[PSE]
City Limit[KC]
Parcel Boundary[COB] - *white outline*

Wire Zone[PSE]
Wires [PSE]
Existing Poles to Remain[PSE]
Existing Poles to be Removed[PSE]
Proposed Pole Footprints[PSE]

Trees to Retain[TWC]
Trees to Remove[TWC]
Dead / Dying Trees[TWC]
Canopy to be Removed[TWC]
Canopy to Remain[TWC]

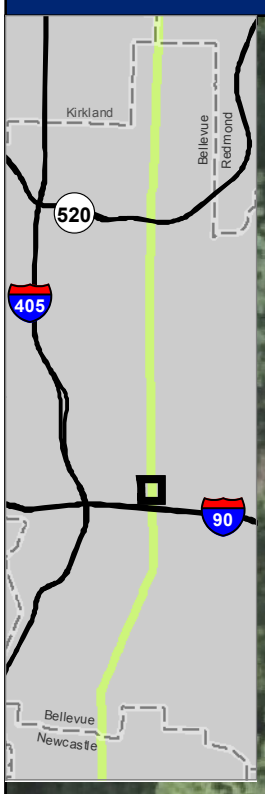
DSD 000746

5

0 20 40
Feet

Data sources: Puget Sound Energy (PSE), The Watershed Company (TWC), City of Bellevue (COB), and King County (KC). Aerial imagery from PSE, 2011.

PSE EE230 - OUTREACH MAP: TREE REMOVAL AND RETENTION



48

5455300320

8135300110

0
0
0

Existing Easement Boundary[PSE]
City Limit[KC]
Parcel Boundary[COB] - *white outline*

Wire Zone[PSE]
Wires [PSE]
Existing Poles to Remain[PSE]
Existing Poles to be Removed[PSE]
Proposed Pole Footprints[PSE]

Trees to Retain[TWC]
Trees to Remove[TWC]
Dead / Dying Trees[TWC]
Canopy to be Removed[TWC]
Canopy to Remain[TWC]

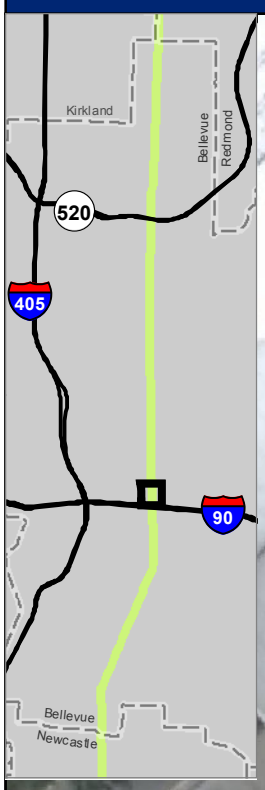
DSD 000747

6

0 10 20
Feet

Data sources: Puget Sound Energy (PSE), The Watershed Company (TWC), City of Bellevue (COB), and King County (KC). Aerial imagery from PSE, 2011.

PSE EE230 - OUTREACH MAP: TREE REMOVAL AND RETENTION



8135300110

0

5453300320

8/10
8/10
8/10
8/10

8135300020

Existing Easement Boundary[PSE]
City Limit[KC]
Parcel Boundary[COB] - *white outline*

Wire Zone[PSE]
Wires [PSE]
Existing Poles to Remain[PSE]
Existing Poles to be Removed[PSE]
Proposed Pole Footprints[PSE]

Trees to Retain[TWC]
Trees to Remove[TWC]
Dead / Dying Trees[TWC]
Canopy to be Removed[TWC]
Canopy to Remain[TWC]

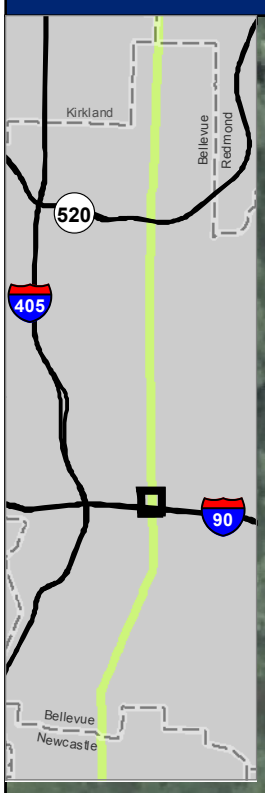
DSD 000748

7

0 10 20
Feet

Data sources: Puget Sound Energy (PSE), The Watershed Company (TWC), City of Bellevue (COB), and King County (KC). Aerial imagery from PSE, 2011.

PSE EE230 - OUTREACH MAP: TREE REMOVAL AND RETENTION



5453300320

8135300020

1024059101

2590
8/9
8/9
8/9
8/9
2591
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2596

Existing Easement Boundary[PSE]
City Limit[KC]
Parcel Boundary[COB] - *white outline*

Wire Zone[PSE]
Wires [PSE]
Existing Poles to Remain[PSE]
Existing Poles to be Removed[PSE]
Proposed Pole Footprints[PSE]

Trees to Retain[TWC]
Trees to Remove[TWC]
Dead / Dying Trees[TWC]
Canopy to be Removed[TWC]
Canopy to Remain[TWC]

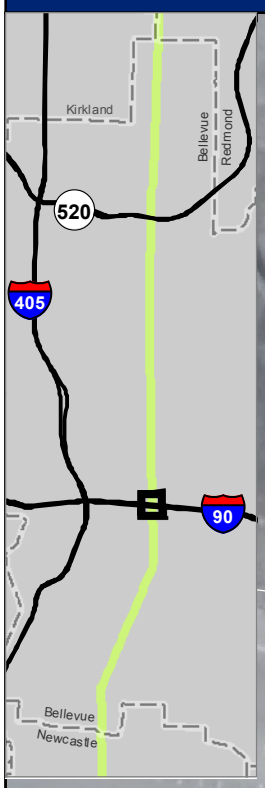
DSD 000749

8

0 10 20
Feet

Data sources: Puget Sound Energy (PSE), The Watershed Company (TWC), City of Bellevue (COB), and King County (KC). Aerial imagery from PSE, 2011.

PSE EE230 - OUTREACH MAP: TREE REMOVAL AND RETENTION



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2602

1024059101

8135300020

Mountains to Sound Greenway

SE EASTGATE WAY

I-90

I-90

I-90

I-90

Existing Easement Boundary[PSE]
City Limit[KC]
Parcel Boundary[COB] - *white outline*

Wire Zone[PSE]
Wires [PSE]
Existing Poles to Remain[PSE]
Existing Poles to be Removed[PSE]
Proposed Pole Footprints[PSE]

Trees to Retain[TWC]
Trees to Remove[TWC]
Dead / Dying Trees[TWC]
Canopy to be Removed[TWC]
Canopy to Remain[TWC]

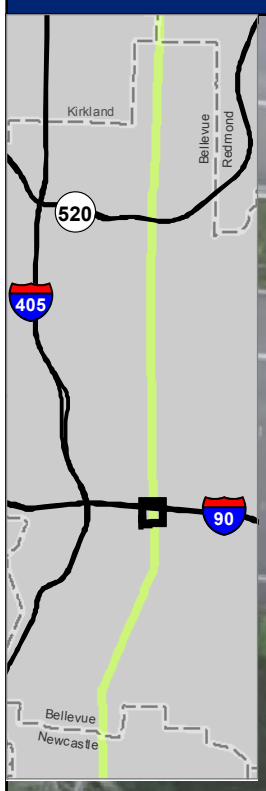
DSD 000750

9

0 10 20
Feet

Data sources: Puget Sound Energy (PSE), The Watershed Company (TWC), City of Bellevue (COB), and King County (KC). Aerial imagery from PSE, 2011.

PSE EE230 - OUTREACH MAP: TREE REMOVAL AND RETENTION



Mountains to Sound Greenway

SE 36TH ST

2490
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8/8
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8/8
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2528
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3927250020
1024059123
2526
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2500
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2502
2536

Existing Easement Boundary[PSE]
City Limit[KC]
Parcel Boundary[COB] - *white outline*
Wire Zone[PSE]
Wires [PSE]
Existing Poles to Remain[PSE]
Existing Poles to be Removed[PSE]
Proposed Pole Footprints[PSE]
Trees to Retain[TWC]
Trees to Remove[TWC]
Dead / Dying Trees[TWC]
Canopy to be Removed[TWC]
Canopy to Remain[TWC]

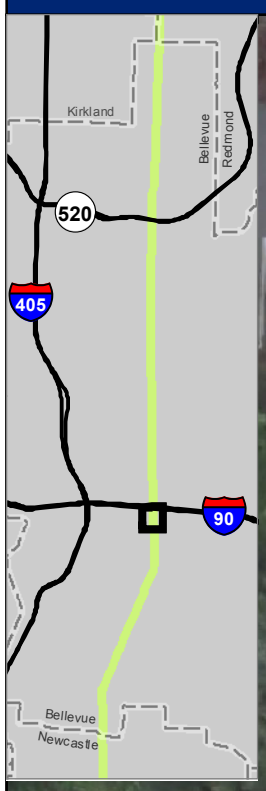
DSD 000751

10

0 10 20
Feet

Data sources: Puget Sound Energy (PSE), The Watershed Company (TWC), City of Bellevue (COB), and King County (KC). Aerial imagery from PSE, 2011.

PSE EE230 - OUTREACH MAP: TREE REMOVAL AND RETENTION



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3927250020
1024059123
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2544
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2541
2542
2539
2538
2206500015
2206500020
2206500025
2540
2206500030
SE 37TH ST
2549
2547
8/7
8/7
2548
2552
2206500220
2206500285
2206500280
2551
2550
2206500225
2553

Existing Easement Boundary[PSE]
City Limit[KC]
Parcel Boundary[COB] - *white outline*
Wire Zone[PSE]
Wires [PSE]
Existing Poles to Remain[PSE]
Existing Poles to be Removed[PSE]
Proposed Pole Footprints[PSE]
Trees to Retain[TWC]
Trees to Remove[TWC]
Dead / Dying Trees[TWC]
Canopy to be Removed[TWC]
Canopy to Remain[TWC]

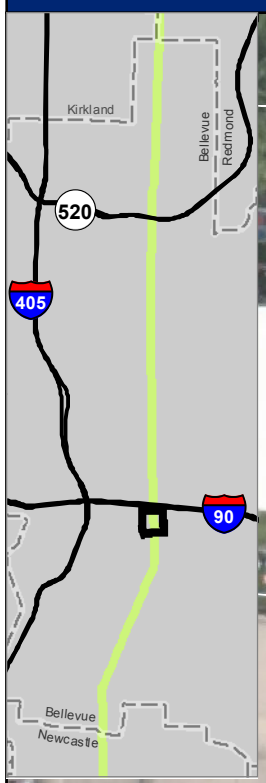
DSD 000752

11

0 10 20
Feet

Data sources: Puget Sound Energy (PSE), The Watershed Company (TWC), City of Bellevue (COB), and King County (KC). Aerial imagery from PSE, 2011.

PSE EE230 - OUTREACH MAP: TREE REMOVAL AND RETENTION



2206500220
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2206500225
2206500280
2206500285
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2558
2206500265
2206500230
0
2589
0
2206500260
2206500235
2587
2561
2562
2588
2206500255
2206500240
0
2567
2565
2566
2563
2564
136TH PL SE
2206500256
2206500190
2206500245
0
0
2206500250
0
2206500185

Existing Easement Boundary[PSE]
City Limit[KC]
Parcel Boundary[COB] - *white outline*

Wire Zone[PSE]
Wires [PSE]
Existing Poles to Remain[PSE]
Existing Poles to be Removed[PSE]
Proposed Pole Footprints[PSE]

Trees to Retain[TWC]
Trees to Remove[TWC]
Dead / Dying Trees[TWC]
Canopy to be Removed[TWC]
Canopy to Remain[TWC]

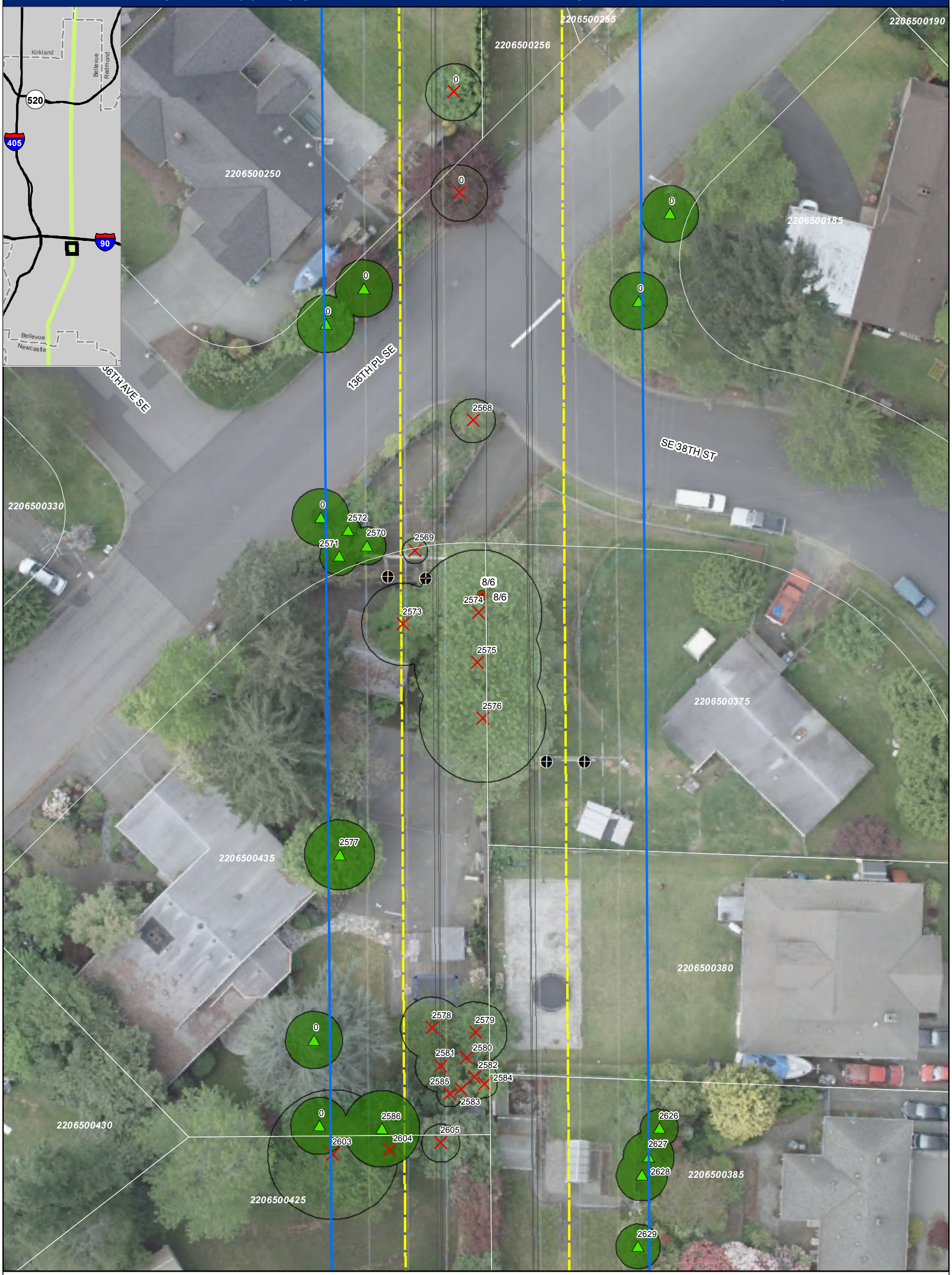
DSD 000753

12

0 10 20
Feet

Data sources: Puget Sound Energy (PSE), The Watershed Company (TWC), City of Bellevue (COB), and King County (KC). Aerial imagery from PSE, 2011.

PSE EE230 - OUTREACH MAP: TREE REMOVAL AND RETENTION



Existing Easement Boundary[PSE]
City Limit[KC]
Parcel Boundary[COB] - *white outline*

Wire Zone[PSE]
Wires [PSE]
Existing Poles to Remain[PSE]
Existing Poles to be Removed[PSE]
Proposed Pole Footprints[PSE]

Trees to Retain[TWC]
Trees to Remove[TWC]
Dead / Dying Trees[TWC]
Canopy to be Removed[TWC]
Canopy to Remain[TWC]

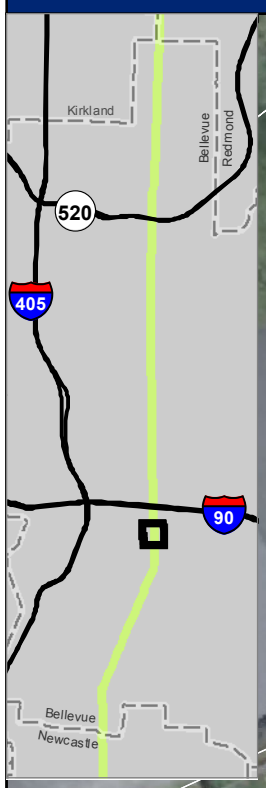
DSD 000754

13

0 10 20
Feet

Data sources: Puget Sound Energy (PSE), The Watershed Company (TWC), City of Bellevue (COB), and King County (KC). Aerial imagery from PSE, 2011.

PSE EE230 - OUTREACH MAP: TREE REMOVAL AND RETENTION



2603 2604 2627 2628 2629 2630 2621 2622 2607 2606 2610 2608 2609 2611 2623 2620 2625 2624 2619 2612 2613 2537 2538 2617 2539 2536 2535 2531 2614 2615 2616 2534 2533 2532 2618 2643 2644 2642 2645 2646 2641 2647 2640 2651 2649 2648 2650 8/5 8/5

2206500425 2206500385 2206500390 2206500420 2206500395 2206500415 2206500400 2206500410 2206500405

SE 40TH ST

Existing Easement Boundary[PSE]
City Limit[KC]
Parcel Boundary[COB] - *white outline*

Wire Zone[PSE]
Wires [PSE]
Existing Poles to Remain[PSE]
Existing Poles to be Removed[PSE]
Proposed Pole Footprints[PSE]

Trees to Retain[TWC]
Trees to Remove[TWC]
Dead / Dying Trees[TWC]
Canopy to be Removed[TWC]
Canopy to Remain[TWC]

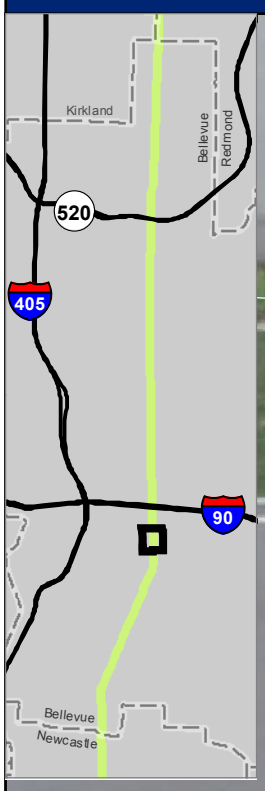
DSD 000755

14

0 10 20
Feet

Data sources: Puget Sound Energy (PSE), The Watershed Company (TWC), City of Bellevue (COB), and King County (KC). Aerial imagery from PSE, 2011.

PSE EE230 - OUTREACH MAP: TREE REMOVAL AND RETENTION



SE 40TH ST

2652 2653 2656 2654 2655 2657 2658 2659 2660 2661 2662 2663

1524059005

Existing Easement Boundary[PSE]
City Limit[KC]
Parcel Boundary[COB] - *white outline*

Wire Zone[PSE]
Wires [PSE]
Existing Poles to Remain[PSE]
Existing Poles to be Removed[PSE]
Proposed Pole Footprints[PSE]

Trees to Retain[TWC]
Trees to Remove[TWC]
Dead / Dying Trees[TWC]
Canopy to be Removed[TWC]
Canopy to Remain[TWC]

DSD 000756

15

0 10 20
Feet

Data sources: Puget Sound Energy (PSE), The Watershed Company (TWC), City of Bellevue (COB), and King County (KC). Aerial imagery from PSE, 2011.

PSE EE230 - OUTREACH MAP: TREE REMOVAL AND RETENTION

2663
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8/4
1524059005
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2674

Existing Easement Boundary[PSE]
City Limit[KC]
Parcel Boundary[COB] - *white outline*

Wire Zone[PSE]
Wires [PSE]
Existing Poles to Remain[PSE]
Existing Poles to be Removed[PSE]
Proposed Pole Footprints[PSE]

Trees to Retain[TWC]
Trees to Remove[TWC]
Dead / Dying Trees[TWC]
Canopy to be Removed[TWC]
Canopy to Remain[TWC]

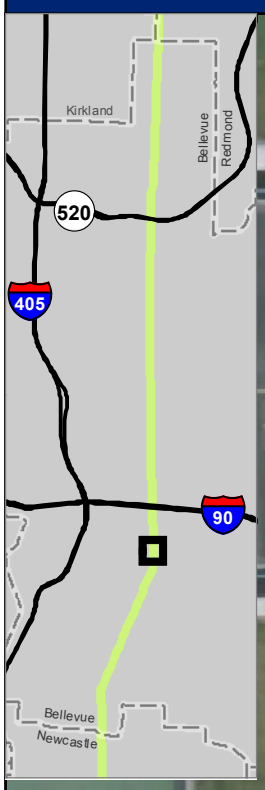
DSD 000757

16

0 10 20
Feet

Data sources: Puget Sound Energy (PSE), The Watershed Company (TWC), City of Bellevue (COB), and King County (KC). Aerial imagery from PSE, 2011.

PSE EE230 - OUTREACH MAP: TREE REMOVAL AND RETENTION



1524059005
1524059080
1524059032
SE ALLEN RD

2712 2713 0 2675 2679 2676 2678 2677 2681 2680 2682 2684 2685 2683 8/3 8/3 8/3 2686 2687 2707 2709 2710 2711 2708 2705 2706 2702 2703 2719 2701 2718 2717 2716 0 2699 2698 2700 2697 2696 2695 2715 2714

Existing Easement Boundary[PSE]
City Limit[KC]
Parcel Boundary[COB] - *white outline*
Wire Zone[PSE]
Wires [PSE]
Existing Poles to Remain[PSE]
Existing Poles to be Removed[PSE]
Proposed Pole Footprints[PSE]
Trees to Retain[TWC]
Trees to Remove[TWC]
Dead / Dying Trees[TWC]
Canopy to be Removed[TWC]
Canopy to Remain[TWC]

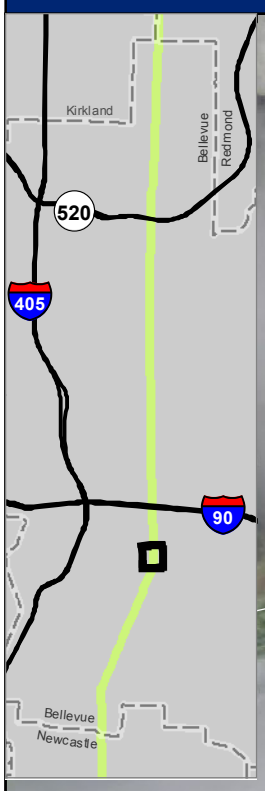
DSD 000758

17

0 10 20
Feet

Data sources: Puget Sound Energy (PSE), The Watershed Company (TWC), City of Bellevue (COB), and King County (KC). Aerial imagery from PSE, 2011.

PSE EE230 - OUTREACH MAP: TREE REMOVAL AND RETENTION



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1524059032
7856640290
1524059137
1524059145
1524059141
7856640295
7856420080
7856640010
7855000640
7856420050
7856420040
7856640020
SE NEWPORT WAY
SE 42ND ST

2697 2696 2695 2715 2714 8506 2694 8505 8504 2693 8503 8502 2692 2691 2689 2688 2690 2726 2725 2724 2723 2722 2721 2720 0 0 2728 8000 2727
2743 2742
2745 2744
2817 2816 2819 2820 2818 2821 2822 2823 2832 2831 2824 2825 2830 2829 2827 2826 2834 2833
2754 0 2746 2747 2748 2749 2750 2751 2752 2753 2755 2767 2756 2758 0 0 2757 2760 2762

Existing Easement Boundary[PSE]
City Limit[KC]
Parcel Boundary[COB] - *white outline*
Wire Zone[PSE]
Wires [PSE]
Existing Poles to Remain[PSE]
Existing Poles to be Removed[PSE]
Proposed Pole Footprints[PSE]
Trees to Retain[TWC]
Trees to Remove[TWC]
Dead / Dying Trees[TWC]
Canopy to be Removed[TWC]
Canopy to Remain[TWC]

DSD 000759

18

0 10 20
Feet

Data sources: Puget Sound Energy (PSE), The Watershed Company (TWC), City of Bellevue (COB), and King County (KC). Aerial imagery from PSE, 2011.

PSE EE230 - OUTREACH MAP: TREE REMOVAL AND RETENTION

Existing Easement Boundary[PSE]
City Limit[KC]
Parcel Boundary[COB] - *white outline*

Wire Zone[PSE]
Wires [PSE]
Existing Poles to Remain[PSE]
Existing Poles to be Removed[PSE]
Proposed Pole Footprints[PSE]

Trees to Retain[TWC]
Trees to Remove[TWC]
Dead / Dying Trees[TWC]
Canopy to be Removed[TWC]
Canopy to Remain[TWC]

DSD 000760

19

0 10 20
Feet

Data sources: Puget Sound Energy (PSE), The Watershed Company (TWC), City of Bellevue (COB), and King County (KC). Aerial imagery from PSE, 2011.

PSE EE230 - OUTREACH MAP: TREE REMOVAL AND RETENTION

Existing Easement Boundary[PSE]
City Limit[KC]
Parcel Boundary[COB] - *white outline*

Wire Zone[PSE]
Wires [PSE]
Existing Poles to Remain[PSE]
Existing Poles to be Removed[PSE]
Proposed Pole Footprints[PSE]

Trees to Retain[TWC]
Trees to Remove[TWC]
Dead / Dying Trees[TWC]
Canopy to be Removed[TWC]
Canopy to Remain[TWC]

DSD 000761

20

0 10 20
Feet

Data sources: Puget Sound Energy (PSE), The Watershed Company (TWC), City of Bellevue (COB), and King County (KC). Aerial imagery from PSE, 2011.

PSE EE230 - OUTREACH MAP: TREE REMOVAL AND RETENTION

Existing Easement Boundary[PSE]
City Limit[KC]
Parcel Boundary[COB] - *white outline*

Wire Zone[PSE]
Wires [PSE]
Existing Poles to Remain[PSE]
Existing Poles to be Removed[PSE]
Proposed Pole Footprints[PSE]

Trees to Retain[TWC]
Trees to Remove[TWC]
Dead / Dying Trees[TWC]
Canopy to be Removed[TWC]
Canopy to Remain[TWC]

DSD 000762

21

0 10 20
Feet

Data sources: Puget Sound Energy (PSE), The Watershed Company (TWC), City of Bellevue (COB), and King County (KC). Aerial imagery from PSE, 2011.

PSE EE230 - OUTREACH MAP: TREE REMOVAL AND RETENTION

2944
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1524059142
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7855000290
7856660230
7856660240
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7855000300
7856660250
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7855000310
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7855000320
SE 44TH ST
7855000340
7855000325
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7855000350
SOMERSET BLVD SE
7855000360

Existing Easement Boundary[PSE]
City Limit[KC]
Parcel Boundary[COB] - *white outline*

Wire Zone[PSE]
Wires [PSE]
Existing Poles to Remain[PSE]
Existing Poles to be Removed[PSE]
Proposed Pole Footprints[PSE]

Trees to Retain[TWC]
Trees to Remove[TWC]
Dead / Dying Trees[TWC]
Canopy to be Removed[TWC]
Canopy to Remain[TWC]

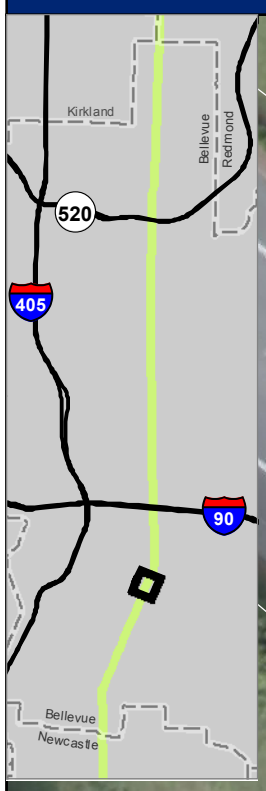
DSD 000763

22

0 10 20
Feet

Data sources: Puget Sound Energy (PSE), The Watershed Company (TWC), City of Bellevue (COB), and King County (KC). Aerial imagery from PSE, 2011.

PSE EE230 - OUTREACH MAP: TREE REMOVAL AND RETENTION



7855000325
7855000350
7855600760
7855000360
7855600770
7855000370
7855000380
7855801770

SE 44TH ST
SOMERSET BLVD SE
SOMERSET DR SE

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Existing Easement Boundary[PSE]
City Limit[KC]
Parcel Boundary[COB] - *white outline*
Wire Zone[PSE]
Wires [PSE]
Existing Poles to Remain[PSE]
Existing Poles to be Removed[PSE]
Proposed Pole Footprints[PSE]
Trees to Retain[TWC]
Trees to Remove[TWC]
Dead / Dying Trees[TWC]
Canopy to be Removed[TWC]
Canopy to Remain[TWC]

DSD 000764

23

0 10 20
Feet

Data sources: Puget Sound Energy (PSE), The Watershed Company (TWC), City of Bellevue (COB), and King County (KC). Aerial imagery from PSE, 2011.

PSE EE230 - OUTREACH MAP: TREE REMOVAL AND RETENTION

7855801770
7855800010
7855800020
7855800030
7856410010
7856410440
SOMERSET PLSE
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0

Existing Easement Boundary[PSE]
City Limit[KC]
Parcel Boundary[COB] - *white outline*
Wire Zone[PSE]
Wires [PSE]
Existing Poles to Remain[PSE]
Existing Poles to be Removed[PSE]
Proposed Pole Footprints[PSE]
Trees to Retain[TWC]
Trees to Remove[TWC]
Dead / Dying Trees[TWC]
Canopy to be Removed[TWC]
Canopy to Remain[TWC]

DSD 000765

24

0 10 20
Feet

Data sources: Puget Sound Energy (PSE), The Watershed Company (TWC), City of Bellevue (COB), and King County (KC). Aerial imagery from PSE, 2011.

PSE EE230 - OUTREACH MAP: TREE REMOVAL AND RETENTION

7855800020 7855801770 7856410440 7855800030 7855800040 7855800050 7856410010 7856410020 7855800060 7855800070 7856410030 SOMERSET PL SE

Existing Easement Boundary[PSE]
City Limit[KC]
Parcel Boundary[COB] - *white outline*
Wire Zone[PSE]
Wires [PSE]
Existing Poles to Remain[PSE]
Existing Poles to be Removed[PSE]
Proposed Pole Footprints[PSE]
Trees to Retain[TWC]
Trees to Remove[TWC]
Dead / Dying Trees[TWC]
Canopy to be Removed[TWC]
Canopy to Remain[TWC]

DSD 000766

25

0 10 20
Feet

Data sources: Puget Sound Energy (PSE), The Watershed Company (TWC), City of Bellevue (COB), and King County (KC). Aerial imagery from PSE, 2011.

PSE EE230 - OUTREACH MAP: TREE REMOVAL AND RETENTION

7855800070
7855800080
7855800090
7855800100
7855800110
7855800120
7855800060
7856410030
7856410040
7856410050
7856410060
7856410070

7/6
7/6
7/6
3070
3078
3137
3036
3137
3143
3138
3142
3144
3145
3141
3146
3147
3148
3151
3149
3150
3152
3211
3208
3209
3207
3206
3210
3205
3204
3203
3199
3201
3200
3198
3202
3153
3157
3158
3154
0
3155

Existing Easement Boundary[PSE]
City Limit[KC]
Parcel Boundary[COB] - *white outline*
Wire Zone[PSE]
Wires [PSE]
Existing Poles to Remain[PSE]
Existing Poles to be Removed[PSE]
Proposed Pole Footprints[PSE]
Trees to Retain[TWC]
Trees to Remove[TWC]
Dead / Dying Trees[TWC]
Canopy to be Removed[TWC]
Canopy to Remain[TWC]

DSD 000767

26

0 10 20
Feet

Data sources: Puget Sound Energy (PSE), The Watershed Company (TWC), City of Bellevue (COB), and King County (KC). Aerial imagery from PSE, 2011.

PSE EE230 - OUTREACH MAP: TREE REMOVAL AND RETENTION

7855800110
7856410070
7855800120
7856410080
7855800130
7856410090
7855800140
7856410100
7856410110
7856410120
7855801650
7855801660
SOMERSET DR SE

0 3155 3156 3159 3160 0 3219 3161 0 3162 3163 7/5 7/5 3169 3228 3229 3231 3170 3230 3234 3235 3236 3237 3337 7/5 3339 3338 3336 3334 3335 3340 3173 3174 3175 3346 3176 3341 3344 3342 3345 3343 3259 3177 3178 3260 3261 3262 0 3220 3233 3232

Existing Easement Boundary[PSE]
City Limit[KC]
Parcel Boundary[COB] - *white outline*
Wire Zone[PSE]
Wires [PSE]
Existing Poles to Remain[PSE]
Existing Poles to be Removed[PSE]
Proposed Pole Footprints[PSE]
Trees to Retain[TWC]
Trees to Remove[TWC]
Dead / Dying Trees[TWC]
Canopy to be Removed[TWC]
Canopy to Remain[TWC]

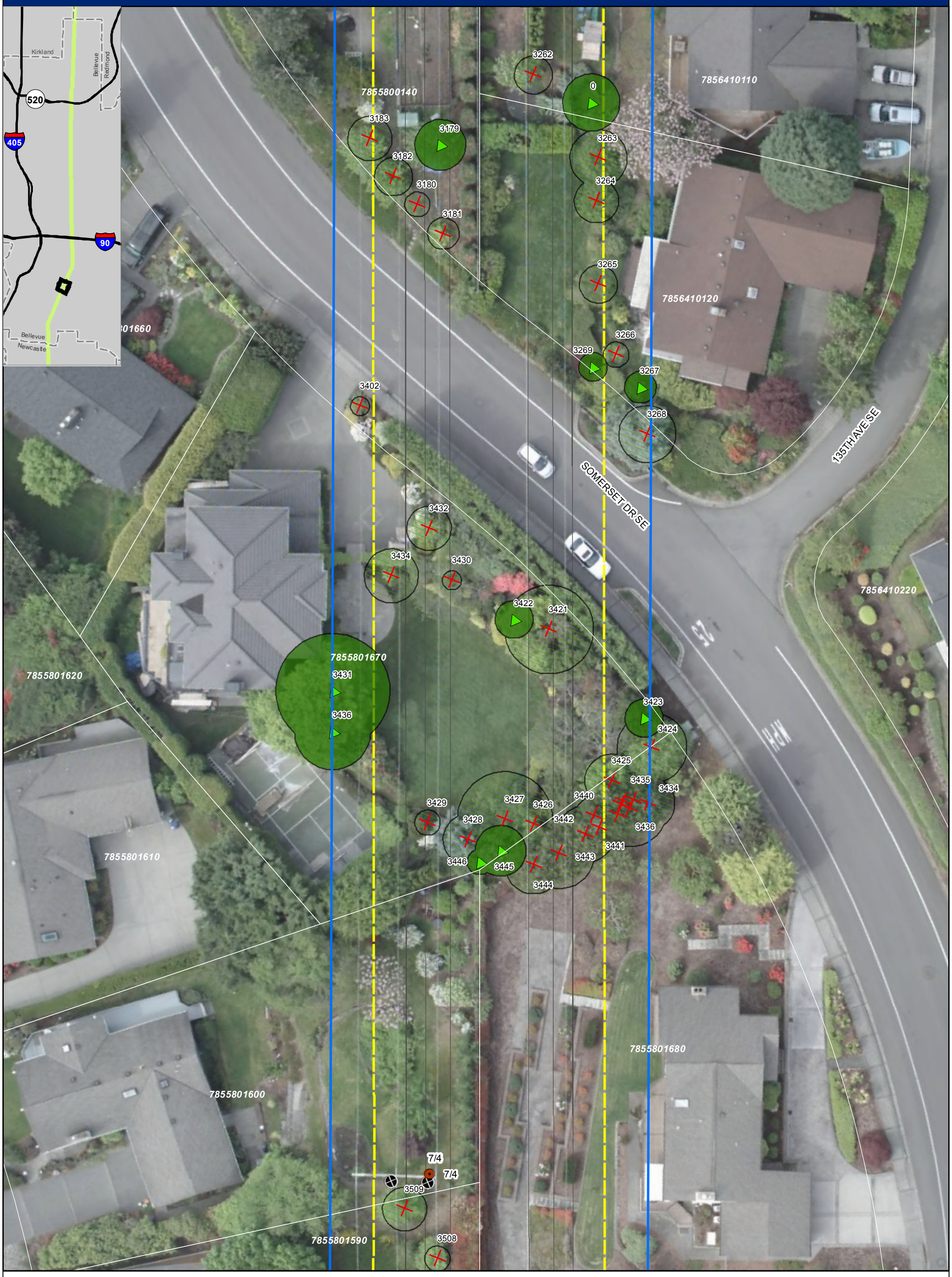
DSD 000768

27

0 10 20
Feet

Data sources: Puget Sound Energy (PSE), The Watershed Company (TWC), City of Bellevue (COB), and King County (KC). Aerial imagery from PSE, 2011.

PSE EE230 - OUTREACH MAP: TREE REMOVAL AND RETENTION



Existing Easement Boundary[PSE]
City Limit[KC]
Parcel Boundary[COB] - *white outline*

Wire Zone[PSE]
Wires [PSE]
Existing Poles to Remain[PSE]
Existing Poles to be Removed[PSE]
Proposed Pole Footprints[PSE]

Trees to Retain[TWC]
Trees to Remove[TWC]
Dead / Dying Trees[TWC]
Canopy to be Removed[TWC]
Canopy to Remain[TWC]

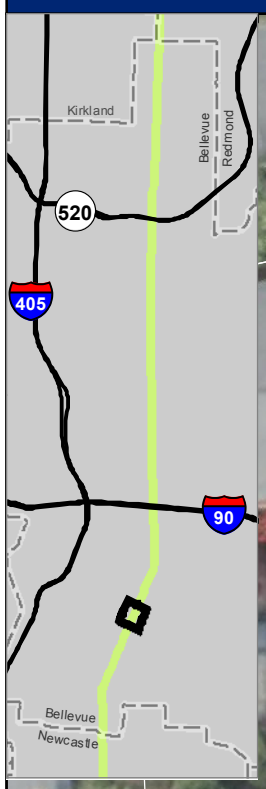
DSD 000769

28

0 10 20
Feet

Data sources: Puget Sound Energy (PSE), The Watershed Company (TWC), City of Bellevue (COB), and King County (KC). Aerial imagery from PSE, 2011.

PSE EE230 - OUTREACH MAP: TREE REMOVAL AND RETENTION



7855801600 7855801590 7855801580 7855801570 7855801560 7855801550 7855801680 7855801690 7855801700 7855801710 7855801720 7855801730

7/4 7/4 3509 3508 3507 3504 3505 3506 3503 3515 3510 3512 3516 3525 3524 3523 3522 3521 3518 3517 3520 3526 3527 3543 3544 3528 3542 3529 3541 3540 3539 3536 3530 3534 3532 3535 3531 3538 3537 3555 3533 3556 3546 3475 3471 3470 3553 3547 3472 3554 3473 3548 3474 3549 3476 3550 3545 3477 3551 3552 3478 3487 3479 3564 3563 3562 3480 3484 3481 3486 3565 3566 3561 3570 3569 3483 3488 0 3449 3450 3451

Existing Easement Boundary[PSE]
City Limit[KC]
Parcel Boundary[COB] - *white outline*
Wire Zone[PSE]
Wires [PSE]
Existing Poles to Remain[PSE]
Existing Poles to be Removed[PSE]
Proposed Pole Footprints[PSE]
Trees to Retain[TWC]
Trees to Remove[TWC]
Dead / Dying Trees[TWC]
Canopy to be Removed[TWC]
Canopy to Remain[TWC]

DSD 000770

29

0 10 20
Feet

Data sources: Puget Sound Energy (PSE), The Watershed Company (TWC), City of Bellevue (COB), and King County (KC). Aerial imagery from PSE, 2011.

PSE EE230 - OUTREACH MAP: TREE REMOVAL AND RETENTION

Existing Easement Boundary[PSE]
City Limit[KC]
Parcel Boundary[COB] - *white outline*

Wire Zone[PSE]
Wires [PSE]
Existing Poles to Remain[PSE]
Existing Poles to be Removed[PSE]
Proposed Pole Footprints[PSE]

Trees to Retain[TWC]
Trees to Remove[TWC]
Dead / Dying Trees[TWC]
Canopy to be Removed[TWC]
Canopy to Remain[TWC]

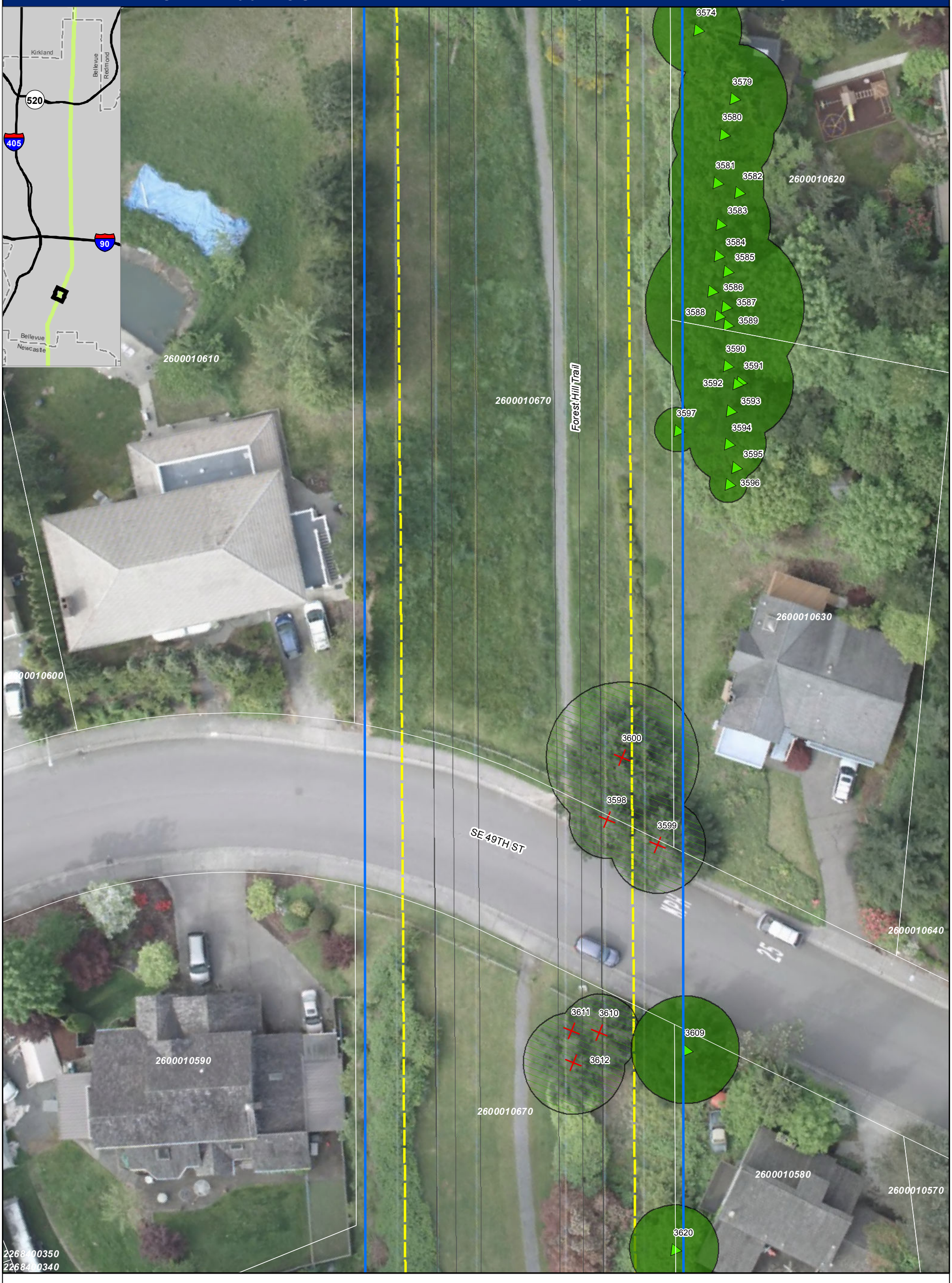
DSD 000771

30

0 10 20
Feet

Data sources: Puget Sound Energy (PSE), The Watershed Company (TWC), City of Bellevue (COB), and King County (KC). Aerial imagery from PSE, 2011.

PSE EE230 - OUTREACH MAP: TREE REMOVAL AND RETENTION



Existing Easement Boundary[PSE]
City Limit[KC]
Parcel Boundary[COB] - *white outline*

Wire Zone[PSE]
Wires [PSE]
Existing Poles to Remain[PSE]
Existing Poles to be Removed[PSE]
Proposed Pole Footprints[PSE]

Trees to Retain[TWC]
Trees to Remove[TWC]
Dead / Dying Trees[TWC]
Canopy to be Removed[TWC]
Canopy to Remain[TWC]

DSD 000772

31

0 10 20
Feet

Data sources: Puget Sound Energy (PSE), The Watershed Company (TWC), City of Bellevue (COB), and King County (KC). Aerial imagery from PSE, 2011.

PSE EE230 - OUTREACH MAP: TREE REMOVAL AND RETENTION

2600010590
2600010570
2600010580
2600010670
2268400330
2268400320
2268400310
2268400300
2268400290

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Foresthill Neighborhood Trail
Forest Hill Trail

Existing Easement Boundary[PSE]
City Limit[KC]
Parcel Boundary[COB] - *white outline*

Wire Zone[PSE]
Wires [PSE]
Existing Poles to Remain[PSE]
Existing Poles to be Removed[PSE]
Proposed Pole Footprints[PSE]

Trees to Retain[TWC]
Trees to Remove[TWC]
Dead / Dying Trees[TWC]
Canopy to be Removed[TWC]
Canopy to Remain[TWC]

DSD 000773

32

0 10 20
Feet

Data sources: Puget Sound Energy (PSE), The Watershed Company (TWC), City of Bellevue (COB), and King County (KC). Aerial imagery from PSE, 2011.

PSE EE230 - OUTREACH MAP: TREE REMOVAL AND RETENTION

Existing Easement Boundary[PSE]
City Limit[KC]
Parcel Boundary[COB] - *white outline*

Wire Zone[PSE]
Wires [PSE]
Existing Poles to Remain[PSE]
Existing Poles to be Removed[PSE]
Proposed Pole Footprints[PSE]

Trees to Retain[TWC]
Trees to Remove[TWC]
Dead / Dying Trees[TWC]
Canopy to be Removed[TWC]
Canopy to Remain[TWC]

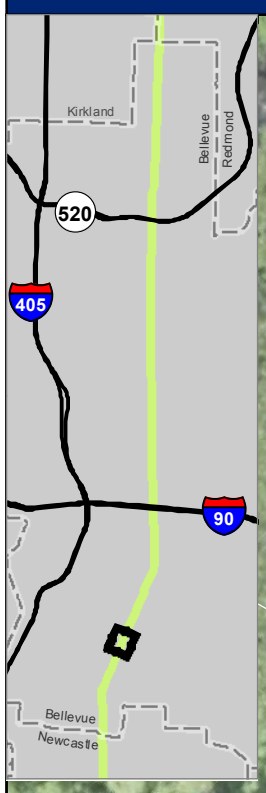
DSD 000774

33

0 10 20
Feet

Data sources: Puget Sound Energy (PSE), The Watershed Company (TWC), City of Bellevue (COB), and King County (KC). Aerial imagery from PSE, 2011.

PSE EE230 - OUTREACH MAP: TREE REMOVAL AND RETENTION



2600010430

2268400270

2268400280

2600010420

Foresthill Neighborhood Trail

FOREST DR SE

2124059052

2124059071

2124059001

Existing Easement Boundary[PSE]
City Limit[KC]
Parcel Boundary[COB] - *white outline*

Wire Zone[PSE]
Wires [PSE]
Existing Poles to Remain[PSE]
Existing Poles to be Removed[PSE]
Proposed Pole Footprints[PSE]

Trees to Retain[TWC]
Trees to Remove[TWC]
Dead / Dying Trees[TWC]
Canopy to be Removed[TWC]
Canopy to Remain[TWC]

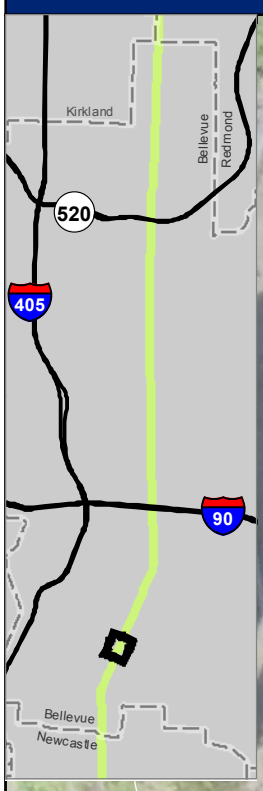
DSD 000775

34

0 10 20
Feet

Data sources: Puget Sound Energy (PSE), The Watershed Company (TWC), City of Bellevue (COB), and King County (KC). Aerial imagery from PSE, 2011.

PSE EE230 - OUTREACH MAP: TREE REMOVAL AND RETENTION



2124059052

2124059071

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2124059001

Foresthill Neighborhood Trail

COAL CREEK PKWY SE

Existing Easement Boundary[PSE]
City Limit[KC]
Parcel Boundary[COB] - *white outline*

Wire Zone[PSE]
Wires [PSE]
Existing Poles to Remain[PSE]
Existing Poles to be Removed[PSE]
Proposed Pole Footprints[PSE]

Trees to Retain[TWC]
Trees to Remove[TWC]
Dead / Dying Trees[TWC]
Canopy to be Removed[TWC]
Canopy to Remain[TWC]

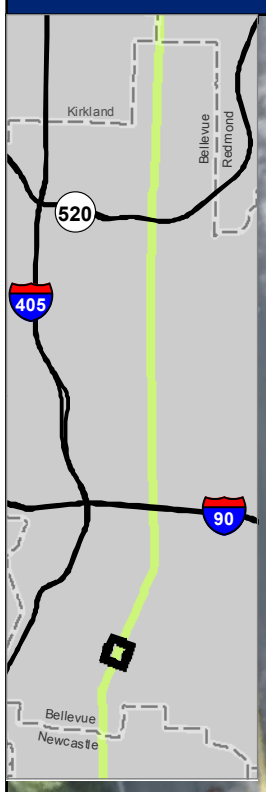
DSD 000776

35

0 10 20
Feet

Data sources: Puget Sound Energy (PSE), The Watershed Company (TWC), City of Bellevue (COB), and King County (KC). Aerial imagery from PSE, 2011.

PSE EE230 - OUTREACH MAP: TREE REMOVAL AND RETENTION



2124059052

COAL CREEK PKWY SE

2124059001

Foresthill Neighborhood Trail

2124059001

0

Existing Easement Boundary[PSE]
City Limit[KC]
Parcel Boundary[COB] - *white outline*

Wire Zone[PSE]
Wires [PSE]
Existing Poles to Remain[PSE]
Existing Poles to be Removed[PSE]
Proposed Pole Footprints[PSE]

Trees to Retain[TWC]
Trees to Remove[TWC]
Dead / Dying Trees[TWC]
Canopy to be Removed[TWC]
Canopy to Remain[TWC]

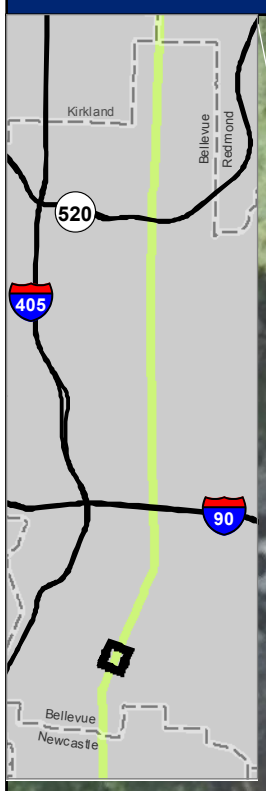
DSD 000777

36

0 10 20
Feet

Data sources: Puget Sound Energy (PSE), The Watershed Company (TWC), City of Bellevue (COB), and King County (KC). Aerial imagery from PSE, 2011.

PSE EE230 - OUTREACH MAP: TREE REMOVAL AND RETENTION



Foresthill Neighborhood Trail

COAL CREEK PKWY SE

2124059001

2124059001

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Existing Easement Boundary[PSE]
City Limit[KC]
Parcel Boundary[COB] - *white outline*

Wire Zone[PSE]
Wires [PSE]
Existing Poles to Remain[PSE]
Existing Poles to be Removed[PSE]
Proposed Pole Footprints[PSE]

Trees to Retain[TWC]
Trees to Remove[TWC]
Dead / Dying Trees[TWC]
Canopy to be Removed[TWC]
Canopy to Remain[TWC]

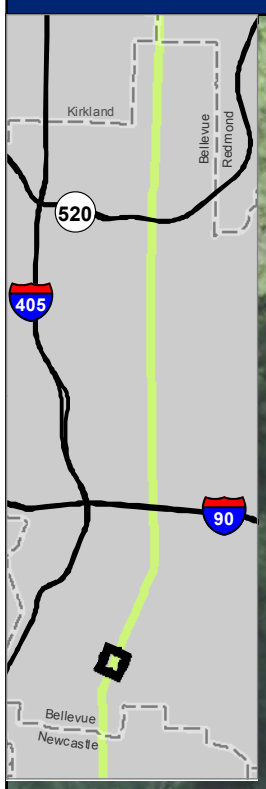
DSD 000778

37

0 10 20
Feet

Data sources: Puget Sound Energy (PSE), The Watershed Company (TWC), City of Bellevue (COB), and King County (KC). Aerial imagery from PSE, 2011.

PSE EE230 - OUTREACH MAP: TREE REMOVAL AND RETENTION



213
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256
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223
250
224
2124059001
COAL CREEK PKWY SE

Existing Easement Boundary[PSE]
City Limit[KC]
Parcel Boundary[COB] - *white outline*
Wire Zone[PSE]
Wires [PSE]
Existing Poles to Remain[PSE]
Existing Poles to be Removed[PSE]
Proposed Pole Footprints[PSE]
Trees to Retain[TWC]
Trees to Remove[TWC]
Dead / Dying Trees[TWC]
Canopy to be Removed[TWC]
Canopy to Remain[TWC]

DSD 000779

38

0 10 20
Feet

Data sources: Puget Sound Energy (PSE), The Watershed Company (TWC), City of Bellevue (COB), and King County (KC). Aerial imagery from PSE, 2011.

PSE EE230 - OUTREACH MAP: TREE REMOVAL AND RETENTION

2124059001

COAL CREEK PKWY SE

224 225 226 227 228 229 230 218 232 249 233 237 0 236 238 248 0 247 240 242 239 241 243 219 244 245 246 251

6/6
6/6

252 253

2124059001

254

Lower Coal Creek Trail

255

Existing Easement Boundary[PSE]
City Limit[KC]
Parcel Boundary[COB] - *white outline*

Wire Zone[PSE]
Wires [PSE]
Existing Poles to Remain[PSE]
Existing Poles to be Removed[PSE]
Proposed Pole Footprints[PSE]

Trees to Retain[TWC]
Trees to Remove[TWC]
Dead / Dying Trees[TWC]
Canopy to be Removed[TWC]
Canopy to Remain[TWC]

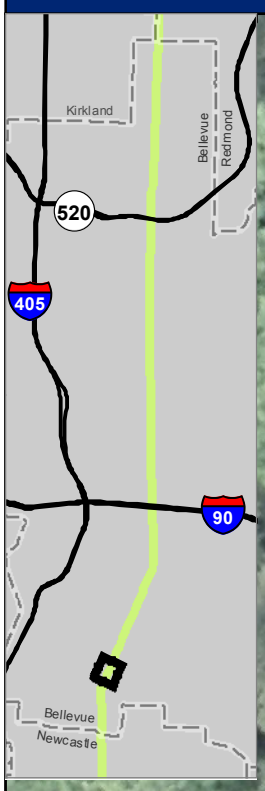
DSD 000780

39

0 10 20
Feet

Data sources: Puget Sound Energy (PSE), The Watershed Company (TWC), City of Bellevue (COB), and King County (KC). Aerial imagery from PSE, 2011.

PSE EE230 - OUTREACH MAP: TREE REMOVAL AND RETENTION



255

Lower Coal Creek Trail

2124059001

6071900240

6071900230

6071900220

6071900210

6/5

6/5

Existing Easement Boundary[PSE]
City Limit[KC]
Parcel Boundary[COB] - *white outline*

Wire Zone[PSE]
Wires [PSE]
Existing Poles to Remain[PSE]
Existing Poles to be Removed[PSE]
Proposed Pole Footprints[PSE]

Trees to Retain[TWC]
Trees to Remove[TWC]
Dead / Dying Trees[TWC]
Canopy to be Removed[TWC]
Canopy to Remain[TWC]

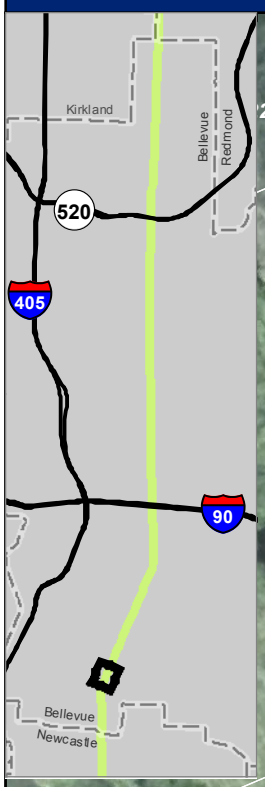
DSD 000781

40

0 10 20
Feet

Data sources: Puget Sound Energy (PSE), The Watershed Company (TWC), City of Bellevue (COB), and King County (KC). Aerial imagery from PSE, 2011.

PSE EE230 - OUTREACH MAP: TREE REMOVAL AND RETENTION



6071900210

6071900200

6071900190

6071900180

6071900170

2124059001

257

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259

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309

Existing Easement Boundary[PSE]
City Limit[KC]
Parcel Boundary[COB] - *white outline*

Wire Zone[PSE]
Wires [PSE]
Existing Poles to Remain[PSE]
Existing Poles to be Removed[PSE]
Proposed Pole Footprints[PSE]

Trees to Retain[TWC]
Trees to Remove[TWC]
Dead / Dying Trees[TWC]
Canopy to be Removed[TWC]
Canopy to Remain[TWC]

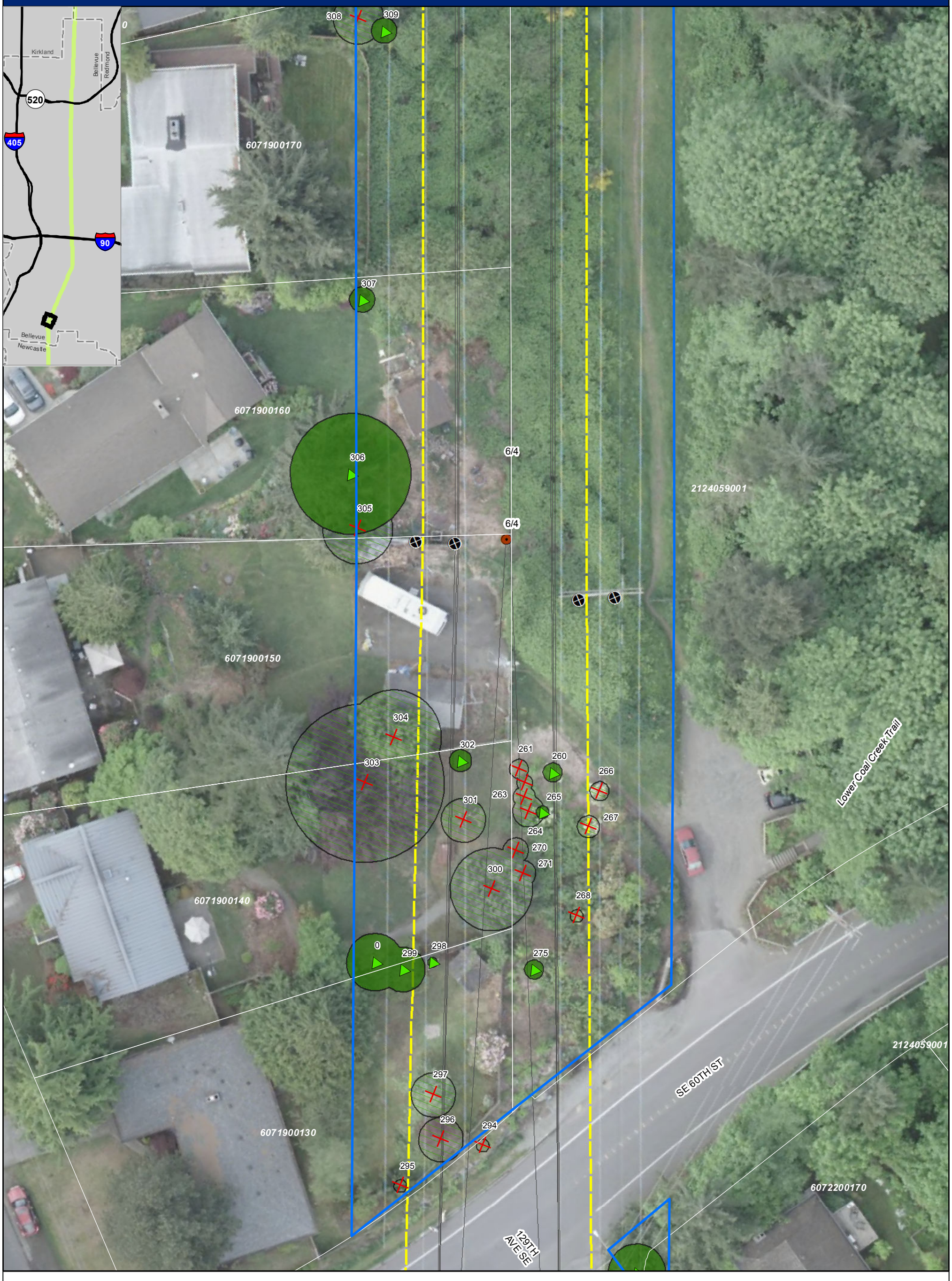
DSD 000782

41

0 10 20
Feet

Data sources: Puget Sound Energy (PSE), The Watershed Company (TWC), City of Bellevue (COB), and King County (KC). Aerial imagery from PSE, 2011.

PSE EE230 - OUTREACH MAP: TREE REMOVAL AND RETENTION



Existing Easement Boundary[PSE]
City Limit[KC]
Parcel Boundary[COB] - *white outline*

Wire Zone[PSE]
Wires [PSE]
Existing Poles to Remain[PSE]
Existing Poles to be Removed[PSE]
Proposed Pole Footprints[PSE]

Trees to Retain[TWC]
Trees to Remove[TWC]
Dead / Dying Trees[TWC]
Canopy to be Removed[TWC]
Canopy to Remain[TWC]

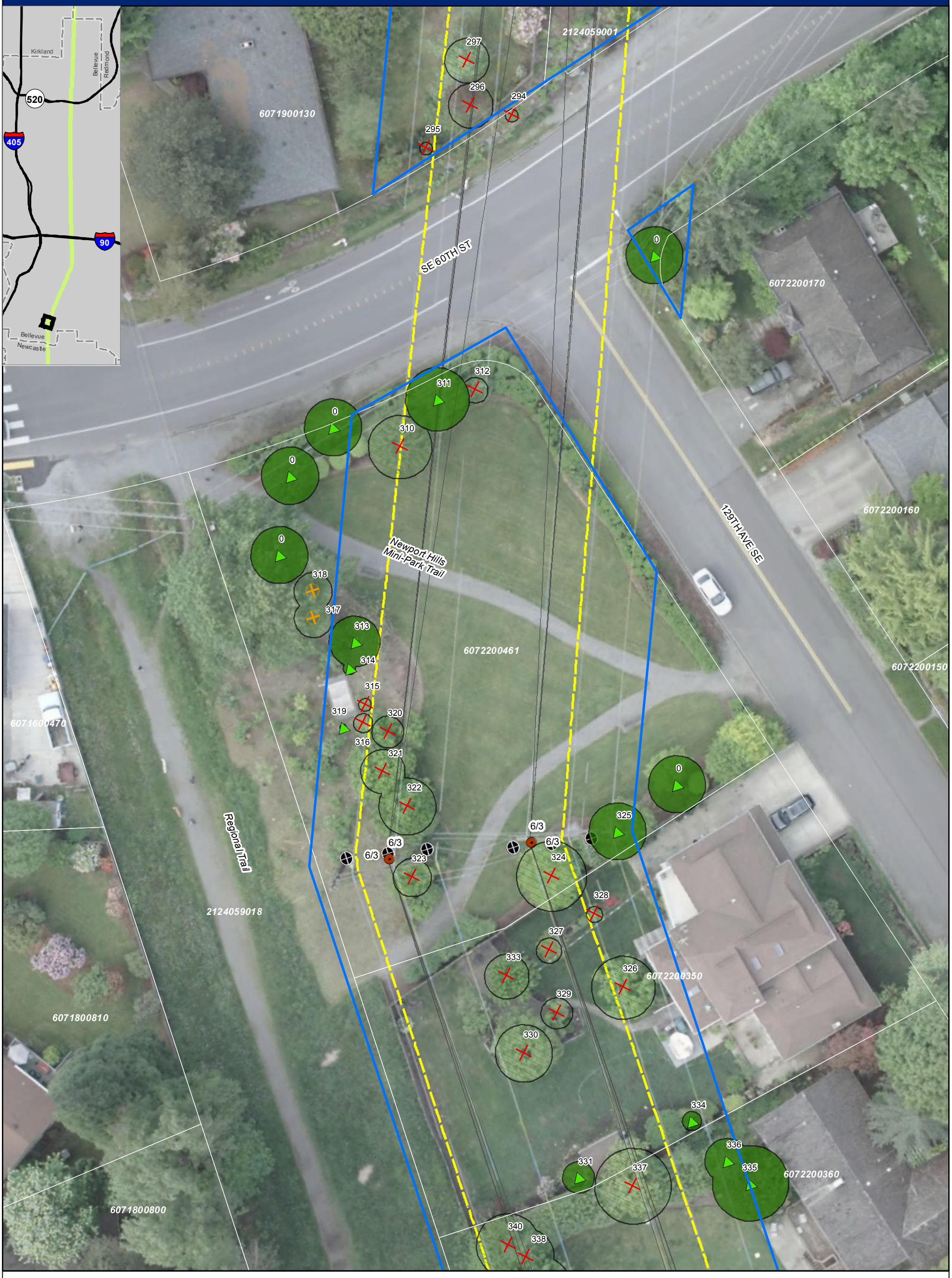
DSD 000783

42

0 10 20
Feet

Data sources: Puget Sound Energy (PSE), The Watershed Company (TWC), City of Bellevue (COB), and King County (KC). Aerial imagery from PSE, 2011.

PSE EE230 - OUTREACH MAP: TREE REMOVAL AND RETENTION



Existing Easement Boundary[PSE]
City Limit[KC]
Parcel Boundary[COB] - *white outline*

Wire Zone[PSE]
Wires [PSE]
Existing Poles to Remain[PSE]
Existing Poles to be Removed[PSE]
Proposed Pole Footprints[PSE]

Trees to Retain[TWC]
Trees to Remove[TWC]
Dead / Dying Trees[TWC]
Canopy to be Removed[TWC]
Canopy to Remain[TWC]

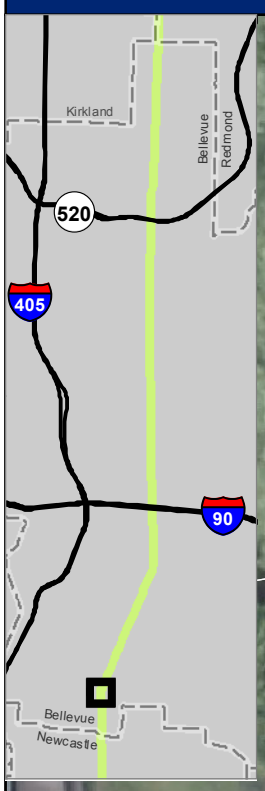
DSD 000784

43

0 10 20
Feet

Data sources: Puget Sound Energy (PSE), The Watershed Company (TWC), City of Bellevue (COB), and King County (KC). Aerial imagery from PSE, 2011.

PSE EE230 - OUTREACH MAP: TREE REMOVAL AND RETENTION



6071800790
6071800780
6071800770
6071800760
2124059018
Regional Trail
6072200350
6072200360
6072200370
6072200380
6072200390
6072200400

330 331 334 337 336 335 340 338 339 341 342 343 344 345 347
348 448 352 356 355
354 353 361 360 358 357 0 0 359
362 363 367 364

Existing Easement Boundary[PSE]
City Limit[KC]
Parcel Boundary[COB] - *white outline*
Wire Zone[PSE]
Wires [PSE]
Existing Poles to Remain[PSE]
Existing Poles to be Removed[PSE]
Proposed Pole Footprints[PSE]
Trees to Retain[TWC]
Trees to Remove[TWC]
Dead / Dying Trees[TWC]
Canopy to be Removed[TWC]
Canopy to Remain[TWC]

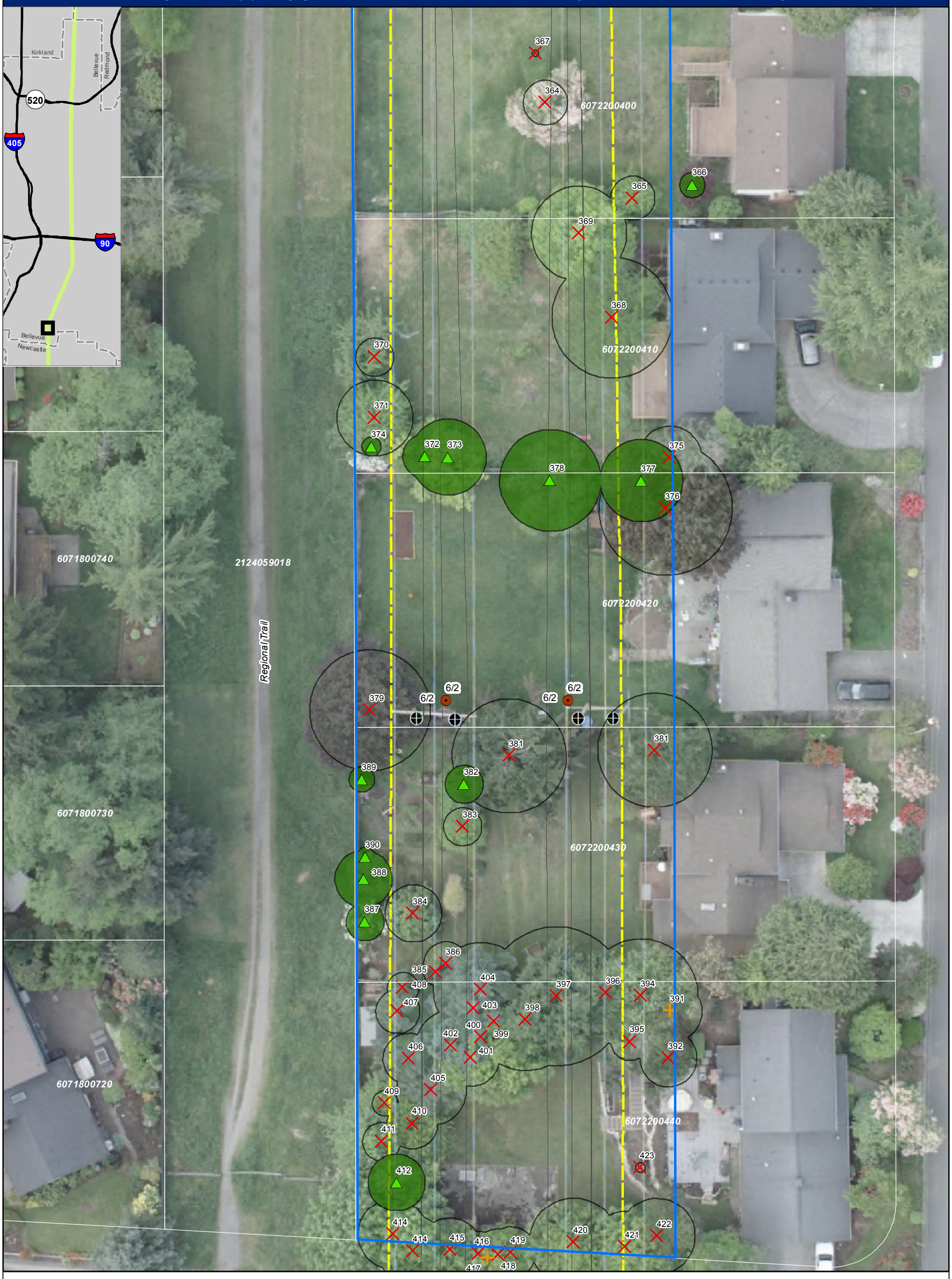
DSD 000785

44

0 10 20
Feet

Data sources: Puget Sound Energy (PSE), The Watershed Company (TWC), City of Bellevue (COB), and King County (KC). Aerial imagery from PSE, 2011.

PSE EE230 - OUTREACH MAP: TREE REMOVAL AND RETENTION



Existing Easement Boundary[PSE]
City Limit[KC]
Parcel Boundary[COB] - *white outline*

Wire Zone[PSE]
Wires [PSE]
Existing Poles to Remain[PSE]
Existing Poles to be Removed[PSE]
Proposed Pole Footprints[PSE]

Trees to Retain[TWC]
Trees to Remove[TWC]
Dead / Dying Trees[TWC]
Canopy to be Removed[TWC]
Canopy to Remain[TWC]

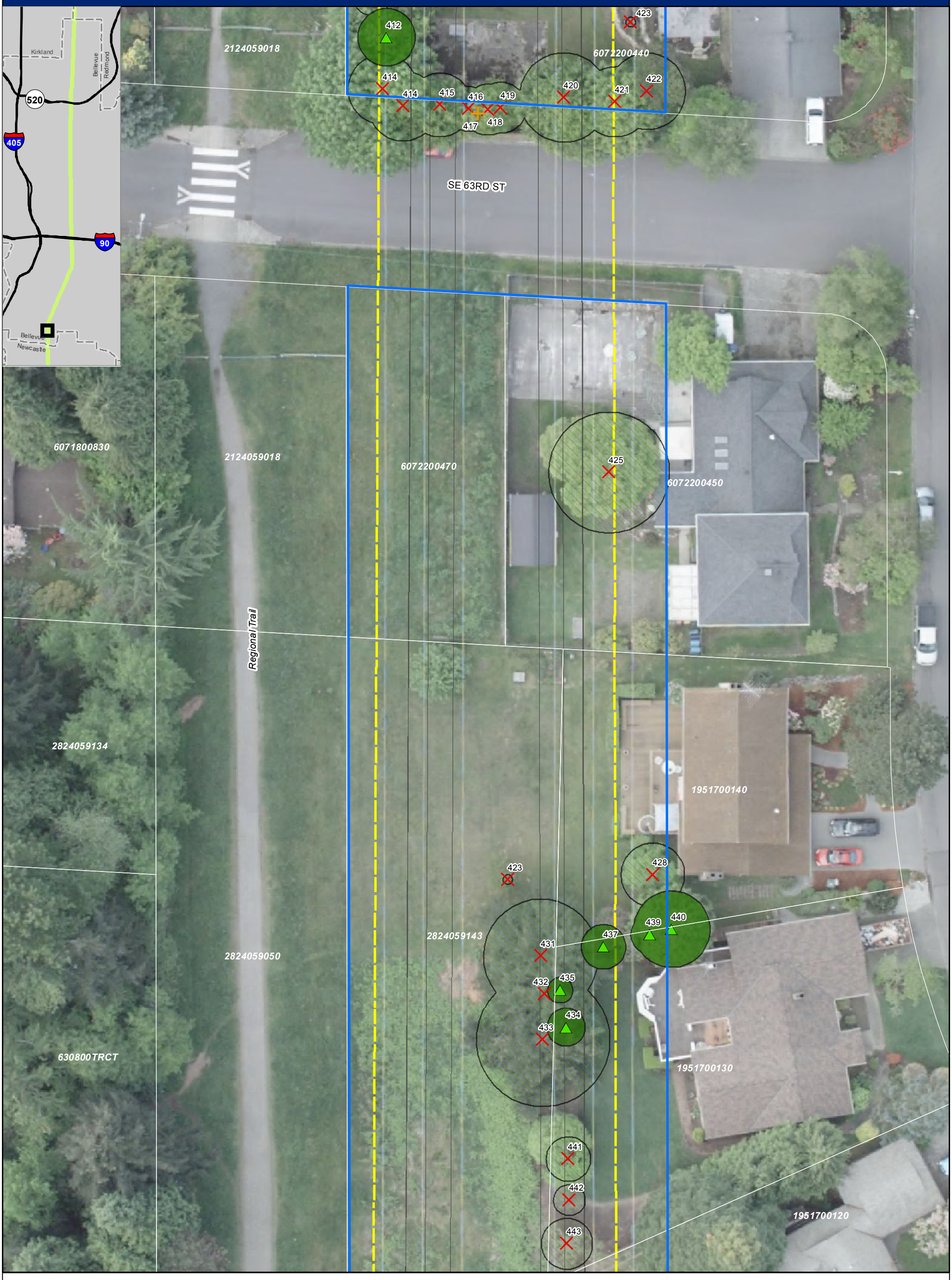
DSD 000786

45

0 10 20
Feet

Data sources: Puget Sound Energy (PSE), The Watershed Company (TWC), City of Bellevue (COB), and King County (KC). Aerial imagery from PSE, 2011.

PSE EE230 - OUTREACH MAP: TREE REMOVAL AND RETENTION



Existing Easement Boundary[PSE]
City Limit[KC]
Parcel Boundary[COB] - *white outline*

Wire Zone[PSE]
Wires [PSE]
Existing Poles to Remain[PSE]
Existing Poles to be Removed[PSE]
Proposed Pole Footprints[PSE]

Trees to Retain[TWC]
Trees to Remove[TWC]
Dead / Dying Trees[TWC]
Canopy to be Removed[TWC]
Canopy to Remain[TWC]

DSD 000787

46

0 10 20
Feet

Data sources: Puget Sound Energy (PSE), The Watershed Company (TWC), City of Bellevue (COB), and King County (KC). Aerial imagery from PSE, 2011.

PSE EE230 - OUTREACH MAP: TREE REMOVAL AND RETENTION

Existing Easement Boundary[PSE]
City Limit[KC]
Parcel Boundary[COB] - *white outline*

Wire Zone[PSE]
Wires [PSE]
Existing Poles to Remain[PSE]
Existing Poles to be Removed[PSE]
Proposed Pole Footprints[PSE]

Trees to Retain[TWC]
Trees to Remove[TWC]
Dead / Dying Trees[TWC]
Canopy to be Removed[TWC]
Canopy to Remain[TWC]

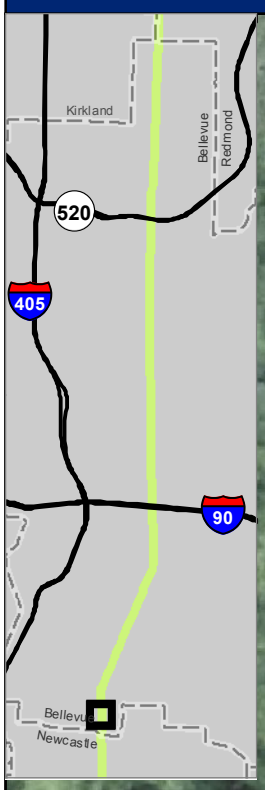
DSD 000788

47

0 10 20
Feet

Data sources: Puget Sound Energy (PSE), The Watershed Company (TWC), City of Bellevue (COB), and King County (KC). Aerial imagery from PSE, 2011.

PSE EE230 - OUTREACH MAP: TREE REMOVAL AND RETENTION



488 487 486 485 484 483 482 481 480 479 478 477 472 473 474 475 476 464 463 462 459 460 461 2824059123 1951700800 509 508 513 507 510 512 511 506 514 1951700790 528 529 527 526 525 524 1951700780 2824059050 630800TRCT Regional Trail 523 522 516 515 531 519 520 530 517 518 521 534 538 537 539 536 535 533 532 541 6308000370 1951700760 542 543 0 1951700750 1951700770

Existing Easement Boundary[PSE]
City Limit[KC]
Parcel Boundary[COB] - *white outline*

Wire Zone[PSE]
Wires [PSE]
Existing Poles to Remain[PSE]
Existing Poles to be Removed[PSE]
Proposed Pole Footprints[PSE]

Trees to Retain[TWC]
Trees to Remove[TWC]
Dead / Dying Trees[TWC]
Canopy to be Removed[TWC]
Canopy to Remain[TWC]

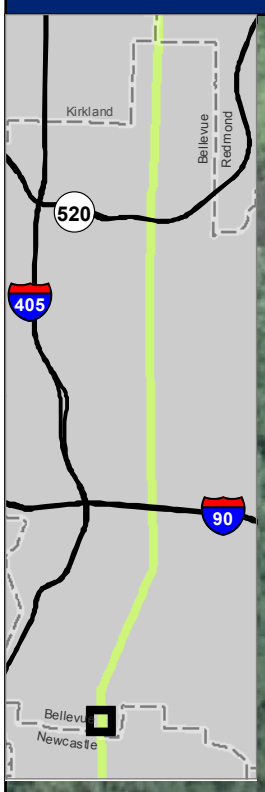
DSD 000789

48

0 10 20
Feet

Data sources: Puget Sound Energy (PSE), The Watershed Company (TWC), City of Bellevue (COB), and King County (KC). Aerial imagery from PSE, 2011.

PSE EE230 - OUTREACH MAP: TREE REMOVAL AND RETENTION



630800TRCT

1951700760 542 543 0 1951700750 545 544 546 0 0 548 547 549 550 551 552 5/9 5/9 596 597 594 593 595 598 592 591 555 553 557 554 558 556 560 559 563 561 562 564 565 566 576 572 571 567 570 590 589 587 585 586 583 584 582 574 573 5/9 569 575 578 0 568 577 581 580 579 0 0

Regional Trail

1951700740 1951700730 1951810080 1951810090 1951810100

6308000370 2824059050 6308000190 6308000180 6308000170

Legend

- Existing Easement Boundary[PSE]
- City Limit[KC]
- Parcel Boundary[COB] - *white outline*
- Wire Zone[PSE]
- Wires [PSE]
- Existing Poles to Remain[PSE]
- Existing Poles to be Removed[PSE]
- Proposed Pole Footprints[PSE]
- Trees to Retain[TWC]
- Trees to Remove[TWC]
- Dead / Dying Trees[TWC]
- Canopy to be Removed[TWC]
- Canopy to Remain[TWC]

DSD 000790

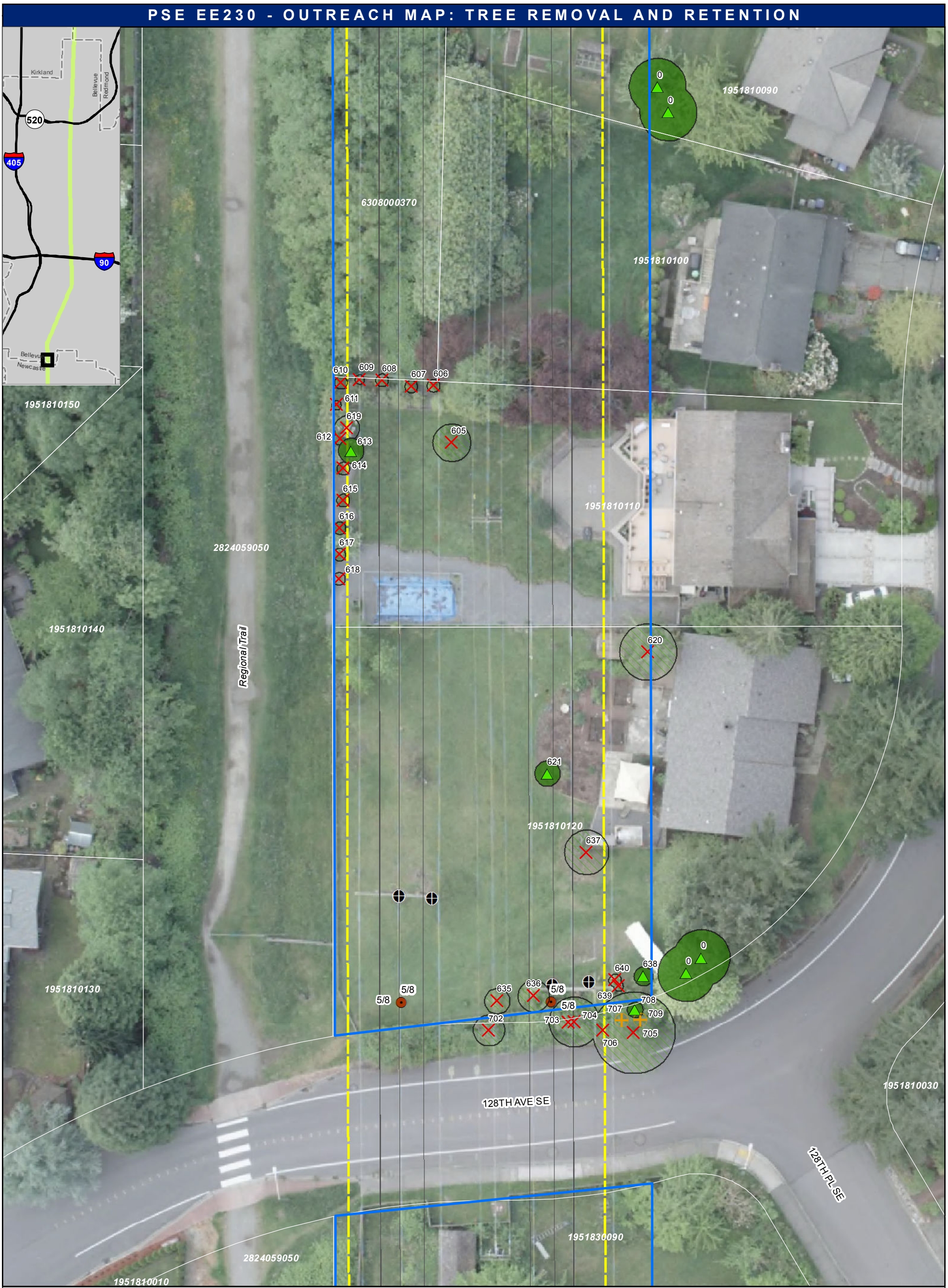
49

0 10 20

Feet

Data sources: Puget Sound Energy (PSE), The Watershed Company (TWC), City of Bellevue (COB), and King County (KC). Aerial imagery from PSE, 2011.

PSE EE230 - OUTREACH MAP: TREE REMOVAL AND RETENTION



Existing Easement Boundary[PSE]
City Limit[KC]
Parcel Boundary[COB] - *white outline*

Wire Zone[PSE]
Wires [PSE]
Existing Poles to Remain[PSE]
Existing Poles to be Removed[PSE]
Proposed Pole Footprints[PSE]

Trees to Retain[TWC]
Trees to Remove[TWC]
Dead / Dying Trees[TWC]
Canopy to be Removed[TWC]
Canopy to Remain[TWC]

DSD 000791

50

0 10 20
Feet

Data sources: Puget Sound Energy (PSE), The Watershed Company (TWC), City of Bellevue (COB), and King County (KC). Aerial imagery from PSE, 2011.

PSE EE230 - OUTREACH MAP: TREE REMOVAL AND RETENTION

1951810030
128TH PL SE
1951830090
1951810010
Regional Trail
2824059050
1951830080
1951830070
1951830100
1951830060
NEWCASTLE WAY
1951830050

666
665
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Existing Easement Boundary[PSE]
City Limit[KC]
Parcel Boundary[COB] - *white outline*
Wire Zone[PSE]
Wires [PSE]
Existing Poles to Remain[PSE]
Existing Poles to be Removed[PSE]
Proposed Pole Footprints[PSE]
Trees to Retain[TWC]
Trees to Remove[TWC]
Dead / Dying Trees[TWC]
Canopy to be Removed[TWC]
Canopy to Remain[TWC]

DSD 000792

51

0 10 20
Feet

Data sources: Puget Sound Energy (PSE), The Watershed Company (TWC), City of Bellevue (COB), and King County (KC). Aerial imagery from PSE, 2011.

PSE EE230 - OUTREACH MAP: TREE REMOVAL AND RETENTION

Existing Easement Boundary[PSE]
City Limit[KC]
Parcel Boundary[COB] - *white outline*

Wire Zone[PSE]
Wires [PSE]
Existing Poles to Remain[PSE]
Existing Poles to be Removed[PSE]
Proposed Pole Footprints[PSE]

Trees to Retain[TWC]
Trees to Remove[TWC]
Dead / Dying Trees[TWC]
Canopy to be Removed[TWC]
Canopy to Remain[TWC]

DSD 000793

52

0 10 20
Feet

Data sources: Puget Sound Energy (PSE), The Watershed Company (TWC), City of Bellevue (COB), and King County (KC). Aerial imagery from PSE, 2011.

	Tree Tag	Parcel Number	Scientific Name	Common Name	DBH_1	DBH_2	DBH_3	DBH_4	DBH_5	Condition	Remove or Retain?
1	5194	2124059001	Pseudotsuga menziesii	Douglas-fir	11.0					3 - Fair	Retain
2	5195	2124059001	Pseudotsuga menziesii	Douglas-fir	9.1					3 - Fair	Retain
3	5196	2124059001	Pseudotsuga menziesii	Douglas-fir	10.2					3 - Fair	Retain
4	5193	2124059001	Pseudotsuga menziesii	Douglas-fir	14.5					4 - Poor	Retain
5	5188	2124059018	Acer macrophyllum	Bigleaf maple	9.8	3.1	3.1			3 - Fair	Retain
6	5189	2124059018	Pseudotsuga menziesii	Douglas-fir	28.8					3 - Fair	Retain
7	5190	2124059018	Pseudotsuga menziesii	Douglas-fir	8.0					4 - Poor	Retain
8	5191	2124059001	Acer macrophyllum	Bigleaf maple	22.5	19.1				3 - Fair	Retain
9	5192	2124059001	Pseudotsuga menziesii	Douglas-fir	28.2					3 - Fair	Retain
10	0	1024059083	Fagus sylvatica 'purpurea'	European beech (purple)	27.3					3 - Fair	Retain
11	0	1024059083	Pinus contorta	Shore pine	10.0					3 - Fair	Retain
12	0	1024059083	Fagus sylvatica 'purpurea'	European beech (purple)	27.0					3 - Fair	Retain
13	0	1024059083	Fagus sylvatica 'purpurea'	European beech (purple)	28.0					3 - Fair	Retain
14	0	1024059083	Pinus nigra	Austrian pine	20.0					4 - Poor	Retain
15	0	1024059083	Pinus nigra	Austrian pine	27.0					4 - Poor	Retain
16	0	1024059083	Pinus nigra	Austrian pine	15.0					4 - Poor	Retain
17	0	1024059083	Pinus nigra	Austrian pine	14.0					4 - Poor	Retain
18	0	1024059083	Pinus nigra	Austrian pine	10.0					4 - Poor	Retain
19	0	1024059083	Pinus nigra	Austrian pine	23.0					4 - Poor	Retain
20	0	1024059083	Pinus nigra	Austrian pine	17.0					4 - Poor	Retain
21	0	1024059083	Pinus nigra	Austrian pine	12.0					4 - Poor	Retain
22	0	1024059083	Pinus nigra	Austrian pine	18.0					4 - Poor	Retain
23	0	1024059083	Pinus nigra	Austrian pine	16.0					4 - Poor	Retain
24	0	1024059083	Pinus nigra	Austrian pine	12.0					4 - Poor	Retain
25	0	1024059083	Pinus nigra	Austrian pine	13.0					4 - Poor	Retain
26	0	1024059083	Pinus nigra	Austrian pine	14.0					4 - Poor	Retain
27	0	1024059083	Pinus nigra	Austrian pine	18.0					4 - Poor	Retain
28	0	1024059083	Pinus nigra	Austrian pine	19.0					4 - Poor	Retain
29	0	1024059083	Betula pendula	European white birch	11.0					4 - Poor	Retain
30	0	1024059083	Pinus nigra	Austrian pine	20.7					4 - Poor	Retain
31	0	1024059083	Betula pendula	European white birch	9.5					4 - Poor	Retain
32	0	1024059083	Betula pendula	European white birch	10.0					4 - Poor	Retain
33	0	1024059083	Pinus nigra	Austrian pine	24.0					4 - Poor	Retain
34	0	1024059083	Pinus nigra	Austrian pine	22.0					4 - Poor	Retain
35	0	1024059083	Pinus nigra	Austrian pine	14.0					4 - Poor	Retain
36	0	1024059083	Pinus nigra	Austrian pine	20.5					4 - Poor	Retain
37	0	1024059083	Pinus nigra	Austrian pine	17.0					4 - Poor	Retain
38	219	2124059001	Acer platanoides	Norway maple	12.0					3 - Fair	Remove
39	1769	0672100160	Pinus sylvestris	Scots pine	19.1					3 - Fair	Retain
40	1770	0672100160	Robinia pseudoacacia	Black locust	12.5					3 - Fair	Retain
41	3776	1024059130	Alnus rubra	Red alder	9.7					3 - Fair	Retain
42	3777	1024059130	Alnus rubra	Red alder	9.7	8.2				3 - Fair	Retain
43	3778	1024059130	Alnus rubra	Red alder	9.0	8.2				3 - Fair	Retain
44	3779	1024059130	Alnus rubra	Red alder	10.0	8	8	6	6	3 - Fair	Retain
45	3772	1024059130	Salix scouleriana	Scouler's willow	15.5					3 - Fair	Retain
46	3775	1024059130	Alnus rubra	Red alder	10.5					3 - Fair	Retain
47	3774	1024059130	Alnus rubra	Red alder	9.0					3 - Fair	Retain
48	3771	1024059130	Acer macrophyllum	Bigleaf maple	31.0					3 - Fair	Retain
49	3772	1024059130	Salix scouleriana	Scouler's willow	15.5					3 - Fair	Retain
50	3914	1024059130	Alnus rubra	Red alder	9.0					2 - Good	Retain
51	218	2124059001	Acer platanoides	Norway maple	9.5					3 - Fair	Remove
52	242	1024059130	Populus balsamifera	Black cottonwood	20.3	0				3 - Fair	Retain
53	246	1024059130	Populus balsamifera	Black cottonwood	22.0	0				3 - Fair	Retain
54	3807	1024059130	Alnus rubra	Red alder	12.0	8				3 - Fair	Remove
55	3770	1024059130	Acer macrophyllum	Bigleaf maple	40.0	15	15			3 - Fair	Retain
56	3805	1024059130	Salix lasiandra	Pacific willow	18.0					4 - Poor	Remove
57	3803	1024059130	Alnus rubra	Red alder	8.4	8.2				4 - Poor	Remove
58	3804	1024059130	Salix lasiandra	Pacific willow	13.0					3 - Fair	Remove
59	3808	1024059130	Acer macrophyllum	Bigleaf maple	23.0	14	8			3 - Fair	Remove
60	3809	1024059130	Acer macrophyllum	Bigleaf maple	13.5	13.5				3 - Fair	Remove
61	3812	1024059130	Acer macrophyllum	Bigleaf maple	27.0					3 - Fair	Remove
62	3814	1024059130	Acer macrophyllum	Bigleaf maple	24.0	20	12.8	12		3 - Fair	Remove
63	3816	1024059130	Acer macrophyllum	Bigleaf maple	22.0	20	20	20	20	3 - Fair	Remove
64	3821	1024059130	Salix lasiandra	Pacific willow	9.0					4 - Poor	Retain
65	3810	1024059130	Acer macrophyllum	Bigleaf maple	15.0					3 - Fair	Remove
66	3813	1024059130	Acer macrophyllum	Bigleaf maple	17.3					3 - Fair	Remove
67	3811	1024059130	Acer macrophyllum	Bigleaf maple	21.0					3 - Fair	Remove
68	3817	1024059130	Thuja plicata	Western red cedar	24.0					3 - Fair	Remove
69	3818	1024059130	Thuja plicata	Western red cedar	32.4					3 - Fair	Remove
70	3826	1024059130	Thuja plicata	Western red cedar	8.7	5				3 - Fair	Remove
71	3819	1024059130	Thuja plicata	Western red cedar	9.0					3 - Fair	Remove
72	3826	1024059130	Malus domestica	Apple	11.0					3 - Fair	Remove
73	3747	1024059130	Alnus rubra	Red alder	11.7					3 - Fair	Retain

Field inventory completed on October 13, 2016, and includes trees that may have been removed by others since that time.

	Tree Tag	Parcel Number	Scientific Name	Common Name	DBH_1	DBH_2	DBH_3	DBH_4	DBH_5	Condition	Remove or Retain?
74	3748	1024059130	Alnus rubra	Red alder	14.7					4 - Poor	Retain
75	3757	1024059130	Alnus rubra	Red alder	29.7					4 - Poor	Retain
76	3764	1024059130	Acer macrophyllum	Bigleaf maple	16.0					4 - Poor	Retain
77	3763	1024059130	Acer macrophyllum	Bigleaf maple	23.0					4 - Poor	Retain
78	3767	1024059130	Acer macrophyllum	Bigleaf maple	24.0					3 - Fair	Retain
79	3769	1024059130	Acer macrophyllum	Bigleaf maple	24.0	15	15			4 - Poor	Retain
80	3768	1024059130	Acer macrophyllum	Bigleaf maple	15.0					4 - Poor	Retain
81	3753	1024059130	Alnus rubra	Red alder	16.0	9	8			3 - Fair	Retain
82	3754	1024059130	Alnus rubra	Red alder	13.0	11	9			4 - Poor	Retain
83	3755	1024059130	Alnus rubra	Red alder	8.0					3 - Fair	Retain
84	3756	1024059130	Alnus rubra	Red alder	20.0					4 - Poor	Retain
85	3752	1024059130	Alnus rubra	Red alder	10.0	5				4 - Poor	Retain
86	3751	1024059130	Alnus rubra	Red alder	10.6					3 - Fair	Retain
87	3750	1024059130	Alnus rubra	Red alder	11.6					4 - Poor	Retain
88	3749	1024059130	Alnus rubra	Red alder	8.0					4 - Poor	Retain
89	3730	1024059130	Alnus rubra	Red alder	24.0					4 - Poor	Retain
90	3729	1024059130	Alnus rubra	Red alder	22.0					4 - Poor	Retain
91	3759	1024059130	Alnus rubra	Red alder	16.5					4 - Poor	Retain
92	3758	1024059130	Alnus rubra	Red alder	16.5					4 - Poor	Retain
93	3746	1024059130	Alnus rubra	Red alder	12.0	12	10	9	8	4 - Poor	Retain
94	3745	1024059130	Alnus rubra	Red alder	9.0					3 - Fair	Retain
95	3743	1024059130	Alnus rubra	Red alder	18.0	10	10			4 - Poor	Retain
96	3742	1024059130	Salix sitchensis	Sitka willow	10.0					3 - Fair	Retain
97	3741	1024059130	Alnus rubra	Red alder	20.0	9				4 - Poor	Retain
98	3740	1024059130	Acer macrophyllum	Bigleaf maple	12.0	12	11			3 - Fair	Retain
99	3738	1024059130	Acer macrophyllum	Bigleaf maple	18.0	18	11			3 - Fair	Retain
100	3737	1024059130	Alnus rubra	Red alder	11.5					3 - Fair	Retain
101	3739	1024059130	Alnus rubra	Red alder	9.0					3 - Fair	Retain
102	3731	1024059130	Acer macrophyllum	Bigleaf maple	26.0	14				4 - Poor	Retain
103	3735	1024059130	Alnus rubra	Red alder	8.0					3 - Fair	Retain
104	3734	1024059130	Alnus rubra	Red alder	11.0					4 - Poor	Retain
105	3698	1024059130	Acer macrophyllum	Bigleaf maple	16.5	15	10	8	8	3 - Fair	Retain
106	3732	1024059130	Alnus rubra	Red alder	13.0					4 - Poor	Retain
107	161	7856420060	Pseudotsuga menziesii	Douglas-fir	11.3					3 - Fair	Remove
108	3825	1024059130	Crataegus monogyna	Common hawthorn	9.0					3 - Fair	Remove
109	3823	1024059130	Prunus emarginata	Bitter cherry	9.2					4 - Poor	Retain
110	3827	1024059130	Acer macrophyllum	Bigleaf maple	20.5					4 - Poor	Remove
111	3828	1024059130	Acer macrophyllum	Bigleaf maple	18.0	16	14	12	12	3 - Fair	Remove
112	3834	1024059130	Acer macrophyllum	Bigleaf maple	20.0	15				4 - Poor	Remove
113	3833	1024059130	Acer macrophyllum	Bigleaf maple	24.0	10				3 - Fair	Remove
114	3832	1024059130	Acer macrophyllum	Bigleaf maple	22.0					4 - Poor	Remove
115	3831	1024059130	Acer macrophyllum	Bigleaf maple	24.0	9				4 - Poor	Remove
116	3830	1024059130	Acer macrophyllum	Bigleaf maple	15.0	13	12	12	10	4 - Poor	Remove
117	3829	1024059130	Acer macrophyllum	Bigleaf maple	17.5					3 - Fair	Remove
118	3719	1024059130	Alnus rubra	Red alder	13.0					3 - Fair	Retain
119	3720	1024059130	Alnus rubra	Red alder	13.0					3 - Fair	Retain
120	3721	1024059130	Alnus rubra	Red alder	10.0					4 - Poor	Retain
121	3722	1024059130	Alnus rubra	Red alder	11.0					3 - Fair	Retain
122	3723	1024059130	Alnus rubra	Red alder	11.0					3 - Fair	Retain
123	3724	1024059130	Alnus rubra	Red alder	20.7					4 - Poor	Retain
124	3725	1024059130	Alnus rubra	Red alder	8.0					3 - Fair	Retain
125	3718	1024059130	Alnus rubra	Red alder	8.0					4 - Poor	Retain
126	3717	1024059130	Alnus rubra	Red alder	8.0					3 - Fair	Retain
127	3700	1024059130	Alnus rubra	Red alder	13.3					4 - Poor	Retain
128	3728	1024059130	Alnus rubra	Red alder	11.0					3 - Fair	Retain
129	3726	1024059130	Alnus rubra	Red alder	9.0	7				3 - Fair	Retain
130	3727	1024059130	Alnus rubra	Red alder	8.0					3 - Fair	Retain
131	3699	1024059130	Alnus rubra	Red alder	16.7					3 - Fair	Retain
132	3697	1024059130	Alnus rubra	Red alder	14.0					4 - Poor	Retain
133	3696	1024059130	Alnus rubra	Red alder	15.0					4 - Poor	Retain
134	3695	1024059130	Alnus rubra	Red alder	11.0					3 - Fair	Retain
135	160	7856640010	Thuja plicata	Western red cedar	22.0					2 - Good	Remove
136	148	2206500400	Pinus sylvestris	Scots pine	11.0					4 - Poor	Remove
137	145	8135300020	Quercus sp.	Oak	10.8					3 - Fair	Remove
138	151	2206500400	Prunus domestica	Plum	13.5					4 - Poor	Remove
139	3835	1024059130	Acer macrophyllum	Bigleaf maple	30.0					4 - Poor	Remove
140	3836	1024059130	Acer macrophyllum	Bigleaf maple	24.0	16	15	15	12	3 - Fair	Remove
141	3837	1024059130	Acer macrophyllum	Bigleaf maple	36.0	36	24	10	10	3 - Fair	Remove
142	146	8135300020	Thuja plicata	Western red cedar	12.0					4 - Poor	Remove
143	147	2206500400	Pinus sylvestris	Scots pine	13.2					4 - Poor	Remove
144	133	8135300020	Pseudotsuga menziesii	Douglas-fir	12.0					3 - Fair	Remove
145	132	8135300020	Pseudotsuga menziesii	Douglas-fir	10.9					3 - Fair	Remove
146	3838	1024059130	Acer macrophyllum	Bigleaf maple	36.0	36				3 - Fair	Remove

Field inventory completed on October 13, 2016, and includes trees that may have been removed by others since that time.

	Tree Tag	Parcel Number	Scientific Name	Common Name	DBH_1	DBH_2	DBH_3	DBH_4	DBH_5	Condition	Remove or Retain?
147	3839	1024059130	Acer macrophyllum	Bigleaf maple	24.0	20				3 - Fair	Remove
148	18	1024059123	Pseudotsuga menziesii	Douglas-fir	11.4					4 - Poor	Remove
149	131	8135300020	Pseudotsuga menziesii	Douglas-fir	12.9					3 - Fair	Remove
150	3853	1024059130	Alnus rubra	Red alder	9.0					3 - Fair	Remove
151	3852	1024059130	Alnus rubra	Red alder	11.0	10				3 - Fair	Remove
152	3851	1024059130	Alnus rubra	Red alder	9.0	8	7			3 - Fair	Remove
153	3850	1024059130	Alnus rubra	Red alder	9.0	8				3 - Fair	Remove
154	3849	1024059130	Alnus rubra	Red alder	12.0					3 - Fair	Remove
155	3847	1024059130	Alnus rubra	Red alder	14.0	14				3 - Fair	Remove
156	3846	1024059130	Alnus rubra	Red alder	10.5					3 - Fair	Remove
157	3845	1024059130	Alnus rubra	Red alder	15.0	11	11			3 - Fair	Remove
158	3843	1024059130	Alnus rubra	Red alder	12.0					3 - Fair	Remove
159	3842	1024059130	Alnus rubra	Red alder	14.0					3 - Fair	Remove
160	3841	1024059130	Alnus rubra	Red alder	8.0					3 - Fair	Remove
161	19	1024059123	Pseudotsuga menziesii	Douglas-fir	14.0					4 - Poor	Remove
162	20	1024059123	Pseudotsuga menziesii	Douglas-fir	13.2					4 - Poor	Remove
163	21	1024059123	Pseudotsuga menziesii	Douglas-fir	16.1					4 - Poor	Remove
164	22	1024059123	Pseudotsuga menziesii	Douglas-fir	14.1					4 - Poor	Remove
165	23	1024059123	Pseudotsuga menziesii	Douglas-fir	14.0					4 - Poor	Remove
166	24	1024059123	Pseudotsuga menziesii	Douglas-fir	20.5					4 - Poor	Remove
167	3840	1024059130	Alnus rubra	Red alder	12.0	10	8			3 - Fair	Remove
168	3716	1024059130	Alnus rubra	Red alder	15.0					3 - Fair	Retain
169	3715	1024059130	Salix lasiandra	Pacific willow	12.0	12	12			3 - Fair	Retain
170	3714	1024059130	Alnus rubra	Red alder	16.0					3 - Fair	Retain
171	3713	1024059130	Alnus rubra	Red alder	9.0	8	8	7		3 - Fair	Retain
172	3712	1024059130	Alnus rubra	Red alder	9.0					4 - Poor	Retain
173	3710	1024059130	Alnus rubra	Red alder	9.0					3 - Fair	Retain
174	3711	1024059130	Alnus rubra	Red alder	8.0					3 - Fair	Retain
175	3708	1024059130	Alnus rubra	Red alder	11.0					4 - Poor	Retain
176	3704	1024059130	Alnus rubra	Red alder	9.0					3 - Fair	Retain
177	3705	1024059130	Alnus rubra	Red alder	10.0					3 - Fair	Retain
178	3706	1024059130	Alnus rubra	Red alder	12.4					4 - Poor	Retain
179	3707	1024059130	Alnus rubra	Red alder	12.0					3 - Fair	Retain
180	3709	1024059130	Alnus rubra	Red alder	8.0					4 - Poor	Retain
181	3703	1024059130	Alnus rubra	Red alder	15.0					3 - Fair	Retain
182	3702	1024059130	Alnus rubra	Red alder	13.0					3 - Fair	Retain
183	3701	1024059130	Alnus rubra	Red alder	8.0					4 - Poor	Retain
184	1954	0324059066	Alnus rubra	Red alder	12.4					2 - Good	Retain
185	3694	1024059130	Alnus rubra	Red alder	18.3	8.7				3 - Fair	Retain
186	3396	1024059130	Salix lasiandra	Pacific willow	12.0					3 - Fair	Retain
187	3395	1024059130	Salix lasiandra	Pacific willow	12.0	10	6			3 - Fair	Retain
188	3393	1024059130	Alnus rubra	Red alder	10.8					3 - Fair	Retain
189	3398	1024059130	Alnus rubra	Red alder	10.0					3 - Fair	Retain
190	3397	1024059130	Alnus rubra	Red alder	8.0					3 - Fair	Retain
191	3394	1024059130	Salix lasiandra	Pacific willow	8.0					3 - Fair	Retain
192	3401	1024059130	Acer macrophyllum	Bigleaf maple	15.8					3 - Fair	Retain
193	3854	1024059130	Alnus rubra	Red alder	9.0					3 - Fair	Remove
194	3392	1024059130	Alnus rubra	Red alder	10.0	10	9	6		3 - Fair	Retain
195	3391	1024059130	Alnus rubra	Red alder	9.0					3 - Fair	Retain
196	3389	1024059130	Alnus rubra	Red alder	9.0					3 - Fair	Retain
197	3384	1024059130	Alnus rubra	Red alder	10.0	9	7	5		3 - Fair	Retain
198	3383	1024059130	Acer macrophyllum	Bigleaf maple	10.0					3 - Fair	Retain
199	3380	1024059130	Alnus rubra	Red alder	9.0	9	7			4 - Poor	Retain
200	3378	1024059130	Alnus rubra	Red alder	11.0	9				3 - Fair	Retain
201	3377	1024059130	Alnus rubra	Red alder	9.0					3 - Fair	Retain
202	3376	1024059130	Alnus rubra	Red alder	8.0					3 - Fair	Retain
203	3369	1024059130	Alnus rubra	Red alder	10.0	10	9	6		3 - Fair	Retain
204	3375	1024059130	Alnus rubra	Red alder	8.0					3 - Fair	Retain
205	3374	1024059130	Salix lasiandra	Pacific willow	12.0					3 - Fair	Retain
206	3373	1024059130	Alnus rubra	Red alder	13.0					3 - Fair	Retain
207	3388	1024059130	Alnus rubra	Red alder	9.5					4 - Poor	Retain
208	3379	1024059130	Alnus rubra	Red alder	8.0					3 - Fair	Retain
209	3386	1024059130	Alnus rubra	Red alder	9.5					3 - Fair	Retain
210	3385	1024059130	Alnus rubra	Red alder	9.5					3 - Fair	Retain
211	3400	1024059130	Alnus rubra	Red alder	8.5					4 - Poor	Retain
212	3856	1024059130	Alnus rubra	Red alder	8.0					3 - Fair	Remove
213	3855	1024059130	Alnus rubra	Red alder	12.0	8	5	5		3 - Fair	Remove
214	3857	1024059130	Alnus rubra	Red alder	14.0					3 - Fair	Remove
215	3858	1024059130	Acer macrophyllum	Bigleaf maple	8.0					2 - Good	Remove
216	25	1024059123	Acer macrophyllum	Bigleaf maple	13.4					3 - Fair	Remove
217	3859	1024059130	Alnus rubra	Red alder	9.0					3 - Fair	Remove
218	3860	1024059130	Alnus rubra	Red alder	10.0					3 - Fair	Remove
219	111	1024059123	Alnus rubra	Red alder	8.5					4 - Poor	Retain

	Tree Tag	Parcel Number	Scientific Name	Common Name	DBH_1	DBH_2	DBH_3	DBH_4	DBH_5	Condition	Remove or Retain?
220	110	1024059123	Populus balsamifera	Black cottonwood	9.0					4 - Poor	Retain
221	115	1024059123	Acer rubrum	Red maple	13.7					2 - Good	Remove
222	116	2206500435	Acer palmatum	Japanese maple	8.5					2 - Good	Retain
223	117	2206500435	Prunus avium	Sweet cherry	9.1					3 - Fair	Remove
224	3861	1024059130	Alnus rubra	Red alder	10.0	8				3 - Fair	Remove
225	27	3425059010	×Hesperotropsis leylandii	Leyland cypress	8.3					2 - Good	Remove
226	3864	1024059130	Alnus rubra	Red alder	18.0					3 - Fair	Remove
227	3863	1024059130	Acer macrophyllum	Bigleaf maple	8.0					3 - Fair	Remove
228	3862	1024059130	Alnus rubra	Red alder	16.5	7				3 - Fair	Remove
229	3876	1024059130	Alnus rubra	Red alder	12.5					3 - Fair	Remove
230	3878	1024059130	Alnus rubra	Red alder	8.0					3 - Fair	Remove
231	3879	1024059130	Alnus rubra	Red alder	14.0					3 - Fair	Remove
232	3880	1024059130	Acer macrophyllum	Bigleaf maple	9.5	5.5				3 - Fair	Remove
233	3877	1024059130	Acer macrophyllum	Bigleaf maple	10.0					3 - Fair	Remove
234	3368	1024059130	Alnus rubra	Red alder	11.0	7				3 - Fair	Retain
235	3367	1024059130	Alnus rubra	Red alder	9.0	7				3 - Fair	Retain
236	3366	1024059130	Alnus rubra	Red alder	11.0					3 - Fair	Retain
237	3365	1024059130	Alnus rubra	Red alder	14.9					3 - Fair	Retain
238	3364	1024059130	Alnus rubra	Red alder	10.0					3 - Fair	Retain
239	3362	1024059130	Alnus rubra	Red alder	8.0					3 - Fair	Retain
240	3361	1024059130	Alnus rubra	Red alder	9.0	8	7			3 - Fair	Retain
241	3358	1024059130	Alnus rubra	Red alder	16.5					3 - Fair	Retain
242	3372	1024059130	Alnus rubra	Red alder	12.0	10	6			3 - Fair	Retain
243	3371	1024059130	Alnus rubra	Red alder	11.3					4 - Poor	Retain
244	3360	1024059130	Alnus rubra	Red alder	11.6					3 - Fair	Retain
245	3359	1024059130	Alnus rubra	Red alder	17.8					4 - Poor	Retain
246	3363	1024059130	Alnus rubra	Red alder	12.2					3 - Fair	Retain
247	124	1024059123	Acer rubrum	Red maple	15.5					2 - Good	Remove
248	29	3425059010	×Hesperotropsis leylandii	Leyland cypress	12.3					2 - Good	Remove
249	62	2225059272	Prunus cerasifera	Flowering plum	9.5					2 - Good	Retain
250	2590	1024059101	Arbutus menziesii	Pacific madrone	17.3					2 - Good	Remove
251	2591	1024059101	Arbutus menziesii	Pacific madrone	11.7					3 - Fair	Remove
252	2595	8135300020	Prunus serrulata	Japanese flowering cherry	8.3					4 - Poor	Remove
253	2596	8135300020	Quercus sp.	Oak	10.8					3 - Fair	Remove
254	2597	8135300020	Thuja plicata	Western red cedar	12.0					4 - Poor	Remove
255	2602	8135300020	Fraxinus sp.	Ash species	8.0					2 - Good	Remove
256	2601	8135300020	Pseudotsuga menziesii	Douglas-fir	12.9					3 - Fair	Remove
257	2600	8135300020	Pseudotsuga menziesii	Douglas-fir	10.9					3 - Fair	Remove
258	2599	8135300020	Pseudotsuga menziesii	Douglas-fir	12.0					3 - Fair	Remove
259	2497	1024059123	Pinus sylvestris	Scots pine	13.1					3 - Fair	Remove
260	2494	1024059123	Thuja occidentalis	Eastern arborvitae	8.3					3 - Fair	Remove
261	2495	1024059123	Thuja plicata	Western red cedar	11.6					4 - Poor	Remove
262	2532	1024059123	Acer rubrum	Red maple	13.7					2 - Good	Remove
263	2530	1024059123	Alnus rubra	Red alder	8.5					4 - Poor	Remove
264	2505	1024059123	Pinus sylvestris	Scots pine	9.5					3 - Fair	Remove
265	2501	1024059123	Pinus sylvestris	Scots pine	9.2					4 - Poor	Remove
266	2535	1024059123	Acer rubrum	Red maple	15.5					2 - Good	Remove
267	2507	1024059123	Thuja plicata	Western red cedar	8.0					4 - Poor	Remove
268	2506	1024059123	Pinus sylvestris	Scots pine	9.4					4 - Poor	Remove
269	2515	1024059123	Pseudotsuga menziesii	Douglas-fir	16.1					4 - Poor	Remove
270	2510	1024059123	Pseudotsuga menziesii	Douglas-fir	10.0					3 - Fair	Remove
271	2512	1024059123	Pseudotsuga menziesii	Douglas-fir	11.4					4 - Poor	Remove
272	2511	1024059123	Pseudotsuga menziesii	Douglas-fir	10.0					4 - Poor	Remove
273	2513	1024059123	Pseudotsuga menziesii	Douglas-fir	14.0					4 - Poor	Remove
274	2514	1024059123	Pseudotsuga menziesii	Douglas-fir	13.2					4 - Poor	Remove
275	2546	2206500020	Arbutus menziesii	Pacific madrone	18.7					2 - Good	Remove
276	2545	2206500020	Abies grandis	Grand fir	12.1					4 - Poor	Remove
277	2516	1024059123	Pseudotsuga menziesii	Douglas-fir	14.1					4 - Poor	Remove
278	2520	1024059123	Acer macrophyllum	Bigleaf maple	13.4					3 - Fair	Remove
279	2544	2206500020	Pinus nigra	Austrian pine	8.5					4 - Poor	Remove
280	2541	2206500025	Pseudotsuga menziesii	Douglas-fir	20.6					2 - Good	Retain
281	2543	2206500020	Thuja plicata	Western red cedar	13.0					4 - Poor	Remove
282	2540	2206500025	Pseudotsuga menziesii	Douglas-fir	31.8					2 - Good	Remove
283	2538	2206500025	Acer macrophyllum	Bigleaf maple	10.5					3 - Fair	Remove
284	2542	2206500020	Pseudotsuga menziesii	Douglas-fir	12.3					4 - Poor	Remove
285	2548	2206500220	Malus domestica	Apple	12.0					3 - Fair	Retain
286	2558	2206500230	Prunus domestica	Plum	14.6					3 - Fair	Remove
287	2587	2206500255	Acer platanoides	Norway maple	18.0					2 - Good	Remove
288	2574	2206500435	Platanus occidentalis	American sycamore	18.0					2 - Good	Remove
289	2573	2206500435	Magnolia stellata	Star magnolia	12.4					3 - Fair	Remove
290	2575	2206500435	Platanus occidentalis	American sycamore	13.0					2 - Good	Remove
291	2576	2206500435	Platanus occidentalis	American sycamore	22.1					2 - Good	Remove
292	2577	2206500435	Acer palmatum	Japanese maple	8.5					2 - Good	Retain

Field inventory completed on October 13, 2016, and includes trees that may have been removed by others since that time.

	Tree Tag	Parcel Number	Scientific Name	Common Name	DBH_1	DBH_2	DBH_3	DBH_4	DBH_5	Condition	Remove or Retain?
293	2578	2206500435	Prunus avium	Sweet cherry	9.1					3 - Fair	Remove
294	2579	2206500435	Prunus domestica	Plum	12.0					4 - Poor	Remove
295	2603	2206500425	Prunus avium	Sweet cherry	15.6					3 - Fair	Remove
296	2586	2206500435	Prunus domestica	Plum	8.2					3 - Fair	Retain
297	2610	2206500420	Prunus avium	Sweet cherry	8.3					2 - Good	Remove
298	2608	2206500425	Prunus avium	Sweet cherry	9.1					3 - Fair	Remove
299	2611	2206500420	Prunus avium	Sweet cherry	28.0					3 - Fair	Remove
300	2620	2206500390	Sequoia sempervirens	Redwood	38.0					4 - Poor	Remove
301	2538	2206500025	Acer macrophyllum	Bigleaf maple	10.5					3 - Fair	Remove
302	2617	2206500415	Prunus serrulata	Japanese flowering cherry	10.4					3 - Fair	Retain
303	2535	1024059123	Acer rubrum	Red maple	15.5					2 - Good	Remove
304	2532	1024059123	Acer rubrum	Red maple	13.7					2 - Good	Remove
305	2531	1024059123	Populus balsamifera	Black cottonwood	9.0					4 - Poor	Remove
306	2618	2206500410	Malus domestica	Apple	8.0					1 - Excellent	Remove
307	2654	1524059005	Quercus palustris	Pin oak	15.3					2 - Good	Remove
308	2662	1524059005	Prunus serrulata	Japanese flowering cherry	12.0					3 - Fair	Remove
309	2663	1524059005	Malus domestica	Apple	8.6					3 - Fair	Retain
310	2679	1524059005	Pinus sp. <2 needle>	Pine tree, 2 needle	12.5					3 - Fair	Remove
311	2675	1524059005	Pinus sp. <2 needle>	Pine tree, 2 needle	12.6					3 - Fair	Remove
312	2676	1524059005	Pinus ponderosa	Ponderosa pine	16.4					4 - Poor	Remove
313	2678	1524059005	Pinus sp. <2 needle>	Pine tree, 2 needle	12.3					3 - Fair	Remove
314	2683	1524059005	Pinus sp. <2 needle>	Pine tree, 2 needle	14.6					3 - Fair	Remove
315	2680	1524059005	Pinus sp. <2 needle>	Pine tree, 2 needle	10.3					4 - Poor	Remove
316	2682	1524059005	Pseudotsuga menziesii	Douglas-fir	12.0					3 - Fair	Remove
317	2684	1524059005	Pinus sp. <2 needle>	Pine tree, 2 needle	10.5					4 - Poor	Remove
318	2686	1524059005	Arbutus menziesii	Pacific madrone	11.8					3 - Fair	Remove
319	2685	1524059005	Pinus sp. <2 needle>	Pine tree, 2 needle	11.8					3 - Fair	Remove
320	2709	1524059032	Pseudotsuga menziesii	Douglas-fir	15.5					4 - Poor	Remove
321	2710	1524059032	Thuja plicata	Western red cedar	10.0					4 - Poor	Remove
322	2711	1524059032	Thuja plicata	Western red cedar	11.3					4 - Poor	Remove
323	2707	1524059032	Pseudotsuga menziesii	Douglas-fir	9.3					4 - Poor	Remove
324	2708	1524059032	Pseudotsuga menziesii	Douglas-fir	14.5					4 - Poor	Remove
325	2702	1524059080	Thuja plicata	Western red cedar	15.5					3 - Fair	Remove
326	2698	1524059080	Thuja plicata	Western red cedar	10.8					3 - Fair	Remove
327	2699	1524059080	Thuja plicata	Western red cedar	10.3					3 - Fair	Remove
328	2700	1524059080	Prunus cerasifera	Flowering plum	11.8					3 - Fair	Retain
329	2697	1524059080	Thuja plicata	Western red cedar	16.5					3 - Fair	Remove
330	2716	1524059032	Picea pungens	Colorado spruce	9.5					3 - Fair	Remove
331	2696	1524059080	Thuja plicata	Western red cedar	18.0					3 - Fair	Remove
332	2695	1524059080	Thuja plicata	Western red cedar	20.0					3 - Fair	Remove
333	2694	1524059080	×Hesperotropsis leylandii	Leyland cypress	11.5					3 - Fair	Remove
334	2688	1524059080	×Hesperotropsis leylandii	Leyland cypress	12.0					3 - Fair	Retain
335	2690	1524059080	×Hesperotropsis leylandii	Leyland cypress	9.0					3 - Fair	Retain
336	2722	1524059032	×Hesperotropsis leylandii	Leyland cypress	12.0					3 - Fair	Retain
337	2723	1524059032	×Hesperotropsis leylandii	Leyland cypress	11.8					3 - Fair	Remove
338	2724	1524059032	×Hesperotropsis leylandii	Leyland cypress	11.0					3 - Fair	Remove
339	2726	1524059032	Pinus sylvestris	Scots pine	11.2					4 - Poor	Remove
340	2743	1524059145	Prunus cerasifera	Flowering plum	9.3					3 - Fair	Retain
341	2742	1524059145	Prunus cerasifera	Flowering plum	10.7					3 - Fair	Retain
342	2746	7856640010	Thuja plicata	Western red cedar	17.3					2 - Good	Remove
343	2747	7856640010	Thuja plicata	Western red cedar	13.4					2 - Good	Remove
344	2748	7856640010	Thuja plicata	Western red cedar	16.0					2 - Good	Remove
345	2749	7856640010	Picea pungens	Colorado spruce	8.4					3 - Fair	Remove
346	2817	7856420080	Populus balsamifera	Black cottonwood	13.0					3 - Fair	Remove
347	2820	7856420080	Populus balsamifera	Black cottonwood	15.0					3 - Fair	Remove
348	2819	7856420080	Thuja plicata	Western red cedar	11.0					2 - Good	Remove
349	2821	7856420080	Pseudotsuga menziesii	Douglas-fir	12.3					3 - Fair	Remove
350	2823	7856420080	Thuja plicata	Western red cedar	9.7					3 - Fair	Remove
351	2822	7856420080	Pseudotsuga menziesii	Douglas-fir	9.8					3 - Fair	Remove
352	2824	7856420080	Arbutus menziesii	Pacific madrone	9.5					3 - Fair	Remove
353	2831	7856420050	Salix scouleriana	Scouler's willow	12.5					3 - Fair	Remove
354	2825	7856420080	Pseudotsuga menziesii	Douglas-fir	11.9					4 - Poor	Remove
355	2826	7856420080	Pseudotsuga menziesii	Douglas-fir	8.6					4 - Poor	Remove
356	2826	7856420080	Pseudotsuga menziesii	Douglas-fir	8.6					4 - Poor	Remove
357	2830	7856420080	Arbutus menziesii	Pacific madrone	11.6					3 - Fair	Remove
358	2832	7856420050	Salix scouleriana	Scouler's willow	13.5					3 - Fair	Remove
359	2753	7856640010	Thuja plicata	Western red cedar	22.0					2 - Good	Remove
360	2767	7856640020	Pseudotsuga menziesii	Douglas-fir	17.2					3 - Fair	Remove
361	2756	7856640010	Thuja plicata	Western red cedar	10.4					2 - Good	Remove
362	2762	7856640020	Thuja plicata	Western red cedar	9.7					3 - Fair	Remove
363	2766	7856640020	Pseudotsuga menziesii	Douglas-fir	13.7					3 - Fair	Remove
364	2765	7856640020	Thuja plicata	Western red cedar	11.2					3 - Fair	Remove
365	2772	7856640020	Thuja plicata	Western red cedar	10.1					3 - Fair	Remove

	Tree Tag	Parcel Number	Scientific Name	Common Name	DBH_1	DBH_2	DBH_3	DBH_4	DBH_5	Condition	Remove or Retain?
366	2764	7856640020	Thuja plicata	Western red cedar	9.0					3 - Fair	Remove
367	2768	7856640020	Pseudotsuga menziesii	Douglas-fir	11.6					3 - Fair	Remove
368	2769	7856640020	Pseudotsuga menziesii	Douglas-fir	12.8					3 - Fair	Remove
369	2770	7856640020	Pseudotsuga menziesii	Douglas-fir	13.6					3 - Fair	Remove
370	2775	7856640020	Pseudotsuga menziesii	Douglas-fir	11.7					3 - Fair	Remove
371	2777	7856640020	Thuja plicata	Western red cedar	11.0					3 - Fair	Remove
372	2778	7856640020	Thuja plicata	Western red cedar	8.7					3 - Fair	Remove
373	2779	7856640020	Pseudotsuga menziesii	Douglas-fir	11.3					3 - Fair	Remove
374	2780	7856640020	Pseudotsuga menziesii	Douglas-fir	11.2					3 - Fair	Remove
375	2835	7856420050	Thuja plicata	Western red cedar	23.5					2 - Good	Remove
376	2781	7856640020	Pseudotsuga menziesii	Douglas-fir	9.5					3 - Fair	Remove
377	2782	7856640020	Pseudotsuga menziesii	Douglas-fir	9.9					4 - Poor	Remove
378	2783	7856640020	Pseudotsuga menziesii	Douglas-fir	9.6					4 - Poor	Remove
379	2788	7856640020	Pseudotsuga menziesii	Douglas-fir	9.5					4 - Poor	Remove
380	2786	7856640020	Pinus sylvestris	Scots pine	12.1					4 - Poor	Remove
381	2789	7856640020	Pseudotsuga menziesii	Douglas-fir	17.9					4 - Poor	Remove
382	2790	7856640020	Pseudotsuga menziesii	Douglas-fir	13.2					4 - Poor	Remove
383	2792	7856640020	Pseudotsuga menziesii	Douglas-fir	16.7					4 - Poor	Remove
384	2804	7856640020	Pseudotsuga menziesii	Douglas-fir	24.6					4 - Poor	Remove
385	2795	7856640020	Pseudotsuga menziesii	Douglas-fir	10.3					4 - Poor	Remove
386	2797	7856640020	Pseudotsuga menziesii	Douglas-fir	13.5					4 - Poor	Remove
387	2796	7856640020	Pseudotsuga menziesii	Douglas-fir	11.4					4 - Poor	Remove
388	2803	7856640020	Pseudotsuga menziesii	Douglas-fir	12.6					4 - Poor	Remove
389	2798	7856640020	Thuja plicata	Western red cedar	13.6					4 - Poor	Remove
390	2806	7856640030	Pseudotsuga menziesii	Douglas-fir	16.7					4 - Poor	Remove
391	2802	7856640020	Pseudotsuga menziesii	Douglas-fir	15.5					4 - Poor	Remove
392	2805	7856640030	Pseudotsuga menziesii	Douglas-fir	15.3					4 - Poor	Remove
393	2836	7856420050	Acer macrophyllum	Bigleaf maple	8.6					3 - Fair	Remove
394	2863	7856640430	Tsuga mertensiana	Mountain hemlock	8.3					3 - Fair	Remove
395	2867	7856640430	Prunus cerasifera	Flowering plum	10.5					3 - Fair	Remove
396	2882	7855000230	Prunus serrulata	Japanese flowering cherry	19.0					2 - Good	Retain
397	2877	7856640430	Prunus cerasifera	Flowering plum	8.5					4 - Poor	Remove
398	2868	7856640430	Prunus cerasifera	Flowering plum	11.5					3 - Fair	Remove
399	2869	7856640430	Prunus cerasifera	Flowering plum	9.2					3 - Fair	Remove
400	2872	7856640430	Prunus cerasifera	Flowering plum	10.1					3 - Fair	Remove
401	2881	7855000230	Liquidambar styraciflua	American sweetgum	14.1					3 - Fair	Remove
402	2891	7855000240	×Hesperotropsis leylandii	Leyland cypress	26.0					3 - Fair	Remove
403	2888	7855000240	Callitropsis┬ánootkatensis	Alaska cedar	13.3					3 - Fair	Remove
404	2887	7855000240	Cedrus deodara	Deodar cedar	9.4					3 - Fair	Remove
405	2901	7855000240	Chamaecyparis obtusa	Hinoki Falsecypress	14.1					2 - Good	Retain
406	2885	7855000240	×Hesperotropsis leylandii	Leyland cypress	26.0					2 - Good	Remove
407	2886	7855000240	×Hesperotropsis leylandii	Leyland cypress	22.9					2 - Good	Remove
408	2928	1524059142	Crataegus monogyna	Common hawthorn	10.4					3 - Fair	Remove
409	2934	7855000270	Prunus armeniaca	Apricot	9.0					3 - Fair	Remove
410	2941	1524059142	Pinus nigra	Austrian pine	18.5					4 - Poor	Remove
411	2942	1524059142	Pinus nigra	Austrian pine	19.0					4 - Poor	Remove
412	2944	7855000290	Pinus nigra	Austrian pine	15.5					4 - Poor	Remove
413	2945	7855000290	Pseudotsuga menziesii	Douglas-fir	9.1					4 - Poor	Remove
414	2946	7855000290	Sequoiadendron giganteum	Giant sequoia	31.5					4 - Poor	Remove
415	2947	7855000290	Sequoiadendron giganteum	Giant sequoia	22.5					4 - Poor	Remove
416	2948	7855000290	Sequoiadendron giganteum	Giant sequoia	27.0					4 - Poor	Remove
417	2950	7855000290	Pinus sylvestris	Scots pine	11.0					4 - Poor	Remove
418	3163	7855800120	Malus domestica	Apple	9.0					4 - Poor	Remove
419	3183	7855800140	Prunus domestica	Plum	8.5					3 - Fair	Remove
420	3268	7856410120	Picea pungens	Colorado spruce	14.7					4 - Poor	Remove
421	3431	7855801670	Acer palmatum	Japanese maple	8.4					3 - Fair	Retain
422	3428	7855801670	Picea pungens	Colorado spruce	9.8					4 - Poor	Remove
423	3423	7855801670	Myrica californica	Pacific waxmyrtle	8.4					3 - Fair	Retain
424	3442	7855801680	Pinus nigra	Austrian pine	10.3					3 - Fair	Remove
425	3439	7855801680	Pinus contorta	Shore pine	8.6					3 - Fair	Remove
426	3444	7855801680	Pinus nigra	Austrian pine	12.2					3 - Fair	Remove
427	3504	7855801590	Pinus contorta	Shore pine	18.8					4 - Poor	Remove
428	3506	7855801590	Arbutus menziesii	Pacific madrone	9.0					2 - Good	Remove
429	3449	7855801700	Cornus florida	Flowering dogwood	9.4					3 - Fair	Remove
430	3526	7855801570	Pseudotsuga menziesii	Douglas-fir	9.5					3 - Fair	Remove
431	3543	7855801570	Pseudotsuga menziesii	Douglas-fir	8.5					3 - Fair	Remove
432	3538	7855801570	Pseudotsuga menziesii	Douglas-fir	19.2					3 - Fair	Remove
433	3546	7855801560	Picea pungens	Colorado spruce	13.4					4 - Poor	Remove
434	3547	7855801560	Picea pungens	Colorado spruce	9.5					4 - Poor	Remove
435	3548	7855801560	Picea pungens	Colorado spruce	10.5					4 - Poor	Remove
436	3472	7855801720	Chamaecyparis obtusa	Hinoki Falsecypress	11.0					3 - Fair	Retain
437	3470	7855801720	Chamaecyparis obtusa	Hinoki Falsecypress	9.0					3 - Fair	Remove
438	3549	7855801560	Picea pungens	Colorado spruce	9.4					4 - Poor	Remove

	Tree Tag	Parcel Number	Scientific Name	Common Name	DBH_1	DBH_2	DBH_3	DBH_4	DBH_5	Condition	Remove or Retain?
439	3550	7855801560	Picea pungens	Colorado spruce	12.5					4 - Poor	Remove
440	3477	7855801720	Prunus domestica	Plum	11.0					2 - Good	Remove
441	3552	7855801560	Picea pungens	Colorado spruce	13.3					4 - Poor	Remove
442	3564	7855801550	Liquidambar styraciflua	American sweetgum	11.2					3 - Fair	Remove
443	3563	7855801550	Picea pungens	Colorado spruce	16.4					4 - Poor	Remove
444	3561	7855801550	Picea pungens	Colorado spruce	10.5					4 - Poor	Remove
445	3560	7855801550	Picea pungens	Colorado spruce	14.5					4 - Poor	Remove
446	3559	7855801550	Picea pungens	Colorado spruce	12.1					4 - Poor	Remove
447	3493	7855801730	Malus domestica	Apple	9.7					3 - Fair	Retain
448	3571	7855801550	Arbutus menziesii	Pacific madrone	11.6					3 - Fair	Remove
449	3557	7855801550	Pseudotsuga menziesii	Douglas-fir	18.6					4 - Poor	Remove
450	3558	7855801550	Pseudotsuga menziesii	Douglas-fir	22.1					4 - Poor	Remove
451	3498	7855801740	Prunus domestica	Plum	9.0					4 - Poor	Remove
452	3604	7855801540	Cedrus deodara	Deodar cedar	18.4					4 - Poor	Remove
453	3600	2600010630	Pseudotsuga menziesii	Douglas-fir	23.0					4 - Poor	Remove
454	3599	2600010630	Pseudotsuga menziesii	Douglas-fir	13.5					4 - Poor	Remove
455	3598	2600010630	Pseudotsuga menziesii	Douglas-fir	16.8					4 - Poor	Remove
456	3610	2600010580	Pseudotsuga menziesii	Douglas-fir	10.6					4 - Poor	Remove
457	3612	2600010580	Pseudotsuga menziesii	Douglas-fir	13.0					4 - Poor	Remove
458	3613	2600010580	Pinus nigra	Austrian pine	17.0					4 - Poor	Remove
459	3614	2600010580	Pinus nigra	Austrian pine	11.7					4 - Poor	Remove
460	3615	2600010580	Pinus nigra	Austrian pine	18.0					4 - Poor	Remove
461	3618	2600010580	Pinus nigra	Austrian pine	14.0					4 - Poor	Remove
462	3616	2600010580	Pinus nigra	Austrian pine	10.0					4 - Poor	Remove
463	3617	2600010580	Pinus nigra	Austrian pine	19.0					4 - Poor	Remove
464	3621	2600010670	Pyrus sp.	Pear tree	8.0					3 - Fair	Remove
465	3629	2268400290	Prunus domestica	Plum	9.4					3 - Fair	Retain
466	3626	2268400290	Prunus serrulata	Japanese flowering cherry	12.8					4 - Poor	Retain
467	3636	2268400280	Pinus nigra	Austrian pine	16.5					2 - Good	Remove
468	3639	2268400280	Acer rubrum	Red maple	11.4					3 - Fair	Remove
469	3642	2268400280	Pinus nigra	Austrian pine	10.4					3 - Fair	Remove
470	3643	2268400280	Prunus serrulata	Japanese flowering cherry	8.3					3 - Fair	Retain
471	3650	2268400280	Acer rubrum	Red maple	9.3					3 - Fair	Remove
472	3656	2268400280	Pinus nigra	Austrian pine	12.2					4 - Poor	Remove
473	3660	2268400280	Quercus palustris	Pin oak	8.3					3 - Fair	Remove
474	3662	2268400280	Betula pendula	European white birch	9.2					3 - Fair	Remove
475	441	1951700130	Malus domestica	Apple	9.0					3 - Fair	Remove
476	443	1951700130	Prunus avium	Sweet cherry	12.0					2 - Good	Remove
477	445	1951700120	Prunus avium	Sweet cherry	9.5					3 - Fair	Remove
478	455	1951700010	Malus domestica	Apple	8.0					2 - Good	Retain
479	452	1951700010	Ilex aquifolium	English holly	12.0					3 - Fair	Remove
480	451	1951700010	Prunus cerasifera 'thundercloud'	Cherry plum	16.0					2 - Good	Remove
481	2490	1024059123	Pseudotsuga menziesii	Douglas-fir	19.1					4 - Poor	Remove
482	2492	1024059123	Thuja plicata	Western red cedar	11.3					3 - Fair	Remove
483	8506	1524059080	×Hesperotropsis leylandii	Leyland cypress	8.0	7	6			2 - Good	Remove
484	2840	7856420060	Abies sp.	Fir species	16.8					4 - Poor	Remove
485	2841	7856420060	Thuja plicata	Western red cedar	17.5					3 - Fair	Remove
486	2842	7856420060	Malus domestica	Apple	11.0					3 - Fair	Remove
487	2844	7856420060	Pseudotsuga menziesii	Douglas-fir	11.3					3 - Fair	Remove
488	2851	7856420070	Prunus avium	Sweet cherry	16.0					2 - Good	Remove
489	2852	7856420070	Acer macrophyllum	Bigleaf maple	32.4					3 - Fair	Remove
490	2943	7855000290	Picea pungens	Colorado spruce	17.0					4 - Poor	Remove
491	2944	7855000290	Pinus nigra	Austrian pine	15.5					4 - Poor	Remove
492	2957	7855000300	Prunus domestica	Plum	15.0					2 - Good	Remove
493	2958	7855000300	Prunus domestica	Plum	10.5					2 - Good	Remove
494	2960	7855000310	Crataegus monogyna	Common hawthorn	8.7					3 - Fair	Remove
495	2962	7855000310	Prunus laurocerasus	Cherry laurel	12.5					3 - Fair	Remove
496	2961	7855000310	Malus domestica	Apple	9.3					3 - Fair	Retain
497	2963	7855000310	Prunus lusitanica	Portuguese laurel	10.2					3 - Fair	Remove
498	2964	7856660250	Pseudotsuga menziesii	Douglas-fir	16.1					4 - Poor	Remove
499	2965	7856660250	Arbutus menziesii	Pacific madrone	10.6					2 - Good	Remove
500	2971	7856660250	Salix matsudana 'Tortuosa'	Corkscrew willow	19.0					3 - Fair	Remove
501	2968	7856660250	Arbutus menziesii	Pacific madrone	15.1					4 - Poor	Remove
502	2969	7856660250	Arbutus menziesii	Pacific madrone	8.4					2 - Good	Remove
503	2970	7856660250	Pinus ponderosa	Ponderosa pine	14.2					3 - Fair	Remove
504	2976	7855000325	Prunus serrulata	Japanese flowering cherry	10.2					3 - Fair	Retain
505	2977	7855000325	Prunus cerasifera	Flowering plum	8.8					3 - Fair	Remove
506	2979	7855000325	Prunus cerasifera	Flowering plum	10.4					3 - Fair	Retain
507	2978	7855000325	Laburnum x watereri	Goldenchain Tree	12.2					3 - Fair	Remove
508	2996	7855000360	Picea pungens	Colorado spruce	14.4					3 - Fair	Remove
509	2997	7855000360	Pinus contorta	Shore pine	14.4					3 - Fair	Remove
510	2999	7855000360	Abies sp.	Fir species	8.2					4 - Poor	Remove
511	3002	7855000360	Abies sp.	Fir species	9.4					4 - Poor	Remove

	Tree Tag	Parcel Number	Scientific Name	Common Name	DBH_1	DBH_2	DBH_3	DBH_4	DBH_5	Condition	Remove or Retain?
512	3005	7855000360	Abies sp.	Fir species	9.0					4 - Poor	Remove
513	3006	7855000360	Tsuga mertensiana	Mountain hemlock	9.0					4 - Poor	Remove
514	3008	7855000360	Pinus sylvestris	Scots pine	8.1					4 - Poor	Remove
515	3007	7855000360	Abies sp.	Fir species	9.0					4 - Poor	Remove
516	3014	7855000360	Abies sp.	Fir species	11.9					4 - Poor	Remove
517	3014	7855000360	Abies sp.	Fir species	11.9					4 - Poor	Remove
518	3017	7855000360	Juniperus scopulorum	Rocky Mountain Juniper	8.6					3 - Fair	Remove
519	3023	7855801770	Laburnum x watereri	Goldenchain Tree	9.4					3 - Fair	Remove
520	3027	7855801770	Prunus emarginata	Bitter cherry	13.1					3 - Fair	Retain
521	3028	7855801770	Arbutus menziesii	Pacific madrone	16.5					3 - Fair	Remove
522	3035	7855800010	Pseudotsuga menziesii	Douglas-fir	16.3					4 - Poor	Remove
523	3038	7855800010	Pseudotsuga menziesii	Douglas-fir	10.8					4 - Poor	Remove
524	3037	7855800010	Cedrus deodara	Deodar cedar	14.1					4 - Poor	Remove
525	3039	7855800010	Pseudotsuga menziesii	Douglas-fir	13.9					4 - Poor	Remove
526	3041	7855800010	Pinus sylvestris	Scots pine	11.0					4 - Poor	Remove
527	3032	7855801770	Salix scouleriana	Scouler's willow	17.0					4 - Poor	Remove
528	3031	7855801770	Arbutus menziesii	Pacific madrone	9.0					3 - Fair	Remove
529	3042	7855800010	Pseudotsuga menziesii	Douglas-fir	19.4					4 - Poor	Remove
530	3043	7855800010	Cedrus deodara	Deodar cedar	20.1					4 - Poor	Remove
531	3044	7855800010	Pseudotsuga menziesii	Douglas-fir	20.4					4 - Poor	Remove
532	3045	7855800010	Cedrus deodara	Deodar cedar	21.4					4 - Poor	Remove
533	3046	7855800010	Pseudotsuga menziesii	Douglas-fir	12.9					4 - Poor	Remove
534	3048	7855800010	Pseudotsuga menziesii	Douglas-fir	18.0					4 - Poor	Remove
535	3047	7855800010	Pseudotsuga menziesii	Douglas-fir	20.0					4 - Poor	Remove
536	3049	7856410010	Arbutus menziesii	Pacific madrone	13.1					3 - Fair	Remove
537	3051	7856410010	Pseudotsuga menziesii	Douglas-fir	11.0					4 - Poor	Remove
538	3050	7856410010	Pseudotsuga menziesii	Douglas-fir	13.4					4 - Poor	Remove
539	3054	7856410010	Arbutus menziesii	Pacific madrone	10.0					4 - Poor	Remove
540	3084	7855800020	Arbutus menziesii	Pacific madrone	12.0					3 - Fair	Remove
541	3086	7855800020	Acer macrophyllum	Bigleaf maple	17.2					3 - Fair	Remove
542	3056	7856410010	Pseudotsuga menziesii	Douglas-fir	9.6					4 - Poor	Remove
543	3057	7856410010	Arbutus menziesii	Pacific madrone	12.0					3 - Fair	Remove
544	3055	7856410010	Arbutus menziesii	Pacific madrone	8.0					3 - Fair	Remove
545	3095	7855800030	Pseudotsuga menziesii	Douglas-fir	20.5					4 - Poor	Remove
546	3060	7856410010	Arbutus menziesii	Pacific madrone	10.9					4 - Poor	Remove
547	3094	7855800030	Pseudotsuga menziesii	Douglas-fir	16.5					4 - Poor	Remove
548	3059	7856410010	Arbutus menziesii	Pacific madrone	13.7					3 - Fair	Remove
549	3093	7855800030	Pseudotsuga menziesii	Douglas-fir	15.8					4 - Poor	Remove
550	3097	7855800030	Thuja plicata	Western red cedar	12.9					4 - Poor	Remove
551	3108	7855800040	Picea pungens	Colorado spruce	10.6					4 - Poor	Remove
552	3109	7855800040	Picea pungens	Colorado spruce	13.5					4 - Poor	Remove
553	3096	7855800030	Pseudotsuga menziesii	Douglas-fir	19.0					4 - Poor	Remove
554	3061	7856410010	Cladrastis kentukea	American yellowwood	11.5					3 - Fair	Remove
555	3063	7856410010	Pseudotsuga menziesii	Douglas-fir	22.3					3 - Fair	Remove
556	3062	7856410010	Cladrastis kentukea	American yellowwood	20.0					3 - Fair	Remove
557	3115	7855800040	Pseudotsuga menziesii	Douglas-fir	12.4					4 - Poor	Remove
558	3117	7855800040	Picea pungens	Colorado spruce	11.4					4 - Poor	Remove
559	3114	7855800040	Pseudotsuga menziesii	Douglas-fir	15.1					4 - Poor	Remove
560	3113	7855800040	Pseudotsuga menziesii	Douglas-fir	15.1					4 - Poor	Remove
561	3064	7856410010	Prunus avium	Sweet cherry	9.3					3 - Fair	Remove
562	3102	7855800040	Pseudotsuga menziesii	Douglas-fir	12.7					4 - Poor	Remove
563	3101	7855800040	Pseudotsuga menziesii	Douglas-fir	20.5					4 - Poor	Remove
564	3099	7855800040	Pseudotsuga menziesii	Douglas-fir	12.9					4 - Poor	Remove
565	3100	7855800040	Pseudotsuga menziesii	Douglas-fir	20.8					4 - Poor	Remove
566	3133	7855800050	Pseudotsuga menziesii	Douglas-fir	8.2					4 - Poor	Remove
567	3132	7855800050	Pseudotsuga menziesii	Douglas-fir	10.5					4 - Poor	Remove
568	3068	7856410010	Malus domestica	Apple	9.8					3 - Fair	Remove
569	3128	7855800050	Pseudotsuga menziesii	Douglas-fir	12.0					4 - Poor	Remove
570	3127	7855800050	Pseudotsuga menziesii	Douglas-fir	15.2					4 - Poor	Remove
571	3126	7855800050	Pseudotsuga menziesii	Douglas-fir	8.8					4 - Poor	Remove
572	3124	7855800050	Picea pungens	Colorado spruce	11.7					4 - Poor	Remove
573	3123	7855800050	Pseudotsuga menziesii	Douglas-fir	18.8					4 - Poor	Remove
574	3119	7855800050	Pseudotsuga menziesii	Douglas-fir	20.0					4 - Poor	Remove
575	3122	7855800050	Pseudotsuga menziesii	Douglas-fir	14.0					4 - Poor	Remove
576	2993	7855800060	Prunus cerasifera	Flowering plum	13.0					3 - Fair	Retain
577	3070	7856410010	Pseudotsuga menziesii	Douglas-fir	16.5					4 - Poor	Remove
578	2994	7855800060	Picea sp.	Spruce species	8.0					3 - Fair	Remove
579	2984	7855800060	Cedrus deodara	Deodar cedar	14.6					4 - Poor	Remove
580	2988	7855800060	Pseudotsuga menziesii	Douglas-fir	11.6					4 - Poor	Remove
581	2983	7855800060	Cedrus deodara	Deodar cedar	11.2					4 - Poor	Remove
582	2981	7855800060	Sequoiadendron giganteum	Giant sequoia	34.0					3 - Fair	Remove
583	2980	7855800060	Sequoiadendron giganteum	Giant sequoia	32.7					3 - Fair	Remove
584	3071	7856410020	Pseudotsuga menziesii	Douglas-fir	12.3					3 - Fair	Remove

	Tree Tag	Parcel Number	Scientific Name	Common Name	DBH_1	DBH_2	DBH_3	DBH_4	DBH_5	Condition	Remove or Retain?
585	3070	7856410010	Pseudotsuga menziesii	Douglas-fir	16.5					4 - Poor	Remove
586	3144	7855800080	Abies pinsapo	Spanish fir	9.9					3 - Fair	Remove
587	3145	7855800080	Prunus cerasifera	Flowering plum	15.0					4 - Poor	Retain
588	3208	7856410060	Prunus serrulata	Japanese flowering cherry	14.2					4 - Poor	Remove
589	3207	7856410060	Malus domestica	Apple	10.6					3 - Fair	Remove
590	3205	7856410060	Prunus avium	Sweet cherry	11.8					3 - Fair	Remove
591	3203	7856410060	Picea pungens	Colorado spruce	11.0					4 - Poor	Remove
592	3154	7855800110	Prunus domestica	Plum	9.1					3 - Fair	Remove
593	3156	7855800110	Malus domestica	Apple	8.3					3 - Fair	Retain
594	3160	7855800120	Pseudotsuga menziesii	Douglas-fir	23.5					4 - Poor	Remove
595	3161	7855800120	Cedrus deodara	Deodar cedar	24.9					4 - Poor	Remove
596	3219	7856410080	Magnolia	Loebner Magnolia	9.1					3 - Fair	Remove
597	3162	7855800120	Cedrus deodara	Deodar cedar	21.7					4 - Poor	Remove
598	3235	7856410090	Prunus domestica	Plum	12.0					3 - Fair	Remove
599	3263	7856410120	Prunus avium	Sweet cherry	13.4					4 - Poor	Remove
600	3802	2124059001	Alnus rubra	Red alder	10.2					4 - Poor	Remove
601	3786	2124059001	Salix lasiandra	Pacific willow	8.4					3 - Fair	Retain
602	214	2124059001	Pseudotsuga menziesii	Douglas-fir	19.0					3 - Fair	Remove
603	213	2124059001	Thuja plicata	Western red cedar	9.0					3 - Fair	Remove
604	3788	2124059001	Acer macrophyllum	Bigleaf maple	12.0					4 - Poor	Remove
605	3790	2124059001	Acer macrophyllum	Bigleaf maple	16.2					4 - Poor	Remove
606	220	2124059001	Acer platanoides	Norway maple	12.0					3 - Fair	Remove
607	221	2124059001	Calocedrus decurrens	Incense cedar	14.5					3 - Fair	Remove
608	222	2124059001	Thuja plicata	Western red cedar	17.0					2 - Good	Remove
609	223	2124059001	Betula pendula	European white birch	13.5					3 - Fair	Remove
610	224	2124059001	Thuja plicata	Western red cedar	14.0					2 - Good	Remove
611	226	2124059001	Pseudotsuga menziesii	Douglas-fir	11.0					2 - Good	Remove
612	225	2124059001	Acer macrophyllum	Bigleaf maple	8.5					2 - Good	Remove
613	234	2124059001	Alnus rubra	Red alder	8.5					2 - Good	Remove
614	228	2124059001	Pseudotsuga menziesii	Douglas-fir	13.5					3 - Fair	Remove
615	308	6071900180	Thuja plicata	Western red cedar	18.5					4 - Poor	Remove
616	309	6071900180	Ilex aquifolium	English holly	8.0					4 - Poor	Retain
617	303	6071900140	Fagus sylvatica 'purpurea'	European beech (purple)	29.0					3 - Fair	Remove
618	304	6071900150	Thuja plicata	Western red cedar	29.0					4 - Poor	Remove
619	306	6071900160	Pseudotsuga menziesii	Douglas-fir	34.5					2 - Good	Retain
620	305	6071900160	Thuja plicata	Western red cedar	27.5					4 - Poor	Remove
621	301	6071900140	Acer platanoides	Norway maple	11.0					3 - Fair	Remove
622	300	6071900140	Pinus sylvestris	Scots pine	16.5					4 - Poor	Remove
623	297	6071900130	Malus domestica	Apple	8.0					3 - Fair	Remove
624	333	6072200350	Prunus sp.	Plum or cherry	14.5					2 - Good	Remove
625	326	6072200350	Malus domestica	Apple	12.5					3 - Fair	Remove
626	330	6072200350	Prunus sp.	Plum or cherry	11.0					2 - Good	Remove
627	337	6072200360	Magnolia grandiflora	Southern Magnolia	18.0					2 - Good	Remove
628	336	6072200360	×Hesperotropsis leylandii	Leyland cypress	9.0					2 - Good	Retain
629	338	6072200360	×Hesperotropsis leylandii	Leyland cypress	9.0					2 - Good	Remove
630	342	6072200360	×Hesperotropsis leylandii	Leyland cypress	11.0					2 - Good	Remove
631	344	6072200360	×Hesperotropsis leylandii	Leyland cypress	14.0					2 - Good	Remove
632	347	6072200370	Malus sp. <flowering>	Flowering crabapple	10.0					2 - Good	Remove
633	352	6072200370	Malus sp. <flowering>	Flowering crabapple	8.5					2 - Good	Retain
634	353	6072200380	Prunus sp.	Plum or cherry	10.0					3 - Fair	Remove
635	364	6072200400	Cornus sp.	Ornamental dogwood	11.0					2 - Good	Remove
636	365	6072200400	Prunus avium	Sweet cherry	11.5					3 - Fair	Remove
637	369	6072200410	Acer palmatum	Japanese maple	9.0					2 - Good	Remove
638	368	6072200410	Prunus serrulata	Japanese flowering cherry	18.0					2 - Good	Remove
639	371	6072200410	Malus domestica	Apple	11.0					3 - Fair	Remove
640	370	6072200410	Malus domestica	Apple	11.5					3 - Fair	Remove
641	373	6072200410	Magnolia	Loebner Magnolia	9.5					3 - Fair	Retain
642	377	6072200420	Ilex aquifolium	English holly	14.0					3 - Fair	Retain
643	378	6072200420	Corylus avellana	European filbert	15.5					2 - Good	Retain
644	376	6072200420	Acer platanoides	Norway maple	25.0					2 - Good	Remove
645	381	6072200430	Pseudotsuga menziesii	Douglas-fir	25.0					4 - Poor	Remove
646	381	6072200430	Pseudotsuga menziesii	Douglas-fir	25.0					4 - Poor	Remove
647	379	6072200420	Fagus sylvatica 'purpurea'	European beech (purple)	21.0					2 - Good	Remove
648	384	6072200430	Magnolia grandiflora	Southern Magnolia	8.0					2 - Good	Remove
649	404	6072200440	Abies alba	European silver fir	19.5					4 - Poor	Remove
650	394	6072200440	Malus domestica	Apple	11.5	6.5				3 - Fair	Remove
651	397	6072200440	Tsuga heterophylla	Western hemlock	19.0					3 - Fair	Remove
652	407	6072200440	Abies alba	European silver fir	12.5					4 - Poor	Remove
653	403	6072200440	Abies alba	European silver fir	17.0					3 - Fair	Remove
654	398	6072200440	Tsuga heterophylla	Western hemlock	16.0					3 - Fair	Remove
655	399	6072200440	Abies alba	European silver fir	8.5					3 - Fair	Remove
656	400	6072200440	Abies alba	European silver fir	12.5					3 - Fair	Remove
657	402	6072200440	Abies alba	European silver fir	13.5					3 - Fair	Remove

	Tree Tag	Parcel Number	Scientific Name	Common Name	DBH_1	DBH_2	DBH_3	DBH_4	DBH_5	Condition	Remove or Retain?
658	401	6072200440	Abies alba	European silver fir	12.0					4 - Poor	Remove
659	406	6072200440	Abies alba	European silver fir	15.0					3 - Fair	Remove
660	405	6072200440	Abies alba	European silver fir	18.0					3 - Fair	Remove
661	410	6072200440	Prunus avium	Sweet cherry	13.0					3 - Fair	Remove
662	411	6072200440	Malus domestica	Apple	12.0					3 - Fair	Remove
663	414	6072200440	Thuja plicata	Western red cedar	14.0					3 - Fair	Remove
664	420	6072200440	Thuja plicata	Western red cedar	32.0					3 - Fair	Remove
665	422	6072200440	Pinus nigra	Austrian pine	16.0					3 - Fair	Remove
666	421	6072200440	Thuja plicata	Western red cedar	22.0					3 - Fair	Remove
667	414	6072200440	Thuja plicata	Western red cedar	14.0					3 - Fair	Remove
668	415	6072200440	Thuja plicata	Western red cedar	15.0	13				3 - Fair	Remove
669	416	6072200440	Thuja plicata	Western red cedar	9.0					3 - Fair	Remove
670	418	6072200440	Thuja plicata	Western red cedar	16.0					4 - Poor	Remove
671	425	6072200450	Acer palmatum	Japanese maple	17.5					2 - Good	Remove
672	428	1951700140	Prunus avium	Sweet cherry	10.0					1 - Excellent	Remove
673	431	1951700130	Pseudotsuga menziesii	Douglas-fir	21.0					4 - Poor	Remove
674	432	1951700130	Pseudotsuga menziesii	Douglas-fir	15.5					4 - Poor	Remove
675	433	1951700130	Pseudotsuga menziesii	Douglas-fir	21.0					4 - Poor	Remove
676	504	1951700800	Ilex aquifolium	English holly	10.0	3	3	3	3	2 - Good	Remove
677	468	1951700800	Aesculus californica	California buckeye	10.0					3 - Fair	Retain
678	467	1951700800	Aesculus californica	California buckeye	8.5					3 - Fair	Retain
679	456	1951700800	Robinia pseudoacacia	Black locust	12.5					3 - Fair	Remove
680	466	1951700800	Aesculus californica	California buckeye	10.0					3 - Fair	Retain
681	465	1951700800	Aesculus californica	California buckeye	12.0					3 - Fair	Retain
682	458	1951700800	Prunus avium	Sweet cherry	8.0					3 - Fair	Remove
683	460	1951700800	Prunus avium	Sweet cherry	13.0					3 - Fair	Remove
684	461	1951700800	Sciadopitys verticillata	Umbrella pine	11.0					3 - Fair	Remove
685	513	1951700790	Malus domestica	Apple	8.0					2 - Good	Remove
686	528	1951700780	Thuja occidentalis	Eastern arborvitae	12.0					2 - Good	Remove
687	529	1951700780	Thuja occidentalis	Eastern arborvitae	9.0					2 - Good	Remove
688	527	1951700780	Thuja occidentalis	Eastern arborvitae	9.0					2 - Good	Remove
689	531	1951700780	Thuja occidentalis	Eastern arborvitae	9.0					2 - Good	Remove
690	530	1951700780	Thuja occidentalis	Eastern arborvitae	8.0					2 - Good	Remove
691	517	1951700780	Prunus sp.	Plum or cherry	11.0					2 - Good	Remove
692	534	1951700770	Prunus avium	Sweet cherry	13.0					3 - Fair	Remove
693	538	6308000370	Pseudotsuga menziesii	Douglas-fir	10.0					4 - Poor	Remove
694	537	6308000370	Picea sp.	Spruce species	10.5					4 - Poor	Remove
695	536	6308000370	Picea sp.	Spruce species	11.0					4 - Poor	Remove
696	535	6308000370	Pseudotsuga menziesii	Douglas-fir	13.0					3 - Fair	Remove
697	549	1951700740	Thuja plicata	Western red cedar	32.0					4 - Poor	Remove
698	550	1951700740	Pseudotsuga menziesii	Douglas-fir	24.0					4 - Poor	Remove
699	551	1951700740	Abies grandis	Grand fir	15.5					4 - Poor	Remove
700	552	1951700740	Picea sp.	Spruce species	12.0					4 - Poor	Remove
701	556	1951700740	Thuja plicata	Western red cedar	9.5					3 - Fair	Remove
702	562	1951700740	Tsuga heterophylla	Western hemlock	14.0					4 - Poor	Remove
703	563	1951700740	Tsuga heterophylla	Western hemlock	12.0					4 - Poor	Remove
704	564	1951700740	Thuja plicata	Western red cedar	15.5					4 - Poor	Remove
705	565	1951700740	Thuja plicata	Western red cedar	10.5					4 - Poor	Remove
706	566	1951700740	Thuja plicata	Western red cedar	14.0					4 - Poor	Remove
707	572	1951810080	Pseudotsuga menziesii	Douglas-fir	10.0					4 - Poor	Remove
708	567	1951700740	Malus domestica	Apple	11.0					3 - Fair	Retain
709	569	1951810080	Thuja sp.	Cedar species	9.0					2 - Good	Retain
710	578	1951810090	Pyrus pyrifolia	Asian pear	8.8					3 - Fair	Retain
711	581	1951810090	Salix lasiandra	Pacific willow	10.0					3 - Fair	Remove
712	580	1951810090	Salix lasiandra	Pacific willow	17.0					3 - Fair	Remove
713	577	1951810090	Pseudotsuga menziesii	Douglas-fir	24.4					3 - Fair	Remove
714	616	1951810110	Thuja occidentalis	Eastern arborvitae	8.0					2 - Good	Remove
715	615	1951810110	Thuja occidentalis	Eastern arborvitae	8.0					2 - Good	Remove
716	614	1951810110	Thuja occidentalis	Eastern arborvitae	8.0					2 - Good	Remove
717	705	1951810120	Betula pendula	European white birch	8.8					2 - Good	Remove
718	666	1951830100	Pseudotsuga menziesii	Douglas-fir	8.4					3 - Fair	Remove
719	663	1951830100	Abies grandis	Grand fir	15.8					4 - Poor	Remove
720	662	1951830100	Pinus nigra	Austrian pine	15.5					3 - Fair	Remove
721	661	1951830100	Pinus nigra	Austrian pine	13.2					3 - Fair	Remove
722	660	1951830100	Pinus nigra	Austrian pine	19.5					3 - Fair	Remove
723	659	1951830100	Prunus cerasifera	Flowering plum	11.4					3 - Fair	Remove
724	683	1951830050	Tsuga heterophylla	Western hemlock	8.3					3 - Fair	Remove
725	687	1951830050	Acer platanoides 'Crimson King'	Norway maple 'Crimson King'	8.8					3 - Fair	Remove
726	692	1951830050	Callitropsis┬ánootkatensis	Alaska cedar	9.0					3 - Fair	Remove
727	3883	1024059130	Acer macrophyllum	Bigleaf maple	11.0					2 - Good	Retain
728	3882	1024059130	Alnus rubra	Red alder	12.0	10	9	7		4 - Poor	Remove
729	3865	1024059130	Alnus rubra	Red alder	11.0	9				3 - Fair	Remove
730	85	1024059089	Salix babylonica	Weeping willow	10.0					3 - Fair	Retain

	Tree Tag	Parcel Number	Scientific Name	Common Name	DBH_1	DBH_2	DBH_3	DBH_4	DBH_5	Condition	Remove or Retain?
731	3872	1024059130	Alnus rubra	Red alder	12.0					3 - Fair	Remove
732	3871	1024059130	Alnus rubra	Red alder	10.0					3 - Fair	Remove
733	3870	1024059130	Alnus rubra	Red alder	10.5					3 - Fair	Remove
734	3869	1024059130	Alnus rubra	Red alder	10.0					3 - Fair	Remove
735	3866	1024059130	Alnus rubra	Red alder	12.5	9				3 - Fair	Remove
736	3868	1024059130	Alnus rubra	Red alder	14.5					3 - Fair	Remove
737	94	3425059010	×Hesperotropsis leylandii	Leyland cypress	10.0					2 - Good	Remove
738	93	3425059010	×Hesperotropsis leylandii	Leyland cypress	9.0					2 - Good	Remove
739	31	3425059010	×Hesperotropsis leylandii	Leyland cypress	10.0					2 - Good	Remove
740	89	3425059010	×Hesperotropsis leylandii	Leyland cypress	8.0					2 - Good	Remove
741	92	3425059010	×Hesperotropsis leylandii	Leyland cypress	9.0					2 - Good	Remove
742	3875	1024059130	Alnus rubra	Red alder	8.0					4 - Poor	Remove
743	32	3425059010	×Hesperotropsis leylandii	Leyland cypress	14.0					2 - Good	Remove
744	3874	1024059130	Alnus rubra	Red alder	12.0					4 - Poor	Remove
745	3873	1024059130	Alnus rubra	Red alder	10.0					4 - Poor	Remove
746	71	1024059119	Salix babylonica	Weeping willow	20.0					3 - Fair	Retain
747	70	2225059272	Pseudotsuga menziesii	Douglas-fir	13.0					4 - Poor	Remove
748	3906	1024059130	Acer macrophyllum	Bigleaf maple	10.0					2 - Good	Retain
749	3902	1024059130	Alnus rubra	Red alder	9.0					3 - Fair	Retain
750	3898	1024059130	Alnus rubra	Red alder	9.5					3 - Fair	Retain
751	2148	7811210180	Pseudotsuga menziesii	Douglas-fir	13.3					4 - Poor	Retain
752	3899	1024059130	Salix lasiandra	Pacific willow	12.0	6				3 - Fair	Retain
753	3900	1024059130	Salix lasiandra	Pacific willow	14.0	12	10			3 - Fair	Retain
754	3904	1024059130	Alnus rubra	Red alder	9.0					3 - Fair	Retain
755	2263	0324059066	Alnus rubra	Red alder	9.2					2 - Good	Retain
756	3908	1024059130	Acer macrophyllum	Bigleaf maple	18.0					3 - Fair	Retain
757	3907	1024059130	Acer macrophyllum	Bigleaf maple	9.8					3 - Fair	Retain
758	3911	1024059130	Alnus rubra	Red alder	12.0					4 - Poor	Remove
759	3910	1024059130	Arbutus menziesii	Pacific madrone	10.0					2 - Good	Remove
760	2295	0324059066	Alnus rubra	Red alder	8.4					3 - Fair	Retain
761	2296	3425059010	×Hesperotropsis leylandii	Leyland cypress	14.0					2 - Good	Remove
762	2297	3425059010	×Hesperotropsis leylandii	Leyland cypress	14.0					2 - Good	Remove
763	2298	3425059010	×Hesperotropsis leylandii	Leyland cypress	18.0					2 - Good	Remove
764	2299	3425059010	×Hesperotropsis leylandii	Leyland cypress	12.5					2 - Good	Remove
765	3347	1024059130	Alnus rubra	Red alder	9.0					3 - Fair	Retain
766	2153	7811210180	×Hesperotropsis leylandii	Leyland cypress	8.8					3 - Fair	Retain
767	2154	7811210180	Prunus serrulata	Japanese flowering cherry	8.6					3 - Fair	Retain
768	3884	1024059130	Alnus rubra	Red alder	9.0					2 - Good	Remove
769	3885	1024059130	Alnus rubra	Red alder	8.0					4 - Poor	Retain
770	3886	1024059130	Alnus rubra	Red alder	8.9					4 - Poor	Retain
771	3887	1024059130	Alnus rubra	Red alder	9.0					3 - Fair	Retain
772	3889	1024059130	Alnus rubra	Red alder	11.0	5				3 - Fair	Retain
773	3888	1024059130	Alnus rubra	Red alder	8.5					3 - Fair	Retain
774	3894	1024059130	Alnus rubra	Red alder	8.0					3 - Fair	Retain
775	3893	1024059130	Acer macrophyllum	Bigleaf maple	8.0					3 - Fair	Retain
776	3892	1024059130	Alnus rubra	Red alder	9.0	4				3 - Fair	Retain
777	3891	1024059130	Alnus rubra	Red alder	11.0					3 - Fair	Retain
778	3895	1024059130	Acer macrophyllum	Bigleaf maple	10.0					2 - Good	Retain
779	3881	1024059130	Acer macrophyllum	Bigleaf maple	10.0					2 - Good	Retain
780	3890	1024059130	Alnus rubra	Red alder	10.0	8				3 - Fair	Retain
781	3896	1024059130	Alnus rubra	Red alder	14.0					3 - Fair	Retain
782	3897	1024059130	Alnus rubra	Red alder	9.0					3 - Fair	Retain
783	3348	1024059130	Alnus rubra	Red alder	8.0	5				3 - Fair	Retain
784	3350	1024059130	Alnus rubra	Red alder	12.0	11				3 - Fair	Retain
785	3349	1024059130	Alnus rubra	Red alder	8.0	8				3 - Fair	Retain
786	3352	1024059130	Alnus rubra	Red alder	9.0	8				3 - Fair	Retain
787	3353	1024059130	Alnus rubra	Red alder	10.0	8	6	5		3 - Fair	Retain
788	3354	1024059130	Alnus rubra	Red alder	8.0	7				3 - Fair	Retain
789	3355	1024059130	Alnus rubra	Red alder	9.0					3 - Fair	Retain
790	3356	1024059130	Alnus rubra	Red alder	10.0					3 - Fair	Retain
791	3357	1024059130	Alnus rubra	Red alder	9.0					3 - Fair	Retain
792	33	9538900020	Malus domestica	Apple	8.0					2 - Good	Remove
793	46	9538900030	Prunus serrulata	Japanese flowering cherry	13.7					3 - Fair	Remove
794	48	9538900020	Malus domestica	Apple	11.1					3 - Fair	Retain
795	2655	1524059005	Quercus palustris	Pin oak	13.2					2 - Good	Retain
796	2677	1524059005	Pinus pungens	Table mountain pine	10.8					3 - Fair	Retain
797	2714	1524059032	Pinus nigra	Austrian pine	12.7					2 - Good	Retain
798	2562	2206500240	Malus domestica	Apple	12.4					3 - Fair	Retain
799	2531	1024059123	Populus balsamifera	Black cottonwood	9.0					4 - Poor	Retain
800	2758	7856640010	Thuja plicata	Western red cedar	8.4					3 - Fair	Retain
801	2760	7856640020	Pseudotsuga menziesii	Douglas-fir	12.4					3 - Fair	Retain
802	2787	7856640020	Thuja plicata	Western red cedar	10.8					4 - Poor	Retain
803	2776	7856640020	Prunus avium	Sweet cherry	11.8					3 - Fair	Retain

	Tree Tag	Parcel Number	Scientific Name	Common Name	DBH_1	DBH_2	DBH_3	DBH_4	DBH_5	Condition	Remove or Retain?
804	2800	7856640020	Pseudotsuga menziesii	Douglas-fir	14.6					4 - Poor	Retain
805	2801	7856640020	Acer macrophyllum	Bigleaf maple	8.0					4 - Poor	Retain
806	2815	7856640030	Acer macrophyllum	Bigleaf maple	8.6					3 - Fair	Retain
807	2814	7856640030	Acer macrophyllum	Bigleaf maple	10.2					3 - Fair	Retain
808	3609	2600010580	Pseudotsuga menziesii	Douglas-fir	16.6					4 - Poor	Retain
809	3575	2600010620	Cedrus deodara	Deodar cedar	19.8					4 - Poor	Retain
810	3574	2600010620	Cedrus deodara	Deodar cedar	16.7					4 - Poor	Retain
811	3579	2600010620	Cedrus deodara	Deodar cedar	26.0					4 - Poor	Retain
812	3584	2600010620	Acer macrophyllum	Bigleaf maple	9.0					3 - Fair	Retain
813	3587	2600010630	Arbutus menziesii	Pacific madrone	10.9					3 - Fair	Retain
814	3588	2600010630	Acer macrophyllum	Bigleaf maple	8.6					2 - Good	Retain
815	3591	2600010630	Pseudotsuga menziesii	Douglas-fir	9.0					4 - Poor	Retain
816	3592	2600010630	Pseudotsuga menziesii	Douglas-fir	15.5					4 - Poor	Retain
817	3603	7855801540	Acer platanoides	Norway maple	13.1					3 - Fair	Retain
818	3602	7855801540	Acer platanoides	Norway maple	12.0					3 - Fair	Retain
819	440	1951700130	Thuja plicata	Western red cedar	28.5					2 - Good	Retain
820	568	1951810080	Populus balsamifera	Black cottonwood	47.0	34				2 - Good	Retain
821	620	1951810120	Betula pendula	European white birch	10.1					2 - Good	Remove
822	256	2124059001	Alnus rubra	Red alder	8.5					2 - Good	Retain
823	241	2124059001	Pseudotsuga menziesii	Douglas-fir	11.0					3 - Fair	Remove
824	237	2124059001	Alnus rubra	Red alder	9.5					2 - Good	Remove
825	218	2124059001	Acer platanoides	Norway maple	9.5					3 - Fair	Remove
826	219	2124059001	Acer platanoides	Norway maple	12.0					3 - Fair	Retain
827	3785	2124059001	Pseudotsuga menziesii	Douglas-fir	9.3					4 - Poor	Retain
828	3784	2124059001	Alnus rubra	Red alder	11.1					3 - Fair	Retain
829	3783	2124059001	Alnus rubra	Red alder	11.8					3 - Fair	Retain
830	3780	2124059001	Alnus rubra	Red alder	9.3					3 - Fair	Retain
831	3782	2124059001	Alnus rubra	Red alder	12.1					3 - Fair	Retain
832	3787	2124059001	Salix lasiandra	Pacific willow	9.7					4 - Poor	Retain
833	3792	2124059001	Acer macrophyllum	Bigleaf maple	13.0					4 - Poor	Remove
834	3794	2124059001	Alnus rubra	Red alder	9.3					4 - Poor	Retain
835	3793	2124059001	Acer macrophyllum	Bigleaf maple	11.0					4 - Poor	Remove
836	3797	2124059001	Alnus rubra	Red alder	12.7					4 - Poor	Retain
837	3798	2124059001	Acer macrophyllum	Bigleaf maple	11.7					3 - Fair	Retain
838	3789	2124059001	Alnus rubra	Red alder	16.0					3 - Fair	Retain
839	665	1951830100	Salix scouleriana	Scouler's willow	12.9					2 - Good	Remove
840	694	1951830100	Salix scouleriana	Scouler's willow	8.0					3 - Fair	Retain
841	335	6072200360	Juniperus communis	Common juniper	23.0					3 - Fair	Retain
842	375	6072200410	Picea pungens var. glauca	Colorado blue spruce	19.0					2 - Good	Remove
843	392	6072200440	Pinus nigra	Austrian pine	16.0					4 - Poor	Remove
844	3089	7855800030	Arbutus menziesii	Pacific madrone	16.7					3 - Fair	Retain
845	3103	7855800040	Pseudotsuga menziesii	Douglas-fir	19.5					4 - Poor	Remove
846	3106	7855800040	Pseudotsuga menziesii	Douglas-fir	12.2					4 - Poor	Retain
847	3107	7855800040	Pseudotsuga menziesii	Douglas-fir	17.6					4 - Poor	Retain
848	3058	7856410010	Pinus contorta	Shore pine	9.3					4 - Poor	Retain
849	3337	7856410100	Pinus thunbergii	Japanese black pine	15.3					2 - Good	Remove
850	2959	7855000310	Chamaecyparis lawsoniana	Lawson falsecypress	12.5					2 - Good	Remove

Field inventory completed on October 13, 2016, and includes trees that may have been removed by others since that time.

PUGET SOUND ENERGY
The Energy To Do Great Things

Puget Sound Energy
P.O. Box 97034
Bellevue, WA 98009-9734

PSE.com

October 17, 2018

Heidi Bedwell, Environmental Planning Manager
City of Bellevue
450 110th Avenue NE
Bellevue, WA 98004

RE: South Bellevue Segment Energize Eastside – Response to Technical Review Letter, Part 3
Conditional Use (File# 17-120556-LB)
Critical Areas Land Use Permit (File #17-120557-LO)

Dear Ms. Bedwell:

Puget Sound Energy, Inc. (PSE) provides the following responses to the City of Bellevue's (City's) August 14th, 2018, letter requesting additional information on the above referenced permit applications. The response is specific to Tree Removal and Vegetation Management.

Land Use Review Comments - Tree Removal and Vegetation Management:

Requirements

The Federal Energy Regulatory Commission (FERC) has certified the National Energy Regulatory Corporation (NERC) as the electric reliability organization who establishes legally enforceable mandatory standards for the U.S. bulk power system. PSE is required by NERC standards to maintain safe clearances between vegetation and utility lines. Specifically, NERC FAC-003-4 (Transmission Vegetation Management) sets forth the vegetation management requirements for transmission lines operated above 200 kV.

Under NERC FAC-003-4, PSE must manage vegetation to prevent encroachments into the Minimum Vegetation Clearance Distance (MVCD) of its applicable line(s). Since the Energize Eastside Project entails replacing the existing 115 kV lines with 230 kV lines, the upgraded transmission lines must comply with the NERC standard and PSE's 230 kV vegetation management standard, which generally require the removal of trees with an expected mature height of more than 15 feet from the wire zone. Management of trees within the transmission right of way may also be required depending on tree species, tree health, distance from the wires, and topography.

Using GIS modeling that uses the above referenced standards, it has been estimated that there are approximately 550 significant trees that do not meet the NERC and PSE vegetation management standards in Bellevue – south segment. Also, it is important to note that these trees are already located within an existing and managed transmission line corridor. Further, more than 80 percent of these trees

are in poor to fair condition. The original tree inventory field work was completed on October 13, 2016, and includes trees that may have been removed by entities other than PSE since that time. Additionally, the GIS modeling estimate does not account for additional trees that may now be regulated as significant trees due to growth since the original inventory. Some of these trees that are now classified as significant are expected to require removal. It is estimated that those trees plus those confirmed during recent property owner meetings (see below) equate to around 579 significant trees that are expected to be removed for the project.

Private Property

Removal of trees associated with transmission lines, especially when upgrading within an existing transmission line corridor, is typically a dynamic process. One factor that can influence the removal determination process is the various access limitations that can arise along the corridor during the planning and design phase of a project. As stated previously, an initial tree inventory and GIS modeling were performed as the basis for evaluation during the EIS process and used to develop PSE's permit application materials.

Using the data collected during the tree inventory work, the Vegetation Impact Analysis (VIA) identified an estimated number of trees that are anticipated for removal in the corridor. Since collection of the data and subsequent analysis, PSE has been inviting property owners to meet and discuss vegetation replacement options. At the property owner meetings, project staff shares the current project design and gathers the property owners' input on how their respective properties can be replanted. Project staff shares an Energize Eastside-specific plant palette (see attached), a reference guide of compatible replacement vegetation, and asks property owners to share their preferences. Also during meetings with property owners, PSE re-confirms, and if necessary, updates the original tree inventory data. Our project staff then uses the tree inventory data (which is field verified during the site visit), each property owner's preferences for compatible vegetation, and the project-specific plant palette to evaluate and develop replacement options for each property.

Using these tools, combined with discussions with the property owners, information is gathered that will help inform the development of a Draft Landscape and Tree Replacement Plan (see sample). The modeling data is then reviewed and the trees are further assessed to determine if removal is required. Typical factors that affect the removal determination are field-confirmed tree sub-species or variety, property specific topography, and existing physical form and current maintenance activities (e.g., a specific variety of fruit tree that is regularly maintained would not be expected to reach its maximum potential height and therefore would not need to be removed).

Following the initial property owner meeting, project staff develops the property specific Draft Landscape and Tree Replacement Plan. Project staff then schedules a second meeting with each affected property owner to share and discuss the draft plan for their property. During the second meeting, the plan is reviewed carefully with the property owner and changes, if necessary, are discussed and documented.

PSE's approach is to encourage property owners to incorporate additional trees into their landscape and tree replacement plans; however, PSE cannot require property owners to do so. While some property owners take this as an opportunity to add additional trees to their properties, others decline the offer of any replacement trees. As of the end of September 2018, PSE has met with approximately 45% of the property owners who are expected to have vegetation changes along the route in Bellevue – south segment.

PSE anticipates that a number of trees cannot be replaced onsite due to property owners' preferences. In those cases replacement trees will need to be planted outside the corridor. One benefit of offsite planting is the option to plant larger trees, which contribute to habitat quality, tree canopy, and area aesthetics. Offsite options that PSE has considered include city parks, neighborhood groups/HOAs, and other developments within the City.

PSE reviewed the number of significant trees located on private property. Table 1 indicates the number of these trees that are in critical areas, buffers, and structure setbacks.

Table 1
Private Property Significant Trees Proposed for Removal

	Non-Critical Areas	Critical Areas[1]	Buffers[2]	Setback[3]	Total
Private Property	240	44	98	102	484

1. Includes wetlands, streams, steep slope and landslide geologic hazard areas, and flood hazard areas (100-year floodplain).
2. "Buffers" includes the standard buffers for wetlands and streams and a 50-foot top-of-slope buffer for steep slopes and landslide geologic hazard areas.
3. Structure setbacks includes a 15-foot structure setback for wetlands and streams and a 75-foot toe-of-slope setback for steep slopes and landslide geologic hazard areas.

Rights-of-Way and City Property

Based on permitting requirements for past PSE projects in Bellevue, the methods outlined in the Council of Tree and Landscape Appraisers, *Guide for Plant Appraisal* have been used to assess the value of trees that required removal from the City's rights-of-way (ROW). PSE proposes to use the City's previous tree valuation approach for Energize Eastside. PSE will provide appraised values of significant ROW trees to the City for approval based on the 10th Edition of the *Guide for Plant Appraisal*.

PSE reviewed the number of trees located in public ROW and on City owned properties. Table 2 indicates the number of significant trees within ROW and City owned properties that are in critical areas, buffers, and structure setbacks. It is important to note that most of these trees have been included in PSE's ongoing vegetation management within the existing transmission line corridor that has been operational for around 80 years. Unlike the trees located within the public ROW, trees located on City owned properties are subject to PSE's easements that predate the City's incorporation. Therefore, trees on private property and city owned property are only eligible for replacement. The tree removal plans for trees in ROW and on City properties are attached.

Table 2
ROW and City Property Trees Proposed for Removal

	Non-Critical Areas	Critical Areas[1]	Buffers[2]	Setback[3]	Total
ROW	32	23	0	11	66
City Property	6	6	9	8	29

1. Includes wetlands, streams, steep slope and landslide geologic hazard areas, and flood hazard areas (100-year floodplain).
2. "Buffers" includes the standard buffers for wetlands and streams and a 50-foot top-of-slope buffer for steep slopes and landslide geologic hazard areas.
3. Structure setbacks includes a 15-foot structure setback for wetlands and streams and a 75-foot toe-of-slope setback for steep slopes and landslide geologic hazard areas.

Tree Replacement Approach

PSE has successfully used an Adaptive Tree Replacement approach on similar 115 kV to 230 kV upgrade projects. Long-term utility corridors that are primarily established by easement can be challenging when it comes to tree replacement. Although PSE has the rights to operate transmission lines in the corridor, the ability to require property owners to accept mitigation (*i.e.,* additional trees) is not specifically identified in the easements. Additionally, it has been PSE's experience that vegetation replacement on properties where the owners actually want additional plantings is the most successful. Recognizing that less than half of the Bellevue property owners have met with PSE to discuss tree replacement options, an Adaptive Tree Replacement approach is being proposed as it will provide the most reliable information based on actual tree removal. This approach will allow for solidification of tree replacement numbers once construction begins. Trees in critical areas may be subject to additional requirements.

The proposed steps for the adaptive Tree Replacement approach include:

- At the time of construction, documentation of trees that are removed on a property by property basis will be collected. This will include the tree species, inventory tag number, and diameter at breast height (dbh) at the time of removal.
- This will be cross-referenced to the proposed landscape and tree replacement plan that was provided to the property owner. Changes to the proposed plan could occur based on a number of factors such as property ownership changes, prior removal of trees by the owner, as well as other factors.
- The landscape and tree replacement plan will be updated and provided to the City as documentation. This will document each tree that was removed and those trees that are installed.
- Upon completion of replanting, PSE will provide a summary report that documents the number and types of trees that have been removed and planted.
- PSE will guarantee plant survival for one year after the planting, with replacement of the plant as the primary remedy.
- Based on the agreed-upon replacement ratios, PSE will provide a financial guarantee that covers the estimated cost of tree replacement (including materials and labor) prior to the issuance of the Clearing and Grading permit. Release of said guarantee by the City will occur upon PSE's submittal of the summary planting report.

To serve as a basis for the financial guarantee and overall tree replacement requirement, PSE is proposing to replace trees using the ratios presented in the table below.

Tree Size (dbh)	Replacement Ratio	Regulated Trees	Replacement Trees
< 6”	As requested by property owner	N/A	TBD
6” to ≤ 12”	1:1	241	241
> 12” to < 30”	2:1	298	596
≥ 30”	3:1	11	33

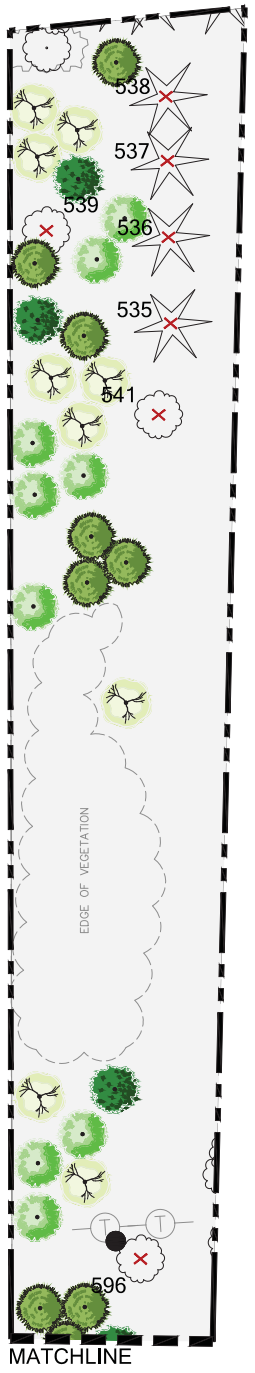
To help increase tree numbers in Bellevue, PSE has been participating in the Energy Saving Trees program, which provides trees to those residents that want to add trees to their property in a manner that can help offset energy usage. While in most cases these trees are not along the project corridor, they are in the City and help buffer potential tree loss due to factors such as mortality and property owner changes (*i.e.,* a new property owner removes existing trees due to landscaping preferences). PSE initiated use of this program earlier in 2018 in an effort to help offset anticipated tree removal associated with Energize Eastside. During the spring event, PSE and the Arbor Days Foundation provided 551 trees to 300 Bellevue residents. Another round of the program is currently underway. We believe that use of this program allows for trees to be provided to property owners who want additional trees.

Thank you for your effort in processing our application. Please let us know if additional clarification is needed.

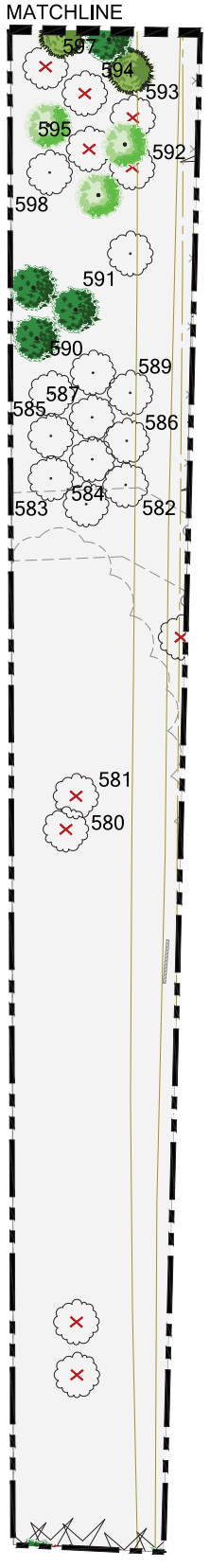
Sincerely,

Brad Strauch
Senior Land Planner

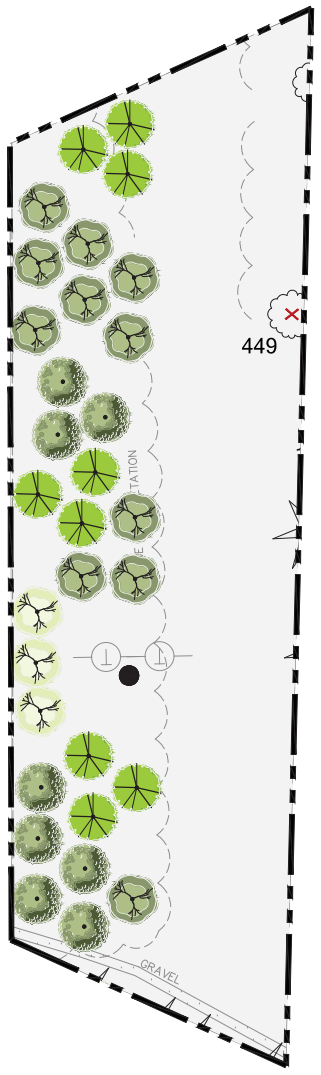
Attachments



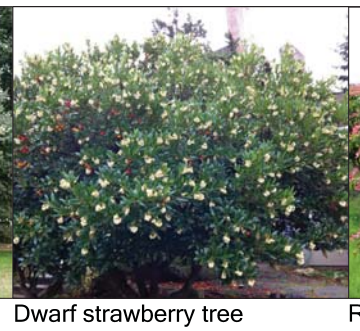
MATCHLINE



MATCHLINE



Pacific serviceberry

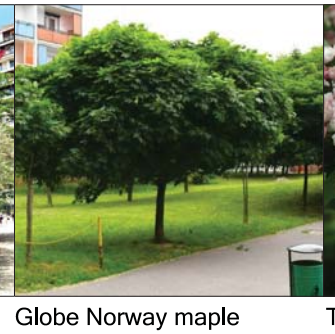


Dwarf strawberry tree

Red Kousa dogwood

Mountain Hemlock

Red buckeye



Globe Norway maple

Toba hawthorn

PLANT SCHEDULE

TREES	COMMON NAME / BOTANICAL NAME	QTY
	PACIFIC SERVICEBERRY / AMELANCHIER ALNIFOLA	9
	DWARF STRAWBERRY TREE / ARBUTUS UNEDO 'COMPACTA'	7
	RED KOUSA DOGWOOD / CORNUS KOUSA `SATOMI`	12
	MOUNTAIN HEMLOCK / TSUGA MERTENSIANA	10

PLANT SCHEDULE

TREES	COMMON NAME / BOTANICAL NAME	QTY
	GLOBE NORWAY MAPLE / ACER PLATANOIDES `GLOBOSUM`	8
	RED BUCKEYE / AESCULUS PAVIA	9
	PACIFIC SERVICEBERRY / AMELANCHIER ALNIFOLA	3
	TOBA HAWTHORN / CRATAEGUS X MORDENENSIS `TOBA`	11

LEGEND

- PSE EASEMENT
- APPROXIMATE PARCEL BOUNDARY
- TREES TO BE REMOVED

TREE TABLE

TAG #	COMMON NAME / BOTANICAL NAME	DBH (IN)	REMOVE	TRUNK TREATMENT	FIELD DETERMINATION
449	Sweet cherry / Prunus avium	3.0	Yes	Grind	1
535	Douglas-fir / Pseudotsuga menziesii	13.0	Yes	Grind	1
536	Spruce species / Picea sp.	11.0	Yes	Grind	1
537	Spruce species / Picea sp.	10.5	Yes	Grind	1
538	Douglas-fir / Pseudotsuga menziesii	10.0	Yes	Grind	1
539	Horse chestnut / Aesculus hippocastanum	5.0	Yes	Grind	1
580	Pacific willow / Salix lasiandra	17.0	Yes	Grind	1
581	Pacific willow / Salix lasiandra	10.0	Yes	Grind	1
582	Apple / Malus domestica	3.7	Yes	Grind	2
583	Apple / Malus domestica	2.2	Yes	Grind	2
584	Apple / Malus domestica	3.0	Yes	Grind	2
585	Apple / Malus domestica	1.8	Yes	Grind	2
586	Apple / Malus domestica	2.6	Yes	Grind	2
587	Apple / Malus domestica	2.2	Yes	Grind	2
589	Apple / Malus domestica	4.1	Yes	Grind	2
590	Apple / Malus domestica	2.0	Yes	Grind	2
591	Apple / Malus domestica	2.0	Yes	Grind	2
592	Sweet cherry / Prunus avium	1.2	Yes	Grind	1
593	Sweet cherry / Prunus avium	3.1	Yes	Grind	1
594	Sweet cherry / Prunus avium	1.5	Yes	Grind	1
595	Sweet cherry / Prunus avium	4.2	Yes	Grind	1
596	Asian pear / Pyrus pyrifolia	1.5	Yes	Grind	1
597	Sweet cherry / Prunus avium	1.4	Yes	Grind	1
598	Apple / Malus domestica	1.0	Yes	Grind	2

NOTES

1. THIS PLAN IS FOR DISCUSSION PURPOSES ONLY. PSE DOES NOT REPRESENT, WARRANT OR GUARANTEE THAT THE FINAL VEGETATION PLAN WILL INCLUDE THE TREES AND SHRUBS, AND PLANTING LOCATIONS DEPICTED IN THIS CONCEPTUAL PLAN. THE PLAN IS SUBJECT TO CHANGE SUBJECT TO FURTHER DESIGN, ENVIRONMENTAL REVIEW, PERMITTING, AND CONSTRUCTION NEEDS THAT MAY ARISE AT A LATER DATE.
2. PLEASE BE AWARE THAT CONSTRUCTION ACCESS, POLE TYPES, POLE HEIGHTS, AND POLE LOCATIONS ARE SUBJECT TO CHANGE PENDING FURTHER DESIGN, ENVIRONMENTAL REVIEW, PERMITTING AND IN-FIELD CONSTRUCTION NEEDS.
3. REPLACEMENT TREES AND SHRUBS WILL BE PLANTED AT LESS MATURE HEIGHTS THAN WHAT IS SHOWN IN THE PLAN.

0 10' 20' 40' 160'

NOT FOR CONSTRUCTION

SUBMITTALS & REVISIONS			
NO.	DATE	DESCRIPTION	BY
1	08-16-2018	PSE REVIEW 1	LM

BELLEVUE

DSD 000811

EXAMPLE PLAN

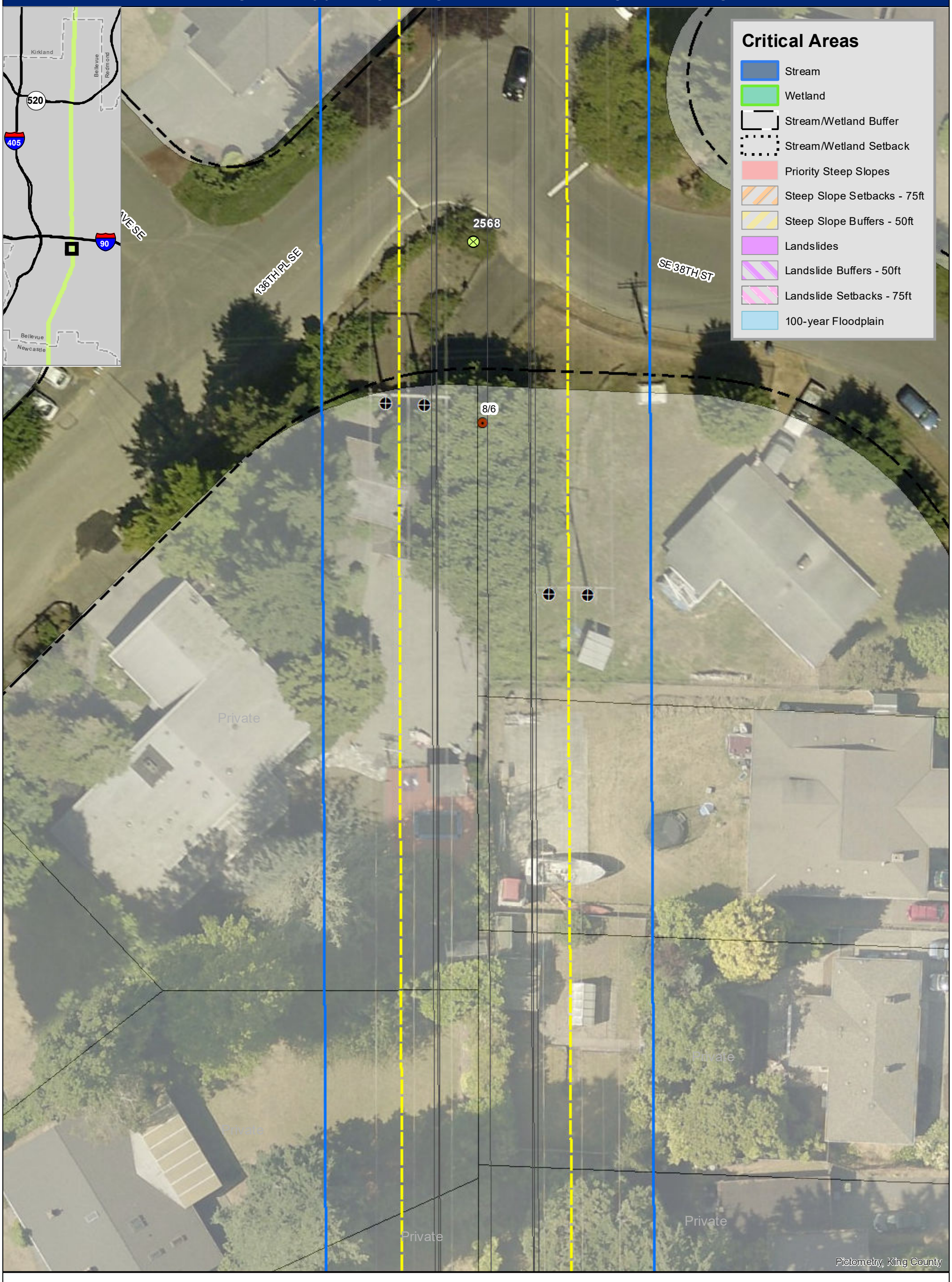
CONCEPTUAL PROPERTY RESTORATION AND PLANTING PLAN

PUGET SOUND ENERGY

THE WATERSHED COMPANY

SHEET NUMBER: 1 OF 1

PSE EE230 - COB: PUBLIC TREE REMOVAL MAPS



Critical Areas

- Stream
- Wetland
- Stream/Wetland Buffer
- Stream/Wetland Setback
- Priority Steep Slopes
- Steep Slope Setbacks - 75ft
- Steep Slope Buffers - 50ft
- Landslides
- Landslide Buffers - 50ft
- Landslide Setbacks - 75ft
- 100-year Floodplain

Significant Trees to be Removed[TWC]

- City Owned
- Park
- Public ROW

Parcel Ownership[KC]

- City Owned Parcel
- Park
- Private/ Other Parcel
- Surveyed ROW

- Existing Easement Boundary[PSE]
- Wire Zone[PSE]
- Wires [PSE]
- Proposed Pole Footprints[PSE]

- Existing Poles to Remain[PSE]
- Existing Poles to be Removed[PSE]
- City Limit[KC]

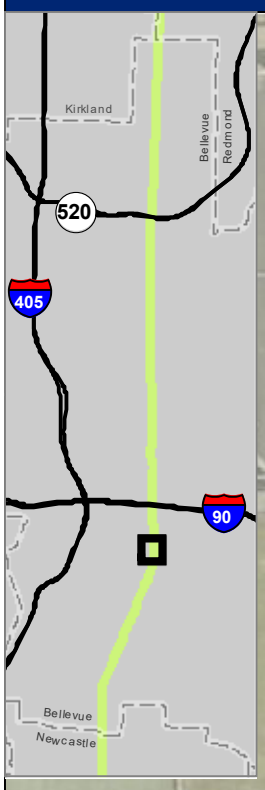
DSD 000812

1

0 10 20
Feet

Data sources: Puget Sound Energy (PSE), The Watershed Company (TWC), City of Bellevue (COB), and King County (KC). Aerial imagery from PSE, 2011.

PSE EE230 - COB: PUBLIC TREE REMOVAL MAPS



Critical Areas

- Stream
- Wetland
- Stream/Wetland Buffer
- Stream/Wetland Setback
- Priority Steep Slopes
- Steep Slope Setbacks - 75ft
- Steep Slope Buffers - 50ft
- Landslides
- Landslide Buffers - 50ft
- Landslide Setbacks - 75ft
- 100-year Floodplain

8/3

8/3

SE ALLEN RD

2705

2706

2707

2708

2709

2710

2711

Private

Private

Pictometry, King County

Significant Trees to be Removed[TWC]

- City Owned
- Park
- Public ROW

Parcel Ownership[KC]

- City Owned Parcel
- Park
- Private/ Other Parcel
- Surveyed ROW

- Existing Easement Boundary[PSE]
- Wire Zone[PSE]
- Wires [PSE]
- Proposed Pole Footprints[PSE]

- Existing Poles to Remain[PSE]
- Existing Poles to be Removed[PSE]
- City Limit[KC]

DSD 000813

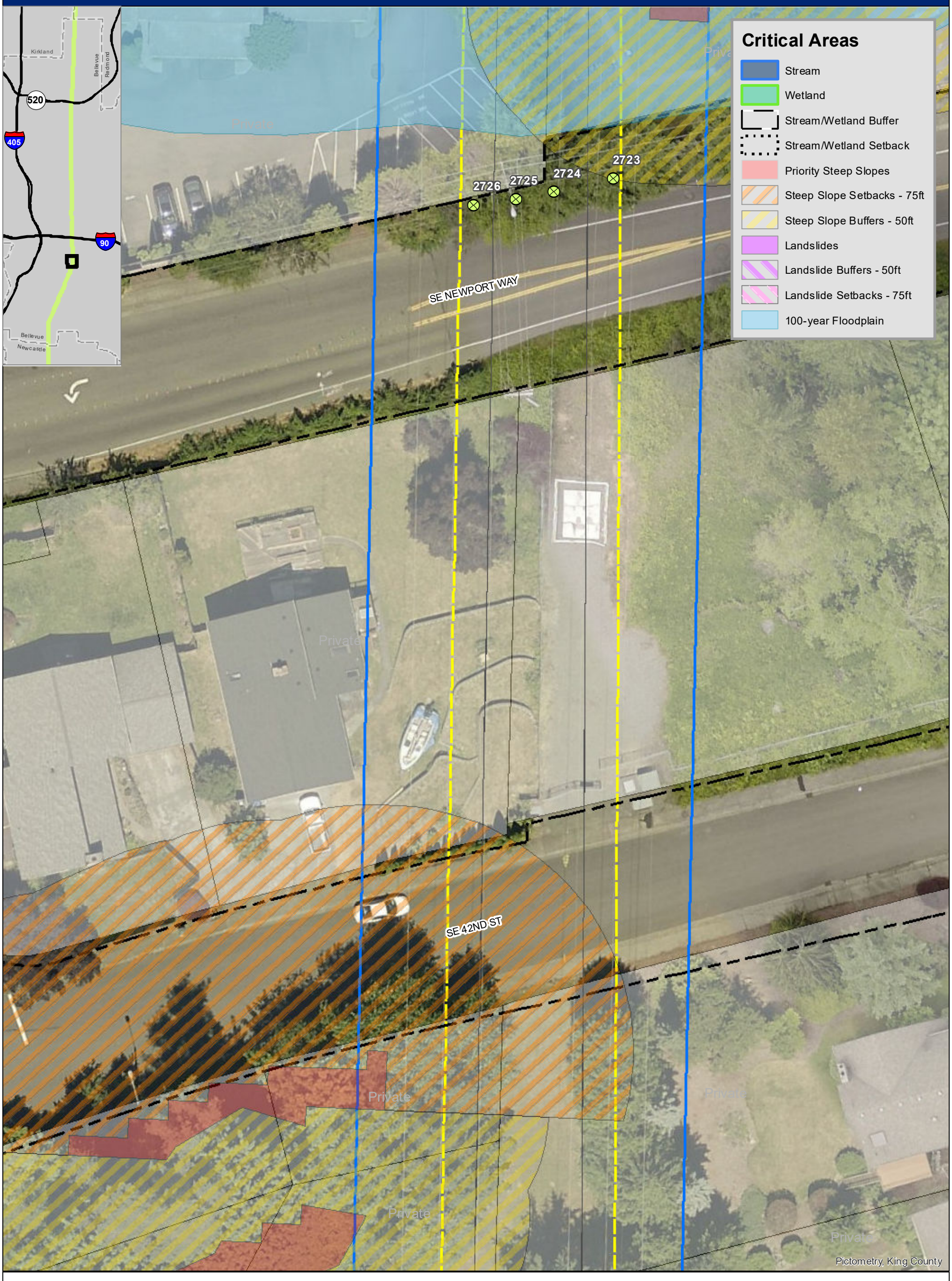
2

0 10 20

Feet

Data sources: Puget Sound Energy (PSE), The Watershed Company (TWC), City of Bellevue (COB), and King County (KC). Aerial imagery from PSE, 2011.

PSE EE230 - COB: PUBLIC TREE REMOVAL MAPS



Significant Trees to be Removed[TWC]
- City Owned
- Park
- Public ROW

Parcel Ownership[KC]
- City Owned Parcel
- Park
- Private/ Other Parcel
- Surveyed ROW

- Existing Easement Boundary[PSE]
- Wire Zone[PSE]
- Wires [PSE]
- Proposed Pole Footprints[PSE]
- Existing Poles to Remain[PSE]
- Existing Poles to be Removed[PSE]
- City Limit[KC]

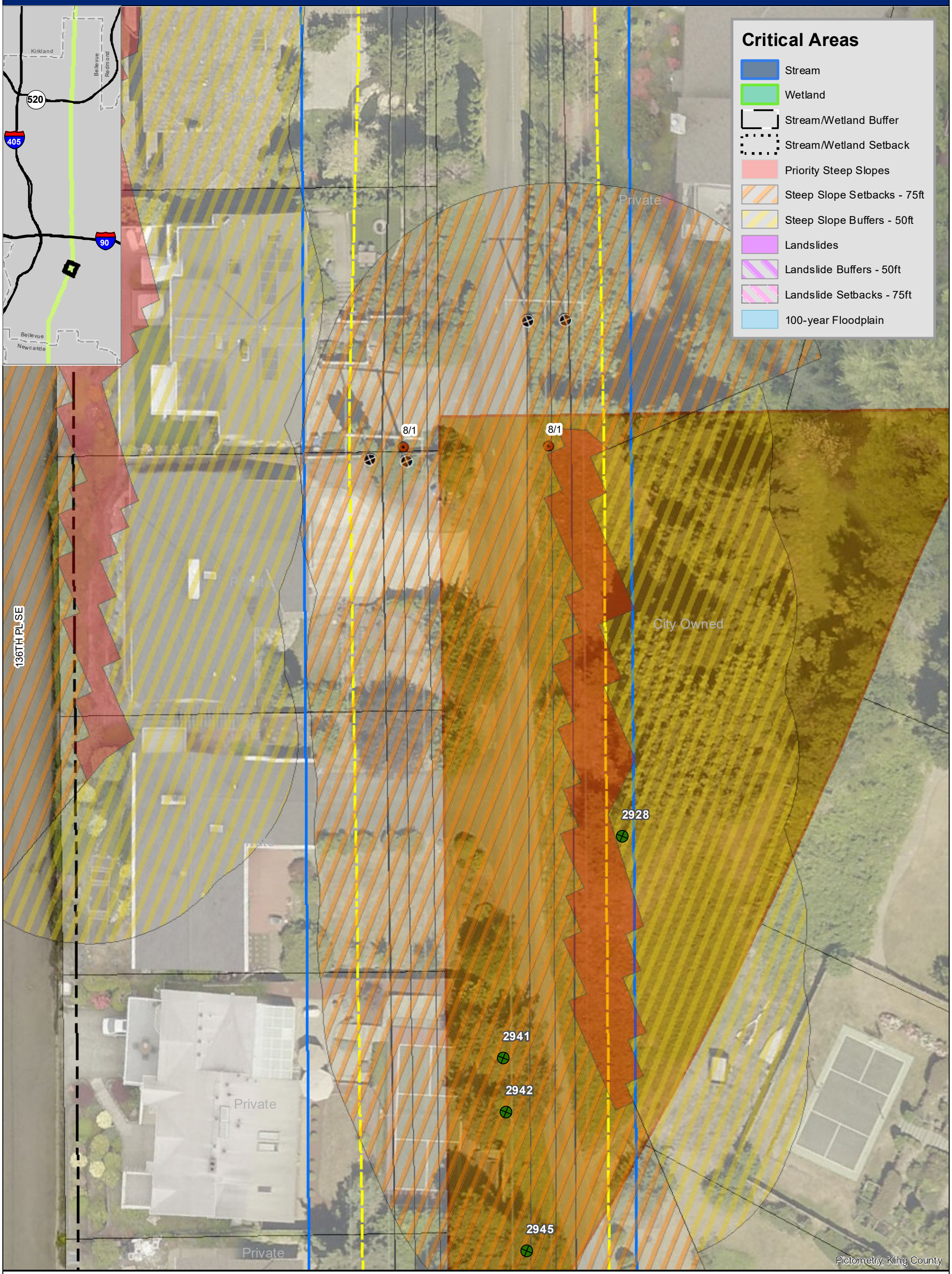
DSD 000814

3

0 10 20
Feet

Data sources: Puget Sound Energy (PSE), The Watershed Company (TWC), City of Bellevue (COB), and King County (KC). Aerial imagery from PSE, 2011.

PSE EE230 - COB: PUBLIC TREE REMOVAL MAPS



Significant Trees to be Removed[TWC]
- City Owned
- Park
- Public ROW

Parcel Ownership[KC]
- City Owned Parcel
- Park
- Private/ Other Parcel
- Surveyed ROW

- Existing Easement Boundary[PSE]
- Wire Zone[PSE]
- Wires [PSE]
- Proposed Pole Footprints[PSE]
- Existing Poles to Remain[PSE]
- Existing Poles to be Removed[PSE]
- City Limit[KC]

DSD 000815

4

0 10 20
Feet

Data sources: Puget Sound Energy (PSE), The Watershed Company (TWC), City of Bellevue (COB), and King County (KC). Aerial imagery from PSE, 2011.

PSE EE230 - COB: PUBLIC TREE REMOVAL MAPS

Significant Trees to be Removed[TWC]

- City Owned
- Park
- Public ROW

Parcel Ownership[KC]

- City Owned Parcel
- Park
- Private/ Other Parcel
- Surveyed ROW

- Existing Easement Boundary[PSE]
- Wire Zone[PSE]
- Wires [PSE]
- Proposed Pole Footprints[PSE]

- Existing Poles to Remain[PSE]
- Existing Poles to be Removed[PSE]
- City Limit[KC]

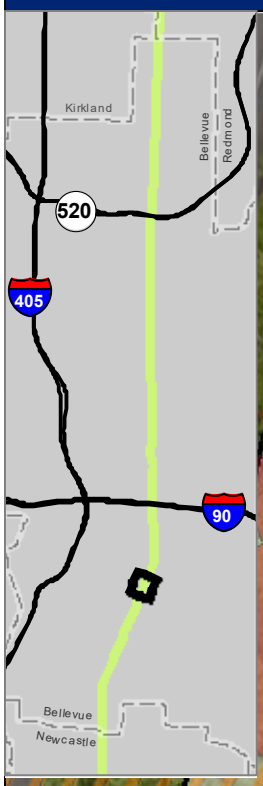
DSD 000816

5

0 10 20
Feet

Data sources: Puget Sound Energy (PSE), The Watershed Company (TWC), City of Bellevue (COB), and King County (KC). Aerial imagery from PSE, 2011.

PSE EE230 - COB: PUBLIC TREE REMOVAL MAPS



Critical Areas

- Stream
- Wetland
- Stream/Wetland Buffer
- Stream/Wetland Setback
- Priority Steep Slopes
- Steep Slope Setbacks - 75ft
- Steep Slope Buffers - 50ft
- Landslides
- Landslide Buffers - 50ft
- Landslide Setbacks - 75ft
- 100-year Floodplain

7/7
7/7
SOMERSET PL SE
3035
3038
3037
3039
3042
3043
3044
3046
Private
Private
Private
Pictometry, King County

Significant Trees to be Removed[TWC]

- City Owned
- Park
- Public ROW

Parcel Ownership[KC]

- City Owned Parcel
- Park
- Private/ Other Parcel
- Surveyed ROW

- Existing Easement Boundary[PSE]
- Wire Zone[PSE]
- Wires [PSE]
- Proposed Pole Footprints[PSE]
- Existing Poles to Remain[PSE]
- Existing Poles to be Removed[PSE]
- City Limit[KC]

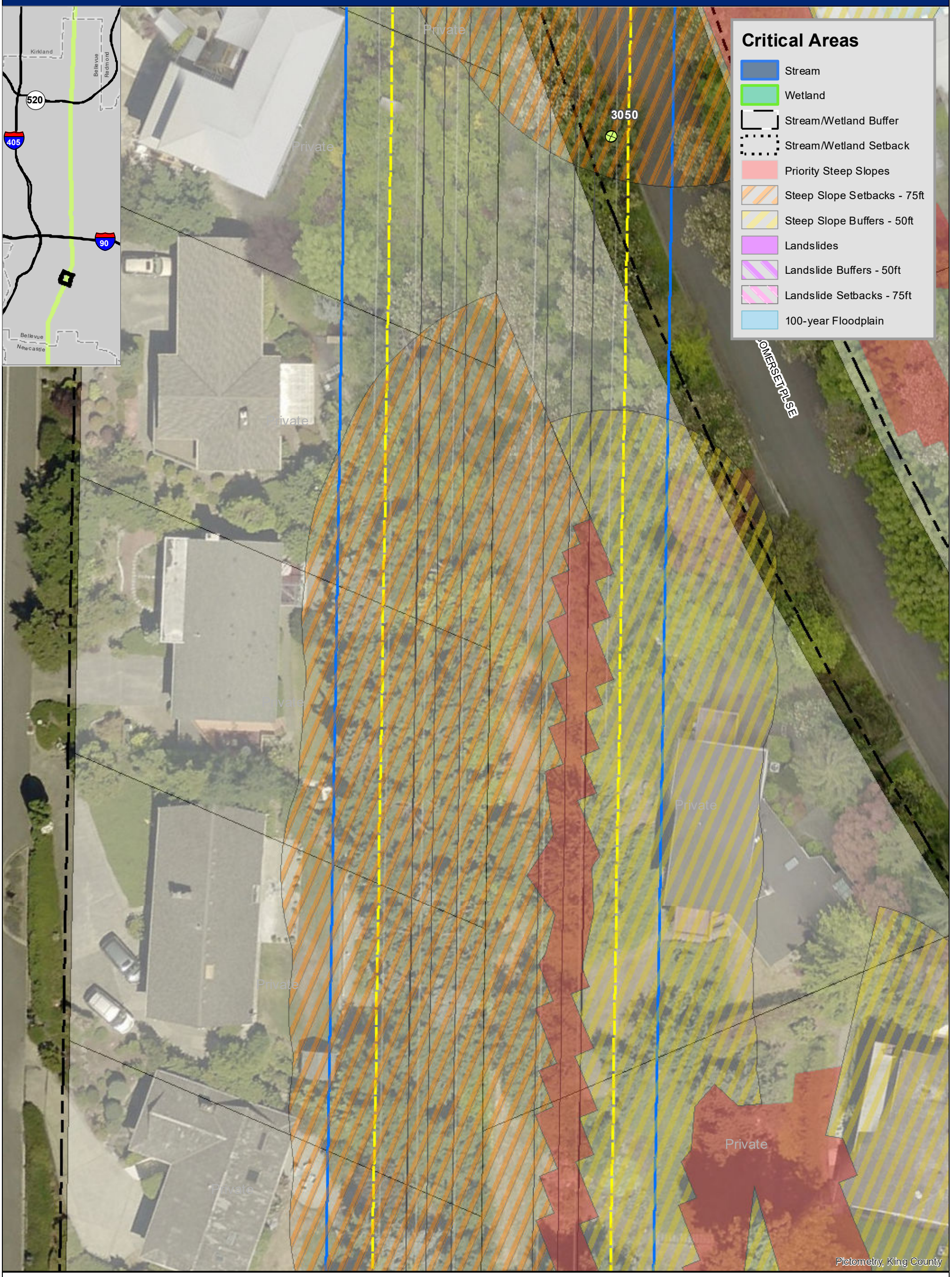
DSD 000817

6

0 10 20
Feet

Data sources: Puget Sound Energy (PSE), The Watershed Company (TWC), City of Bellevue (COB), and King County (KC). Aerial imagery from PSE, 2011.

PSE EE230 - COB: PUBLIC TREE REMOVAL MAPS



Significant Trees to be Removed[TWC]
- City Owned
- Park
- Public ROW

Parcel Ownership[KC]
- City Owned Parcel
- Park
- Private/ Other Parcel
- Surveyed ROW

- Existing Easement Boundary[PSE]
- Wire Zone[PSE]
- Wires [PSE]
- Proposed Pole Footprints[PSE]
- Existing Poles to Remain[PSE]
- Existing Poles to be Removed[PSE]
- City Limit[KC]

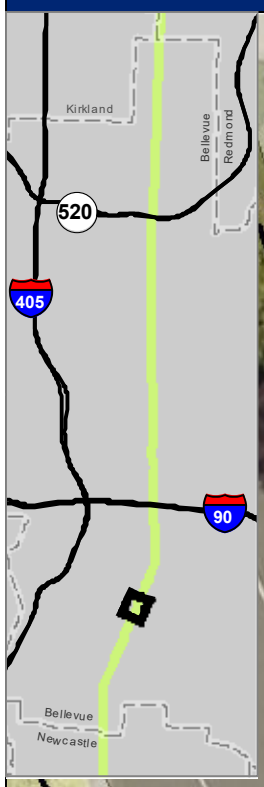
DSD 000818

7

0 10 20
Feet

Data sources: Puget Sound Energy (PSE), The Watershed Company (TWC), City of Bellevue (COB), and King County (KC). Aerial imagery from PSE, 2011.

PSE EE230 - COB: PUBLIC TREE REMOVAL MAPS



Critical Areas

- Stream
- Wetland
- Stream/Wetland Buffer
- Stream/Wetland Setback
- Priority Steep Slopes
- Steep Slope Setbacks - 75ft
- Steep Slope Buffers - 50ft
- Landslides
- Landslide Buffers - 50ft
- Landslide Setbacks - 75ft
- 100-year Floodplain

Private

SOMERSET DR SE

135TH AVE SE

3403 3404 3405 3406 3407 3408 3409 3410 3411 3412 3413 3414 3415 3416 3417 3418 3419 3420 3268

Pictometry, King County

Significant Trees to be Removed[TWC]

- City Owned
- Park
- Public ROW

Parcel Ownership[KC]

- City Owned Parcel
- Park
- Private/ Other Parcel
- Surveyed ROW

- Existing Easement Boundary[PSE]
- Wire Zone[PSE]
- Wires [PSE]
- Proposed Pole Footprints[PSE]

- Existing Poles to Remain[PSE]
- Existing Poles to be Removed[PSE]
- City Limit[KC]

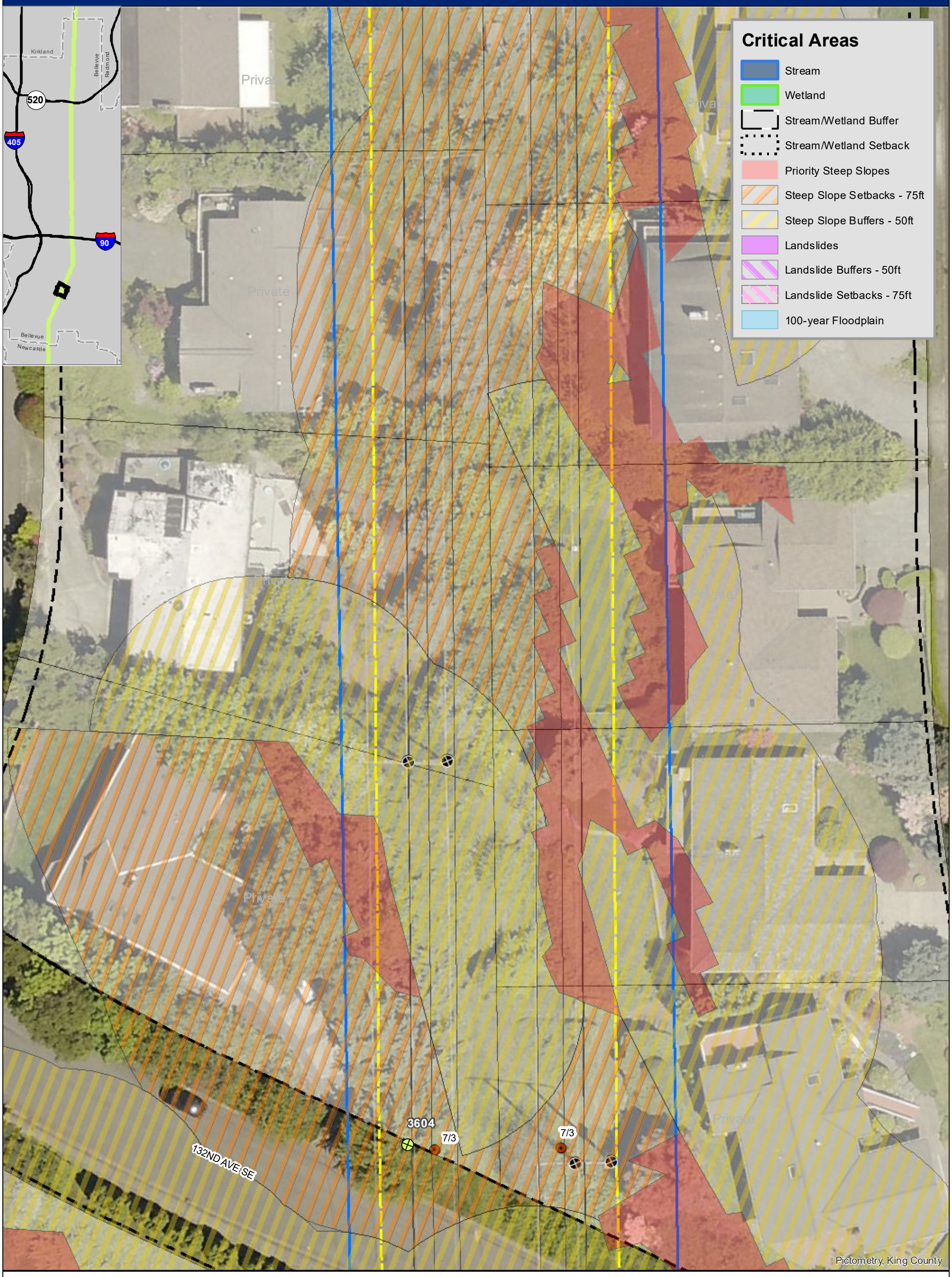
DSD 000819

8

0 10 20
Feet

Data sources: Puget Sound Energy (PSE), The Watershed Company (TWC), City of Bellevue (COB), and King County (KC). Aerial imagery from PSE, 2011.

PSE EE230 - COB: PUBLIC TREE REMOVAL MAPS



Critical Areas

- Stream
- Wetland
- Stream/Wetland Buffer
- Stream/Wetland Setback
- Priority Steep Slopes
- Steep Slope Setbacks - 75ft
- Steep Slope Buffers - 50ft
- Landslides
- Landslide Buffers - 50ft
- Landslide Setbacks - 75ft
- 100-year Floodplain

Significant Trees to be Removed[TWC]

- City Owned
- Park
- Public ROW

Parcel Ownership[KC]

- City Owned Parcel
- Park
- Private/ Other Parcel
- Surveyed ROW

- Existing Easement Boundary[PSE]
- Wire Zone[PSE]
- Wires [PSE]
- Proposed Pole Footprints[PSE]

- Existing Poles to Remain[PSE]
- Existing Poles to be Removed[PSE]
- City Limit[KC]

DSD 000820

9

0 10 20
Feet

Data sources: Puget Sound Energy (PSE), The Watershed Company (TWC), City of Bellevue (COB), and King County (KC). Aerial imagery from PSE, 2011.

PSE EE230 - COB: PUBLIC TREE REMOVAL MAPS

Significant Trees to be Removed[TWC]

- City Owned
- Park
- Public ROW

Parcel Ownership[KC]

- City Owned Parcel
- Park
- Private/ Other Parcel
- Surveyed ROW

- Existing Easement Boundary[PSE]
- Wire Zone[PSE]
- Wires [PSE]
- Proposed Pole Footprints[PSE]
- Existing Poles to Remain[PSE]
- Existing Poles to be Removed[PSE]
- City Limit[KC]

DSD 000821

10

0 10 20

Feet

Data sources: Puget Sound Energy (PSE), The Watershed Company (TWC), City of Bellevue (COB), and King County (KC). Aerial imagery from PSE, 2011.

PSE EE230 - COB: PUBLIC TREE REMOVAL MAPS

Critical Areas

- Stream
- Wetland
- Stream/Wetland Buffer
- Stream/Wetland Setback
- Priority Steep Slopes
- Steep Slope Setbacks - 75ft
- Steep Slope Buffers - 50ft
- Landslides
- Landslide Buffers - 50ft
- Landslide Setbacks - 75ft
- 100-year Floodplain

Significant Trees to be Removed[TWC]

- City Owned
- Park
- Public ROW

Parcel Ownership[KC]

- City Owned Parcel
- Park
- Private/ Other Parcel
- Surveyed ROW

- Existing Easement Boundary[PSE]
- Wire Zone[PSE]
- Wires [PSE]
- Proposed Pole Footprints[PSE]
- Existing Poles to Remain[PSE]
- Existing Poles to be Removed[PSE]
- City Limit[KC]

DSD 000822

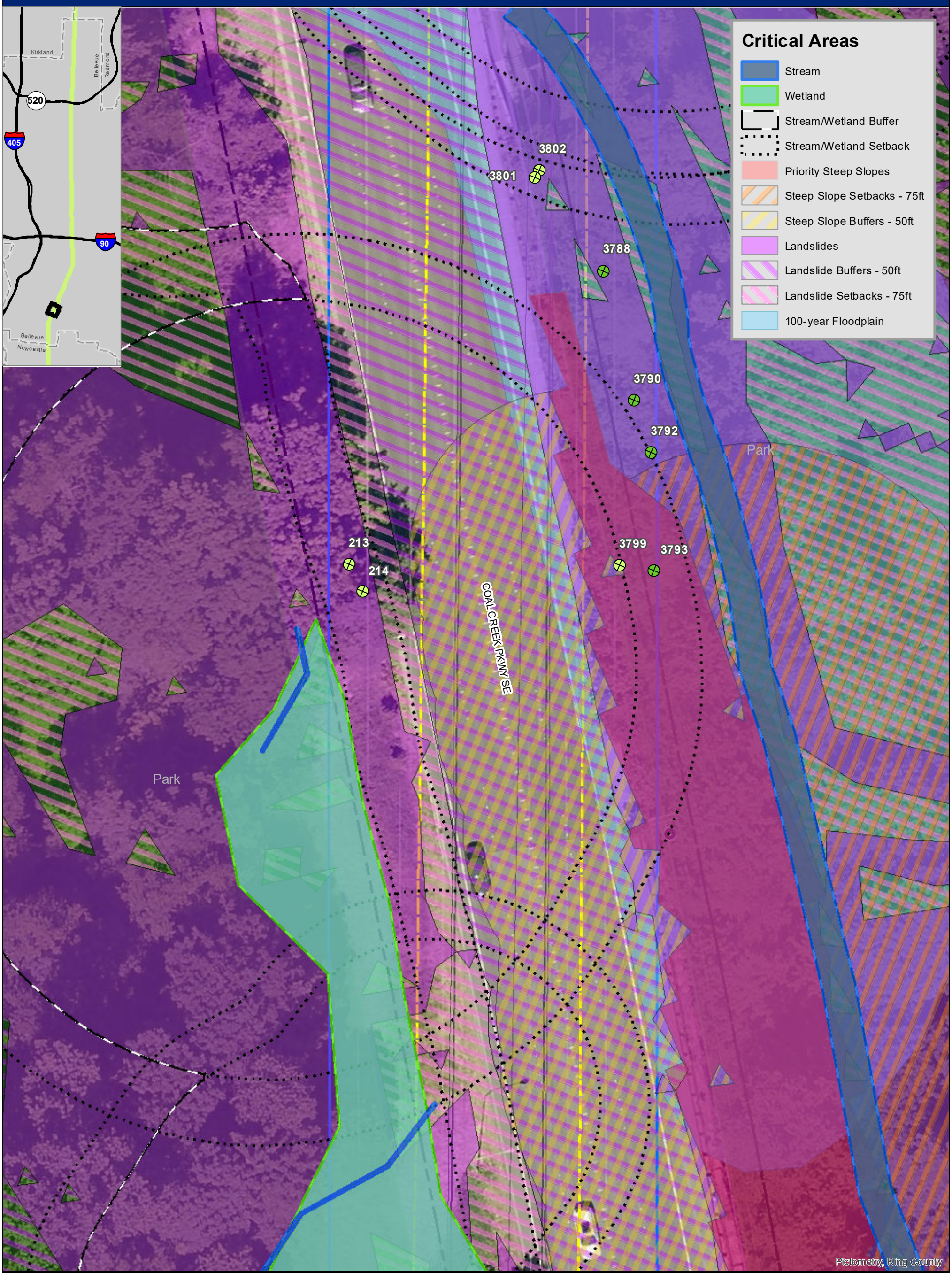
11

0 10 20

Feet

Data sources: Puget Sound Energy (PSE), The Watershed Company (TWC), City of Bellevue (COB), and King County (KC). Aerial imagery from PSE, 2011.

PSE EE230 - COB: PUBLIC TREE REMOVAL MAPS



Significant Trees to be Removed[TWC]

- City Owned
- Park
- Public ROW

Parcel Ownership[KC]

- City Owned Parcel
- Park
- Private/ Other Parcel
- Surveyed ROW

- Existing Easement Boundary[PSE]
- Wire Zone[PSE]
- Wires [PSE]
- Proposed Pole Footprints[PSE]

- Existing Poles to Remain[PSE]
- Existing Poles to be Removed[PSE]
- City Limit[KC]

DSD 000823

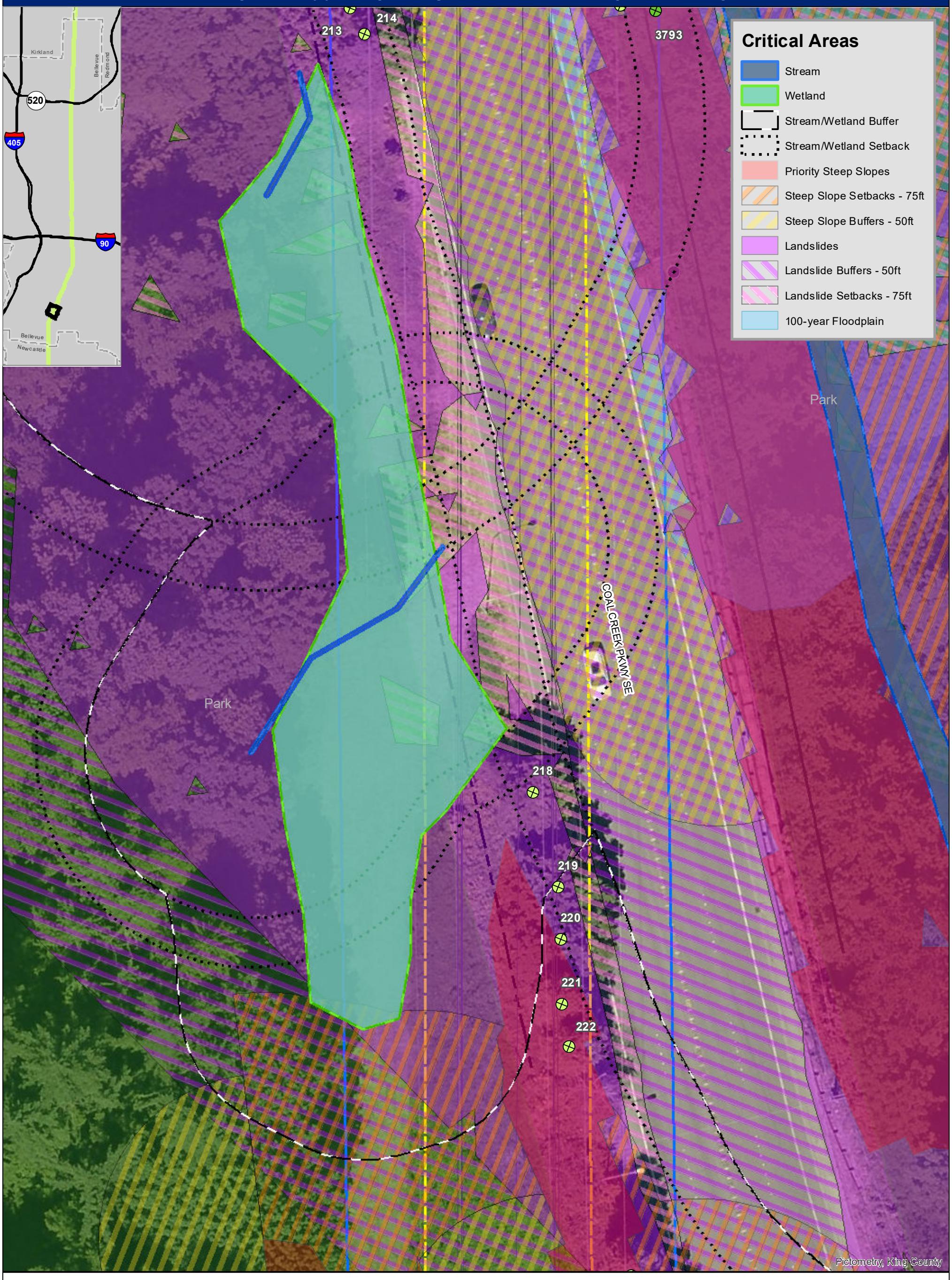
12

0 10 20

Feet

Data sources: Puget Sound Energy (PSE), The Watershed Company (TWC), City of Bellevue (COB), and King County (KC). Aerial imagery from PSE, 2011.

PSE EE230 - COB: PUBLIC TREE REMOVAL MAPS



Significant Trees to be Removed[TWC]
- City Owned
- Park
- Public ROW

Parcel Ownership[KC]
- City Owned Parcel
- Park
- Private/ Other Parcel
- Surveyed ROW

- Existing Easement Boundary[PSE]
- Wire Zone[PSE]
- Wires [PSE]
- Proposed Pole Footprints[PSE]

- Existing Poles to Remain[PSE]
- Existing Poles to be Removed[PSE]
- City Limit[KC]

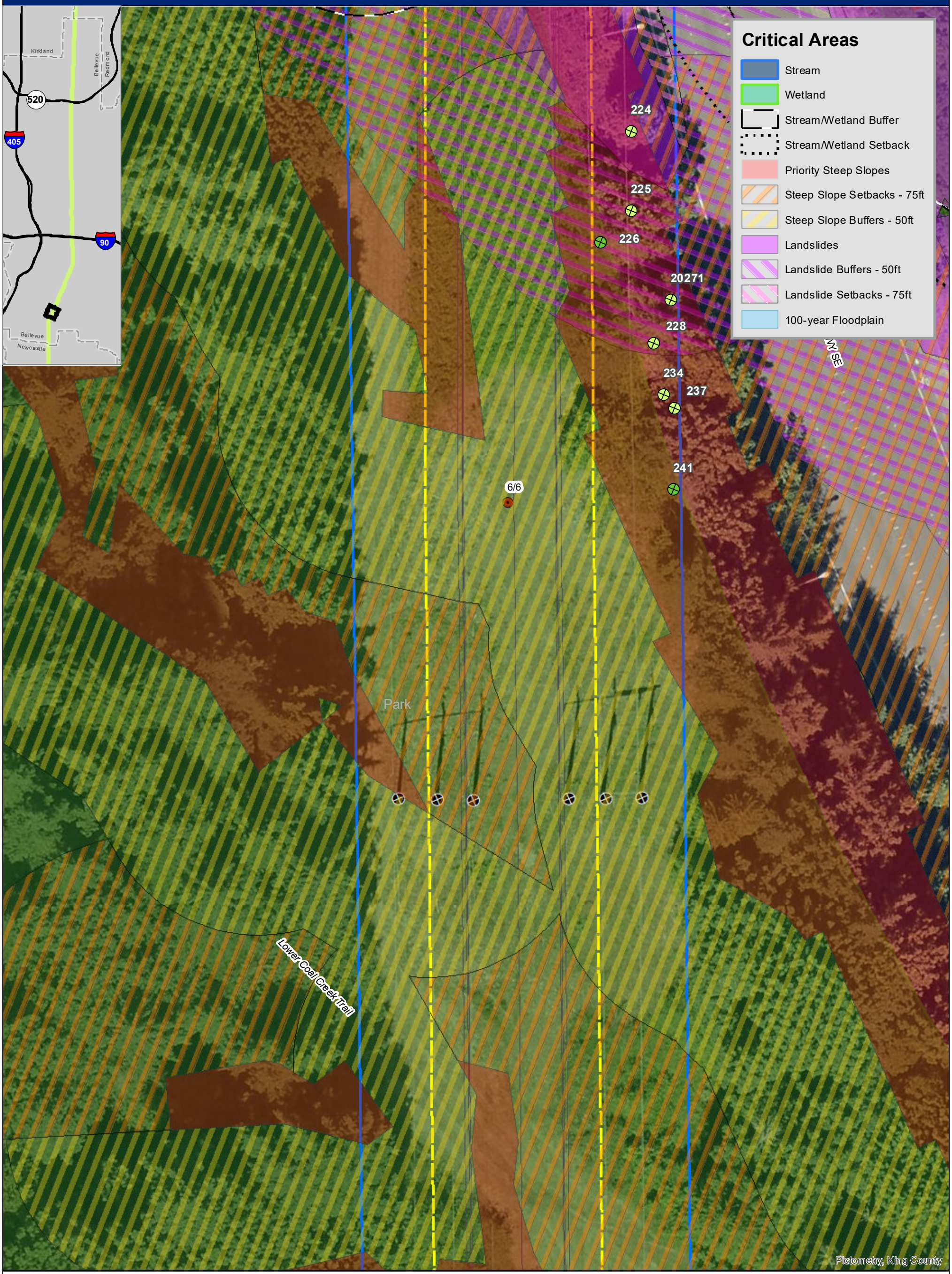
DSD 000824

13

0 10 20
Feet

Data sources: Puget Sound Energy (PSE), The Watershed Company (TWC), City of Bellevue (COB), and King County (KC). Aerial imagery from PSE, 2011.

PSE EE230 - COB: PUBLIC TREE REMOVAL MAPS



Significant Trees to be Removed[TWC]

- City Owned
- Park
- Public ROW

Parcel Ownership[KC]

- City Owned Parcel
- Park
- Private/ Other Parcel
- Surveyed ROW

- Existing Easement Boundary[PSE]
- Wire Zone[PSE]
- Wires [PSE]
- Proposed Pole Footprints[PSE]

- Existing Poles to Remain[PSE]
- Existing Poles to be Removed[PSE]
- City Limit[KC]

DSD 000825

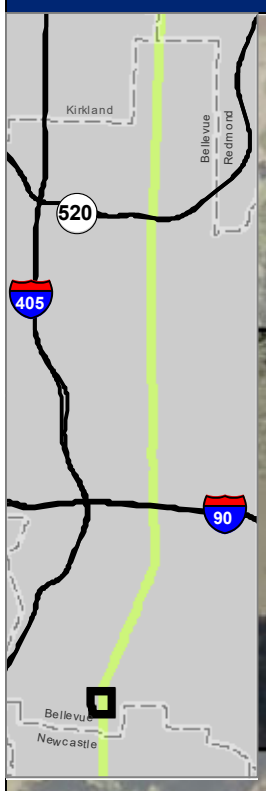
14

0 10 20

Feet

Data sources: Puget Sound Energy (PSE), The Watershed Company (TWC), City of Bellevue (COB), and King County (KC). Aerial imagery from PSE, 2011.

PSE EE230 - COB: PUBLIC TREE REMOVAL MAPS



414 415 416 418

SE 63RD ST

Regional Trail

Private

Private

Private

Private

Pictometry, King County

Critical Areas

- Stream
- Wetland
- Stream/Wetland Buffer
- Stream/Wetland Setback
- Priority Steep Slopes
- Steep Slope Setbacks - 75ft
- Steep Slope Buffers - 50ft
- Landslides
- Landslide Buffers - 50ft
- Landslide Setbacks - 75ft
- 100-year Floodplain

Significant Trees to be Removed[TWC]

- City Owned
- Park
- Public ROW

Parcel Ownership[KC]

- City Owned Parcel
- Park
- Private/ Other Parcel
- Surveyed ROW

- Existing Easement Boundary[PSE]
- Wire Zone[PSE]
- Wires [PSE]
- Proposed Pole Footprints[PSE]

- Existing Poles to Remain[PSE]
- Existing Poles to be Removed[PSE]
- City Limit[KC]

DSD 000826

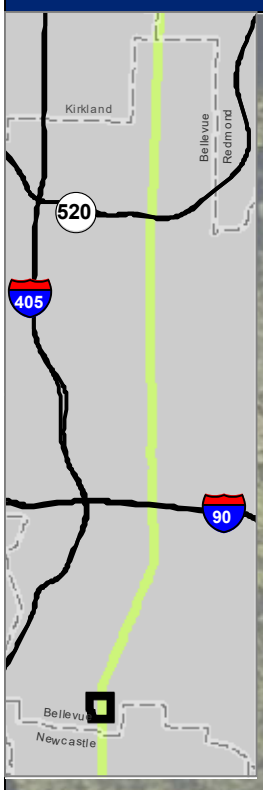
15

0 10 20

Feet

Data sources: Puget Sound Energy (PSE), The Watershed Company (TWC), City of Bellevue (COB), and King County (KC). Aerial imagery from PSE, 2011.

PSE EE230 - COB: PUBLIC TREE REMOVAL MAPS



Critical Areas

- Stream
- Wetland
- Stream/Wetland Buffer
- Stream/Wetland Setback
- Priority Steep Slopes
- Steep Slope Setbacks - 75ft
- Steep Slope Buffers - 50ft
- Landslides
- Landslide Buffers - 50ft
- Landslide Setbacks - 75ft
- 100-year Floodplain

Private
Private
Private
Regional Trail
6/1
6/1
504
SE 65TH ST
128TH AVE SE
Seattle SPU
Pictometry, King County

Significant Trees to be Removed[TWC]

- City Owned
- Park
- Public ROW

Parcel Ownership[KC]

- City Owned Parcel
- Park
- Private/ Other Parcel
- Surveyed ROW

- Existing Easement Boundary[PSE]
- Wire Zone[PSE]
- Wires [PSE]
- Proposed Pole Footprints[PSE]

- Existing Poles to Remain[PSE]
- Existing Poles to be Removed[PSE]
- City Limit[KC]

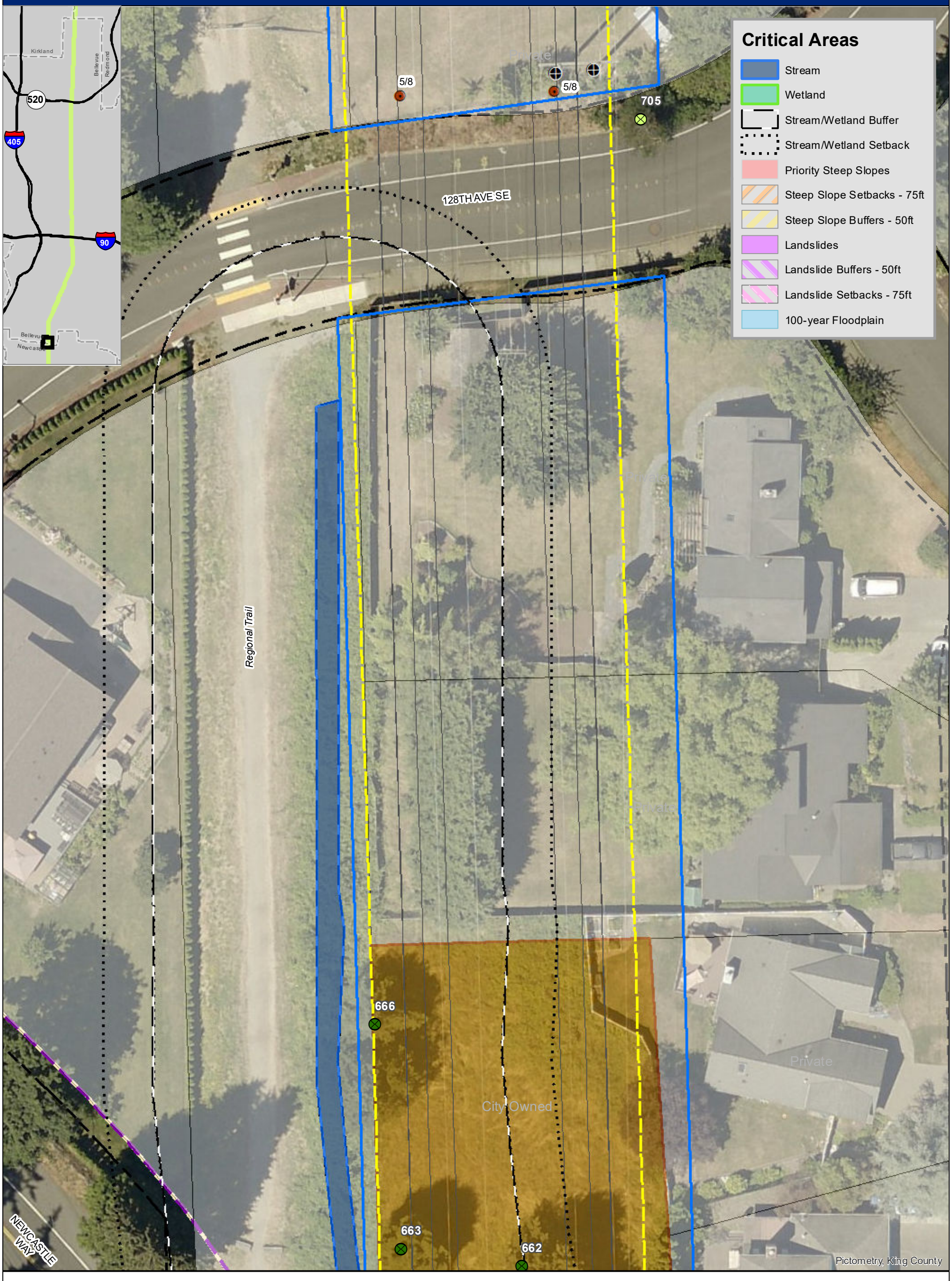
DSD 000827

16

0 10 20
Feet

Data sources: Puget Sound Energy (PSE), The Watershed Company (TWC), City of Bellevue (COB), and King County (KC). Aerial imagery from PSE, 2011.

PSE EE230 - COB: PUBLIC TREE REMOVAL MAPS



Critical Areas

- Stream
- Wetland
- Stream/Wetland Buffer
- Stream/Wetland Setback
- Priority Steep Slopes
- Steep Slope Setbacks - 75ft
- Steep Slope Buffers - 50ft
- Landslides
- Landslide Buffers - 50ft
- Landslide Setbacks - 75ft
- 100-year Floodplain

Significant Trees to be Removed[TWC]

- City Owned
- Park
- Public ROW

Parcel Ownership[KC]

- City Owned Parcel
- Park
- Private/ Other Parcel
- Surveyed ROW

- Existing Easement Boundary[PSE]
- Wire Zone[PSE]
- Wires [PSE]
- Proposed Pole Footprints[PSE]

- Existing Poles to Remain[PSE]
- Existing Poles to be Removed[PSE]
- City Limit[KC]

DSD 000828

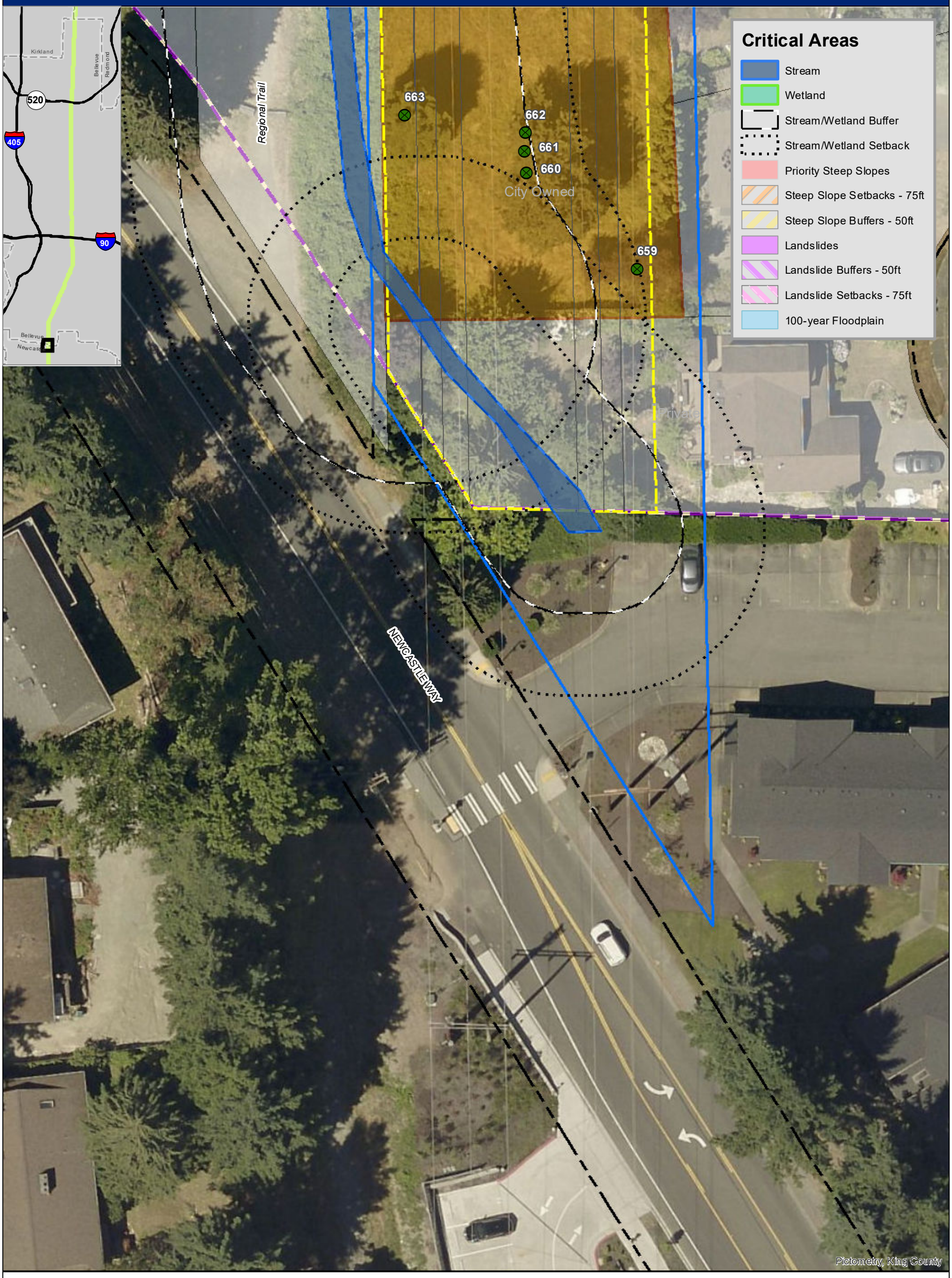
17

0 10 20

Feet

Data sources: Puget Sound Energy (PSE), The Watershed Company (TWC), City of Bellevue (COB), and King County (KC). Aerial imagery from PSE, 2011.

PSE EE230 - COB: PUBLIC TREE REMOVAL MAPS



Significant Trees to be Removed[TWC]

- City Owned
- Park
- Public ROW

Parcel Ownership[KC]

- City Owned Parcel
- Park
- Private/ Other Parcel
- Surveyed ROW

- Existing Easement Boundary[PSE]
- Wire Zone[PSE]
- Wires [PSE]
- Proposed Pole Footprints[PSE]
- Existing Poles to Remain[PSE]
- Existing Poles to be Removed[PSE]
- City Limit[KC]

DSD 000829

18

0 10 20

Feet

Data sources: Puget Sound Energy (PSE), The Watershed Company (TWC), City of Bellevue (COB), and King County (KC). Aerial imagery from PSE, 2011.

Sample plant palette for vegetated screen

Replacement options are subject to location-specific approval and will be planted at less mature heights than shown below

Four-season interest; edible summer fruit; evergreen foliage

Plant Characteristics:

10'H/6'W FULL MED. LOW

Great early-spring flowers with fragrance; glossy, dark evergreen foliage

Plant Characteristics:

10'H/6'W FULL MED. MED.

Flowers mid-June; evergreen foliage

Plant Characteristics:

15'H/15'W MED. MED. MED.

Great winter interest; coarse leaves with sharp margins; evergreen foliage

Plant Characteristics:

10'H/6'W FULL LOW LOW

Small, evergreen leaves; can be sheared or left to grow in loose mounds

Plant Characteristics:

15'H/15'W FULL LOW MED.

Upright form; can be sheared; evergreen needle-like leaves

Plant Characteristics:

15'H/15'W MED. MED. MED.

Tight, pyramidal, evergreen form

Plant Characteristics:

15'H/4'W FULL MED. LOW

Slender, small tree; evergreen foliage; slow growing

Plant Characteristics:

20'H/8'W FULL MED. LOW

Dark, evergreen foliage; fragrant blue / purple blooms

Plant Characteristics:

12'H/9'W FULL MED. LOW

Legend

Approximate Size	Sun Requirement	Water Requirement	Friendly to Pollinators	Native Planting	Edible Parts	Maintenance Requirement

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Updated summer 2018

DSD 000830 6886 0818

Sample plant palette for low-growing trees

Replacement options are subject to location-specific approval and will be planted at less mature heights than shown below

Aesculus pavia
Red Buckeye

Showy, 4-10” long pinnacles of red to orange-red flowers in spring

Plant Characteristics:

15’H/15’W FULL MED. LOW

Acer palmatum **var. *dissectum***
Japanese Maple

Lace-like leaves, mounding form, attractive branching pattern

Plant Characteristics:

10’H/12’W FULL MED. LOW

Amelanchier alnifolia
Western Serviceberry

Star-shaped white flowers, attractive fall color; edible fruit

Plant Characteristics:

15’H/10’W MED. MED. LOW

Hamamelis virginiana
Common Witch Hazel

Small tree or deciduous shrub; blooms yellow October - December

Plant Characteristics:

15’H/20’W FULL MED. LOW

Cornus kousa **‘Satomi’**
Red Flowering Kousa Dogwood

Disease resistant; pink flowers in June

Plant Characteristics:

15’H/18’W FULL HIGH LOW

Parrotia persica
Persian Ironwood

Deciduous tree with nice fall color; exfoliating bark on mature trees

Plant Characteristics:

15’H/10’W FULL MED. MED.

Cryptomeria japonica
‘Black Dragon’
Black Dragon Japanese Cedar

Slow-growing evergreen tree; dense and irregular form

Plant Characteristics:

20’H/20’W FULL HIGH MED.

Pyrus calleryana **‘Jaczam’**
Jack Ornamental Pear

Compact deciduous tree with white flowers; golden fall color

Plant Characteristics:

20’H/12’W MED. MED. LOW

Styrax japonicus
Japanese Snowbell

Compact, deciduous tree with white flowers which bloom May - June

Plant Characteristics:

20’H/20’W FULL MED. LOW

Legend

Approximate Size	Sun Requirement	Water Requirement	Friendly to Pollinators	Native Planting	Edible Parts	Maintenance Requirement

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PSE PUGET SOUND ENERGY

Updated summer 2018

DSD 000831 6886 0818

Sample plant palette for low-growing trees

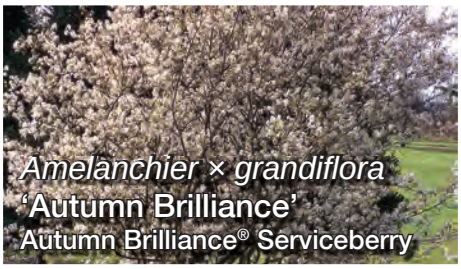
Replacement options are subject to location-specific approval and will be planted at less mature heights than shown below

Acer buergerianum
Trident Maple

Easy growing; deciduous tree with tri-lobed, glossy green leaves; and vibrant fall color

Plant Characteristics:

20'H/20'W | MED. | MED. | MED.



Amelanchier × grandiflora
'Autumn Brilliance'
Autumn Brilliance® Serviceberry

Upright, moderately spreading canopy; four-season interest; vibrant white flowers and vivid red fall color

Plant Characteristics:

20'H/15'W | MED. | MED. | LOW

Chionanthus retusus
'Tokyo Tower'
Tokyo Tower Fringe Tree

Small, deep green showy foliage; upright vase shaped tree with exfoliating bark year-round

Plant Characteristics:

20'H/10'W | MED. | MED. | MED.

Acer platanoides **'Globosum'**
Globe Norway Maple

Dense and round canopy; near-perfect symmetry; and vibrant fall color

Plant Characteristics:

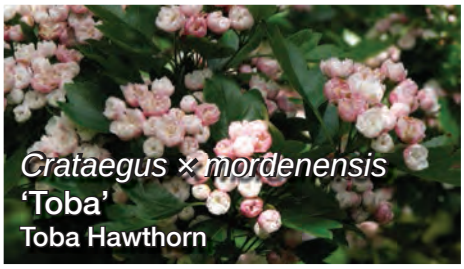
15'H/18'W | MED. | MED. | LOW

Amelanchier grandiflora
'Princess Diana'
Princess Diana Serviceberry

A gracefully spreading small tree with excellent long-lasting fall color; pollinator friendly

Plant Characteristics:

20'H/15'W | MED. | MED. | LOW



Crataegus × mordenensis
'Toba'
Toba Hawthorn

A showy tree with fragrant pink clustered flowers in spring; showy red berries in fall

Plant Characteristics:

20'H/20'W | MED. | MED. | LOW

Halesia carolina
'UConn Wedding Bells'
Wedding Bells Silverbell

Compact, oval shaped canopy; large and significant flowers; yellow fall foliage

Plant Characteristics:

20'H/15'W | FULL | MED. | MED.

Malus **'Adirondack'**
Adirondack Crabapple

Compact, dense, medium-green foliage; very heavy white flower clusters

Plant Characteristics:

18'H/10'W | MED. | MED. | LOW

Malus **'JFS KW214MX'**
Ivory Spear™ Crabapple

Narrow, tightly-columnar, dark green canopy; bright cherry-red fruit; vibrant yellow fall color

Plant Characteristics:

18'H/7'W | MED. | MED. | LOW

Legend

Approximate Size	Sun Requirement	Water Requirement	Friendly to Pollinators	Native Planting	Edible Parts	Maintenance Requirement

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Updated summer 2018

DSD 000832 6886 0818

Sample plant palette for low-growing trees

Replacement options are subject to location-specific approval and will be planted at less mature heights than shown below

Maackia amurensis
Amur Maackia

Hardy; small upright vase-shaped canopy; medium green foliage with white flower clusters

Plant Characteristics:

25'H/20'W | MED. | LOW | LOW

Malus 'Schmidtcutleaf'
Golden Raindrops® Crabapple

Delicate looking and fine textured leaves; elegant form with slender, vase-shaped limbs

Plant Characteristics:

20'H/15'W | FULL | MED. | MED.

Malus 'Red Barron'
Red Barron Crabapple

Narrow and columnar canopy; ascending branch structure; purple, year-round seasonal foliage interest

Plant Characteristics:

18'H/8'W | MED. | MED. | MED.

Malus 'Jewelcole'
Red Jewel™ Crabapple

Bright red, non-edible fruit; upright and pyramidal canopy; white flowers in spring

Plant Characteristics:

15'H/12'W | FULL | MED. | LOW

Prunus 'Frankthrees'
Mt. St. Helens® Plum

Small, rounded, upright spreading canopy; purple foliage; hardy with strong truck and branch form

Plant Characteristics:

20'H/20'W | MED. | MED. | MED.

Syringa reticulata 'Ivory Silk'
Ivory Silk® Japanese Tree Lilac

Large, white plumes of flowers smother the branches in early spring; round upright canopy

Plant Characteristics:

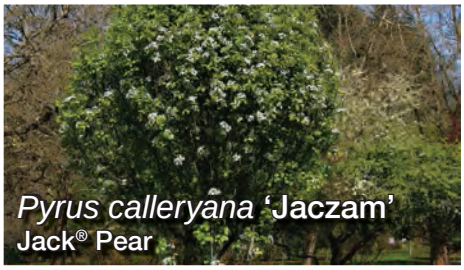
20'H/15'W | MED. | MED. | MED.

Prunus × *cistena* 'Schmidtcis'
Big Cis® Plum

Rounded dense, purple foliage; light pink and fragrant flowers

Plant Characteristics:

14'H/12'W | MED. | MED. | MED.



Pyrus calleryana 'Jaczam'
Jack® Pear

Tight, upright, compact and oval form; dark green foliage; bright yellow fall color

Plant Characteristics:

16'H/10'W | FULL | MED. | LOW

Tilia cordata 'Halka' PP 10589
Summer Sprite® Linden

Semi-dwarf; dense, rounded, rounded pyramid canopy; sheared appearance; green foliage

Plant Characteristics:

20'H/15'W | FULL | MED. | LOW

Legend

Approximate Size	Sun Requirement	Water Requirement	Friendly to Pollinators	Native Planting	Edible Parts	Maintenance Requirement

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PSE PUGET SOUND ENERGY

Updated summer 2018

DSD 000833 6886 0818

Sample plant palette for edible landscape

Replacement options are subject to location-specific approval and will be planted at less mature heights than shown below

Multi-stemmed deciduous shrub; cross pollination required

Plant Characteristics:

20'H/15'W | FULL | MED. | MED.

Deciduous shrub; spreading form; cross pollination not needed

Plant Characteristics:

20'H/20'W | FULL | MED. | MED.

Deciduous small tree; requires pollination; many proven varieties in PNW

Plant Characteristics:

15'H/10'W | FULL | MED. | HIGH

Trained table apple to grow horizontally; great for small spaces

Plant Characteristics:

10'H/15'W | FULL | MED. | HIGH

Small, nut-bearing tree with ornamental value

Plant Characteristics:

15'H/15'W | FULL | MED. | MED.

Deciduous dwarf tree; numerous varieties from sweet to bitter (pie cherry)

Plant Characteristics:

15'H/15'W | FULL | MED. | HIGH

Deciduous tree; requires cross-pollination

Plant Characteristics:

20'H/20'W | FULL | MED. | HIGH

Best in acidic, well-drained soils; cross-pollination recommended

Plant Characteristics:

9'H/6'W | FULL | HIGH | MED.

Best in rich, well-drained soils; the more sun, the sweeter the fruit

Plant Characteristics:

20'H/15'W | FULL | MED. | MED.

Legend

Approximate Size	Sun Requirement	Water Requirement	Friendly to Pollinators	Native Planting	Edible Parts	Maintenance Requirement

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Updated summer 2018

DSD 000834 6886 0818

Sample plant palette for pollinator landscapes

Herbaceous perennial; attracts butterflies; blooms June - September

Plant Characteristics:

3'H/2'W | FULL | LOW | LOW

Herbaceous perennial; attracts birds and butterflies; blooms June - August

Plant Characteristics:

4'H/2'W | FULL | LOW | LOW

Evergreen shrub; attracts bees; blooms in May; blue berries in fall

Plant Characteristics:

2'H/4'W | FULL | LOW | LOW

Deciduous shrub; attracts bees; blooms June - August

Plant Characteristics:

10'H/8'W | FULL | LOW | LOW

Deciduous shrub; attracts bees; blooms July - August

Plant Characteristics:

6'H/6'W | MED. | MED. | MED.

Herbaceous perennial; attracts bufferflies, bees; blooms June - August

Plant Characteristics:

2'H/2'W | FULL | LOW | MED.

Broadleaf deciduous; attracts bees; blooms May - June

Plant Characteristics:

12'H/8'W | FULL | MED. | HIGH

Herbaceous perennial; attracts butterflies; blooms September - October

Plant Characteristics:

2'H/2'W | FULL | LOW | LOW

Deciduous shrub; attracts butterflies; blooms June - July

Plant Characteristics:

6'H/7'W | FULL | MED. | LOW

Legend

Approximate Size	Sun Requirement	Water Requirement	Friendly to Pollinators	Native Planting	Edible Parts	Maintenance Requirement

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PSE PUGET SOUND ENERGY

Updated summer 2018

DSD 000835 6886 0818

Sample habitat snag features

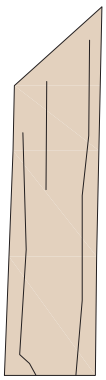
Habitat Snag

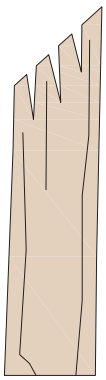
Habitat Snag

Habitat Snag

A habitat snag is an alternative where the lower portion of the tree remains. The upper portion of the tree is removed and the tree is then 5 feet to 15 feet above the ground. The coronet cut (see below) at the top of the tree can then provide habitat for birds, amphibians, bees, bats and small mammals as it decomposes in place.

How the habitats are created


Step one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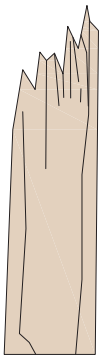
Step three

Photo example

Coronet cut notes:

A coronet cut is a technique for producing a natural fracture effect in cut stub ends:

1. Cut at an angle to height as individually confirmed in the field by restoration consultant;
2. After slicing, cut down into the tree to create crevices at the top; and
3. Cut further by “bouncing” the chain saw on the top to create multiple incisions to encourage decay and colonization by insects and fungi.

Chain saw / tool notes:

1. Use biodegradable bar and chain oil such as “motion lotion” or “Stihl.”

(Brown, Timothy K. 2002. Creating and Maintaining Wildlife, Insect, and Fish Habitat Structures in Dead Wood. U.S. Forest Service Gen. Tech. Rep. PSW-GTR-181; Missouri Department of Conservation. 1994. Forest and Wildlife Benefits on Private Land, Snags and Den Trees.)

ID	Tree Tag	Parcel Number	Scientific Name	Common Name	DBH_1	DBH_2	DBH_3
1	5194	2124059001	Pseudotsuga menziesii	Douglas-fir	11		
2	5195	2124059001	Pseudotsuga menziesii	Douglas-fir	9.1		
3	5196	2124059001	Pseudotsuga menziesii	Douglas-fir	10.2		
4	5193	2124059001	Pseudotsuga menziesii	Douglas-fir	14.5		
5	5188	2124059018	Acer macrophyllum	Bigleaf maple	9.8	3.1	3.1
6	5189	2124059018	Pseudotsuga menziesii	Douglas-fir	28.8		
7	5190	2124059018	Pseudotsuga menziesii	Douglas-fir	8		
8	5191	2124059001	Acer macrophyllum	Bigleaf maple	22.5	19.1	
9	5192	2124059001	Pseudotsuga menziesii	Douglas-fir	28.2		
10	0	1024059083	Fagus sylvatica 'purpurea'	European beech (purple)	27.3		
11	0	1024059083	Pinus contorta	Shore pine	10		
12	0	1024059083	Fagus sylvatica 'purpurea'	European beech (purple)	27		
13	0	1024059083	Fagus sylvatica 'purpurea'	European beech (purple)	28		
14	0	1024059083	Pinus nigra	Austrian pine	20		
15	0	1024059083	Pinus nigra	Austrian pine	27		
16	0	1024059083	Pinus nigra	Austrian pine	15		
17	0	1024059083	Pinus nigra	Austrian pine	14		
18	0	1024059083	Pinus nigra	Austrian pine	10		
19	0	1024059083	Pinus nigra	Austrian pine	23		
20	0	1024059083	Pinus nigra	Austrian pine	17		
21	0	1024059083	Pinus nigra	Austrian pine	12		
22	0	1024059083	Pinus nigra	Austrian pine	18		
23	0	1024059083	Pinus nigra	Austrian pine	16		
24	0	1024059083	Pinus nigra	Austrian pine	12		
25	0	1024059083	Pinus nigra	Austrian pine	13		
26	0	1024059083	Pinus nigra	Austrian pine	14		
27	0	1024059083	Pinus nigra	Austrian pine	18		
28	0	1024059083	Pinus nigra	Austrian pine	19		
29	0	1024059083	Betula pendula	European white birch	11		
30	0	1024059083	Pinus nigra	Austrian pine	20.7		
31	0	1024059083	Betula pendula	European white birch	9.5		
32	0	1024059083	Betula pendula	European white birch	10		
33	0	1024059083	Pinus nigra	Austrian pine	24		
34	0	1024059083	Pinus nigra	Austrian pine	22		
35	0	1024059083	Pinus nigra	Austrian pine	14		
36	0	1024059083	Pinus nigra	Austrian pine	20.5		
37	0	1024059083	Pinus nigra	Austrian pine	17		
38	219	2124059001	Acer platanoides	Norway maple	12		
39	1769	672100160	Pinus sylvestris	Scots pine	19.1		
40	1770	672100160	Robinia pseudoacacia	Black locust	12.5		
41	3776	1024059130	Alnus rubra	Red alder	9.7		
42	3777	1024059130	Alnus rubra	Red alder	9.7	8.2	
43	3778	1024059130	Alnus rubra	Red alder	9	8.2	

44	3779	1024059130	Alnus rubra	Red alder	10	8	8
45	3772	1024059130	Salix scouleriana	Scouler's willow	15.5		
46	3775	1024059130	Alnus rubra	Red alder	10.5		
47	3774	1024059130	Alnus rubra	Red alder	9		
48	3771	1024059130	Acer macrophyllum	Bigleaf maple	31		
49	3772	1024059130	Salix scouleriana	Scouler's willow	15.5		
50	3914	1024059130	Alnus rubra	Red alder	9		
51	218	2124059001	Acer platanoides	Norway maple	9.5		
52	242	1024059130	Populus balsamifera	Black cottonwood	20.3	0	
53	246	1024059130	Populus balsamifera	Black cottonwood	22	0	
54	3807	1024059130	Alnus rubra	Red alder	12	8	
55	3770	1024059130	Acer macrophyllum	Bigleaf maple	40	15	15
56	3805	1024059130	Salix lasiandra	Pacific willow	18		
57	3803	1024059130	Alnus rubra	Red alder	8.4	8.2	
58	3804	1024059130	Salix lasiandra	Pacific willow	13		
59	3808	1024059130	Acer macrophyllum	Bigleaf maple	23	14	8
60	3809	1024059130	Acer macrophyllum	Bigleaf maple	13.5	13.5	
61	3812	1024059130	Acer macrophyllum	Bigleaf maple	27		
62	3814	1024059130	Acer macrophyllum	Bigleaf maple	24	20	12.8
63	3816	1024059130	Acer macrophyllum	Bigleaf maple	22	20	20
64	3821	1024059130	Salix lasiandra	Pacific willow	9		
65	3810	1024059130	Acer macrophyllum	Bigleaf maple	15		
66	3813	1024059130	Acer macrophyllum	Bigleaf maple	17.3		
67	3811	1024059130	Acer macrophyllum	Bigleaf maple	21		
68	3817	1024059130	Thuja plicata	Western red cedar	24		
69	3818	1024059130	Thuja plicata	Western red cedar	32.4		
70	3826	1024059130	Thuja plicata	Western red cedar	8.7	5	
71	3819	1024059130	Thuja plicata	Western red cedar	9		
72	3826	1024059130	Malus domestica	Apple	11		
73	3747	1024059130	Alnus rubra	Red alder	11.7		
74	3748	1024059130	Alnus rubra	Red alder	14.7		
75	3757	1024059130	Alnus rubra	Red alder	29.7		
76	3764	1024059130	Acer macrophyllum	Bigleaf maple	16		
77	3763	1024059130	Acer macrophyllum	Bigleaf maple	23		
78	3767	1024059130	Acer macrophyllum	Bigleaf maple	24		
79	3769	1024059130	Acer macrophyllum	Bigleaf maple	24	15	15
80	3768	1024059130	Acer macrophyllum	Bigleaf maple	15		
81	3753	1024059130	Alnus rubra	Red alder	16	9	8
82	3754	1024059130	Alnus rubra	Red alder	13	11	9
83	3755	1024059130	Alnus rubra	Red alder	8		
84	3756	1024059130	Alnus rubra	Red alder	20		
85	3752	1024059130	Alnus rubra	Red alder	10	5	
86	3751	1024059130	Alnus rubra	Red alder	10.6		
87	3750	1024059130	Alnus rubra	Red alder	11.6		

88	3749	1024059130	Alnus rubra	Red alder	8		
89	3730	1024059130	Alnus rubra	Red alder	24		
90	3729	1024059130	Alnus rubra	Red alder	22		
91	3759	1024059130	Alnus rubra	Red alder	16.5		
92	3758	1024059130	Alnus rubra	Red alder	16.5		
93	3746	1024059130	Alnus rubra	Red alder	12	12	10
94	3745	1024059130	Alnus rubra	Red alder	9		
95	3743	1024059130	Alnus rubra	Red alder	18	10	10
96	3742	1024059130	Salix sitchensis	Sitka willow	10		
97	3741	1024059130	Alnus rubra	Red alder	20	9	
98	3740	1024059130	Acer macrophyllum	Bigleaf maple	12	12	11
99	3738	1024059130	Acer macrophyllum	Bigleaf maple	18	18	11
100	3737	1024059130	Alnus rubra	Red alder	11.5		
101	3739	1024059130	Alnus rubra	Red alder	9		
102	3731	1024059130	Acer macrophyllum	Bigleaf maple	26	14	
103	3735	1024059130	Alnus rubra	Red alder	8		
104	3734	1024059130	Alnus rubra	Red alder	11		
105	3698	1024059130	Acer macrophyllum	Bigleaf maple	16.5	15	10
106	3732	1024059130	Alnus rubra	Red alder	13		
107	161	7856420060	Pseudotsuga menziesii	Douglas-fir	11.3		
108	3825	1024059130	Crataegus monogyna	Common hawthorn	9		
109	3823	1024059130	Prunus emarginata	Bitter cherry	9.2		
110	3827	1024059130	Acer macrophyllum	Bigleaf maple	20.5		
111	3828	1024059130	Acer macrophyllum	Bigleaf maple	18	16	14
112	3834	1024059130	Acer macrophyllum	Bigleaf maple	20	15	
113	3833	1024059130	Acer macrophyllum	Bigleaf maple	24	10	
114	3832	1024059130	Acer macrophyllum	Bigleaf maple	22		
115	3831	1024059130	Acer macrophyllum	Bigleaf maple	24	9	
116	3830	1024059130	Acer macrophyllum	Bigleaf maple	15	13	12
117	3829	1024059130	Acer macrophyllum	Bigleaf maple	17.5		
118	3719	1024059130	Alnus rubra	Red alder	13		
119	3720	1024059130	Alnus rubra	Red alder	13		
120	3721	1024059130	Alnus rubra	Red alder	10		
121	3722	1024059130	Alnus rubra	Red alder	11		
122	3723	1024059130	Alnus rubra	Red alder	11		
123	3724	1024059130	Alnus rubra	Red alder	20.7		
124	3725	1024059130	Alnus rubra	Red alder	8		
125	3718	1024059130	Alnus rubra	Red alder	8		
126	3717	1024059130	Alnus rubra	Red alder	8		
127	3700	1024059130	Alnus rubra	Red alder	13.3		
128	3728	1024059130	Alnus rubra	Red alder	11		
129	3726	1024059130	Alnus rubra	Red alder	9	7	
130	3727	1024059130	Alnus rubra	Red alder	8		
131	3699	1024059130	Alnus rubra	Red alder	16.7		

132	3697	1024059130	Alnus rubra	Red alder	14		
133	3696	1024059130	Alnus rubra	Red alder	15		
134	3695	1024059130	Alnus rubra	Red alder	11		
135	160	7856640010	Thuja plicata	Western red cedar	22		
136	148	2206500400	Pinus sylvestris	Scots pine	11		
137	145	8135300020	Quercus sp.	Oak	10.8		
138	151	2206500400	Prunus domestica	Plum	13.5		
139	3835	1024059130	Acer macrophyllum	Bigleaf maple	30		
140	3836	1024059130	Acer macrophyllum	Bigleaf maple	24	16	15
141	3837	1024059130	Acer macrophyllum	Bigleaf maple	36	36	24
142	146	8135300020	Thuja plicata	Western red cedar	12		
143	147	2206500400	Pinus sylvestris	Scots pine	13.2		
144	133	8135300020	Pseudotsuga menziesii	Douglas-fir	12		
145	132	8135300020	Pseudotsuga menziesii	Douglas-fir	10.9		
146	3838	1024059130	Acer macrophyllum	Bigleaf maple	36	36	
147	3839	1024059130	Acer macrophyllum	Bigleaf maple	24	20	
148	18	1024059123	Pseudotsuga menziesii	Douglas-fir	11.4		
149	131	8135300020	Pseudotsuga menziesii	Douglas-fir	12.9		
150	3853	1024059130	Alnus rubra	Red alder	9		
151	3852	1024059130	Alnus rubra	Red alder	11	10	
152	3851	1024059130	Alnus rubra	Red alder	9	8	7
153	3850	1024059130	Alnus rubra	Red alder	9	8	
154	3849	1024059130	Alnus rubra	Red alder	12		
155	3847	1024059130	Alnus rubra	Red alder	14	14	
156	3846	1024059130	Alnus rubra	Red alder	10.5		
157	3845	1024059130	Alnus rubra	Red alder	15	11	11
158	3843	1024059130	Alnus rubra	Red alder	12		
159	3842	1024059130	Alnus rubra	Red alder	14		
160	3841	1024059130	Alnus rubra	Red alder	8		
161	19	1024059123	Pseudotsuga menziesii	Douglas-fir	14		
162	20	1024059123	Pseudotsuga menziesii	Douglas-fir	13.2		
163	21	1024059123	Pseudotsuga menziesii	Douglas-fir	16.1		
164	22	1024059123	Pseudotsuga menziesii	Douglas-fir	14.1		
165	23	1024059123	Pseudotsuga menziesii	Douglas-fir	14		
166	24	1024059123	Pseudotsuga menziesii	Douglas-fir	20.5		
167	3840	1024059130	Alnus rubra	Red alder	12	10	8
168	3716	1024059130	Alnus rubra	Red alder	15		
169	3715	1024059130	Salix lasiandra	Pacific willow	12	12	12
170	3714	1024059130	Alnus rubra	Red alder	16		
171	3713	1024059130	Alnus rubra	Red alder	9	8	8
172	3712	1024059130	Alnus rubra	Red alder	9		
173	3710	1024059130	Alnus rubra	Red alder	9		
174	3711	1024059130	Alnus rubra	Red alder	8		
175	3708	1024059130	Alnus rubra	Red alder	11		

176	3704	1024059130	Alnus rubra	Red alder	9		
177	3705	1024059130	Alnus rubra	Red alder	10		
178	3706	1024059130	Alnus rubra	Red alder	12.4		
179	3707	1024059130	Alnus rubra	Red alder	12		
180	3709	1024059130	Alnus rubra	Red alder	8		
181	3703	1024059130	Alnus rubra	Red alder	15		
182	3702	1024059130	Alnus rubra	Red alder	13		
183	3701	1024059130	Alnus rubra	Red alder	8		
184	1954	324059066	Alnus rubra	Red alder	12.4		
185	3694	1024059130	Alnus rubra	Red alder	18.3	8.7	
186	3396	1024059130	Salix lasiandra	Pacific willow	12		
187	3395	1024059130	Salix lasiandra	Pacific willow	12	10	6
188	3393	1024059130	Alnus rubra	Red alder	10.8		
189	3398	1024059130	Alnus rubra	Red alder	10		
190	3397	1024059130	Alnus rubra	Red alder	8		
191	3394	1024059130	Salix lasiandra	Pacific willow	8		
192	3401	1024059130	Acer macrophyllum	Bigleaf maple	15.8		
193	3854	1024059130	Alnus rubra	Red alder	9		
194	3392	1024059130	Alnus rubra	Red alder	10	10	9
195	3391	1024059130	Alnus rubra	Red alder	9		
196	3389	1024059130	Alnus rubra	Red alder	9		
197	3384	1024059130	Alnus rubra	Red alder	10	9	7
198	3383	1024059130	Acer macrophyllum	Bigleaf maple	10		
199	3380	1024059130	Alnus rubra	Red alder	9	9	7
200	3378	1024059130	Alnus rubra	Red alder	11	9	
201	3377	1024059130	Alnus rubra	Red alder	9		
202	3376	1024059130	Alnus rubra	Red alder	8		
203	3369	1024059130	Alnus rubra	Red alder	10	10	9
204	3375	1024059130	Alnus rubra	Red alder	8		
205	3374	1024059130	Salix lasiandra	Pacific willow	12		
206	3373	1024059130	Alnus rubra	Red alder	13		
207	3388	1024059130	Alnus rubra	Red alder	9.5		
208	3379	1024059130	Alnus rubra	Red alder	8		
209	3386	1024059130	Alnus rubra	Red alder	9.5		
210	3385	1024059130	Alnus rubra	Red alder	9.5		
211	3400	1024059130	Alnus rubra	Red alder	8.5		
212	3856	1024059130	Alnus rubra	Red alder	8		
213	3855	1024059130	Alnus rubra	Red alder	12	8	5
214	3857	1024059130	Alnus rubra	Red alder	14		
215	3858	1024059130	Acer macrophyllum	Bigleaf maple	8		
216	25	1024059123	Acer macrophyllum	Bigleaf maple	13.4		
217	3859	1024059130	Alnus rubra	Red alder	9		
218	3860	1024059130	Alnus rubra	Red alder	10		
219	111	1024059123	Alnus rubra	Red alder	8.5		

220	110	1024059123	Populus balsamifera	Black cottonwood	9		
221	115	1024059123	Acer rubrum	Red maple	13.7		
222	116	2206500435	Acer palmatum	Japanese maple	8.5		
223	117	2206500435	Prunus avium	Sweet cherry	9.1		
224	3861	1024059130	Alnus rubra	Red alder	10	8	
225	27	3425059010	×Hesperotropsis leylandii	Leyland cypress	8.3		
226	3864	1024059130	Alnus rubra	Red alder	18		
227	3863	1024059130	Acer macrophyllum	Bigleaf maple	8		
228	3862	1024059130	Alnus rubra	Red alder	16.5	7	
229	3876	1024059130	Alnus rubra	Red alder	12.5		
230	3878	1024059130	Alnus rubra	Red alder	8		
231	3879	1024059130	Alnus rubra	Red alder	14		
232	3880	1024059130	Acer macrophyllum	Bigleaf maple	9.5	5.5	
233	3877	1024059130	Acer macrophyllum	Bigleaf maple	10		
234	3368	1024059130	Alnus rubra	Red alder	11	7	
235	3367	1024059130	Alnus rubra	Red alder	9	7	
236	3366	1024059130	Alnus rubra	Red alder	11		
237	3365	1024059130	Alnus rubra	Red alder	14.9		
238	3364	1024059130	Alnus rubra	Red alder	10		
239	3362	1024059130	Alnus rubra	Red alder	8		
240	3361	1024059130	Alnus rubra	Red alder	9	8	7
241	3358	1024059130	Alnus rubra	Red alder	16.5		
242	3372	1024059130	Alnus rubra	Red alder	12	10	6
243	3371	1024059130	Alnus rubra	Red alder	11.3		
244	3360	1024059130	Alnus rubra	Red alder	11.6		
245	3359	1024059130	Alnus rubra	Red alder	17.8		
246	3363	1024059130	Alnus rubra	Red alder	12.2		
247	124	1024059123	Acer rubrum	Red maple	15.5		
248	29	3425059010	×Hesperotropsis leylandii	Leyland cypress	12.3		
249	62	2225059272	Prunus cerasifera	Flowering plum	9.5		
250	2590	1024059101	Arbutus menziesii	Pacific madrone	17.3		
251	2591	1024059101	Arbutus menziesii	Pacific madrone	11.7		
252	2595	8135300020	Prunus serrulata	Japanese flowering cherry	8.3		
253	2596	8135300020	Quercus sp.	Oak	10.8		
254	2597	8135300020	Thuja plicata	Western red cedar	12		
255	2602	8135300020	Fraxinus sp.	Ash species	8		
256	2601	8135300020	Pseudotsuga menziesii	Douglas-fir	12.9		
257	2600	8135300020	Pseudotsuga menziesii	Douglas-fir	10.9		
258	2599	8135300020	Pseudotsuga menziesii	Douglas-fir	12		
259	2497	1024059123	Pinus sylvestris	Scots pine	13.1		
260	2494	1024059123	Thuja occidentalis	Eastern arborvitae	8.3		
261	2495	1024059123	Thuja plicata	Western red cedar	11.6		
262	2532	1024059123	Acer rubrum	Red maple	13.7		
263	2530	1024059123	Alnus rubra	Red alder	8.5		

264	2505	1024059123	Pinus sylvestris	Scots pine	9.5
265	2501	1024059123	Pinus sylvestris	Scots pine	9.2
266	2535	1024059123	Acer rubrum	Red maple	15.5
267	2507	1024059123	Thuja plicata	Western red cedar	8
268	2506	1024059123	Pinus sylvestris	Scots pine	9.4
269	2515	1024059123	Pseudotsuga menziesii	Douglas-fir	16.1
270	2510	1024059123	Pseudotsuga menziesii	Douglas-fir	10
271	2512	1024059123	Pseudotsuga menziesii	Douglas-fir	11.4
272	2511	1024059123	Pseudotsuga menziesii	Douglas-fir	10
273	2513	1024059123	Pseudotsuga menziesii	Douglas-fir	14
274	2514	1024059123	Pseudotsuga menziesii	Douglas-fir	13.2
275	2546	2206500020	Arbutus menziesii	Pacific madrone	18.7
276	2545	2206500020	Abies grandis	Grand fir	12.1
277	2516	1024059123	Pseudotsuga menziesii	Douglas-fir	14.1
278	2520	1024059123	Acer macrophyllum	Bigleaf maple	13.4
279	2544	2206500020	Pinus nigra	Austrian pine	8.5
280	2541	2206500025	Pseudotsuga menziesii	Douglas-fir	20.6
281	2543	2206500020	Thuja plicata	Western red cedar	13
282	2540	2206500025	Pseudotsuga menziesii	Douglas-fir	31.8
283	2538	2206500025	Acer macrophyllum	Bigleaf maple	10.5
284	2542	2206500020	Pseudotsuga menziesii	Douglas-fir	12.3
285	2548	2206500220	Malus domestica	Apple	12
286	2558	2206500230	Prunus domestica	Plum	14.6
287	2587	2206500255	Acer platanoides	Norway maple	18
288	2574	2206500435	Platanus occidentalis	American sycamore	18
289	2573	2206500435	Magnolia stellata	Star magnolia	12.4
290	2575	2206500435	Platanus occidentalis	American sycamore	13
291	2576	2206500435	Platanus occidentalis	American sycamore	22.1
292	2577	2206500435	Acer palmatum	Japanese maple	8.5
293	2578	2206500435	Prunus avium	Sweet cherry	9.1
294	2579	2206500435	Prunus domestica	Plum	12
295	2603	2206500425	Prunus avium	Sweet cherry	15.6
296	2586	2206500435	Prunus domestica	Plum	8.2
297	2610	2206500420	Prunus avium	Sweet cherry	8.3
298	2608	2206500425	Prunus avium	Sweet cherry	9.1
299	2611	2206500420	Prunus avium	Sweet cherry	28
300	2620	2206500390	Sequoia sempervirens	Redwood	38
301	2538	2206500025	Acer macrophyllum	Bigleaf maple	10.5
302	2617	2206500415	Prunus serrulata	Japanese flowering cherry	10.4
303	2535	1024059123	Acer rubrum	Red maple	15.5
304	2532	1024059123	Acer rubrum	Red maple	13.7
305	2531	1024059123	Populus balsamifera	Black cottonwood	9
306	2618	2206500410	Malus domestica	Apple	8
307	2654	1524059005	Quercus palustris	Pin oak	15.3

308	2662	1524059005	Prunus serrulata	Japanese flowering cherry	12
309	2663	1524059005	Malus domestica	Apple	8.6
310	2679	1524059005	Pinus sp. <2 needle>	Pine tree, 2 needle	12.5
311	2675	1524059005	Pinus sp. <2 needle>	Pine tree, 2 needle	12.6
312	2676	1524059005	Pinus ponderosa	Ponderosa pine	16.4
313	2678	1524059005	Pinus sp. <2 needle>	Pine tree, 2 needle	12.3
314	2683	1524059005	Pinus sp. <2 needle>	Pine tree, 2 needle	14.6
315	2680	1524059005	Pinus sp. <2 needle>	Pine tree, 2 needle	10.3
316	2682	1524059005	Pseudotsuga menziesii	Douglas-fir	12
317	2684	1524059005	Pinus sp. <2 needle>	Pine tree, 2 needle	10.5
318	2686	1524059005	Arbutus menziesii	Pacific madrone	11.8
319	2685	1524059005	Pinus sp. <2 needle>	Pine tree, 2 needle	11.8
320	2709	1524059032	Pseudotsuga menziesii	Douglas-fir	15.5
321	2710	1524059032	Thuja plicata	Western red cedar	10
322	2711	1524059032	Thuja plicata	Western red cedar	11.3
323	2707	1524059032	Pseudotsuga menziesii	Douglas-fir	9.3
324	2708	1524059032	Pseudotsuga menziesii	Douglas-fir	14.5
326	2698	1524059080	Thuja plicata	Western red cedar	10.8
327	2699	1524059080	Thuja plicata	Western red cedar	10.3
328	2700	1524059080	Prunus cerasifera	Flowering plum	11.8
329	2697	1524059080	Thuja plicata	Western red cedar	16.5
330	2716	1524059032	Picea pungens	Colorado spruce	9.5
331	2696	1524059080	Thuja plicata	Western red cedar	18
332	2695	1524059080	Thuja plicata	Western red cedar	20
333	2694	1524059080	×Hesperotropsis leylandii	Leyland cypress	11.5
334	2688	1524059080	×Hesperotropsis leylandii	Leyland cypress	12
335	2690	1524059080	×Hesperotropsis leylandii	Leyland cypress	9
336	2722	1524059032	×Hesperotropsis leylandii	Leyland cypress	12
337	2723	1524059032	×Hesperotropsis leylandii	Leyland cypress	11.8
338	2724	1524059032	×Hesperotropsis leylandii	Leyland cypress	11
339	2726	1524059032	Pinus sylvestris	Scots pine	11.2
340	2743	1524059145	Prunus cerasifera	Flowering plum	9.3
341	2742	1524059145	Prunus cerasifera	Flowering plum	10.7
342	2746	7856640010	Thuja plicata	Western red cedar	17.3
343	2747	7856640010	Thuja plicata	Western red cedar	13.4
344	2748	7856640010	Thuja plicata	Western red cedar	16
345	2749	7856640010	Picea pungens	Colorado spruce	8.4
346	2817	7856420080	Populus balsamifera	Black cottonwood	13
347	2820	7856420080	Populus balsamifera	Black cottonwood	15
348	2819	7856420080	Thuja plicata	Western red cedar	11
349	2821	7856420080	Pseudotsuga menziesii	Douglas-fir	12.3
350	2823	7856420080	Thuja plicata	Western red cedar	9.7
351	2822	7856420080	Pseudotsuga menziesii	Douglas-fir	9.8
352	2824	7856420080	Arbutus menziesii	Pacific madrone	9.5

353	2831	7856420050	Salix scouleriana	Scouler's willow	12.5
354	2825	7856420080	Pseudotsuga menziesii	Douglas-fir	11.9
355	2826	7856420080	Pseudotsuga menziesii	Douglas-fir	8.6
356	2826	7856420080	Pseudotsuga menziesii	Douglas-fir	8.6
357	2830	7856420080	Arbutus menziesii	Pacific madrone	11.6
358	2832	7856420050	Salix scouleriana	Scouler's willow	13.5
359	2753	7856640010	Thuja plicata	Western red cedar	22
360	2767	7856640020	Pseudotsuga menziesii	Douglas-fir	17.2
361	2756	7856640010	Thuja plicata	Western red cedar	10.4
362	2762	7856640020	Thuja plicata	Western red cedar	9.7
363	2766	7856640020	Pseudotsuga menziesii	Douglas-fir	13.7
364	2765	7856640020	Thuja plicata	Western red cedar	11.2
365	2772	7856640020	Thuja plicata	Western red cedar	10.1
366	2764	7856640020	Thuja plicata	Western red cedar	9
367	2768	7856640020	Pseudotsuga menziesii	Douglas-fir	11.6
368	2769	7856640020	Pseudotsuga menziesii	Douglas-fir	12.8
369	2770	7856640020	Pseudotsuga menziesii	Douglas-fir	13.6
370	2775	7856640020	Pseudotsuga menziesii	Douglas-fir	11.7
371	2777	7856640020	Thuja plicata	Western red cedar	11
372	2778	7856640020	Thuja plicata	Western red cedar	8.7
373	2779	7856640020	Pseudotsuga menziesii	Douglas-fir	11.3
374	2780	7856640020	Pseudotsuga menziesii	Douglas-fir	11.2
375	2835	7856420050	Thuja plicata	Western red cedar	23.5
376	2781	7856640020	Pseudotsuga menziesii	Douglas-fir	9.5
377	2782	7856640020	Pseudotsuga menziesii	Douglas-fir	9.9
378	2783	7856640020	Pseudotsuga menziesii	Douglas-fir	9.6
379	2788	7856640020	Pseudotsuga menziesii	Douglas-fir	9.5
380	2786	7856640020	Pinus sylvestris	Scots pine	12.1
381	2789	7856640020	Pseudotsuga menziesii	Douglas-fir	17.9
382	2790	7856640020	Pseudotsuga menziesii	Douglas-fir	13.2
383	2792	7856640020	Pseudotsuga menziesii	Douglas-fir	16.7
384	2804	7856640020	Pseudotsuga menziesii	Douglas-fir	24.6
385	2795	7856640020	Pseudotsuga menziesii	Douglas-fir	10.3
386	2797	7856640020	Pseudotsuga menziesii	Douglas-fir	13.5
387	2796	7856640020	Pseudotsuga menziesii	Douglas-fir	11.4
388	2803	7856640020	Pseudotsuga menziesii	Douglas-fir	12.6
389	2798	7856640020	Thuja plicata	Western red cedar	13.6
390	2806	7856640030	Pseudotsuga menziesii	Douglas-fir	16.7
391	2802	7856640020	Pseudotsuga menziesii	Douglas-fir	15.5
392	2805	7856640030	Pseudotsuga menziesii	Douglas-fir	15.3
393	2836	7856420050	Acer macrophyllum	Bigleaf maple	8.6
394	2863	7856640430	Tsuga mertensiana	Mountain hemlock	8.3
395	2867	7856640430	Prunus cerasifera	Flowering plum	10.5
396	2882	7855000230	Prunus serrulata	Japanese flowering cherry	19

397	2877	7856640430	Prunus cerasifera	Flowering plum	8.5	
398	2868	7856640430	Prunus cerasifera	Flowering plum	11.5	
399	2869	7856640430	Prunus cerasifera	Flowering plum	9.2	
400	2872	7856640430	Prunus cerasifera	Flowering plum	10.1	
401	2881	7855000230	Liquidambar styraciflua	American sweetgum	14.1	
402	2891	7855000240	×Hesperotropsis leylandii	Leyland cypress	26	
403	2888	7855000240	Callitropsis┬ánootkatensis	Alaska cedar	13.3	
404	2887	7855000240	Cedrus deodara	Deodar cedar	9.4	
405	2901	7855000240	Chamaecyparis obtusa	Hinoki Falsecypress	14.1	
406	2885	7855000240	×Hesperotropsis leylandii	Leyland cypress	26	
407	2886	7855000240	×Hesperotropsis leylandii	Leyland cypress	22.9	
408	2928	1524059142	Crataegus monogyna	Common hawthorn	10.4	
409	2934	7855000270	Prunus armeniaca	Apricot	9	
410	2941	1524059142	Pinus nigra	Austrian pine	18.5	
411	2942	1524059142	Pinus nigra	Austrian pine	19	
412	2944	7855000290	Pinus nigra	Austrian pine	15.5	
413	2945	7855000290	Pseudotsuga menziesii	Douglas-fir	9.1	
414	2946	7855000290	Sequoiadendron giganteum	Giant sequoia	31.5	
415	2947	7855000290	Sequoiadendron giganteum	Giant sequoia	22.5	
416	2948	7855000290	Sequoiadendron giganteum	Giant sequoia	27	
417	2950	7855000290	Pinus sylvestris	Scots pine	11	
418	3163	7855800120	Malus domestica	Apple	9	
419	3183	7855800140	Prunus domestica	Plum	8.5	
420	3268	7856410120	Picea pungens	Colorado spruce	14.7	
421	3431	7855801670	Acer palmatum	Japanese maple	8.4	
422	3428	7855801670	Picea pungens	Colorado spruce	9.8	
423	3423	7855801670	Myrica californica	Pacific waxmyrtle	8.4	
424	3442	7855801680	Pinus nigra	Austrian pine	10.3	
425	3439	7855801680	Pinus contorta	Shore pine	8.6	
426	3444	7855801680	Pinus nigra	Austrian pine	12.2	
427	3504	7855801590	Pinus contorta	Shore pine	18.8	
428	3506	7855801590	Arbutus menziesii	Pacific madrone	9	
429	3449	7855801700	Cornus florida	Flowering dogwood	9.4	
430	3526	7855801570	Pseudotsuga menziesii	Douglas-fir	9.5	
431	3543	7855801570	Pseudotsuga menziesii	Douglas-fir	8.5	
432	3538	7855801570	Pseudotsuga menziesii	Douglas-fir	19.2	
433	3546	7855801560	Picea pungens	Colorado spruce	13.4	
434	3547	7855801560	Picea pungens	Colorado spruce	9.5	
435	3548	7855801560	Picea pungens	Colorado spruce	10.5	
436	3472	7855801720	Chamaecyparis obtusa	Hinoki Falsecypress	11	
437	3470	7855801720	Chamaecyparis obtusa	Hinoki Falsecypress	9	
438	3549	7855801560	Picea pungens	Colorado spruce	9.4	
439	3550	7855801560	Picea pungens	Colorado spruce	12.5	
440	3477	7855801720	Prunus domestica	Plum	11	

441	3552	7855801560	Picea pungens	Colorado spruce	13.3	
442	3564	7855801550	Liquidambar styraciflua	American sweetgum	11.2	
443	3563	7855801550	Picea pungens	Colorado spruce	16.4	
444	3561	7855801550	Picea pungens	Colorado spruce	10.5	
445	3560	7855801550	Picea pungens	Colorado spruce	14.5	
446	3559	7855801550	Picea pungens	Colorado spruce	12.1	
447	3493	7855801730	Malus domestica	Apple	9.7	
448	3571	7855801550	Arbutus menziesii	Pacific madrone	11.6	
449	3557	7855801550	Pseudotsuga menziesii	Douglas-fir	18.6	
450	3558	7855801550	Pseudotsuga menziesii	Douglas-fir	22.1	
451	3498	7855801740	Prunus domestica	Plum	9	
452	3604	7855801540	Cedrus deodara	Deodar cedar	18.4	
453	3600	2600010630	Pseudotsuga menziesii	Douglas-fir	23	
454	3599	2600010630	Pseudotsuga menziesii	Douglas-fir	13.5	
455	3598	2600010630	Pseudotsuga menziesii	Douglas-fir	16.8	
456	3610	2600010580	Pseudotsuga menziesii	Douglas-fir	10.6	
457	3612	2600010580	Pseudotsuga menziesii	Douglas-fir	13	
458	3613	2600010580	Pinus nigra	Austrian pine	17	
459	3614	2600010580	Pinus nigra	Austrian pine	11.7	
460	3615	2600010580	Pinus nigra	Austrian pine	18	
461	3618	2600010580	Pinus nigra	Austrian pine	14	
462	3616	2600010580	Pinus nigra	Austrian pine	10	
463	3617	2600010580	Pinus nigra	Austrian pine	19	
464	3621	2600010670	Pyrus sp.	Pear tree	8	
465	3629	2268400290	Prunus domestica	Plum	9.4	
466	3626	2268400290	Prunus serrulata	Japanese flowering cherry	12.8	
467	3636	2268400280	Pinus nigra	Austrian pine	16.5	
468	3639	2268400280	Acer rubrum	Red maple	11.4	
469	3642	2268400280	Pinus nigra	Austrian pine	10.4	
470	3643	2268400280	Prunus serrulata	Japanese flowering cherry	8.3	
471	3650	2268400280	Acer rubrum	Red maple	9.3	
472	3656	2268400280	Pinus nigra	Austrian pine	12.2	
473	3660	2268400280	Quercus palustris	Pin oak	8.3	
474	3662	2268400280	Betula pendula	European white birch	9.2	
475	441	1951700130	Malus domestica	Apple	9	
476	443	1951700130	Prunus avium	Sweet cherry	12	
477	445	1951700120	Prunus avium	Sweet cherry	9.5	
478	455	1951700010	Malus domestica	Apple	8	
479	452	1951700010	Ilex aquifolium	English holly	12	
480	451	1951700010	Prunus cerasifera 'thundercloud'	Cherry plum	16	
481	2490	1024059123	Pseudotsuga menziesii	Douglas-fir	19.1	
482	2492	1024059123	Thuja plicata	Western red cedar	11.3	
483	8506	1524059080	×Hesperotropsis leylandii	Leyland cypress	8	7
484	2840	7856420060	Abies sp.	Fir species	16.8	

485	2841	7856420060	Thuja plicata	Western red cedar	17.5
486	2842	7856420060	Malus domestica	Apple	11
487	2844	7856420060	Pseudotsuga menziesii	Douglas-fir	11.3
488	2851	7856420070	Prunus avium	Sweet cherry	16
489	2852	7856420070	Acer macrophyllum	Bigleaf maple	32.4
490	2943	7855000290	Picea pungens	Colorado spruce	17
491	2944	7855000290	Pinus nigra	Austrian pine	15.5
492	2957	7855000300	Prunus domestica	Plum	15
493	2958	7855000300	Prunus domestica	Plum	10.5
494	2960	7855000310	Crataegus monogyna	Common hawthorn	8.7
495	2962	7855000310	Prunus laurocerasus	Cherry laurel	12.5
496	2961	7855000310	Malus domestica	Apple	9.3
497	2963	7855000310	Prunus lusitanica	Portuguese laurel	10.2
498	2964	7856660250	Pseudotsuga menziesii	Douglas-fir	16.1
499	2965	7856660250	Arbutus menziesii	Pacific madrone	10.6
500	2971	7856660250	Salix matsudana 'Tortuosa'	Corkscrew willow	19
501	2968	7856660250	Arbutus menziesii	Pacific madrone	15.1
502	2969	7856660250	Arbutus menziesii	Pacific madrone	8.4
503	2970	7856660250	Pinus ponderosa	Ponderosa pine	14.2
504	2976	7855000325	Prunus serrulata	Japanese flowering cherry	10.2
505	2977	7855000325	Prunus cerasifera	Flowering plum	8.8
506	2979	7855000325	Prunus cerasifera	Flowering plum	10.4
507	2978	7855000325	Laburnum x watereri	Goldenchain Tree	12.2
508	2996	7855000360	Picea pungens	Colorado spruce	14.4
509	2997	7855000360	Pinus contorta	Shore pine	14.4
510	2999	7855000360	Abies sp.	Fir species	8.2
511	3002	7855000360	Abies sp.	Fir species	9.4
512	3005	7855000360	Abies sp.	Fir species	9
513	3006	7855000360	Tsuga mertensiana	Mountain hemlock	9
514	3008	7855000360	Pinus sylvestris	Scots pine	8.1
515	3007	7855000360	Abies sp.	Fir species	9
516	3014	7855000360	Abies sp.	Fir species	11.9
517	3014	7855000360	Abies sp.	Fir species	11.9
518	3017	7855000360	Juniperus scopulorum	Rocky Mountain Juniper	8.6
519	3023	7855801770	Laburnum x watereri	Goldenchain Tree	9.4
520	3027	7855801770	Prunus emarginata	Bitter cherry	13.1
521	3028	7855801770	Arbutus menziesii	Pacific madrone	16.5
522	3035	7855800010	Pseudotsuga menziesii	Douglas-fir	16.3
523	3038	7855800010	Pseudotsuga menziesii	Douglas-fir	10.8
524	3037	7855800010	Cedrus deodara	Deodar cedar	14.1
525	3039	7855800010	Pseudotsuga menziesii	Douglas-fir	13.9
526	3041	7855800010	Pinus sylvestris	Scots pine	11
527	3032	7855801770	Salix scouleriana	Scouler's willow	17
528	3031	7855801770	Arbutus menziesii	Pacific madrone	9

529	3042	7855800010	Pseudotsuga menziesii	Douglas-fir	19.4	
530	3043	7855800010	Cedrus deodara	Deodar cedar	20.1	
531	3044	7855800010	Pseudotsuga menziesii	Douglas-fir	20.4	
532	3045	7855800010	Cedrus deodara	Deodar cedar	21.4	
533	3046	7855800010	Pseudotsuga menziesii	Douglas-fir	12.9	
534	3048	7855800010	Pseudotsuga menziesii	Douglas-fir	18	
535	3047	7855800010	Pseudotsuga menziesii	Douglas-fir	20	
536	3049	7856410010	Arbutus menziesii	Pacific madrone	13.1	
537	3051	7856410010	Pseudotsuga menziesii	Douglas-fir	11	
538	3050	7856410010	Pseudotsuga menziesii	Douglas-fir	13.4	
539	3054	7856410010	Arbutus menziesii	Pacific madrone	10	
540	3084	7855800020	Arbutus menziesii	Pacific madrone	12	
541	3086	7855800020	Acer macrophyllum	Bigleaf maple	17.2	
542	3056	7856410010	Pseudotsuga menziesii	Douglas-fir	9.6	
543	3057	7856410010	Arbutus menziesii	Pacific madrone	12	
544	3055	7856410010	Arbutus menziesii	Pacific madrone	8	
545	3095	7855800030	Pseudotsuga menziesii	Douglas-fir	20.5	
546	3060	7856410010	Arbutus menziesii	Pacific madrone	10.9	
547	3094	7855800030	Pseudotsuga menziesii	Douglas-fir	16.5	
548	3059	7856410010	Arbutus menziesii	Pacific madrone	13.7	
549	3093	7855800030	Pseudotsuga menziesii	Douglas-fir	15.8	
550	3097	7855800030	Thuja plicata	Western red cedar	12.9	
551	3108	7855800040	Picea pungens	Colorado spruce	10.6	
552	3109	7855800040	Picea pungens	Colorado spruce	13.5	
553	3096	7855800030	Pseudotsuga menziesii	Douglas-fir	19	
554	3061	7856410010	Cladrastis kentukea	American yellowwood	11.5	
555	3063	7856410010	Pseudotsuga menziesii	Douglas-fir	22.3	
556	3062	7856410010	Cladrastis kentukea	American yellowwood	20	
557	3115	7855800040	Pseudotsuga menziesii	Douglas-fir	12.4	
558	3117	7855800040	Picea pungens	Colorado spruce	11.4	
559	3114	7855800040	Pseudotsuga menziesii	Douglas-fir	15.1	
560	3113	7855800040	Pseudotsuga menziesii	Douglas-fir	15.1	
561	3064	7856410010	Prunus avium	Sweet cherry	9.3	
562	3102	7855800040	Pseudotsuga menziesii	Douglas-fir	12.7	
563	3101	7855800040	Pseudotsuga menziesii	Douglas-fir	20.5	
564	3099	7855800040	Pseudotsuga menziesii	Douglas-fir	12.9	
565	3100	7855800040	Pseudotsuga menziesii	Douglas-fir	20.8	
566	3133	7855800050	Pseudotsuga menziesii	Douglas-fir	8.2	
567	3132	7855800050	Pseudotsuga menziesii	Douglas-fir	10.5	
568	3068	7856410010	Malus domestica	Apple	9.8	
569	3128	7855800050	Pseudotsuga menziesii	Douglas-fir	12	
570	3127	7855800050	Pseudotsuga menziesii	Douglas-fir	15.2	
571	3126	7855800050	Pseudotsuga menziesii	Douglas-fir	8.8	
572	3124	7855800050	Picea pungens	Colorado spruce	11.7	

573	3123	7855800050	Pseudotsuga menziesii	Douglas-fir	18.8	
574	3119	7855800050	Pseudotsuga menziesii	Douglas-fir	20	
575	3122	7855800050	Pseudotsuga menziesii	Douglas-fir	14	
576	2993	7855800060	Prunus cerasifera	Flowering plum	13	
577	3070	7856410010	Pseudotsuga menziesii	Douglas-fir	16.5	
578	2994	7855800060	Picea sp.	Spruce species	8	
579	2984	7855800060	Cedrus deodara	Deodar cedar	14.6	
580	2988	7855800060	Pseudotsuga menziesii	Douglas-fir	11.6	
581	2983	7855800060	Cedrus deodara	Deodar cedar	11.2	
582	2981	7855800060	Sequoiadendron giganteum	Giant sequoia	34	
583	2980	7855800060	Sequoiadendron giganteum	Giant sequoia	32.7	
584	3071	7856410020	Pseudotsuga menziesii	Douglas-fir	12.3	
585	3070	7856410010	Pseudotsuga menziesii	Douglas-fir	16.5	
586	3144	7855800080	Abies pinsapo	Spanish fir	9.9	
587	3145	7855800080	Prunus cerasifera	Flowering plum	15	
588	3208	7856410060	Prunus serrulata	Japanese flowering cherry	14.2	
589	3207	7856410060	Malus domestica	Apple	10.6	
590	3205	7856410060	Prunus avium	Sweet cherry	11.8	
591	3203	7856410060	Picea pungens	Colorado spruce	11	
592	3154	7855800110	Prunus domestica	Plum	9.1	
593	3156	7855800110	Malus domestica	Apple	8.3	
594	3160	7855800120	Pseudotsuga menziesii	Douglas-fir	23.5	
595	3161	7855800120	Cedrus deodara	Deodar cedar	24.9	
596	3219	7856410080	Magnolia	Loebner Magnolia	9.1	
597	3162	7855800120	Cedrus deodara	Deodar cedar	21.7	
598	3235	7856410090	Prunus domestica	Plum	12	
599	3263	7856410120	Prunus avium	Sweet cherry	13.4	
600	3802	2124059001	Alnus rubra	Red alder	10.2	
601	3786	2124059001	Salix lasiandra	Pacific willow	8.4	
602	214	2124059001	Pseudotsuga menziesii	Douglas-fir	19	
603	213	2124059001	Thuja plicata	Western red cedar	9	
604	3788	2124059001	Acer macrophyllum	Bigleaf maple	12	
605	3790	2124059001	Acer macrophyllum	Bigleaf maple	16.2	
606	220	2124059001	Acer platanoides	Norway maple	12	
607	221	2124059001	Calocedrus decurrens	Incense cedar	14.5	
608	222	2124059001	Thuja plicata	Western red cedar	17	
609	223	2124059001	Betula pendula	European white birch	13.5	
610	224	2124059001	Thuja plicata	Western red cedar	14	
611	226	2124059001	Pseudotsuga menziesii	Douglas-fir	11	
612	225	2124059001	Acer macrophyllum	Bigleaf maple	8.5	
613	234	2124059001	Alnus rubra	Red alder	8.5	
614	228	2124059001	Pseudotsuga menziesii	Douglas-fir	13.5	
615	308	6071900180	Thuja plicata	Western red cedar	18.5	
616	309	6071900180	Ilex aquifolium	English holly	8	

617	303	6071900140	Fagus sylvatica 'purpurea'	European beech (purple)	29		
618	304	6071900150	Thuja plicata	Western red cedar	29		
619	306	6071900160	Pseudotsuga menziesii	Douglas-fir	34.5		
620	305	6071900160	Thuja plicata	Western red cedar	27.5		
621	301	6071900140	Acer platanoides	Norway maple	11		
622	300	6071900140	Pinus sylvestris	Scots pine	16.5		
623	297	6071900130	Malus domestica	Apple	8		
624	333	6072200350	Prunus sp.	Plum or cherry	14.5		
625	326	6072200350	Malus domestica	Apple	12.5		
626	330	6072200350	Prunus sp.	Plum or cherry	11		
627	337	6072200360	Magnolia grandiflora	Southern Magnolia	18		
628	336	6072200360	×Hesperotropsis leylandii	Leyland cypress	9		
629	338	6072200360	×Hesperotropsis leylandii	Leyland cypress	9		
630	342	6072200360	×Hesperotropsis leylandii	Leyland cypress	11		
631	344	6072200360	×Hesperotropsis leylandii	Leyland cypress	14		
632	347	6072200370	Malus sp. <flowering>	Flowering crabapple	10		
633	352	6072200370	Malus sp. <flowering>	Flowering crabapple	8.5		
634	353	6072200380	Prunus sp.	Plum or cherry	10		
635	364	6072200400	Cornus sp.	Ornamental dogwood	11		
636	365	6072200400	Prunus avium	Sweet cherry	11.5		
637	369	6072200410	Acer palmatum	Japanese maple	9		
638	368	6072200410	Prunus serrulata	Japanese flowering cherry	18		
639	371	6072200410	Malus domestica	Apple	11		
640	370	6072200410	Malus domestica	Apple	11.5		
641	373	6072200410	Magnolia	Loebner Magnolia	9.5		
642	377	6072200420	Ilex aquifolium	English holly	14		
643	378	6072200420	Corylus avellana	European filbert	15.5		
644	376	6072200420	Acer platanoides	Norway maple	25		
645	381	6072200430	Pseudotsuga menziesii	Douglas-fir	25		
646	381	6072200430	Pseudotsuga menziesii	Douglas-fir	25		
647	379	6072200420	Fagus sylvatica 'purpurea'	European beech (purple)	21		
648	384	6072200430	Magnolia grandiflora	Southern Magnolia	8		
649	404	6072200440	Abies alba	European silver fir	19.5		
650	394	6072200440	Malus domestica	Apple	11.5	6.5	
651	397	6072200440	Tsuga heterophylla	Western hemlock	19		
652	407	6072200440	Abies alba	European silver fir	12.5		
653	403	6072200440	Abies alba	European silver fir	17		
654	398	6072200440	Tsuga heterophylla	Western hemlock	16		
655	399	6072200440	Abies alba	European silver fir	8.5		
656	400	6072200440	Abies alba	European silver fir	12.5		
657	402	6072200440	Abies alba	European silver fir	13.5		
658	401	6072200440	Abies alba	European silver fir	12		
659	406	6072200440	Abies alba	European silver fir	15		
660	405	6072200440	Abies alba	European silver fir	18		

661	410	6072200440	Prunus avium	Sweet cherry	13		
662	411	6072200440	Malus domestica	Apple	12		
663	414	6072200440	Thuja plicata	Western red cedar	14		
664	420	6072200440	Thuja plicata	Western red cedar	32		
665	422	6072200440	Pinus nigra	Austrian pine	16		
666	421	6072200440	Thuja plicata	Western red cedar	22		
667	414	6072200440	Thuja plicata	Western red cedar	14		
668	415	6072200440	Thuja plicata	Western red cedar	15	13	
669	416	6072200440	Thuja plicata	Western red cedar	9		
670	418	6072200440	Thuja plicata	Western red cedar	16		
671	425	6072200450	Acer palmatum	Japanese maple	17.5		
672	428	1951700140	Prunus avium	Sweet cherry	10		
673	431	1951700130	Pseudotsuga menziesii	Douglas-fir	21		
674	432	1951700130	Pseudotsuga menziesii	Douglas-fir	15.5		
675	433	1951700130	Pseudotsuga menziesii	Douglas-fir	21		
676	504	1951700800	Ilex aquifolium	English holly	10	3	3
677	468	1951700800	Aesculus californica	California buckeye	10		
678	467	1951700800	Aesculus californica	California buckeye	8.5		
679	456	1951700800	Robinia pseudoacacia	Black locust	12.5		
680	466	1951700800	Aesculus californica	California buckeye	10		
681	465	1951700800	Aesculus californica	California buckeye	12		
682	458	1951700800	Prunus avium	Sweet cherry	8		
683	460	1951700800	Prunus avium	Sweet cherry	13		
684	461	1951700800	Sciadopitys verticillata	Umbrella pine	11		
685	513	1951700790	Malus domestica	Apple	8		
686	528	1951700780	Thuja occidentalis	Eastern arborvitae	12		
687	529	1951700780	Thuja occidentalis	Eastern arborvitae	9		
688	527	1951700780	Thuja occidentalis	Eastern arborvitae	9		
689	531	1951700780	Thuja occidentalis	Eastern arborvitae	9		
690	530	1951700780	Thuja occidentalis	Eastern arborvitae	8		
691	517	1951700780	Prunus sp.	Plum or cherry	11		
692	534	1951700770	Prunus avium	Sweet cherry	13		
693	538	6308000370	Pseudotsuga menziesii	Douglas-fir	10		
694	537	6308000370	Picea sp.	Spruce species	10.5		
695	536	6308000370	Picea sp.	Spruce species	11		
696	535	6308000370	Pseudotsuga menziesii	Douglas-fir	13		
697	549	1951700740	Thuja plicata	Western red cedar	32		
698	550	1951700740	Pseudotsuga menziesii	Douglas-fir	24		
699	551	1951700740	Abies grandis	Grand fir	15.5		
700	552	1951700740	Picea sp.	Spruce species	12		
701	556	1951700740	Thuja plicata	Western red cedar	9.5		
702	562	1951700740	Tsuga heterophylla	Western hemlock	14		
703	563	1951700740	Tsuga heterophylla	Western hemlock	12		
704	564	1951700740	Thuja plicata	Western red cedar	15.5		

705	565	1951700740	Thuja plicata	Western red cedar	10.5		
706	566	1951700740	Thuja plicata	Western red cedar	14		
707	572	1951810080	Pseudotsuga menziesii	Douglas-fir	10		
708	567	1951700740	Malus domestica	Apple	11		
709	569	1951810080	Thuja sp.	Cedar species	9		
710	578	1951810090	Pyrus pyrifolia	Asian pear	8.8		
711	581	1951810090	Salix lasiandra	Pacific willow	10		
712	580	1951810090	Salix lasiandra	Pacific willow	17		
713	577	1951810090	Pseudotsuga menziesii	Douglas-fir	24.4		
714	616	1951810110	Thuja occidentalis	Eastern arborvitae	8		
715	615	1951810110	Thuja occidentalis	Eastern arborvitae	8		
716	614	1951810110	Thuja occidentalis	Eastern arborvitae	8		
717	705	1951810120	Betula pendula	European white birch	8.8		
718	666	1951830100	Pseudotsuga menziesii	Douglas-fir	8.4		
719	663	1951830100	Abies grandis	Grand fir	15.8		
720	662	1951830100	Pinus nigra	Austrian pine	15.5		
721	661	1951830100	Pinus nigra	Austrian pine	13.2		
722	660	1951830100	Pinus nigra	Austrian pine	19.5		
723	659	1951830100	Prunus cerasifera	Flowering plum	11.4		
724	683	1951830050	Tsuga heterophylla	Western hemlock	8.3		
725	687	1951830050	Acer platanoides 'Crimson King'	Norway maple 'Crimson King'	8.8		
726	692	1951830050	Callitropsis┬ánootkatensis	Alaska cedar	9		
727	3883	1024059130	Acer macrophyllum	Bigleaf maple	11		
728	3882	1024059130	Alnus rubra	Red alder	12	10	9
729	3865	1024059130	Alnus rubra	Red alder	11	9	
730	85	1024059089	Salix babylonica	Weeping willow	10		
731	3872	1024059130	Alnus rubra	Red alder	12		
732	3871	1024059130	Alnus rubra	Red alder	10		
733	3870	1024059130	Alnus rubra	Red alder	10.5		
734	3869	1024059130	Alnus rubra	Red alder	10		
735	3866	1024059130	Alnus rubra	Red alder	12.5	9	
736	3868	1024059130	Alnus rubra	Red alder	14.5		
737	94	3425059010	×Hesperotropsis leylandii	Leyland cypress	10		
738	93	3425059010	×Hesperotropsis leylandii	Leyland cypress	9		
739	31	3425059010	×Hesperotropsis leylandii	Leyland cypress	10		
740	89	3425059010	×Hesperotropsis leylandii	Leyland cypress	8		
741	92	3425059010	×Hesperotropsis leylandii	Leyland cypress	9		
742	3875	1024059130	Alnus rubra	Red alder	8		
743	32	3425059010	×Hesperotropsis leylandii	Leyland cypress	14		
744	3874	1024059130	Alnus rubra	Red alder	12		
745	3873	1024059130	Alnus rubra	Red alder	10		
746	71	1024059119	Salix babylonica	Weeping willow	20		
747	70	2225059272	Pseudotsuga menziesii	Douglas-fir	13		
748	3906	1024059130	Acer macrophyllum	Bigleaf maple	10		

749	3902	1024059130	Alnus rubra	Red alder	9		
750	3898	1024059130	Alnus rubra	Red alder	9.5		
751	2148	7811210180	Pseudotsuga menziesii	Douglas-fir	13.3		
752	3899	1024059130	Salix lasiandra	Pacific willow	12	6	
753	3900	1024059130	Salix lasiandra	Pacific willow	14	12	10
754	3904	1024059130	Alnus rubra	Red alder	9		
755	2263	324059066	Alnus rubra	Red alder	9.2		
756	3908	1024059130	Acer macrophyllum	Bigleaf maple	18		
757	3907	1024059130	Acer macrophyllum	Bigleaf maple	9.8		
758	3911	1024059130	Alnus rubra	Red alder	12		
759	3910	1024059130	Arbutus menziesii	Pacific madrone	10		
760	2295	324059066	Alnus rubra	Red alder	8.4		
761	2296	3425059010	×Hesperotropsis leylandii	Leyland cypress	14		
762	2297	3425059010	×Hesperotropsis leylandii	Leyland cypress	14		
763	2298	3425059010	×Hesperotropsis leylandii	Leyland cypress	18		
764	2299	3425059010	×Hesperotropsis leylandii	Leyland cypress	12.5		
765	3347	1024059130	Alnus rubra	Red alder	9		
766	2153	7811210180	×Hesperotropsis leylandii	Leyland cypress	8.8		
767	2154	7811210180	Prunus serrulata	Japanese flowering cherry	8.6		
768	3884	1024059130	Alnus rubra	Red alder	9		
769	3885	1024059130	Alnus rubra	Red alder	8		
770	3886	1024059130	Alnus rubra	Red alder	8.9		
771	3887	1024059130	Alnus rubra	Red alder	9		
772	3889	1024059130	Alnus rubra	Red alder	11	5	
773	3888	1024059130	Alnus rubra	Red alder	8.5		
774	3894	1024059130	Alnus rubra	Red alder	8		
775	3893	1024059130	Acer macrophyllum	Bigleaf maple	8		
776	3892	1024059130	Alnus rubra	Red alder	9	4	
777	3891	1024059130	Alnus rubra	Red alder	11		
778	3895	1024059130	Acer macrophyllum	Bigleaf maple	10		
779	3881	1024059130	Acer macrophyllum	Bigleaf maple	10		
780	3890	1024059130	Alnus rubra	Red alder	10	8	
781	3896	1024059130	Alnus rubra	Red alder	14		
782	3897	1024059130	Alnus rubra	Red alder	9		
783	3348	1024059130	Alnus rubra	Red alder	8	5	
784	3350	1024059130	Alnus rubra	Red alder	12	11	
785	3349	1024059130	Alnus rubra	Red alder	8	8	
786	3352	1024059130	Alnus rubra	Red alder	9	8	
787	3353	1024059130	Alnus rubra	Red alder	10	8	6
788	3354	1024059130	Alnus rubra	Red alder	8	7	
789	3355	1024059130	Alnus rubra	Red alder	9		
790	3356	1024059130	Alnus rubra	Red alder	10		
791	3357	1024059130	Alnus rubra	Red alder	9		
792	33	9538900020	Malus domestica	Apple	8		

793	46	9538900030	Prunus serrulata	Japanese flowering cherry	13.7	
794	48	9538900020	Malus domestica	Apple	11.1	
795	2655	1524059005	Quercus palustris	Pin oak	13.2	
796	2677	1524059005	Pinus pungens	Table mountain pine	10.8	
797	2714	1524059032	Pinus nigra	Austrian pine	12.7	
798	2562	2206500240	Malus domestica	Apple	12.4	
799	2531	1024059123	Populus balsamifera	Black cottonwood	9	
800	2758	7856640010	Thuja plicata	Western red cedar	8.4	
801	2760	7856640020	Pseudotsuga menziesii	Douglas-fir	12.4	
802	2787	7856640020	Thuja plicata	Western red cedar	10.8	
803	2776	7856640020	Prunus avium	Sweet cherry	11.8	
804	2800	7856640020	Pseudotsuga menziesii	Douglas-fir	14.6	
805	2801	7856640020	Acer macrophyllum	Bigleaf maple	8	
806	2815	7856640030	Acer macrophyllum	Bigleaf maple	8.6	
807	2814	7856640030	Acer macrophyllum	Bigleaf maple	10.2	
808	3609	2600010580	Pseudotsuga menziesii	Douglas-fir	16.6	
809	3575	2600010620	Cedrus deodara	Deodar cedar	19.8	
810	3574	2600010620	Cedrus deodara	Deodar cedar	16.7	
811	3579	2600010620	Cedrus deodara	Deodar cedar	26	
812	3584	2600010620	Acer macrophyllum	Bigleaf maple	9	
813	3587	2600010630	Arbutus menziesii	Pacific madrone	10.9	
814	3588	2600010630	Acer macrophyllum	Bigleaf maple	8.6	
815	3591	2600010630	Pseudotsuga menziesii	Douglas-fir	9	
816	3592	2600010630	Pseudotsuga menziesii	Douglas-fir	15.5	
817	3603	7855801540	Acer platanoides	Norway maple	13.1	
818	3602	7855801540	Acer platanoides	Norway maple	12	
819	440	1951700130	Thuja plicata	Western red cedar	28.5	
820	568	1951810080	Populus balsamifera	Black cottonwood	47	34
821	620	1951810120	Betula pendula	European white birch	10.1	
822	256	2124059001	Alnus rubra	Red alder	8.5	
823	241	2124059001	Pseudotsuga menziesii	Douglas-fir	11	
824	237	2124059001	Alnus rubra	Red alder	9.5	
825	218	2124059001	Acer platanoides	Norway maple	9.5	
826	219	2124059001	Acer platanoides	Norway maple	12	
827	3785	2124059001	Pseudotsuga menziesii	Douglas-fir	9.3	
828	3784	2124059001	Alnus rubra	Red alder	11.1	
829	3783	2124059001	Alnus rubra	Red alder	11.8	
830	3780	2124059001	Alnus rubra	Red alder	9.3	
831	3782	2124059001	Alnus rubra	Red alder	12.1	
832	3787	2124059001	Salix lasiandra	Pacific willow	9.7	
833	3792	2124059001	Acer macrophyllum	Bigleaf maple	13	
834	3794	2124059001	Alnus rubra	Red alder	9.3	
835	3793	2124059001	Acer macrophyllum	Bigleaf maple	11	
836	3797	2124059001	Alnus rubra	Red alder	12.7	

837	3798	2124059001	Acer macrophyllum	Bigleaf maple	11.7		
838	3789	2124059001	Alnus rubra	Red alder	16		
839	665	1951830100	Salix scouleriana	Scouler's willow	12.9		
840	694	1951830100	Salix scouleriana	Scouler's willow	8		
841	335	6072200360	Juniperus communis	Common juniper	23		
842	375	6072200410	Picea pungens var. glauca	Colorado blue spruce	19		
843	392	6072200440	Pinus nigra	Austrian pine	16		
844	3089	7855800030	Arbutus menziesii	Pacific madrone	16.7		
845	3103	7855800040	Pseudotsuga menziesii	Douglas-fir	19.5		
846	3106	7855800040	Pseudotsuga menziesii	Douglas-fir	12.2		
847	3107	7855800040	Pseudotsuga menziesii	Douglas-fir	17.6		
848	3058	7856410010	Pinus contorta	Shore pine	9.3		
849	3337	7856410100	Pinus thunbergii	Japanese black pine	15.3		
850	2959	7855000310	Chamaecyparis lawsoniana	Lawson falsecypress	12.5		
851	2568	2206500435	Prunus serrulata	Japanese flowering cherry	8		
852	2705	1524059032	Prunus serrulata	Japanese flowering cherry	8		
853	2706	1524059032	Laurus nobilis	Bay laurel	9		
854	2725	1524059032	Prunus domestica	Common plum	8		
855	3403	7855801670	×Hesperotropsis leylandii	Leyland cypress	11		
856	3404	7855801670	×Hesperotropsis leylandii	Leyland cypress	9		
857	3405	7855801670	×Hesperotropsis leylandii	Leyland cypress	8		
858	3406	7855801670	×Hesperotropsis leylandii	Leyland cypress	9		
859	3407	7855801670	×Hesperotropsis leylandii	Leyland cypress	8		
860	3408	7855801670	×Hesperotropsis leylandii	Leyland cypress	9		
861	3409	7855801670	×Hesperotropsis leylandii	Leyland cypress	8		
862	3410	7855801670	×Hesperotropsis leylandii	Leyland cypress	10		
863	3411	7855801670	×Hesperotropsis leylandii	Leyland cypress	9		
864	3412	7855801670	×Hesperotropsis leylandii	Leyland cypress	9		
865	3413	7855801670	×Hesperotropsis leylandii	Leyland cypress	9		
866	3414	7855801670	×Hesperotropsis leylandii	Leyland cypress	9		
867	3415	7855801670	×Hesperotropsis leylandii	Leyland cypress	11		
868	3416	7855801670	×Hesperotropsis leylandii	Leyland cypress	9		
869	3417	7855801670	×Hesperotropsis leylandii	Leyland cypress	10		
870	3418	7855801670	×Hesperotropsis leylandii	Leyland cypress	9		
871	3419	7855801670	×Hesperotropsis leylandii	Leyland cypress	8		
872	3420	7855801670	×Hesperotropsis leylandii	Leyland cypress	8		
873	3801	2124059001	Alnus rubra	Red alder	8		
874	3799	2124059001	Acer macrophyllum	Bigleaf maple	8.2		
875	20271	No parcel number (ROW)	Acer macrophyllum	Bigleaf maple	10		

DBH_5	DBH_5	Condition	Remove or Retain?
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20	20	3 - Fair	Remove
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9	8	4 - Poor	Retain
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		4 - Poor	Retain
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		2 - Good	Remove
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		4 - Poor	Remove
		3 - Fair	Remove
		4 - Poor	Remove
		2 - Good	Retain
		4 - Poor	Remove
		2 - Good	Remove
		3 - Fair	Remove
		4 - Poor	Remove
		3 - Fair	Retain
		3 - Fair	Remove
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		3 - Fair	Remove
		3 - Fair	Retain
		2 - Good	Remove
		3 - Fair	Remove
		3 - Fair	Remove
		4 - Poor	Remove
		3 - Fair	Remove
		3 - Fair	Retain
		2 - Good	Remove
		2 - Good	Remove
		4 - Poor	Remove
		1 - Excellent	Remove
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PUGET SOUND ENERGY
The Energy To Do Great Things

Puget Sound Energy
P.O. Box 97034
Bellevue, WA 98009-9734

PSE.com

January 15, 2019

Heidi Bedwell, Environmental Planning Manager
City of Bellevue
450 110th Avenue NE
Bellevue, WA 98004

RE: South Bellevue Segment Energize Eastside – Addendum for Response to Technical Review Letter, Part 3
Conditional Use (File# 17-120556-LB)
Critical Areas Land Use Permit (File #17-120557-LO)

Dear Ms. Bedwell:

Puget Sound Energy, Inc. (PSE) provides the following information to support the October 17, 2018, Response to Technical Review Letter, Part 3, that addressed a Tree Removal and Vegetation Management plan for the Energize Eastside Project.

Adaptive Tree Replacement Approach - Locations

As stated in our previous response, PSE proposes to use an Adaptive Tree Replacement approach which has been successful on similar 115 kV to 230 kV upgrade projects. An adaptive tree replacement approach is appropriate because, due to the range of underlying property interests, PSE cannot guarantee tree replacement in the utility corridors. Although PSE has easements to operate transmission lines in the corridor, the ability to require property owners to accept tree replacement or mitigation (*i.e.,* additional trees) is not provided for in the easements. Additionally, vegetation replacement is most successful on properties where the owners actually want the additional plantings.

In light of these factors and recognizing that less than half of the affected Bellevue property owners have met with PSE to discuss tree replacement options, an Adaptive Tree Replacement approach is being proposed which, as explained in detail below, sets out the range of tree replacement and mitigation strategies. The approach proposes to first maximize tree replacement and mitigation within the easements in the Energize Eastside corridor. If landowners in the corridor decline to have trees planted in their yards, PSE will then seek out replanting at alternative properties within Bellevue through the Energy Savings Tree program. PSE's proposed mitigation at the Richards Creek and Somerset substations and response from Bellevue residents to date strongly indicates that a combination of these two approaches will likely fully mitigate for any tree impacts to regulated trees. However, if additional mitigation is required, PSE will identify additional properties for planting, as explained in detail below.

To support the Adaptive Tree Replacement approach, PSE's preference for tree replacement is to encourage property owners to incorporate additional trees into their draft Tree Replacement and Landscape plans; however, PSE cannot require property owners to do so, nor does the City's code that regulates trees on single-family lots. While some property owners take this as an opportunity to add additional trees to their properties, others decline the offer for replacement trees. As of the end of September 2018, PSE has met with approximately 45% of the property owners who are expected to have vegetation changes along the route in Bellevue – south segment. Thus far, the number or replacement trees proposed for the 45% of the properties where landscape and tree replacement plans have been prepared is around 650 trees[1], or approximately 80% of the approximately 807 replacement trees ultimately proposed as mitigation in Bellevue (see table below). Based on these results, there is a high likelihood that all of the replacement trees will be replanted within the utility corridor.

In addition to individual properties located along the transmission line corridor, PSE proposes to plant replacement trees at two company-owned properties, which are also located along the Energize Eastside corridor. These are the Somerset substation and the proposed Richards Creek substation site, with the latter being developed as part of the project. Using these two sites reflect the City's preferred approach, which is to plant trees along the corridor. The planting plans at these two sites have been previously provided to the City[2] and show the installation of more than 700 trees, most of which will be native species (see attached).

While the primary focus of the tree replacement efforts will continue to be within the existing transmission line corridor, other locations may be necessary if all of the required replacement trees cannot be accommodated within the corridor. Secondary planting areas will include those areas outside of the managed right-of-way, but within PSE's easement boundaries or on other portions of those properties where trees have been removed as part of the project. However, planting in these areas will only be on those properties where the owners have provided permission. In these areas, PSE will give preference to native plantings for tree replacement, subject to agreement by the property owner.

If the number of tree plantings necessary to mitigate for Energize Eastside-related impacts cannot be met within the project corridor, then additional planting areas will need to be identified. An emphasis will be placed on finding receiving sites within 0.25 miles of the corridor, which was the defined study area used to assess scenic views and aesthetics in the EIS. PSE will identify opportunity replacement areas starting with a GIS-based analysis of:

1. Land use: existing land use, such as parks, trails, schools, campuses; critical area or buffer status; open space areas; existing tree cover
2. Ownership: PSE-owned, public, private ownerships, such as individuals or Home Owner Associations

[1] As defined by the Energize Eastside 2018 Plant Pallet previously provided to the City and is attached.
[2] See the Richards Creek Sub-Basin Mitigation Plan and the Somerset Substation Energize Eastside Mitigation Plan.

Based on the GIS-based analysis, maps/figures that depict potentially viable planting opportunities will be generated. PSE will assess the viability of the identified sites and will work with the property owners to determine if they would be interested in planting trees on their property. Upon completion of this analysis and property owner communications, the potential planting locations will be proposed to the City prior to initiation of construction.

If additional tree planting is required to meet permit condition, planting programs will be used in locations that are off corridor but within the City. PSE has been participating in the Energy Saving Trees program, which provides trees to those residents that want to add trees to their property in a manner that can help offset energy usage. While it is not guaranteed that these trees will be planted along the project corridor, they are in the City and help buffer potential tree loss due to factors such as mortality and property owner changes (*i.e.*, a new property owner removes existing trees due to landscaping preferences).

PSE began participating in the Energy Saving Trees program in 2018. During the 2018 spring event, PSE and the Arbor Days Foundation provided 551 trees to 300 Bellevue residents. During the 2018 fall event, another 163 trees were provided to Bellevue residents, for a 2018 total of 714 trees. We believe that continued use of this program is the best approach to replacing tree in Bellevue outside of the corridor, as it provides trees to property owners who want additional trees. As stated previously, emphasis will be made to provide trees to property owners within 0.25 miles of the corridor; however, if that is not successful, the program will be expanded city-wide.

The exact number of trees removed may vary slightly during construction (if for example a property owner removes a tree prior to construction) but PSE estimates, which are consistent with the numbers reported as described in the October 17, 2018 letter, Response to Technical Review Letter, Part 3, are provided in the table below.

Tree Size (dbh)	Replacement Ratio	Regulated Trees**	Replacement Trees
< 6”*	As requested by property owner	N/A	TBD
6” to ≤ 12”	1:1	230	230
> 12” to < 30”	2:1	272	544
≥ 30”	3:1	11	33
Totals		513	807

* **Note:** Bellevue municipal code identifies trees with a dbh of greater than 8-inches as significant; however, to ensure that impacts associated with the Energize Eastside project are mitigated for equally in all impacted jurisdictions, PSE has used a 6-inch dbh to categorize significance.

** **Note:** The table includes all significant trees (*i.e.*, regulated trees greater than 6-inches), but does not include those trees in City ROW, which will be mitigated through application of the method outlined in the Council of Tree and Landscape Appraisers, 10th Edition.

Planting of all replacement trees, regardless of location, will occur within two years of project energization. The adaptive tree replacement approach provides a method to help ensure that the necessary trees will be replaced within the City and that PSE fully mitigates for trees removed during project construction.

Thank you for your effort in processing our application. Please let us know if additional clarification is needed.

Sincerely,

Brad Strauch
Senior Land Planner

Attachments

Sample plant palette for vegetated screen

Replacement options are subject to location-specific approval and will be planted at less mature heights than shown below

Four-season interest; edible summer fruit; evergreen foliage

Plant Characteristics:

10'H/6'W FULL MED. LOW

Great early-spring flowers with fragrance; glossy, dark evergreen foliage

Plant Characteristics:

10'H/6'W FULL MED. MED.

Flowers mid-June; evergreen foliage

Plant Characteristics:

15'H/15'W MED. MED. MED.

Great winter interest; coarse leaves with sharp margins; evergreen foliage

Plant Characteristics:

10'H/6'W FULL LOW LOW

Small, evergreen leaves; can be sheared or left to grow in loose mounds

Plant Characteristics:

15'H/15'W FULL LOW MED.

Upright form; can be sheared; evergreen needle-like leaves

Plant Characteristics:

15'H/15'W MED. MED. MED.

Tight, pyramidal, evergreen form

Plant Characteristics:

15'H/4'W FULL MED. LOW

Slender, small tree; evergreen foliage; slow growing

Plant Characteristics:

20'H/8'W FULL MED. LOW

Dark, evergreen foliage; fragrant blue / purple blooms

Plant Characteristics:

12'H/9'W FULL MED. LOW

Legend

Approximate Size	Sun Requirement	Water Requirement	Friendly to Pollinators	Native Planting	Edible Parts	Maintenance Requirement

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PSE PUGET SOUND ENERGY

Updated summer 2018

DSD 000881 6886 0818

Sample plant palette for low-growing trees

Replacement options are subject to location-specific approval and will be planted at less mature heights than shown below

Aesculus pavia
Red Buckeye

Showy, 4-10” long pinnacles of red to orange-red flowers in spring

Plant Characteristics:

15’H/15’W FULL MED. LOW

Acer palmatum **var. *dissectum***
Japanese Maple

Lace-like leaves, mounding form, attractive branching pattern

Plant Characteristics:

10’H/12’W FULL MED. LOW

Amelanchier alnifolia
Western Serviceberry

Star-shaped white flowers, attractive fall color; edible fruit

Plant Characteristics:

15’H/10’W MED. MED. LOW

Hamamelis virginiana
Common Witch Hazel

Small tree or deciduous shrub; blooms yellow October - December

Plant Characteristics:

15’H/20’W FULL MED. LOW

Cornus kousa **‘Satomi’**
Red Flowering Kousa Dogwood

Disease resistant; pink flowers in June

Plant Characteristics:

15’H/18’W FULL HIGH LOW

Parrotia persica
Persian Ironwood

Deciduous tree with nice fall color; exfoliating bark on mature trees

Plant Characteristics:

15’H/10’W FULL MED. MED.

Cryptomeria japonica
‘Black Dragon’
Black Dragon Japanese Cedar

Slow-growing evergreen tree; dense and irregular form

Plant Characteristics:

20’H/20’W FULL HIGH MED.

Pyrus calleryana **‘Jaczam’**
Jack Ornamental Pear

Compact deciduous tree with white flowers; golden fall color

Plant Characteristics:

20’H/12’W MED. MED. LOW

Styrax japonicus
Japanese Snowbell

Compact, deciduous tree with white flowers which bloom May - June

Plant Characteristics:

20’H/20’W FULL MED. LOW

Legend

Approximate Size	Sun Requirement	Water Requirement	Friendly to Pollinators	Native Planting	Edible Parts	Maintenance Requirement

pse.com/energizeeastside

PSE PUGET SOUND ENERGY

Updated summer 2018

DSD 000882 6886 0818

Sample plant palette for low-growing trees

Replacement options are subject to location-specific approval and will be planted at less mature heights than shown below

Acer buergerianum
Trident Maple

Easy growing; deciduous tree with tri-lobed, glossy green leaves; and vibrant fall color

Plant Characteristics:

20'H/20'W | MED. | MED. | MED.

Amelanchier × grandiflora
'Autumn Brilliance'
Autumn Brilliance® Serviceberry

Upright, moderately spreading canopy; four-season interest; vibrant white flowers and vivid red fall color

Plant Characteristics:

20'H/15'W | MED. | MED. | LOW

Chionanthus retusus
'Tokyo Tower'
Tokyo Tower Fringe Tree

Small, deep green showy foliage; upright vase shaped tree with exfoliating bark year-round

Plant Characteristics:

20'H/10'W | MED. | MED. | MED.

Acer platanoides **'Globosum'**
Globe Norway Maple

Dense and round canopy; near-perfect symmetry; and vibrant fall color

Plant Characteristics:

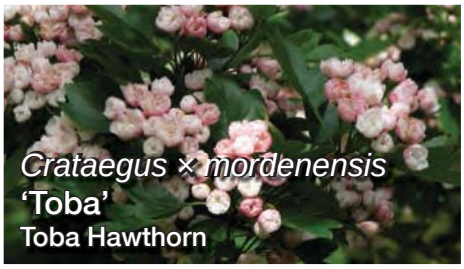
15'H/18'W | MED. | MED. | LOW

Amelanchier grandiflora
'Princess Diana'
Princess Diana Serviceberry

A gracefully spreading small tree with excellent long-lasting fall color; pollinator friendly

Plant Characteristics:

20'H/15'W | MED. | MED. | LOW



Crataegus × mordenensis
'Toba'
Toba Hawthorn

A showy tree with fragrant pink clustered flowers in spring; showy red berries in fall

Plant Characteristics:

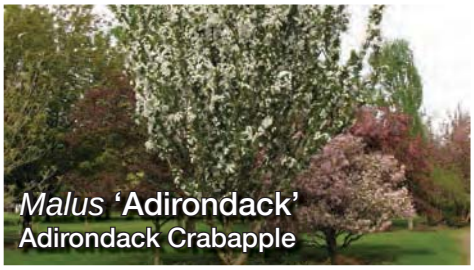
20'H/20'W | MED. | MED. | LOW

Halesia carolina
'UConn Wedding Bells'
Wedding Bells Silverbell

Compact, oval shaped canopy; large and significant flowers; yellow fall foliage

Plant Characteristics:

20'H/15'W | FULL | MED. | MED.



Malus **'Adirondack'**
Adirondack Crabapple

Compact, dense, medium-green foliage; very heavy white flower clusters

Plant Characteristics:

18'H/10'W | MED. | MED. | LOW

Malus **'JFS KW214MX'**
Ivory Spear™ Crabapple

Narrow, tightly-columnar, dark green canopy; bright cherry-red fruit; vibrant yellow fall color

Plant Characteristics:

18'H/7'W | MED. | MED. | LOW

Legend

Approximate Size	Sun Requirement	Water Requirement	Friendly to Pollinators	Native Planting	Edible Parts	Maintenance Requirement

pse.com/energizeeastside

PSE PUGET SOUND ENERGY

Updated summer 2018

DSD 000883 6886 0818

Sample plant palette for low-growing trees

Replacement options are subject to location-specific approval and will be planted at less mature heights than shown below

Maackia amurensis
Amur Maackia

Hardy; small upright vase-shaped canopy; medium green foliage with white flower clusters

Plant Characteristics:

25'H/20'W | MED. | LOW | LOW

Malus **'Schmidtcutleaf'**
Golden Raindrops® Crabapple

Delicate looking and fine textured leaves; elegant form with slender, vase-shaped limbs

Plant Characteristics:

20'H/15'W | FULL | MED. | MED.

Malus **'Red Barron'**
Red Barron Crabapple

Narrow and columnar canopy; ascending branch structure; purple, year-round seasonal foliage interest

Plant Characteristics:

18'H/8'W | MED. | MED. | MED.

Malus **'Jewelcole'**
Red Jewel™ Crabapple

Bright red, non-edible fruit; upright and pyramidal canopy; white flowers in spring

Plant Characteristics:

15'H/12'W | FULL | MED. | LOW

Prunus **'Frankthrees'**
Mt. St. Helens® Plum

Small, rounded, upright spreading canopy; purple foliage; hardy with strong truck and branch form

Plant Characteristics:

20'H/20'W | MED. | MED. | MED.

Syringa reticulata **'Ivory Silk'**
Ivory Silk® Japanese Tree Lilac

Large, white plumes of flowers smother the branches in early spring; round upright canopy

Plant Characteristics:

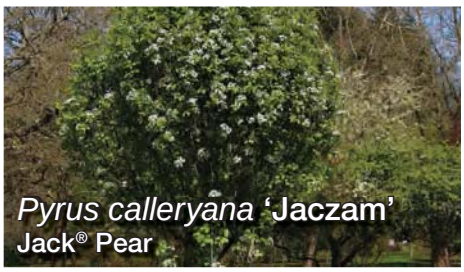
20'H/15'W | MED. | MED. | MED.

Prunus × cistena **'Schmidtcis'**
Big Cis® Plum

Rounded dense, purple foliage; light pink and fragrant flowers

Plant Characteristics:

14'H/12'W | MED. | MED. | MED.

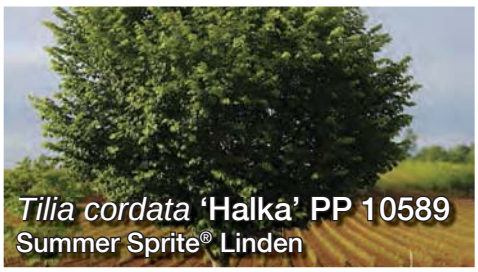


Pyrus calleryana **'Jaczam'**
Jack® Pear

Tight, upright, compact and oval form; dark green foliage; bright yellow fall color

Plant Characteristics:

16'H/10'W | FULL | MED. | LOW



Tilia cordata **'Halka' PP 10589**
Summer Sprite® Linden

Semi-dwarf; dense, rounded, rounded pyramid canopy; sheared appearance; green foliage

Plant Characteristics:

20'H/15'W | FULL | MED. | LOW

Legend

Approximate Size	Sun Requirement	Water Requirement	Friendly to Pollinators	Native Planting	Edible Parts	Maintenance Requirement

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PSE PUGET SOUND ENERGY

Updated summer 2018

DSD 000884 6886 0818

Sample plant palette for edible landscape

Replacement options are subject to location-specific approval and will be planted at less mature heights than shown below

Multi-stemmed deciduous shrub; cross pollination required

Plant Characteristics:

20'H/15'W | FULL | MED. | MED.

Deciduous shrub; spreading form; cross pollination not needed

Plant Characteristics:

20'H/20'W | FULL | MED. | MED.

Deciduous small tree; requires pollination; many proven varieties in PNW

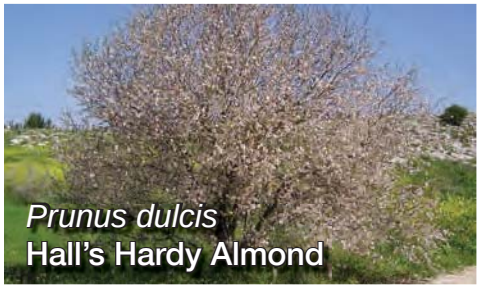
Plant Characteristics:

15'H/10'W | FULL | MED. | HIGH

Trained table apple to grow horizontally; great for small spaces

Plant Characteristics:

10'H/15'W | FULL | MED. | HIGH



Small, nut-bearing tree with ornamental value

Plant Characteristics:

15'H/15'W | FULL | MED. | MED.

Deciduous dwarf tree; numerous varieties from sweet to bitter (pie cherry)

Plant Characteristics:

15'H/15'W | FULL | MED. | HIGH

Deciduous tree; requires cross-pollination

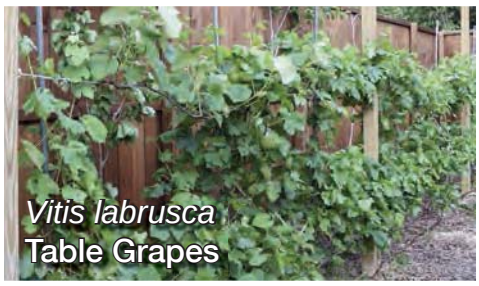
Plant Characteristics:

20'H/20'W | FULL | MED. | HIGH

Best in acidic, well-drained soils; cross-pollination recommended

Plant Characteristics:

9'H/6'W | FULL | HIGH | MED.



Best in rich, well-drained soils; the more sun, the sweeter the fruit

Plant Characteristics:

20'H/15'W | FULL | MED. | MED.

Legend

Approximate Size	Sun Requirement	Water Requirement	Friendly to Pollinators	Native Planting	Edible Parts	Maintenance Requirement

pse.com/energizeeastside

PSE PUGET SOUND ENERGY

Updated summer 2018

DSD 000885 6886 0818

Sample plant palette for pollinator landscapes

Herbaceous perennial; attracts butterflies; blooms June - September

Plant Characteristics:

3'H/2'W | FULL | LOW | LOW

Herbaceous perennial; attracts birds and butterflies; blooms June - August

Plant Characteristics:

4'H/2'W | FULL | LOW | LOW

Evergreen shrub; attracts bees; blooms in May; blue berries in fall

Plant Characteristics:

2'H/4'W | FULL | LOW | LOW

Deciduous shrub; attracts bees; blooms June - August

Plant Characteristics:

10'H/8'W | FULL | LOW | LOW

Deciduous shrub; attracts bees; blooms July - August

Plant Characteristics:

6'H/6'W | MED. | MED. | MED.

Herbaceous perennial; attracts bufferflies, bees; blooms June - August

Plant Characteristics:

2'H/2'W | FULL | LOW | MED.

Broadleaf deciduous; attracts bees; blooms May - June

Plant Characteristics:

12'H/8'W | FULL | MED. | HIGH

Herbaceous perennial; attracts butterflies; blooms September - October

Plant Characteristics:

2'H/2'W | FULL | LOW | LOW

Deciduous shrub; attracts butterflies; blooms June - July

Plant Characteristics:

6'H/7'W | FULL | MED. | LOW

Legend

Approximate Size	Sun Requirement	Water Requirement	Friendly to Pollinators	Native Planting	Edible Parts	Maintenance Requirement

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PSE PUGET SOUND ENERGY

Updated summer 2018

DSD 000886 6886 0818

Sample habitat snag features

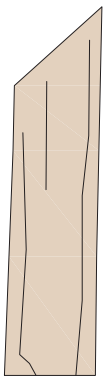
Habitat Snag

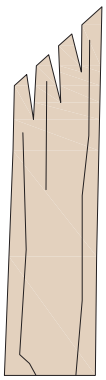
Habitat Snag

Habitat Snag

A habitat snag is an alternative where the lower portion of the tree remains. The upper portion of the tree is removed and the tree is then 5 feet to 15 feet above the ground. The coronet cut (see below) at the top of the tree can then provide habitat for birds, amphibians, bees, bats and small mammals as it decomposes in place.

How the habitats are created


Step one


Step two

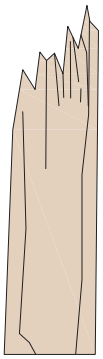

Step three

Photo example

Coronet cut notes:

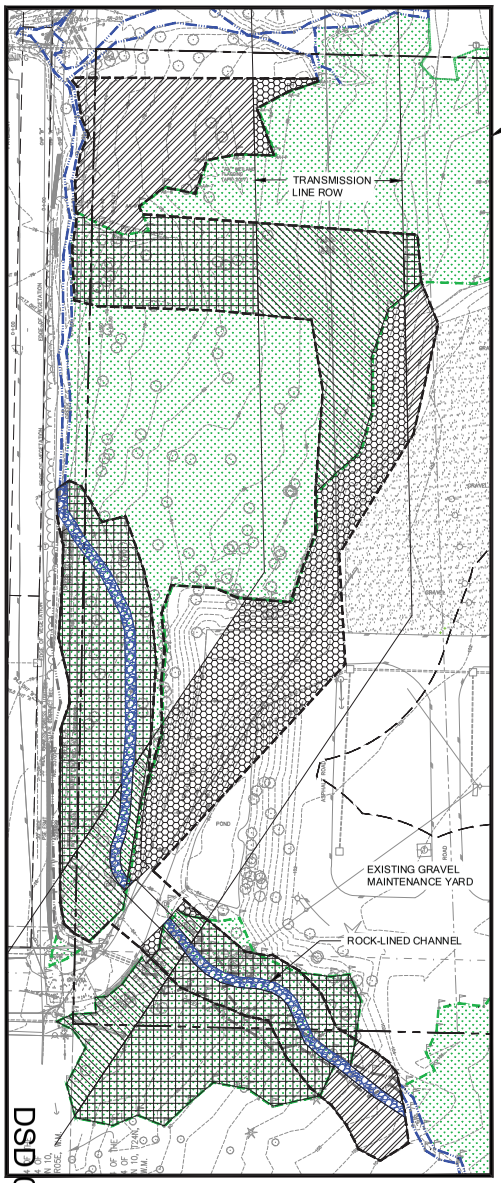
A coronet cut is a technique for producing a natural fracture effect in cut stub ends:

1. Cut at an angle to height as individually confirmed in the field by restoration consultant;
2. After slicing, cut down into the tree to create crevices at the top; and
3. Cut further by “bouncing” the chain saw on the top to create multiple incisions to encourage decay and colonization by insects and fungi.

Chain saw / tool notes:

1. Use biodegradable bar and chain oil such as “motion lotion” or “Stihl.”

(Brown, Timothy K. 2002. Creating and Maintaining Wildlife, Insect, and Fish Habitat Structures in Dead Wood. U.S. Forest Service Gen. Tech. Rep. PSW-GTR-181; Missouri Department of Conservation. 1994. Forest and Wildlife Benefits on Private Land, Snags and Den Trees.)



LEGEND

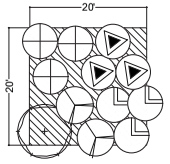
- WETLAND BOUNDARY
- WETLAND BOUNDARY (APPROXIMATE)
- STREAM BOUNDARY (OHWM)
- CRITICAL AREA BUFFER
- PROPERTY BOUNDARY
- PROJECT BOUNDARY

NOTES

1.* FOCUS SITKA SPRUCE IN AREAS HEAVILY DOMINATED BY REEDCANARY GRASS
2. PIT PLANTING ONLY IN AREAS OF EXISTING NATIVE VEGETATION. NATIVE VEGETATION MUST BE FLAGGED BY A RESTORATION SPECIALIST PRIOR TO PLANT INSTALLATION.

WETLAND ENHANCEMENT PLANTING TYPICAL (ROW)

TOTAL AREA = 16,175

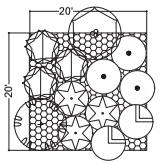


	SIZE	SPACING	SIZE
TREES			
SALIX LUCIDA / PACIFIC WILLOW	80	9 O.C.	2 GAL.
SALIX SITCHENSIS / SITKA WILLOW	80		2 GAL.
			2 GAL.
SHRUBS			
CORNUS SERICEA / RED-OSIER DOGWOOD	116	6' O.C.	1 GAL.
ROSA NUTKANA / NOOTKA ROSE	116		1 GAL.
RUBUS SPECTABILIS / SALMONBERRY	116		1 GAL.
PHYSOCARPUS CAPITATUS/ PACIFIC NINEBARK	116		1 GAL.
GROUNDCOVER			
*ALL SPECIES TO BE SPACED TRIANGULARLY			
ATHYRIUM FILIX-FEMINA/ LADY FERN (NO INUNDATION)	1280	24" O.C.	1 GAL
TOLMIEA MENZIESII /PIGGYBACK PLANT (NO INUNDATION)	1280		1 GAL
SCIRPUS MICROCARPUS / SMALL FRUITED BULRUSH	1280		1 GAL.

(PLANT BY SPECIES IN ODD GROUPS OF 9-15)

BUFFER ENHANCEMENT PLANTING TYPICAL (ROW)

TOTAL AREA = 19,010

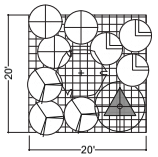


	QTY	SPACING	SIZE
TREES			
SALIX SCOULERIANA / SCOULER'S WILLOW	114	9 O.C.	2 GAL
AMELANCHIER ALNIFOLIA / PACIFIC SERVICEBERRY	114		2 GAL
SHRUBS			
RUBUS SPECTABILIS / SALMONBERRY	120	6' O.C.	1 GAL
SYMPHORICARPUS ALBUS / SNOWBERRY	120		1 GAL
OEMLERIA CERASIFORMIS / OSOBERRY	120		1 GAL
MAHONIA AQUIFOLIUM / TALL OREGON GRAPE	120		1 GAL
ACER CIRCINATUM / VINE MAPLE	120		1 GAL
GROUNDCOVER			
*ALL SPECIES TO BE SPACED TRIANGULARLY			
POLYSTICHUM MUNITUM / SWORD FERN	2320	24" O.C.	1 GAL
BLECHNUM SPICANT / DEER FERN	2320		1 GAL

(PLANT BY SPECIES IN ODD GROUPS OF 9-15)

WETLAND ENHANCEMENT PLANTING TYPICAL

TOTAL AREA = 32,540

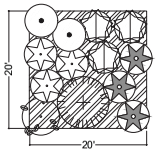


	QTY	SPACING	SIZE
TREES (66)			
ALNUS RUBRA / RED ALDER	40	9' O.C.	2 GAL.
FRAXINUS LATIFOLIA / OREGON ASH	40		2 GAL.
SALIX LUCIDA / PACIFIC WILLOW	40		2 GAL.
PICEA SITCHENSIS / SITKA SPRUCE*	80		2 GAL.
SALIX SITCHENSIS / SITKA WILLOW	40		2 GAL.
SHRUBS (600)			
CORNUS SERICEA / RED-OSIER DOGWOOD	150	6' O.C.	1 GAL.
ROSA NUTKANA / NOOTKA ROSE	150		1 GAL.
RUBUS SPECTABILIS / SALMONBERRY	150		1 GAL.
PHYSOCARPUS CAPITATUS/ PACIFIC NINEBARK	150		1 GAL.
GROUNDCOVER (3600)			
*ALL SPECIES TO BE SPACED TRIANGULARLY			
ATHYRIUM FILIX-FEMINA/ LADY FERN (NO INUNDATION)	1160	24" O.C.	1 GAL
TOLMIEA MENZIESII /PIGGYBACK PLANT (NO INUNDATION)	1160		1 GAL
SCIRPUS MICROCARPUS / SMALL FRUITED BULRUSH	1160		1 GAL.
CAREX OBNUPTA/ SLOUGH SEDGE (BACKWATER AREAS)	1160		1 GAL.

(PLANT BY SPECIES IN ODD GROUPS OF 9-15)

BUFFER ENHANCEMENT PLANTING TYPICAL

TOTAL AREA = 13,435



	QTY	SPACING	SIZE
TREES (48)			
PSEUDOTSUGA MENZIESII / DOUGLAS-FIR	26	9' O.C.	2 GAL
THUJA PLUCATA / WESTERN RED CEDAR	26		2 GAL
ARBUTUS MENZIESII / PACIFIC MADRONE (PLANT NEXT TO DOUGLAS-FIR)	26		2 GAL
PRUNUS EMARGINATA / BITTER CHEERY	26		2 GAL
SALIX SCOULERIANA / SCOULER'S WILLOW	26		2 GAL
ACER MACROPHYLLUM / BIG LEAF MAPLE (AWAY FROM ACCESS DRIVE)	26		2 GAL
SHRUBS (240)			
RUBUS SPECTABILIS / SALMONBERRY	70	6' O.C.	1 GAL
SYMPHORICARPUS ALBUS / SNOWBERRY	70		1 GAL
OEMLERIA CERASIFORMIS / OSOBERRY	70		1 GAL
MAHONIA NERVOSA / LOW OREGON GRAPE	70		1 GAL
MAHONIA AQUIFOLIUM / TALL OREGON GRAPE	70		1 GAL
ACER CIRCINATUM / VINE MAPLE	70		1 GAL
GROUNDCOVER (3290)			
*ALL SPECIES TO BE SPACED TRIANGULARLY			
POLYSTICHUM MUNITUM / SWORD FERN	1640	24" O.C.	1 GAL
BLECHNUM SPICANT / DEER FERN	1640		1 GAL

(PLANT BY SPECIES IN ODD GROUPS OF 9-15)

Know what's **below.** **Call** before you dig.

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DSD0008888

PLANTING PLAN & SCHEDULE

SCALE: 1" = 40'

THE WATERSHED COMPANY
750 Sixth Street South
Kirkland WA 98033
p 425.822.5242 f 425.827.8136
www.watershedco.com
Science & Design

PSE RICHARDS CREEK SUBSTATION

RICHARDS CREEK SUB-BASIN MITIGATION PLAN
PREPARED FOR: PUGET SOUND ENERGY
ENERGIZE EASTSIDE, SOUTH BELLEVUE SEGMENT
PARCELS #: 1024059130, 1024059083, 5453300150
BELLEVUE, WA

SUBMITTALS & REVISIONS

NO.	DATE	DESCRIPTION	BY
1	04-19-2018	MITIGATION PLAN	LM
2	12-06-2018	RESPONSE TO CITY COMMENTS	LM

GENERAL NOTES:

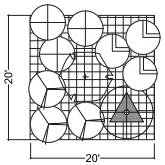
SHEET SIZE:
ORIGINAL PLAN IS 24" X 36".
SCALE ACCORDINGLY.

PROJECT MANAGER: JC
DESIGNED: LM
DRAFTED: LM
CHECKED: JC / AM
JOB NUMBER: 111103.11
SHEET NUMBER: W5 OF 7

DATE	PHASE
12/7/2018	MITIGATION PLANNING

DRAWN BY: AMANDA ZOMMANN

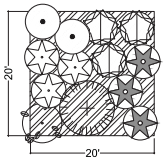
WETLAND ENHANCEMENT PLANTING TYPICAL
(WITH TREES)



	QTY	SPACING	SIZE
TREES (18)			
FRAXINUS LATIFOLIA / OREGON ASH	6	9' O.C.	2 GAL.
THUJA PLICATA / WESTERN REDCEDAR	6		2 GAL.
PICEA SITCHENSIS / SITKA SPRUCE	6		2 GAL.
SHRUBS (48)			
CORNUS SERICEA / RED-OSIER DOGWOOD	12	6' O.C.	1 GAL.
ROSA NUTKANA / NOOTKA ROSE	12		1 GAL.
RUBUS SPECTABILIS / SALMONBERRY	12		1 GAL.
PHYSOCARPUS CAPITATUS / PACIFIC NINEBARK	12		1 GAL.
GROUNDCOVER (367)			
*ALL SPECIES TO BE SPACED TRIANGULARLY		24" O.C.	
ATHYRIUM FILIX-FEMINA/ LADY FERN	92		1 GAL
TOLMIEA MENZIESII /PIGGYBACK PLANT	92		1 GAL
SCIRPUS MICROCARPUS / SMALL FRUITED BULRUSH	92		1 GAL.
CAREX OBNUPTA/ SLOUGH SEDGE	92		1 GAL.

(PLANT BY SPECIES IN ODD NUMBER GROUPS OF 9-15)

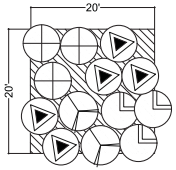
BUFFER ENHANCEMENT PLANTING TYPICAL
(WITH TREES)



	QTY	SPACING	SIZE
TREES (19)			
THUJA PLUCATA / WESTERN REDCEDAR	6	9' O.C.	2 GAL
ARBUTUS MENZIESII / PACIFIC MADRONE (PLANT NEXT TO EXISTING DOUGLAS-FIR)	6		2 GAL
PRUNUS EMARGINATA / BITTER CHERRY	7		2 GAL
SHRUBS (51)			
SYMPHORICARPUS ALBUS / SNOWBERRY	10	6' O.C.	1 GAL
OEMLERIA CERASIFORMIS / OSOBERRY	10		1 GAL
MAHONIA NERVOSA / LOW OREGON GRAPE	10		1 GAL
MAHONIA AQUIFOLIUM / TALL OREGON GRAPE	10		1 GAL
ACER CIRCINATUM / VINE MAPLE	11		1 GAL
GROUNDCOVER (392)			
*ALL SPECIES TO BE SPACED TRIANGULARLY			
POLYSTICHUM MUNITUM / SWORD FERN	196	24" O.C.	1 GAL
BLECHNUM SPICANT / DEER FERN	196		1 GAL

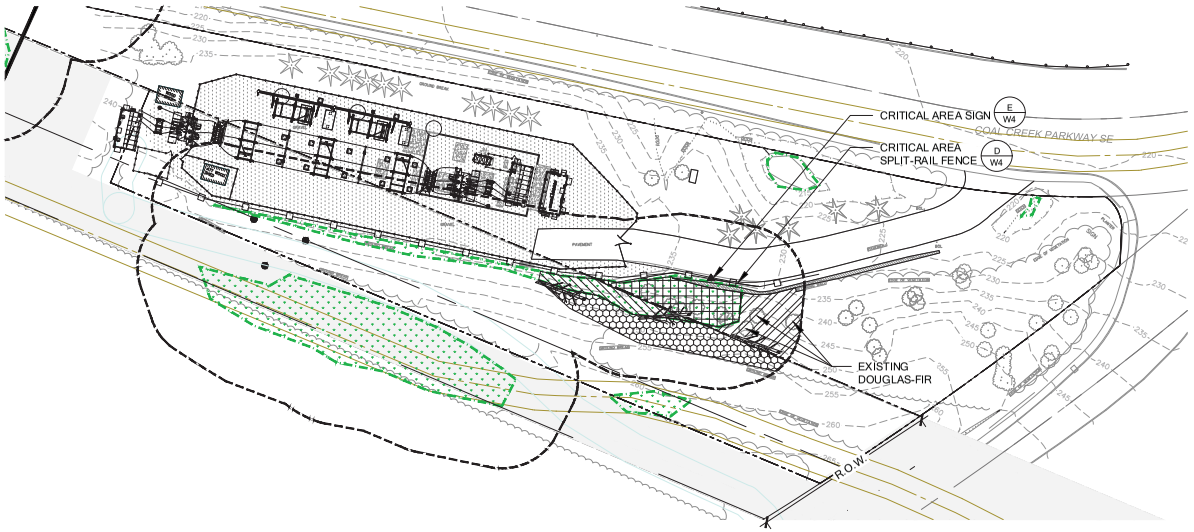
(PLANT BY SPECIES IN ODD NUMBER GROUPS OF 9-15)

WETLAND ROW ENHANCEMENT PLANTING TYPICAL
(NO TREES)

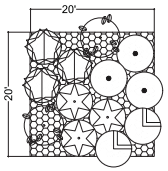


	SIZE	SPACING	SIZE
SHRUBS (12)			
CORNUS SERICEA / RED-OSIER DOGWOOD	3	6' O.C.	1 GAL.
ROSA NUTKANA / NOOTKA ROSE	3		1 GAL.
RUBUS SPECTABILIS / SALMONBERRY	3		1 GAL.
PHYSOCARPUS CAPITATUS/ PACIFIC NINEBARK	3		1 GAL.
GROUNDCOVER (102)			
*ALL SPECIES TO BE SPACED TRIANGULARLY		24" O.C.	
ATHYRIUM FILIX-FEMINA/ LADY FERN (NO INUNDATION)	34		1 GAL
TOLMIEA MENZIESII /PIGGYBACK PLANT (NO INUNDATION)	34		1 GAL
SCIRPUS MICROCARPUS / SMALL FRUITED BULRUSH	34		1 GAL.

(PLANT BY SPECIES IN ODD NUMBER GROUPS OF 9-15)



BUFFER ROW ENHANCEMENT PLANTING TYPICAL
(NO TREES)



	QTY	SPACING	SIZE
SHRUBS (75)			
RUBUS SPECTABILIS / SALMONBERRY	15	6' O.C.	1 GAL
SYMPHORICARPUS ALBUS / SNOWBERRY	15		1 GAL
OEMLERIA CERASIFORMIS / OSOBERRY	15		1 GAL
MAHONIA AQUIFOLIUM / TALL OREGON GRAPE	15		1 GAL
ACER CIRCINATUM / VINE MAPLE	15		1 GAL
GROUNDCOVER (600)			
*ALL SPECIES TO BE SPACED TRIANGULARLY		24" O.C.	
POLYSTICHUM MUNITUM / SWORD FERN	300		1 GAL
BLECHNUM SPICANT / DEER FERN	300		1 GAL

(PLANT BY SPECIES IN ODD NUMBER GROUPS OF 9-15)

SOMERSET SUBSTATION
PLANTING PLAN

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THE WATERSHED COMPANY
750 Sixth Street South
Kirkland WA 98033
p 425.822.5242
www.watershedco.com
Science & Design

SOMERSET SUBSTATION
ENERGIZE EASTSIDE MITIGATION PLAN
PREPARED FOR: PUGET SOUND ENERGY
PARCEL #2124059071, #2124059052
5200 SE COAL CREEK PKWY
BELLEVUE, WA 98006

SUBMITTALS & REVISIONS

NO.	DATE	DESCRIPTION	BY
1	05/03/2018	MITIGATION PLAN	AJ

SHEET SIZE:
ORIGINAL PLAN IS 22" x 34".
SCALE ACCORDINGLY.

PROJECT MANAGER: JC
DESIGNED: -
DRAFTED: AJ/LM
CHECKED: CM
JOB NUMBER:
111103.11
SHEET NUMBER:
W2 OF 5

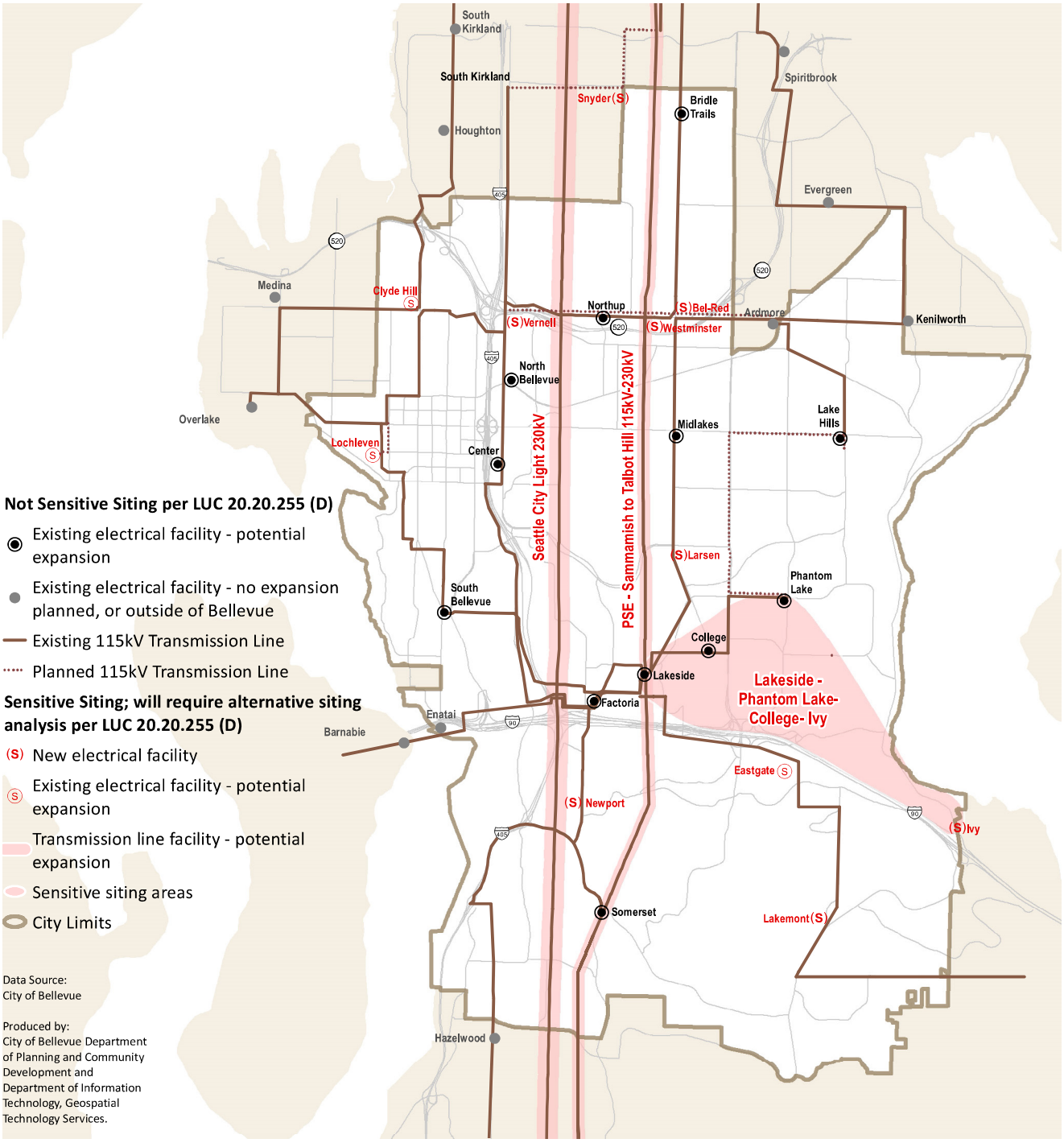
FILENAME
PRINTED BY
DATE

DSD 000889

Attachment: F
Comprehensive Plan
Map UT-7

Map UT-7. New or Expanded Electrical Facilities

This map shows the general locations and conceptual alignments of Puget Sound Energy's planned facilities together with the city's sensitive siting classifications. These locations, alignments and classifications guide the review of the actual location of transmission lines, routes, and substations subject to the Conditional Use Permit and other city review processes. The actual locations may ultimately differ from those depicted here.



DSD 000891

Attachment: G
Comprehensive Plan Policy Analysis

Attachment G to Staff Report

COMPREHENSIVE PLAN POLICY ANALYSIS **N/A= Not Applicable**

Comp. Plan Policies Identified During Land Use Process:	City of Bellevue Comment:
Land Use	
Policy LU-2: Retain the city's park-like character through the preservation and enhancement of parks, open space, and tree canopy throughout the city.	PSE's proposal will require the selective removal of vegetation within the wire zone, managed right-of-way, or legal right-of-way if the vegetation matures to a certain height, unless terrain conditions allow for more clearance between the electrical utility facility infrastructure and the height of the vegetation. However, the proposal will utilize the existing transmission corridor, is designed to retain and replace trees within neighborhoods and parks, and to limit tree removal to the amount necessary to ensure safe operation of the proposed transmission lines. Specifically, PSE's proposal includes the replacement of trees within the existing transmission corridor, and it is anticipated that most replacement trees can be planted in areas where the tree removal is occurring. If this is not feasible, then PSE will focus tree replacement efforts in secondary planting areas outside the managed right-of-way but within PSE's easement boundaries or on other portions of those properties where trees have been removed as part of the project. Similarly, PSE will give preference to native planting for tree replacement in these areas. If the number of trees cannot be met within the corridor then PSE will identify additional planting areas. The City's park-like character will be maintained after the project is

Attachment G to Staff Report

COMPREHENSIVE PLAN POLICY ANALYSIS **N/A= Not Applicable**

Comp. Plan Policies Identified During Land Use Process:	City of Bellevue Comment:
	constructed. See Attachment E to the Staff Report - Vegetation Management Plan – and the Conditions of Approval contained in Section X of the Staff Report for further discussion.
Parks, Recreation and Open Space	
Policy PA-30: Protect and retain, in a natural state, significant trees and vegetation in publicly and privately-dedicated greenbelt areas.	Approximately 29 trees will be removed from parks and other City-owned property outside of the public right of way. This is the minimum amount necessary to ensure safe operation of the proposed transmission lines. PSE proposes to replace vegetation to maintain the natural state of the park's open space. The proposal will also utilize the existing transmission corridor.
Policy PA-31: Manage Bellevue's forest resources, including street trees, formal plantings, and self-sustaining natural stands, to ensure their long term vitality.	With the implementation of a vegetation management plan and the planting of additional vegetation, the project will ensure long term vitality of Bellevue Park's forest resources. See Attachment E to the Staff Report - Vegetation Management Plan – and the Conditions of Approval contained in Section X of the Staff Report for further discussion.
Urban Design	
Policy UD-2: Preserve trees as a component of the skyline to retain the image of a "City in a Park."	Wherever feasible, PSE has proposed to retain and replace trees. With the proposed mitigation the proposal does not significantly impact the image of Bellevue as a "City in a Park". Trees will continue to

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COMPREHENSIVE PLAN POLICY ANALYSIS **N/A= Not Applicable**

Comp. Plan Policies Identified During Land Use Process:	City of Bellevue Comment:
	be a component of the skyline throughout the City. See also City Comment to LU-2, *supra*.
Policy UD-6: Encourage the green and wooded character of existing neighborhoods.	Because of its linear nature, the proposed transmission line traverses several neighborhoods. The amount of tree removal in any one neighborhood will not significantly alter wooded character of other existing neighborhoods. The replacement of trees and vegetation in individual neighborhoods will also maintain the green and wooded character of neighborhoods that have this character currently. Each neighborhood that includes the existing transmission line corridor has been built next to the existing corridor, and the existing or intended character and appearance of those neighborhoods will be maintained.
Policy UD-55: Exemplify the Pacific Northwest character through the use of appropriate plants in new landscaping.	PSE has proposed a planting palette that includes native and native compatible species. See Attachment E to the Staff Report - Vegetation Management Plan – and the Conditions of Approval contained in Section X of the Staff Report for further discussion. See also City Comment to LU-2, *supra*.
Policy UD-62: Identify and preserve views of water, mountains, skylines or other unique landmarks from public places as valuable civic assets.	Views from public places will not be significantly impacted by the proposal. See discussion in the Final EIS, Chapter 4.2, regarding views and aesthetic impacts. Private views are not protected under City of Bellevue regulations or policy.

Attachment G to Staff Report

COMPREHENSIVE PLAN POLICY ANALYSIS **N/A= Not Applicable**

Comp. Plan Policies Identified During Land Use Process:	City of Bellevue Comment:
Economic Development	
Policy ED-33: Maintain and improve communications, electric utility, and other infrastructure needed to support the city's economic needs and growth.	PSE's proposal and the Energize Eastside project maintains and improves electric infrastructure in support of the City's economic needs and growth.
Utilities	
Policy UT-1: Manage utility systems effectively in order to provide reliable, sustainable, quality service.	The stated purpose of the Energize Eastside project is to meet local demand growth and protect reliability in the Eastside of King County. PSE has described the need for the Project and its importance in helping to manage their utility system effectively. This stated need and purpose is consistent with and anticipated by the City's Comprehensive Plan (see Attachment F to the Staff Report [Map UT-7]). In addition, the City of Bellevue's independent technical analysis (see Attachment D to the Staff Report [USE 2015]) confirmed the project is needed to address the reliability of the electric grid on the Eastside.
Policy UT-3: Use design and construction standards that are environmentally sensitive, safe, cost-effective, and appropriate.	PSE's proposal will utilize the existing corridor that is shared with another utility (the Olympic Pipeline system) and will consolidate the transmission lines onto fewer poles. PSE will also be required to adjust pole types and color to limit visual impacts, develop vegetation management that maintains flexibility for property owners, and limit the number of telecommunications facilities that can be located on

Attachment G to Staff Report

COMPREHENSIVE PLAN POLICY ANALYSIS **N/A= Not Applicable**

Comp. Plan Policies Identified During Land Use Process:	City of Bellevue Comment:
	the transmission line to remain the existing number. In order to ensure that every feasible effort is made to minimize risks involving the Olympic pipeline system and strike a balance between potential health effects and the costs of mitigating those effects, the City has imposed Project-specific mitigation measures, consistent with the Final EIS, as Conditions of Approval.
Policy UT-7: Base the extension and sizing of system components on the land use plan of the area. System capacity will not determine land use.	PSE's proposal is based on anticipated growth and reliability protection in the Eastside of King County. System capacity does not determine land uses but rather responds to anticipated demand.
Policy UT-8: Design, construct, and maintain facilities to minimize their impact on surrounding neighborhoods.	PSE's proposal will utilize the existing corridor and will consolidate the transmission lines onto fewer poles. PSE's proposal complies with LUC 20.20.255's Alternative Siting Analysis (LUC 20.20.255.D) and Design Standards (LUC 20.20.255.F) regulations for Electrical Utility Facilities. Replacement poles will be fewer than are currently installed and will be located approximately in the same location as the existing poles. Access to the pole installation locations will be via existing or historic access routes that were used for original pole installation or maintenance activities. The proposed Richards Creek Substation is located in a light industrial (LI) zoning district and includes adequate screening, per LUC 20.20.255.F, to minimize impacts to surrounding neighborhoods. In

Attachment G to Staff Report

COMPREHENSIVE PLAN POLICY ANALYSIS **N/A= Not Applicable**

Comp. Plan Policies Identified During Land Use Process:	City of Bellevue Comment:
	the Somerset neighborhood, PSE has sited and designed the proposal to minimize impacts to the extent feasible, including modifications to pole design to reduce the necessary height in the Somerset segment to respond to the existing physical characteristics of the neighborhood, which has developed as a result of private covenants.
Policy UT-45: Coordinate with non-city utility providers to ensure planning for system growth consistent with the city's Comprehensive Plan and growth forecasts.	The City and PSE coordinate regularly on growth projections and meet annually at an Electric Reliability Workshop to discuss electrical system reliability and planned reliability projects. The City shares project growth and key development projects which may impact PSE's service delivery. The Energize Eastside project has been included in and anticipated by the City's Comprehensive Plan for many years (see Attachment F [Map UT-7]).
Policy UT-47: Defer to the serving utility the implementation sequence of utility plan components.	PSE is the serving utility responsible for implementation of their utility plans. The Energize Eastside project is a component of their plan and is part of a larger interconnected, multi-jurisdictional electrical utilities facilities and distribution network. The Energize Eastside project has been included in and anticipated by the City's Comprehensive Plan for many years (see Attachment F [Map UT-7]).
Policy UT-48: Coordinate with the appropriate jurisdictions and governmental entities in the planning and implementation of multi-jurisdictional utility facility additions and improvements.	In 2014, the jurisdictions of Kirkland, Redmond, Newcastle, Renton (Partner Cities) along with Bellevue determined with PSE that the Energize

Attachment G to Staff Report

COMPREHENSIVE PLAN POLICY ANALYSIS **N/A= Not Applicable**

Comp. Plan Policies Identified During Land Use Process:	City of Bellevue Comment:
	Eastside project was likely to have probable significant adverse environmental impacts and Issued a Determination of Significance. Bellevue assumed lead agency status and coordinated with the Partner Cities for comprehensive environmental review of the Project and the preparation of an Environmental Impact Statement (EIS). The culmination of this environmental review was issuance of the March 1, 2018 Final EIS. The Final EIS built upon the previous Phase 1 Draft EIS and Phase 2 Draft EIS, released in January 2016 and May 2017, respectively.
Policy UT-57: Require notification to the city prior to a utility's maintenance or removal of vegetation in city right-of-way.	N/A: Once the project is built PSE will be required to contact the City regarding any proposed maintenance or removal of vegetation in the City right-of-way consistent with the applicable franchise agreements.
Policy UT-60: Work with Puget Sound Energy, telecom providers, state regulatory agencies, and other responsible parties to develop funding tools that enable full mitigation of the neighborhood impacts of deploying electrical and telecommunications infrastructure.	N/A, but see City Comment to Policy UT-8, *supra*.
Policy UT-64: Require the reasonable screening and/or architecturally compatible integration of all new utility and telecommunication facilities.	The proposed substation at Richard Creek will include landscape screening and fencing around the new substation. PSE's proposal complies with the City's Design Standards (LUC 20.20.255.F) for Electrical Utility Facilities.

Attachment G to Staff Report

COMPREHENSIVE PLAN POLICY ANALYSIS **N/A= Not Applicable**

Comp. Plan Policies Identified During Land Use Process:	City of Bellevue Comment:
Policy UT-67. Encourage consolidation on existing facilities where reasonably feasible and where such consolidation leads to fewer impacts than would construction of separate facilities. Examples of facilities which could be shared are towers, electrical, telephone and light poles, antenna, substation sites, trenches, and easements.	The proposed project is located within an existing easement held by PSE in which the Olympic Pipeline Company also has existing pipeline facilities and easements. The proposed substation is located in close proximity to the existing lakeside substation. This consolidation limits impacts to existing environmentally sensitive areas.
Policy UT-68: Encourage the use of utility corridors as non-motorized trails. The city and utility company should coordinate the acquisition, use, and enhancement of utility corridors for pedestrian, bicycle and equestrian trails and for wildlife corridors and habitat.	N/A
Policy UT-69: Avoid, when reasonably possible, locating overhead lines in greenbelt and open spaces as identified in the Parks and Open Space System Plan.	The existing transmission lines do cross greenbelt and open spaces. Because PSE's proposal utilizes the same corridor as the existing transmission lines, proposal includes overhead lines in these same areas, but no new overhead lines will be located in new parks or open spaces.
Policy UT-72: Encourage cooperation with other jurisdictions in the planning and implementation of multi-jurisdictional utility facility additions and improvements. Decisions made regarding utility facilities shall be made in a manner consistent with, and complementary to, regional demand and resources, and shall reinforce an interconnected regional distribution network.	See City Comment to Policy UT-48, *supra*, for discussion of cooperation between the Partner Cities. In addition, PSE cooperated in the preparation of the Final EIS, including providing information regarding regional demand and operational need. The Energize Eastside project responds to a network need within the Eastside of King County, and the transmission lines span

Attachment G to Staff Report

COMPREHENSIVE PLAN POLICY ANALYSIS **N/A= Not Applicable**

Comp. Plan Policies Identified During Land Use Process:	City of Bellevue Comment:
	multiple jurisdictions as part of a connected regional network.
Policy UT-74. Encourage system practices intended to minimize the number and duration of interruptions to customer service.	As part of PSE's needs analysis they have determined that without adding transmission capacity for local peak periods in the Eastside a deficiency could develop and with it a potential for load shedding (forced power outages). Load shedding can be avoided with the construction of the proposal which will minimize the number and duration of interruptions to customer services associated with the transmission line. In June 2018, PSE notified the City of Bellevue that the actual peak demand in the summer of 2017 was equal to the peak demand they had projected for summer 2018, and warned that during peak summer demand periods, Corrective Action Plans would be in place that include intentional load shedding (rolling blackouts) for Eastside customers.
Policy UT-75: Prior to seeking city approval for facilities, encourage utilities service providers to solicit community input on the siting of proposed facilities which may have a significant adverse impact on the surrounding community	PSE has engaged in several efforts to solicit community input on the Energize Eastside project. Outreach began in December 2013 and continued into 2014 with the Community Advisory Group (CAG) and other public open houses and meetings. See Attachment B (Alternative Siting Analysis) for a summary of public outreach and involvement conducted as part of the Project.

Attachment G to Staff Report

COMPREHENSIVE PLAN POLICY ANALYSIS **N/A= Not Applicable**

Comp. Plan Policies Identified During Land Use Process:	City of Bellevue Comment:
Policy UT-77: Require all utility equipment support facilities to be aesthetically compatible with the area in which they are placed by using landscape screening and/or architecturally compatible details and integration.	See City Comment to Policy UT-3, UT-8 & UT-64, *supra*.
Policy UT-91: Encourage the public to conserve electrical energy through public education.	N/A
Policy UT-94: Require in the planning, siting, and construction of all electrical facilities, systems, lines, and substations that the electrical utility strike a reasonable balance between potential health effects and the cost and impacts of mitigating those effects by taking reasonable cost effective steps.	Studies on Electric and Magnetic Fields (EMF) and Pipeline Safety were included as part of the environmental review associated with the EIS preparation. The operation of the proposed transmission lines would result in a decrease of magnetic field levels relative to the existing transmission facility. The proposed configuration of the wires is in a vertical arrangement which results in a narrower magnetic field profile. The proposed poles also provide a higher minimum clearance for the lowest hanging wires than the existing poles. Higher wires allow more room for magnetic field levels to decrease before they reach the ground. The proposed project also incorporated recommendations from the DNV GL report entitled, "A Detailed Approach to Assess AC Interference Levels Between the Energize Eastside Transmission Line Project and the Existing Olympic Pipelines, OLP16 & OPL20," dated September 9, 2016 (hereinafter "DNV GL 2016"). The DNV GL 2016 report included recommendations to reduce

Attachment G to Staff Report

COMPREHENSIVE PLAN POLICY ANALYSIS **N/A= Not Applicable**

Comp. Plan Policies Identified During Land Use Process:	City of Bellevue Comment:
	and control the risk of electrical interference on pipelines present in the corridor. Where feasible, these recommendations have been incorporated into the Conditions of Approval for the proposal.
Policy UT-95: Work with Puget Sound Energy to implement the electrical service system serving Bellevue in such a manner that new and expanded transmission and substation facilities are compatible and consistent with the local context and the land use pattern established in the Comprehensive Plan. Discussion: Where feasible, electrical facilities should be sited within the area requiring additional service. Electrical facilities primarily serving commercial and mixed use areas should be located in commercial and mixed use areas, and not in areas that are primarily residential. Further, the siting and design of these facilities should incorporate measures to mitigate the visual impact on nearby residential areas. These considerations must be balanced with the community's need to have an adequate and reliable power supply.	UT policies work in concert with the Land Use Element to ensure that the City will have adequate utilities to serve both existing development and future growth. (UT Element, p. 122.) While the Comprehensive Plan states that it is critically important to meet growing demand for utility services and provide reliability of the City's utilities systems, the UT Policies also recognize that it important to ensure that new and expanding utility facilities are sensitive to neighborhood character. (Id., p. 139.) The Comprehensive Plan recognizes the tension between the utility's obligation to meet growing demand and provide reliability, and the policies that are designed to ensure that new and expanding utility facilities are sensitive to neighborhood character. The Conditions of Approval assure that the proposal will be compatible with the land use pattern established in the Comprehensive Plan and will minimize impacts of the proposal on neighborhoods that contain, or are adjacent to, the existing corridor. The land use pattern established in the Comprehensive Plan along the existing corridor is a geographic area within the City where

Attachment G to Staff Report

COMPREHENSIVE PLAN POLICY ANALYSIS **N/A= Not Applicable**

Comp. Plan Policies Identified During Land Use Process:	City of Bellevue Comment:
	the electrical utility facilities have become a fixture of the landscape. Where feasible, the proposal is designed to avoid and minimize impacts to the character of existing neighborhoods by retaining and replacing trees within neighborhoods and parks, and by limiting tree removal to the amount necessary to ensure safe operation of the proposed lines. PSE will also be required to provide landscape screening and fencing of the Richards Creek substation as required by LUC 20.20.255.F. The proposal is sited within an area, the South Bellevue Segment, requiring additional service, and the siting (existing corridor) and design of the proposal incorporate measures to mitigate the visual impact on nearby residential areas. Throughout the environmental review and land use processes, the City has worked with PSE to balance the need to have an adequate and reliable power supply with the existing neighborhood character along the corridor.
Policy UT-96: Require siting **a**nalysis through the development review process for new facilities, and expanded facilities at sensitive sites, including a consideration of alternative sites. Discussion: Sensitive facility sites are those new facilities and existing facilities proposed to be expanded where located in or in close proximity to residentially-zoned districts such that there is potential for visual impacts absent appropriate siting and mitigation. The city will update Map UT-7 to the extent needed to	The proposal includes an expanded transmission line within an existing corridor and a new substation. The Energize Eastside project is proposed to address a deficiency in transmission capacity located on the eastside and it was determined that additional 230kV power source would best be centrally located on the Eastside, specifically in Bellevue. The transmission lines will connect the

Attachment G to Staff Report

COMPREHENSIVE PLAN POLICY ANALYSIS **N/A= Not Applicable**

Comp. Plan Policies Identified During Land Use Process:	City of Bellevue Comment:
stay current with changes in Puget Sound Energy's system planning.	new transformer at the Richards Creek Substation with existing 230 kV substations in the region in Redmond and Renton. The Project will service all uses in the Eastside including industrial, commercial, residential, and public facilities. Alternatives were considered through PSE's CAG process as well as in the preparation of the EIS. Comprehensive Plan Utilities Element Map UT-7 reflects PSE's system planning and specifically identifies the subject project and alignment. PSE submitted an Alternative Siting Analysis that complies with LUC 20.20.255.D and memorializes the methodology employed, the alternative sites analyzed, the technologies considered, and the community outreach undertaken in connection with the proposal (see Attachment B to the Staff Report).
Policy UT-97: Avoid, minimize and mitigate the impacts of new or expanded electrical facilities through the use of land use regulations and performance standards that address siting considerations, architectural design, site screening, landscaping, maintenance, available technologies, and other appropriate measures.	PSE is required to comply with the regulations and performance standards found in LUC 20.20.255, Electrical Utility Facilities. As part of the standards, PSE has prepared an Alternative Siting Analysis and has incorporated appropriate architectural and site design standards including landscaping, pole designs, and pole finish. See Attachments B & J to the Staff Report and the Section X Conditions of Approval.

Attachment G to Staff Report

COMPREHENSIVE PLAN POLICY ANALYSIS **N/A= Not Applicable**

Comp. Plan Policies Identified During Land Use Process:	City of Bellevue Comment:
Policy UT-98: Discourage new aerial facilities within corridors that have no existing aerial facilities.	The proposal is to replace existing aerial facilities within an existing corridor. No new facilities will be located in new corridors.
Policy UT-99: Work with and encourage Puget Sound Energy to plan, site, build and maintain an electrical system that meets the needs of existing and future development, and provides highly reliable service for Bellevue customers. Discussion: Providing highly reliable service is a critical expectation for the service provider, given the importance of reliable and uninterrupted electrical service for public safety and health, as well as convenience. Highly reliable service means there are few and infrequent outages, and when an unavoidable outage occurs it is of short duration and customers are frequently updated as to when power is likely to be restored. A highly reliable system will be designed, operated and maintained to keep pace with the expectations and needs of residents and businesses as well as evolving technologies and operating standards as they advance over time.	The City of Bellevue and PSE have worked closely to evaluate potential alternatives to plan, site, build, and maintain the electrical system. The policy requires a highly reliable service to meet the expectations and needs of residents and businesses of Bellevue. PSE has demonstrated through their system planning that they are proposing a project that addresses the transmission capacity need in response to growing population and employment on the Eastside, changing power consumption and in response to utility regulations. For further discussion regarding PSE's determination of operational need, see Section VIII of the Staff Report.
Environment	
Environmental Stewardship	
Policy EN-1: Balance the immediate and long range environmental impacts of policy and regulatory decisions in the context of the city's commitment to provide for public safety, infrastructure, economic development and other obligations.	The proposed project is subject to the City's critical area regulations, which recognize the use as allowed in a critical area or critical area buffer. While allowing this use, the project is also required to mitigate for unavoidable impacts to the functions and values. The code recognizes the balancing required between limiting environmental impacts

Attachment G to Staff Report

COMPREHENSIVE PLAN POLICY ANALYSIS **N/A= Not Applicable**

Comp. Plan Policies Identified During Land Use Process:	City of Bellevue Comment:
	and providing appropriate infrastructure for the city's economic development needs. By utilizing the existing corridor, impacts to critical areas will be minimized. Mitigation for the impacts will provide additional function and enhancement through the planting of native and native-compatible vegetation. In order to ensure that every effort is made to minimize risks involving the Olympic pipeline system and strike a balance between potential health effects and the costs of mitigating those effects, the City has imposed Project-specific mitigation measures, consistent with the Final EIS, as Conditions of Approval.
Policy EN-12: Work toward a citywide tree canopy target of at least 40% canopy coverage that reflects our "City in a Park" character and maintain an action plan for meeting the target across multiple land use types including right-of way, public lands, and residential and commercial uses.	The city of Bellevue is recognized as being a "City in a Park" partly because of its existing tree canopy. The proposed project will include tree removal and selective pruning as well as tree and vegetation replacement. The removal of trees located in the right-of-way will be mitigated using the methods outlined in the Council of Tree and Landscape Appraisers, *Guide for Plant Appraisal*, and a total value of the trees will be provided to the City of Bellevue for replanting in the City right-of-way or other City-owned parcels. Any trees located in a critical area or critical area buffer shall be replaced at a 3:1 replacement ratio

COMPREHENSIVE PLAN POLICY ANALYSIS **N/A= Not Applicable**

Comp. Plan Policies Identified During Land Use Process:	City of Bellevue Comment:
	regardless of their size. In order to mitigate for the proposed tree removal, PSE proposes an adaptive Tree Replacement approach. This approach is described in detail in Sections VI and X of the Staff Report. It is anticipated that most replacement trees can be planted in areas where the tree removal is occurring. However, if this is not feasible then PSE will focus tree replacement efforts in secondary planting areas outside the managed right-of-way but within PSE's easement boundaries or on other portions of those properties where trees have been removed as part of the project. PSE will also give preference to native planting for tree replacement in these areas. If the number of trees cannot be met within the corridor then PSE will identify additional planting areas. An emphasis will be placed on finding receiving sites within 0.25 miles of the corridor. A GIS analysis will identify these opportunity areas and PSE will reach out to landowners to discuss interest in receiving plant material. Finally, if tree plantings required to meet the tree replacement ratios proposed cannot be accommodated by the previously discussed approaches, PSE will pursue planting programs to address the final tree planting. PSE has also been participating in the Energy Saving Trees program,

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COMPREHENSIVE PLAN POLICY ANALYSIS **N/A= Not Applicable**

Comp. Plan Policies Identified During Land Use Process:	City of Bellevue Comment:
	which provides trees to those residents that want to add trees to their property in a manner that can help offset energy usage. While in most cases these trees are not along the project corridor, they are in the City and help advance mitigate for potential tree loss due to factors such as mortality and property owner changes (i.e., a new property owner removes existing trees due to landscaping preferences). PSE initiated this program in early 2018 in an effort to offset anticipated tree removal associated with the Energize Eastside project. All of these efforts will contribute towards the City's tree canopy goals. As memorialized in the recommended Conditions of Approval described in Section X of the Staff Report, PSE shall submit a final Tree Replacement plan as part of the required clearing and grading permits consistent with Attachment E (Vegetation Management Plan) to the Staff Report.
Policy EN-13: Minimize the loss of tree canopy and natural areas due to transportation and infrastructure projects and mitigate for losses, where impacts are unavoidable.	PSE is proposing to minimize tree removal by pruning trees where possible and where tree removal is required to replant vegetation. See also City Comment to LU-2, PA-30, PA-31, UD-2, UD-6, UD-55, EN-1 & EN-12, *supra*.
Water Resources	

Attachment G to Staff Report

COMPREHENSIVE PLAN POLICY ANALYSIS **N/A= Not Applicable**

Comp. Plan Policies Identified During Land Use Process:	City of Bellevue Comment:
Policy EN-19: Retain existing open surface water systems in a natural state and restore conditions that have become degraded.	All streams within the project transmission corridor will remain open surface water systems. As part of PSE's proposal, they will be replacing an existing culvert under the access road on the proposed Richards Creek Substation site and realigning and restoring a degraded stream channel.
Policy EN-26: Manage water runoff for new development and redevelopment to meet water quality objectives, consistent with state law.	Minimal new impervious surfaces and development are proposed, except for improvements and impervious surface on the Richards Creek Substation site. PSE's proposal includes a new stormwater vault and all aspects of the project will be required to meet the city's current Stormwater Engineering Design standards and State requirements.
Geo Hazards	
Policy EN-30: Regulate land use and development to protect natural topographic, geologic, vegetational, and hydrological features.	The proposed project will include minimal grading associated with the installation of the transmission poles. The transmission line and the Richards Creek substation will comply with the City's regulations regarding Electrical Utilities Facilities design and site landscaping (LUC 20.20.255.F) and the City's critical areas regulations (Part 20.25H LUC). Compliance with City land use regulations is discussed throughout the Staff Report.

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COMPREHENSIVE PLAN POLICY ANALYSIS **N/A= Not Applicable**

Comp. Plan Policies Identified During Land Use Process:	City of Bellevue Comment:
Policy EN-39: Use specific criteria in decisions to exempt specific small, isolated, or artificially created steep slopes from critical areas designation.	The City's Critical Areas regulations exempt slopes that are less than 1000 square feet in size and do not contain a rise of at least 10 feet. These areas are not designated as critical areas.
Policy EN-40: Minimize and control soil erosion during and after development through the use of best management practices and other development restrictions.	A clearing and grading permit will be required to construct the proposed project. A temporary erosion and sedimentation control plan will be required to implement BMPs for erosion control.
Fish and Wildlife Habitat	
Policy EN-63: Preserve and maintain fish and wildlife habitat conservation areas and wetlands in a natural state and restore similar areas that have become degraded.	PSE's proposal is required to comply with the City's critical areas regulations (Part 20.25H LUC). The critical areas regulations protect existing fish and wildlife habitat, including wetlands and streams. The proposal includes the enhancement of degraded wetlands and associated buffers. Additionally, the project will replace a culvert and enhance a degraded fish bearing stream through channel realignment and bed stabilization.
Policy EN-67: Prohibit creating new fish passage barriers and remove existing artificial fish passage barriers in accordance with applicable state law	PSE's proposal is required to comply with the City's critical areas regulations (Part 20.25H LUC). The critical areas regulations protect existing fish and wildlife habitat, including wetlands and streams. The culvert replacement and associated stream realignment will enhance fish passage. The proposal will also be required to comply with applicable state law and receive approval from state

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COMPREHENSIVE PLAN POLICY ANALYSIS **N/A= Not Applicable**

Comp. Plan Policies Identified During Land Use Process:	City of Bellevue Comment:
	agencies responsible for stream and fish habitat protection.
Policy EN-70: Improve wildlife habitat especially in patches and linkages by enhancing vegetation composition and structure, and incorporating indigenous plant species compatible with the site.	The proposed wetland enhancement and stream realignment will improve wildlife habitat and provide a link to adjoining critical areas on the Lakeside substation site and properties to the south of Richards Creek substation. The mitigation includes native vegetation appropriate for wetland and stream riparian areas.
Policy EN-71: Preserve a proportion of the significant trees throughout the city in order to sustain fish and wildlife habitat.	The proposal will minimize tree removal to the amount necessary to ensure safe operation of the proposed transmission lines, and PSE will plant vegetation when avoidance is not feasible. Fish and wildlife habitat will be sustained and improved when the project is completed, particularly on the Richards Creek substation site.
Policy EN-75: Protect wildlife corridors to minimize habitat fragmentation, especially along existing linkages and in patches of native habitat.	The existing transmission corridor acts as a wildlife corridor. The proposed project will not further fragment this habitat because the proposal includes fewer poles and is located in an already managed utility corridor.
Critical Areas	
Policy EN-84: Use science based mitigation for unavoidable adverse impacts to critical areas to protect overall critical areas function in the watershed.	The applicant has prepared a Critical Areas Report that demonstrates impacts, particularly to wetlands, are mitigated using science-based enhancement and restoration techniques. The techniques use

Attachment G to Staff Report

COMPREHENSIVE PLAN POLICY ANALYSIS **N/A= Not Applicable**

Comp. Plan Policies Identified During Land Use Process:	City of Bellevue Comment:
	appropriate native plantings and stream restoration elements such as large woody debris and bed stabilization. The project will protect the critical area functions in the watershed through these enhancement and restoration actions.
Policy EN-92: Require mitigation proportional to any adverse environmental impacts from development or redevelopment in the Protection Zone.	Unavoidable impacts to critical areas will be mitigated through the implementation of restoration planting plans. The project includes both permanent impacts to wetlands and buffers on the Richards Creek substation site as well as vegetation conversion within the transmission line corridor. Specific mitigation measures are discussed throughout the Final EIS and Staff Report, and are memorialized in Attachments E (Vegetation Management Plan) and I (Critical Areas Report) to the Staff Report, the Final EIS Mitigation Analysis, and Section X of the Staff Report (Conditions of Approval).
Subarea Policies	
Richards Valley	
Policy S-RV-1: Enhance the natural environment within the industrial area by encouraging redevelopment to consider natural features in site design, including but not limited to reducing impervious surfaces, improving the functions of wetlands and stream corridors, incorporating natural drainage features, retaining trees, and restoring vegetated corridors.	The proposed Richards Creek substation is within an area zoned light industrial (LI). Impervious surfaces are limited to the access road and the substation improvements. Wetlands and streams on the site will be enhanced through native plantings. The project includes a soldier pile

Attachment G to Staff Report

COMPREHENSIVE PLAN POLICY ANALYSIS **N/A= Not Applicable**

Comp. Plan Policies Identified During Land Use Process:	City of Bellevue Comment:
	retaining wall to minimize impacts to natural features and minimize tree removal. For a full discussion of the Richards Creek substation and the applicable mitigation measures, see Sections II.C, III and X of the Staff Report.
POLICY S-RV-6: Protect and enhance the capability of Richards Creek, Kelsey Creek, and Mercer Slough and their tributaries to support fisheries along with other water-related wildlife.	The streams and wetlands on the proposed substation site drain to Richards Creek. The proposed mitigation and stream enhancements will support fish and other water-related wildlife by removing invasive plants and stabilizing the stream channel. The proposed culvert replacement and stream realignment will improve fish passage and in-stream and riparian habitat. See Attachment I to the Staff Report and the discussion of mitigation measures related to the culvert replacement and stream realignment at the Richards Creek substation site throughout the Staff Report.
POLICY S-RV-7: Retain and enhance existing vegetation on steep slopes, within wetland areas, and along stream corridors to control erosion and landslide hazard potential and to protect the natural drainage system.	Vegetation on the Richards Creek substation site will be enhanced within slope, wetland, and stream corridors. Landslide hazard potential will be minimized through the use of construction BMPs and the construction of a soldier pile retaining wall.
POLICY S-RV-20: Use common corridors for new utilities if needed.	The project proposes to replace existing transmission poles within an already developed transmission corridor.

Attachment G to Staff Report

COMPREHENSIVE PLAN POLICY ANALYSIS **N/A= Not Applicable**

Comp. Plan Policies Identified During Land Use Process:	City of Bellevue Comment:
Discussion: If new power lines are needed in the Subarea, they should be developed in areas that already contain power lines, rather than causing visual impacts in new areas.	
POLICY S-RV-21: Improve the appearance of public streets and power line rights-of-way.	The power line right-of-way is managed by PSE. The proposed poles will be monopole designs replacing existing wood H-frame poles. The consistent design will improve the appearance of the electrical utility facilities and will be consistent with the already developed light industrial area.
POLICY S-RV-33: Develop areas designated for light industrial uses with sensitivity to the natural constraints of the sites	The proposed substation is located within an already disturbed area of the site. The location and design of the proposal is sensitive to and is intended to protect, to the extent feasible, the stream and wetland features on the site. The proposal, as conditioned, complies with the requirements of LUC 20.20.255, Electrical Utility Facilities, and the City's critical areas regulations, Part 20.25H LUC.
Factoria	
POLICY S-FA-8: Protect and enhance the capability of Sunset Creek, Richards Creek, Coal Creek, and their tributaries to support fisheries and water related wildlife.	Mitigation and enhancement occurring at the Richards and Somerset substations will enhance critical area functions that support fish and wildlife habitat. The proposed mitigation and stream enhancements will support fish and other water-related wildlife by removing invasive plants and stabilizing the stream channel. The proposed culvert

Attachment G to Staff Report

COMPREHENSIVE PLAN POLICY ANALYSIS **N/A= Not Applicable**

Comp. Plan Policies Identified During Land Use Process:	City of Bellevue Comment:
	replacement and stream realignment will improve fish passage and in-stream and riparian habitat.
POLICY S-FA-9: Retain and enhance vegetation on steep slopes, within wetland areas, and along stream corridors in order to control erosion, reduce landslide hazard and to protect the natural drainage system	Vegetation on the Somerset substation site will be enhanced within slope and wetlands. No significant grading is proposed that would impact slope stability within the transmission corridor. Landslide hazard and erosion potential will be minimized through the use of construction BMPs as described in Section X of the Staff Report.
POLICY S-FA-24: Encourage the undergrounding of utility distribution lines in areas of new development and redevelopment.	N/A because PSE's proposal is for utility transmission lines and not distribution lines. Nevertheless, undergrounding the transmission line was suggested as a mitigation measure in the Final EIS, but it is no longer being considered for the South Bellevue Segment due to cost and feasibility concerns discussed in Section VI.C of the Staff Report.
Newport Hills	
POLICY S-NH-8: Protect significant trees and environmentally-sensitive areas (steep slopes, riparian corridors, and wetlands) in accordance with the provisions of the Land Use Code.	The project is subject to the Critical Areas provisions in the Land Use Code (Part 20.25H LUC) that protect significant trees and sensitive areas. The proposal is also subject to the Electrical Utility Facilities regulations in the Land Use Code, LUC 20.20.255, and the conditional use regulations, LUC 20.30B.140. The Staff Report discusses PSE's proposal's compliance with applicable sections of

Attachment G to Staff Report

COMPREHENSIVE PLAN POLICY ANALYSIS **N/A= Not Applicable**

Comp. Plan Policies Identified During Land Use Process:	City of Bellevue Comment:
	the City's Land Use Code, including the impacts to and mitigation measures for significant trees, steep slopes, riparian corridors, and wetlands.
POLICY S-NH-28: Ensure that all new development and redevelopment includes measures to protect and enhance surface water quality.	Surface water quality is protected through the implementation of construction BMPs and through restoration of restored areas. New impervious area is limited to the Richards Creek substation site. The City's Utilities Department has approved the preliminary designs; however, they will review final designs to determine if an enhanced water quality facility will be required because the run off for this site flows to fish bearing stream. All design review, plan approval, and field inspection shall be performed under the individual permits and/or Utility Developer Extension Agreements depending on the extent of the work.
POLICY S-NH-30: Protect and enhance fish and wildlife habitat in environmentally sensitive areas.	The project is subject to the Critical Areas provisions in the Land Use Code (Part 20.25H LUC) that protect environmentally sensitive areas. Impacts to vegetation in Critical Areas will be mitigated through the implementation of native vegetation planting and restoration plans. The Richards Creek substation construction will include wetland mitigation, culvert replacement and stream habitat improvement. In addition to the new culvert crossing, the proposal will restore and/or enhance adjoining habitat areas. This includes realigning and enhancing stream sections extending upstream and downstream, and

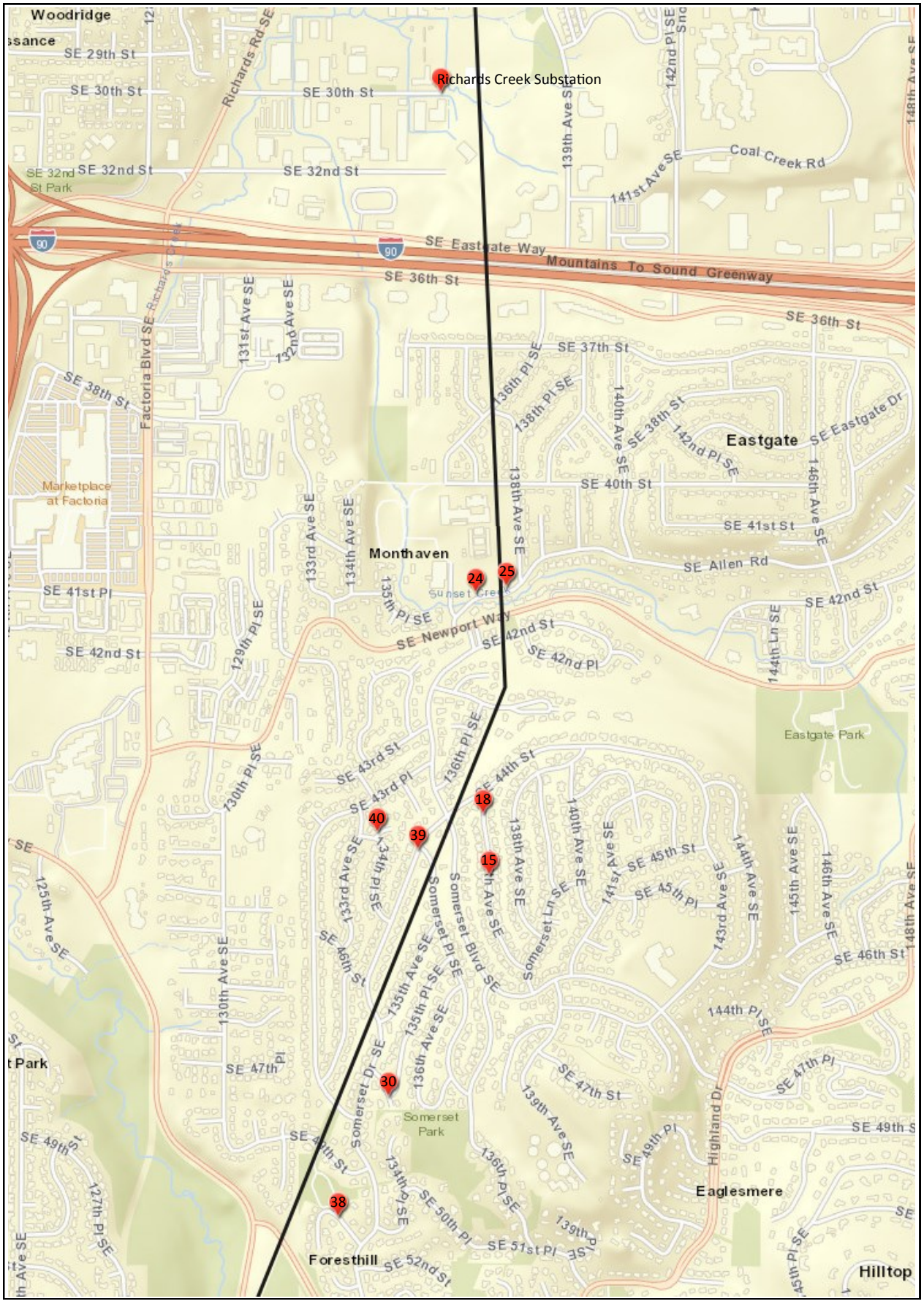
Attachment G to Staff Report

COMPREHENSIVE PLAN POLICY ANALYSIS **N/A= Not Applicable**

Comp. Plan Policies Identified During Land Use Process:	City of Bellevue Comment:
	enhancing the new stream buffer including associated wetland areas.

Attachment: H
Photo Simulations

PSE EE230 Photo Simulations Reference Map



DSD 000920

Existing Conditions

Conceptual Project

Photo simulations are for discussion purposes only and may change pending public, regulatory and utility review 8/4/2017

Address	**13440 SE 30th St, Bellevue**
Date	**7/24/2017**
Time	**1:23 PM**
Viewing Direction	**East**
Existing Pole Heights	**~65-70 feet**
Proposed Pole Heights	**~70-100 feet**

Richards Creek SUBSTATION

energizeEASTSIDE

PSE PUGET SOUND ENERGY

DSD 000921

Photo simulations are for discussion purposes only and may change pending public, regulatory and utility review 7/6/2017

Address	**4489 137th Ave SE, Bellevue**
Date	**4/10/2014**
Time	**9:32 AM**
Viewing Direction	**North**
Existing Pole Heights	**~55 feet**
Proposed Pole Heights	**~80 feet**

KOP CENTRAL 15 SEGMENT 2

energizeEASTSIDE

PSE PUGET SOUND ENERGY

DSD 000922

Photo simulations are for discussion purposes only and may change pending public, regulatory and utility review 7/6/2017

Address	**4489 137th Ave SE, Bellevue**
Date	**4/10/2014**
Time	**9:32 AM**
Viewing Direction	**North**
Existing Pole Heights	**~55 feet**
Proposed Pole Heights	**~80 feet**

KOP CENTRAL 15 SEGMENT 2

energizeEASTSIDE

PSE PUGET SOUND ENERGY

DSD 000923

KOP CENTRAL 18
SEGMENT 2

Address	**4411 137th Ave SE, Bellevue**
Date	**5/7/2014**
Time	**10:53 AM**
Viewing Direction	**Northwest**
Existing Pole Heights	**~55 feet**
Proposed Pole Heights	**~80 feet**

energizeEASTSIDE

PSE PUGET SOUND ENERGY

DSD 000924

KOP CENTRAL 18
SEGMENT 2

Address	**4411 137th Ave SE, Bellevue**
Date	**5/7/2014**
Time	**10:53 AM**
Viewing Direction	**Northwest**
Existing Pole Heights	**~55 feet**
Proposed Pole Heights	**~80 feet**

energizeEASTSIDE

PSE PUGET SOUND ENERGY

DSD 000925

Address	**13630 SE Allen Rd, Bellevue**
Date	**3/30/2016**
Time	**1:44 PM**
Viewing Direction	**Northeast**
Existing Pole Heights	**~60 feet**
Proposed Pole Heights	**~95 feet**

KOP SOUTH 24
SEGMENT 2

energizeEASTSIDE

PSE PUGET SOUND ENERGY

DSD 000926

Existing Conditions

Conceptual Project

Photo simulations are for discussion purposes only and may change pending public, regulatory and utility review 7/13/2017

Address	**4730 134th Place SE, Bellevue**
Date	**8/24/2016**
Time	**3:28 PM**
Viewing Direction	**West**
Existing Pole Heights	**~44 feet**
Proposed Pole Heights	**~75 feet**

KOP CENTRAL 30
SEGMENT 2

energizeEASTSIDE

PSE PUGET SOUND ENERGY

DSD 000927

Existing Conditions

Conceptual Project

Photo simulations are for discussion purposes only and may change pending public, regulatory and utility review 7/13/2017

Address	**4730 134th Place SE, Bellevue**
Date	**8/24/2016**
Time	**3:28 PM**
Viewing Direction	**West**
Existing Pole Heights	**~44 feet**
Proposed Pole Heights	**~75 feet**

KOP CENTRAL 30
SEGMENT 2

energizeEASTSIDE

PSE PUGET SOUND ENERGY

DSD 000928

Existing Conditions

Conceptual Project

Photo simulations are for discussion purposes only and may change pending public, regulatory and utility review 8/4/2017

Address	**13233 SE 51st Pl, Bellevue**
Date	**7/24/2017**
Time	**2:21 PM**
Viewing Direction	**Northwest**
Existing Pole Heights	**~55 feet**
Proposed Pole Heights	**~65 feet**

KOP CENTRAL 38 SEGMENT 2

energizeEASTSIDE

PSE PUGET SOUND ENERGY

DSD 000929

Existing Conditions

Conceptual Project

Photo simulations are for discussion purposes only and may change pending public, regulatory and utility review 8/4/2017

Address	**4411 Somerset Dr SE, Bellevue**
Date	**7/24/2017**
Time	**9:26 AM**
Viewing Direction	**South**
Existing Pole Heights	**~55 feet**
Proposed Pole Heights	**~75 feet**

KOP CENTRAL 39 SEGMENT 2

energizeEASTSIDE

PSE PUGET SOUND ENERGY

DSD 000930

Photo simulations are for discussion purposes only and may change pending public, regulatory and utility review 8/4/2017

Address	**13300 SE 44th Pl, Bellevue**
Date	**7/24/2017**
Time	**2:05 PM**
Viewing Direction	**East**
Existing Pole Heights	**~55 feet**
Proposed Pole Heights	**~75 feet**

KOP CENTRAL 40 SEGMENT 2

energizeEASTSIDE

PSE PUGET SOUND ENERGY

DSD 000931

Address	**13744 SE Allen Rd, Bellevue**
Date	**3/30/2016**
Time	**1:42 PM**
Viewing Direction	**Northeast**
Existing Pole Heights	**~65 feet**
Proposed Pole Heights	**~90 feet**

KOP SOUTH 25 SEGMENT 2

energizeEASTSIDE

PSE PUGET SOUND ENERGY

DSD 000932

PUGET SOUND ENERGY
The Energy To Do Great Things

Puget Sound Energy
P.O. Box 97034
Bellevue, WA 98009-9734

PSE.com

September 21, 2018

Heidi Bedwell, Environmental Planning Manager
City of Bellevue
450 110th Avenue NE
Bellevue, WA 98004

RE: South Bellevue Segment Energize Eastside – Response to Technical Review Letter, Part 1
Conditional Use (File# 17-120556-LB)
Critical Areas Land Use Permit (File #17-120557-LO)

Dear Ms. Bedwell:

Puget Sound Energy, Inc. (PSE) provides the following responses to the City of Bellevue's (City's) August 14th, 2018, letter requesting additional information on the above referenced permit applications. The responses follow the order in which they are presented in the City's letter.

Land Use Review Comments

Map Book: The map books have been repaginated to better facilitate review. These are included with this submittal.

Substation Site Plan: The existing conditions site plan for the Richards Creek substation (Drawing D-18160, Sheet 1) has been updated with the critical areas information and is included with this submittal. An update to the Critical Areas report that captures the areas of impact at Richards Creek will be submitted under separate cover.

Load Forecast: Please see the attached memorandum on this topic.

1. What was the actual peak Eastside customer demand for the summer of 2017? Please indicate what the [summer] peak load period was and express the peak in terms of hourly demand. Please clarify what is considered the Eastside in this context.

PSE does not track Eastside actual load data in real time as part of its regular operations. PSE does track the system peak. The 2017 system summer peak exceeded PSE's forecasted 2018 summer normalized system peak used in the Eastside studies. This demonstrates that the forecasts that PSE used in its planning studies are accurate, although perhaps a bit conservative. Where previous analysis focused on the Eastside as a part of the existing system, PSE undertook specific complex engineering analysis for those purposes. However, PSE uses forecasting, not past actuals, to ensure that the existing transmission system meets regulatory criteria. As stated in the report prepared for Bellevue by Utility Systems Efficiencies, Inc. (2015): "Several hypothetical scenarios were studied as part of the Optional Technical Analysis (OTA). Each one showed overloads in the 2017/18 timeframe, indicating project need in order for PSE to meet federal regulatory requirements for system reliability."

PSE's system planning studies that comply with federal planning standards (NERC TPL-01-004) used peak area forecasting as an input for the studies, which demonstrated that there are transmission system deficiencies (violations) that must be addressed. The magnitude or duration of the violation is used as input to develop an appropriate solution to address the violation.

Energize Eastside utilized the federal planning standard (NERC TPL-01-004) requirements in developing solutions to resolve the deficiencies identified in PSE's planning. The impacted area is generally the east side of Lake Washington (as generally shown on Figure 2-1 of the *Puget Sound Energy, Energize Eastside Outage Cost Study* (Nexant 2015).

2. Does PSE have any data on what drove higher electrical consumption in 2017 and/or whether the rate of growth assumed in the needs analysis for Energize Eastside is likely to remain the same or to change, either higher or lower?

PSE does not have specific data related to consumption sources. Additionally, general consumption (a person's use of energy over a period of time) is not a factor that is used to meet federal planning standards (i.e. what is needed to meet peak demand under various contingencies). Based on PSE's forecasts, peak loads are expected to continue to increase over the 20 year planning horizon.

3. During the 2017 peak load period, what was the flow, if any, across the Northern Intertie?

Operationally, there are always power flows across the Northern Intertie. Typically, the power flows from north to south during the summer and south to north in the winter. This topic was addressed in the report prepared for Bellevue by Utility Systems Efficiencies, Inc. (2015):

"The Optional Technical Analysis examined this issue by reducing the Northern Intertie flow to zero (no transfers to Canada). Although this scenario is not actually possible due to extant treaties, it was modeled to provide data on the drivers for the EE project, to examine if regional requirements might be driving the need. The results showed that in winter 2017/18, even with the Northern Intertie adjusted to zero flow, the Talbot Hill 230/115 kV transformer #2 would still be overloaded by several contingencies (several different outage scenarios). Again, the projected overloads indicate a project need at the local level to meet reliability regulations."

4. During the 2017 peak load period, what was the output of PSE's power plants in the northern part of the Puget Sound Region?

During the 2017 summer peak load, various PSE generation sources were operating; however, whether or not generation was turned on is relevant to operational parameters and not federal planning standards. Federal planning standards are used to determine the need for the Energize Eastside project. In addition, as stated in the report prepared for Bellevue by Utility Systems Efficiencies, Inc. (2015):

"Several hypothetical scenarios were studied as part of the Optional Technical Analysis (OTA). Each one showed overloads in the 2017/18 timeframe, indicating project need in order for PSE to meet federal

regulatory requirements for system reliability. The OTA results showed that reducing the Eastside area growth from 2.4% to 1.5% per year in the period from winter 2013/14 to winter 2017/18 still resulted in project need. Reducing PSE's King County growth while keeping the Eastside growth the same similarly resulted in a project need. Turning on additional generation in the Puget Sound area also resulted in a project need." Therefore, area generation being turned on or off does not change the need for Energize Eastside.

5. Was there a correspondingly higher rate of growth in the winter peak customer demand in winter 2017-2018?

Federal planning criteria do not differentiate between summer and winter peaks. The transmission system is planned to address overload scenarios during a variety of contingencies regardless of the time of year.

Alternative Pole Height-Somerset Neighborhood: The six separate requests under this topic are addressed below.

1. Feasibility: While it may be feasible to reduce the heights of the poles through this area (poles 7/3 through 8/2), trade-offs and obstacles must be considered. The electrical and magnetic fields ("EMF") levels and the potential for interaction with the pipeline would increase with any reduction in pole height, and there would be significantly more poles. However, by balancing the span lengths and maintaining safety clearances, preliminary analysis indicates that pole heights could, on average, be reduced by around 16 feet. Under this configuration, the number of poles would more than double and poles would have to be sited on properties that currently do not have poles. Additional access to new properties would need to be developed and assessed for feasibility. The quantity of excavation would also more than double due to the increased number of poles. For illustrative purposes, please see the attached revised photo simulations for KOP Central 18 and KOP Central 39. These show the Conceptual Project (*i.e.,* CUP Application) and the City's Alternative.

2. EMF Levels: As stated in the EMF report (Power Engineers, March 2017), "[r]aising phase conductors higher allows more room for EMF to decrease in value at the measured height of one meter from the ground." PSE worked with Power Engineers to develop an alternative pole layout in the Somerset area using approximately twice the number of poles (C-16 structure type) in order to reduce the overall height. While this approach reduces the average pole height by around 16 feet, the corresponding calculated EMF levels would increase with any pole height reduction. Using the reduced C-16 pole height scenario, the number of poles in the Somerset area would increase from 18 to 42. The calculated maximum EMF would increase approximately 5.5 times (for both electric and magnetic fields) when compared to the existing design (C-16).

Hypothetically, if C-17 pole structures were used throughout the Somerset area (rather than at some limited, specific locations under the existing design), the calculated maximum electric and magnetic fields would increase by approximately 7 and 10 times, respectively.

Additionally, the "[e]lectromagnetic induction is the primary effect of the HVAC transmission line on the buried pipeline during normal (steady state) operation" per the DNV-GL study. Since the EMF levels increase with the shorter poles, so does the potential interaction with collocated pipeline(s). With the shorter pole heights, the source of the EMF (the phase wires in this case) is brought closer to the ground level, thereby decreasing the separation distance between the phase wires and the pipeline. The strength of the EMF decreases with greater distance from the source. Thus, in the existing corridor, with the pole heights comprising the largest component of this separation distance, decreasing the pole heights and the corresponding separation distance between the pipeline and transmission line phase wires would act to increase the induced AC potential on the co-located pipeline segments.

3. Vegetation Impacts: Additional trees would be expected to be removed if pole heights are decreased. Although the lowest conductor sag point would not change, the addition of poles and associated access and construction areas would have more impacts on the ground. With fewer taller poles, the conductors are installed with more sag (*i.e.,* they curve more), so the conductor attachment points at the poles are farther from the ground, which, in turn, allows for taller vegetation to be located near the poles.

4. Pole Diameter: The difference in pole diameter between the existing design and the shortened C-16 configuration would be nominal as the general taper of the poles is low. It would be expected that the diameter of the shorter poles would generally be reduced by only a few inches.

5. C-17 Structure Type: The C-17 pole type allows for lower overall pole heights; however, they were designed to specifically facilitate crossing under the Seattle City Light 230 kV transmission lines in Renton. The C-17 design changes the conductor arrangement from a delta configuration to a flat or horizontal arrangement. Changing the wire configuration will also result in the following impacts: over double the number of poles as compared to the existing C-16 configuration; increased electric and magnetic fields (approximately 7 and 10 times, respectively) as cross-cancellation is significantly reduced when the wires are arranged horizontally; increased pipeline interaction; and increase vegetation removal.

6. Additional Parcel Impacts: In order to reduce pole height in the Somerset area, approximately 24 additional poles would be required, 17 of which would be on properties that do not currently have poles. Conceptual pole locations that could be used to facilitate the shorter pole design are depicted on figures 1 through 4. It is important to note that access to the new pole locations has not been assessed nor designed.

Tree Removal and Vegetation Management: Information related to tree removal and vegetation management will be submitted under separate cover.

Reconfiguration of 115kV lines around Richards Creek substation: The Lakeside substation is PSE's primary 115 kV switching station on the Eastside. Electricity is supplied to the station from the Sammamish and Talbot Hill substations along the two existing Sammamish-Lakeside-Talbot Hill 115 kV

transmission lines, which form the "backbone" of the Eastside electric system. There are thirteen 115 kV transmission lines that originate at the Lakeside substation and connect with as many distribution substations in the Eastside area. As a result of the number of transmission lines in and out of the Lakeside substation and the boundaries of PSE's property and easements, it is necessary to re-locate and re-configure many of these transmission lines to accommodate the Energize Eastside project. The relocated lines are primarily located south of the Lakeside substation and west and south of the proposed Richard's Creek substation. The specific 115 kV line work south of the Lakeside substation, which is part of the South Segment CUP, is described below and is depicted on Appendix C (Substation Site Plan) within the Map Book.

Shuffleton-Lakeside 115 kV Line: To accommodate the required wire clearance between the upgraded 230kV Talbot Hill-Richards Creek line and the existing Shuffleton-Lakeside line, the Shuffleton-Lakeside line moves to the west. The relocated Shuffleton-Lakeside line will be strung on new steel poles between the Lakeside substation and the southern boundary of the Richards Creek substation yard. At Talbot Hill-Richards Creek 230 kV #2 pole 8/10 (western circuit) near the King County Transfer Station, the Shuffleton-Lakeside 115 kV and the Talbot Hill-Richards Creek 230 kV #2 (western circuit) line will share a steel double circuit pole, with the Shuffleton-Lakeside line turning 70 degrees and continuing to the west at pole 8/5.

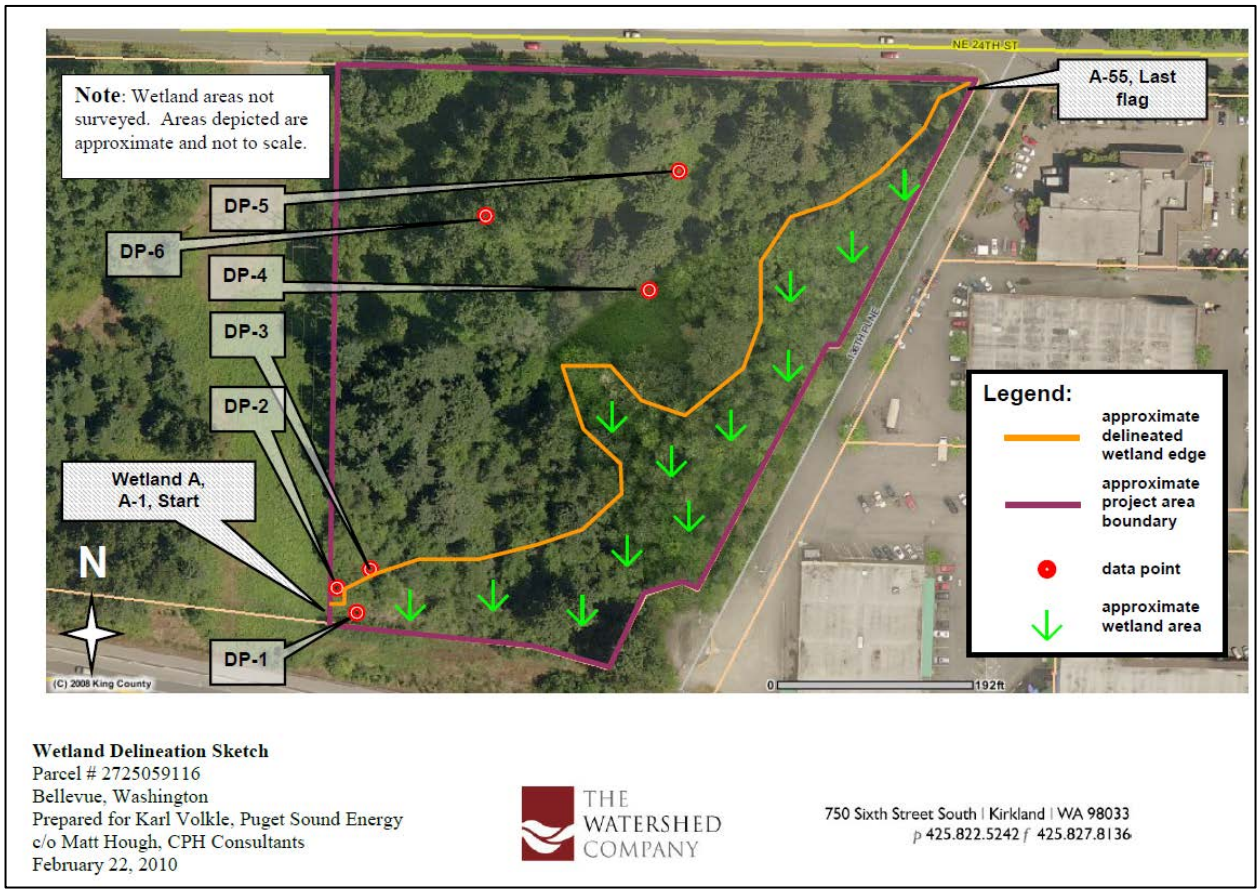
Lakeside-Goodes Corner 115kV Line: In the vicinity of the Lakeside and new Richards Creek substations, the Lakeside-Goodes Corner line is currently on double circuit structures with the existing Talbot Hill-Lakeside #1 line (which will be upgraded to 230 kV). When the existing Talbot Hill-Lakeside #1 and #2 115 kV lines are upgraded to 230 kV as part of the Energize Eastside project, they will be attached to the south side of the new Richards Creek substation; therefore the Lakeside-Goodes Corner line will require new poles to support it. Starting at Lakeside Substation the Lakeside-Goodes Corner line will be moved to the east on steel poles (similar to the C-17 pole type) and cross under both the Richards Creek-Lakeside 115 kV line and the Sammamish-Richards Creek 230 kV #2 line (west circuit). As the Lakeside-Goodes Corner line travels south, it will be relocated west of its existing location for the length of the Richards Creek substation. At the southern limit of the Richards Creek substation, the Lakeside-Goodes Corner line will turn to the southeast for one span and cross under the Sammamish-Richards Creek 230 kV #2 line and the Talbot Hill-Richards Creek 230 kV #1 and #2 lines before proceeding due south. Between poles 8/10 and 9/1 on the Talbot Hill-Richards Creek 230 kV #1 line a new wood pole will be installed for the Lakeside-Goodes Corner line to facilitate keeping it within the existing easement. From this point, the Lakeside-Goodes Corner line will be co-located with the Talbot Hill-Richards Creek 230 kV #1 line on poles 8/9 and 8/10. As the Lakeside-Goodes Corner line continues south it crosses I-90, where it makes a 90 degree turn to the east. At the 90 degree turn south of I-90, this line will be placed on a new steel pole located east of Talbot Hill-Richards Creek 230 kV #1 line, pole 8/8 (eastern circuit).

Richards Creek-Lakeside 115 kV Line: The Richards Creek-Lakeside line is a new short line between the new Richards Creek substation and the Lakeside substation. The Richards Creek-Lakeside line requires two new steel poles (structures 115-1 and 115-2) and is three spans in length. Pole 115-1 will be a double circuit pole with both the Richards Creek-Lakeside 115 kV line and the Sammamish-Richards Creek 230 kV #1 line.

Public Comment: PSE will provide responses to the public comments under separate cover.

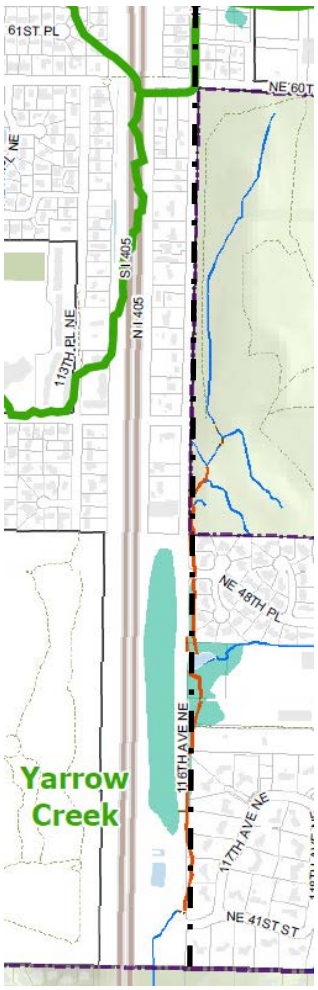
Critical Areas: During initial planning of Energize Eastside in 2014, three substation sites were identified and evaluated both by PSE and the Community Advisory Group. The substations sites were named Richards Creek (subject of CUP application), Westminster, and Vernell. These sites were chosen because they are all owned by PSE with the intent of using them for future substation sites (shown on Bellevue Comprehensive Plan Map UT-7). As part of the 2014 evaluation, Critical Areas were factors that were considered, specifically, wetlands, stream crossings, and steep slopes. Both the Richards Creek and Westminster sites are located along the existing SAM-LAK-TAL corridor (i.e., *Willow* route); however, the Vernell site would require the new 230 kV transmission lines to follow a different corridor (i.e., *Sycamore* route) between the Sammamish and Lakeside substations, as well as the installation of additional 115 kV lines between the Clyde Hill and Ardmore substations.

The critical areas associated with the Richards Creek substation site are included in the CUP and LO permit applications. The Westminster site would have used the same 230 kV transmission line corridor that connects the Sammamish substation to the Richards Creek substation (*Willow* route), and so would have similar impacts to those analyzed in the permit applications. The Westminster site, however, is undeveloped and is currently forested with known wetlands located along the eastern portion of the site (See figure below). The siting of a substation at this location would likely cause new impacts to critical areas.



A new 230 kV transmission line route (*Sycamore* route) would be required to connect the Vernell site to the Sammamish substation in Redmond. The Sycamore route was located west of the existing dual 115 kV transmission line corridor (*Willow* route) and is about 3 miles longer than the *Willow* route. A substantial portion of the Sammamish-Vernell 230 kV transmission line corridor would traverse through the city of Kirkland along 116th Avenue NE, which parallels the western extent of Bridle Trails State Park. In addition to the new 230 kV transmission line, in order to use the Vernell site, approximately 2.3 miles of new 115 kV transmission line would need to be constructed between the Vernell site and the Ardmore substation located at 15335 NE 24th Street in Redmond. Additionally, another mile of new 115 kV transmission line would be required to connect the Clyde Hill substation (2401 Bellevue Way NE, Bellevue) to the Vernell site. The Vernell site was removed from further consideration in 2014 because it was not recommended for additional study by the Community Advisory Group. Therefore, specific critical areas information related to the 230 kV line, Vernell site, and appurtenant 115 kV transmission lines corridors was not collected.

The GIS-based data that was collected for the Community Advisory Group process can be used to make a relative comparison between the *Willow* (Richards Creek and Westminster) and *Sycamore* (Vernell) routes. In general, the *Sycamore* route would cross approximately nine more wetlands, four fewer streams, and four more geologic faults than the Willow route. Also, using the CAG GIS data, it is estimated that approximately 1,300 more trees would be subject to removal with the Sycamore route. Most of these trees would be along the western extent of Bridle Trails State Park and 116th Avenue NE, where a number of streams (including known salmonid locations) and wetlands have been identified on Kirkland's Sensitive Areas map (2018).



Clearing and Grading – Geotechnical Considerations

Please see the attached memorandum from GeoEngineers dated September 14, 2018.

Transportation

1) The City's understanding of the Richards Creek substation operation is correct. When complete, the substation will not have full-time employees; therefore, trip generating patterns or characteristics will not occur. Trips to the site related to inspections and maintenance will occur. As stated in the EIS, "A small number of vehicle trips are expected to be generated when the completed substation is operational." This typically equates to around one round trip vehicle trip per month during standard operation conditions. Additionally, the Richards Creek substation is located adjacent to PSE's Lakeside substation; therefore, the length of the trips to either substation can be minimized.

2) The additional details that have been requested will be submitted as part of the Clear and Grade Permit application.

Right of Way Use Permit

PSE acknowledges that to work in the City ROW that a Right-of-Way Use Permit will be required. PSE or its contractor will apply for the permit separately.

Thank you for you effort in processing our application. Please let us know if additional clarification is needed.

Sincerely,

Brad Strauch
Senior Land Planner

DSD 000941

7/7 to 7/3 Reduced Pole Height

0 59.5 119

Feet

N

Figure 1

This map is to be used for reference purposes only. Map was produced from an automated server with data available at the time the map was created.
Scale is approximate. Puget Sound Energy and POWER Engineers, Inc. are neither responsible nor liable for any inaccuracies herein contained.

Printed on: 09/13/2018

DSD 000942

7/13 to 7/8 Reduced Pole Height

0 59.5 119
Feet

N

PUGET SOUND ENERGY

POWER ENGINEERS

Figure 2

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Printed on: 09/13/2018

DSD 000943

7/18 to 7/14 Reduced Pole Height

PUGET SOUND ENERGY

0 59.5 119
Feet

N

POWER ENGINEERS

Figure 3

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Printed on: 09/13/2018

DSD 000944

8/3 to 7/19 Reduced Pole Height

0 59.5 119
Feet

N

Figure 4

This map is to be used for reference purposes only. Map was produced from an automated server with data available at the time the map was created.
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Printed on: 09/13/2018

KOP CENTRAL 18 SEGMENT 2

City's Alternative

Photo simulations are for discussion purposes only and may change pending public, regulatory and utility review 9/4/2018

Address	**4411 137th Ave SE, Bellevue**
Date	**5/7/2014**
Time	**10:53 AM**
Viewing Direction	**Northwest**
City's Alternative Pole Heights	**~65 feet**
Conceptual Project in CUP Pole Heights	**~80 feet**

Conceptual Project in CUP

Photo simulations are for discussion purposes only and may change pending public, regulatory and utility review 7/6/2017

energizeEASTSIDE

PUGET SOUND ENERGY

September 2018

DSD 000945

City's Alternative

Photo simulations are for discussion purposes only and may change pending public, regulatory and utility review 9/4/2018

Conceptual Project in CUP

Photo simulations are for discussion purposes only and may change pending public, regulatory and utility review 8/4/2017

Address	**4411 Somerset Dr SE, Bellevue**
Date	**7/24/2017**
Time	**9:26 AM**
Viewing Direction	**South**
City's Alternative	**~65 feet**
Conceptual Project in CUP	**~75 feet**

KOP CENTRAL 39 SEGMENT 2

energizeEASTSIDE

PSE PUGET SOUND ENERGY

September 2018

DSD 000946

Attachment: I
Critical Areas Report

TECHNICAL MEMORANDUM

THE WATERSHED COMPANY

Date:	January 2, 2019
To:	Bradley Strauch, PSE
From:	Watershed team
TWC Project Number:	111103
Project Name:	Energize Eastside Critical Areas Impact Analysis – South Bellevue

Subject: South Bellevue Critical Areas Land Use Permit (File #17-120557-LO) -Revised Critical Areas Report

A Revised South Bellevue Critical Areas Report (CAR) was issued for the Puget Sound Energy (PSE) Energize Eastside project in December of 2018. This memo provides additional information clarifying omissions or typographical errors identified in two sections of the Revised CAR after its issuance, and is intended to serve as an addendum to the December 2018 report.

Section 8.1.3, Photos

Section 8.1.3 of the Revised CAR provides photos of the existing conditions on the Richards Creek Substation parcel in the vicinity of the proposed stream re-alignment and wetland enhancement project area. Captions are provided identifying the condition the photo is intended to depict, however not every photo includes identification of which wetland or other critical area the photo is of. For clarification, the list below provides additional location information for each photo found in Section 8.1.3.

Photo 1- Looking west from the existing access road toward Wetland A and Stream C.

Photo 2- Wetland A is on the right (north) side, Wetland D to the left (south).

Photo 3- Centrally-located within Wetland D (same invasive plant species are found in Wetland A as well).

Photo 4- Wetland D.

Photo 5- Stream C and Wetland A at its southernmost extent.

Photo 6- Stream C and Wetland A at its southernmost extent.

Photo 7- Stream C and Wetland A, facing northwest from just downstream of the access road.

Photo 8- Looking westward into Wetland A with the access road in the foreground.

Photo 9- Stream C within Wetland A.

Photo 10- Stream C within Wetland A.

Photo 11- Facing northeast with Stream C and Wetland A behind the stored construction materials.

Photo 12- Facing southward, Wetland A and Stream C.

Photo 13- Southernmost extent of Wetland A, at the access road culvert outlet.

Photo 14- Facing east, Wetland A is out of the photo to the upper left, Wetland D is out of the photo to the upper right.

Photo 15- Centrally-located within Wetland D.

Photo 16- Wetland A lies beyond the wall.

Photo 17- Facing southeast, Wetland A is beyond the stored construction materials in the background.

One additional photo is provided below depicting a wider view of Wetland D not captured by the other photos in the report.

Photo 18. Native willow and alder canopy with understory heavily disturbed by invasive species in Wetland D. From southern edge of Wetland D facing northwest with Fowler property in background.

Section 9.7, Requirement 6

Section 9.7 of the Revised CAR addresses the critical areas report submittal requirements per Bellevue Land Use Code (LUC) 20.25H.250. The response to requirement B.6 is provided on the bottom of Page 99, however the corresponding text of requirement B.6 was erroneously left out of the report. The requirement listed in Section 9.7 as B.6 is actually B.7 and the requirement listed as B.7 is actually B.8. The text below corrects this omission and should replace the second response under 5.c on the bottom of Page 99 up to the start of the requirements listed under "C" on Page 100.

6. *A discussion of the performance standards applicable to the critical area and proposed activity pursuant to LUC 20.25H.160, and recommendation for additional or modified performance standards, if any;*

Response: Not applicable; the Project will not cause impacts to habitat associated with species of local importance.

7. *A discussion of the mitigation requirements applicable to the proposal pursuant to LUC 20.25H.210, and a recommendation for additional or modified mitigation, if any; and*

Response: See Sections 7.2 and 8.1. Consistent with the description above, mitigation for the Project is being designed to be in compliance with LUC 20.25H.210 through 25.25H.225. The wetland mitigation required in the Richards Creek sub-basin based on calculated impacts consists of 30,718 SF of enhancement. The Richards Creek Substation Mitigation Plan (Appendix A) proposes 30,718 SF of wetland enhancement to meet this mitigation need. Enhancement is proposed within degraded portions of Wetland A and Wetland D.

A portion of the wetland enhancement mitigation (13,396 SF) is proposed to occur to wetland areas within the boundaries of the stream restoration project. However, no out-of-kind mitigation is being proposed. The stream restoration itself, including the both the habitat improvements and flooding alleviation it is expected to bring, is not proposed as mitigation for the wetland impacts generated by Energize Eastside. The stream realignment and restoration proposal will not result in permanent impacts to wetland function. Rather, it will enhance the functions of the interrelated and interdependent stream and wetland system and will help provide a greater functional lift to the restored wetlands within the stream project area. Additional enhancement is also proposed in Wetlands A and D, outside of the stream project area and above what is required to mitigate for project impacts (See Table 17).

8. Any additional information required for the specific critical area as specified in the sections of this part addressing that critical area.

Response: A delineation report has been prepared which documents wetlands and streams in the proposed Project area (The Watershed Company 2016). Additional delineation reports were prepared for the Richards Creek Substation sites (The Watershed Company 2017 and 2017b, respectively).

REVISED SOUTH BELLEVUE CRITICAL AREAS REPORT

Puget Sound Energy – Energize Eastside Project

Prepared for:

Bradley Strauch
PSE Energize Eastside
355 110th Avenue NE
Bellevue, WA 98004

Prepared by:

THE WATERSHED COMPANY
750 Sixth Street South
Kirkland . WA 98033
p 425.822.5242
f 425.827.8136
watershedco.com

December 2018

The Watershed Company Reference Number:
111103.8

The Watershed Company Contact Person:
Jennifer Creveling, Senior Biologist
Katy Crandall, Ecologist / Arborist
or Clover McIngalls, Environmental Planner

Cite this document as:
The Watershed Company. December 2018. Revised City of Bellevue Critical Areas Report: Puget Sound Energy – Energize Eastside Project South Bellevue Segment. Prepared for PSE.

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REVISED SOUTH BELLEVUE CRITICAL AREAS REPORT

PUGET SOUND ENERGY – ENERGIZE EASTSIDE

1 EXECUTIVE SUMMARY

PSE's Energize Eastside Project (the Project) proposes to build a new electric substation (Richards Creek Substation) and upgrade existing transmission lines to increase transmission system capacity to 230kV power to meet the growing need for power during peak demand onthe Eastside's electric grid.

Regulated critical areas are present in the South Bellevue Segment of the Project area, including wetlands, streams, geologic hazard areas, flood hazard areas, and associated buffers and may sustain varying degrees of impact as a result of proposed activities.

The Project was designed to avoid and minimize impacts to critical areas. The following efforts describe how critical area impacts were avoided to the extent feasible: new poles were relocated outside of critical areas; the Richards Creek Substation design accounts for nearby critical areas and utilizes the existing pole yard footprint; and construction access, pole construction work areas, and stringing sites have been strategically located outside of critical areas in most instances. Critical area impact minimization techniques include utilizing the existing transmission line corridor, limiting disturbance and implementing best management practices (BMPs) when working in critical areas, and installing transmission lines between poles with minimal site disturbance.

Impacts have been classified as permanent, vegetation conversion, and temporary and are expected to occur in wetlands, wetland/stream buffers, flood hazard areas, geologic hazard areas, and associated geologic hazard area buffers. The majority of critical area impacts occur in wetlands and wetland/stream buffers and will be mitigated accordingly, in-kind. Proposed impacts to geologic and flood hazard areas have been quantitatively assessed; proposed activities have been determined to not significantly affect geologic and flood hazard areas or any associated buffers.

The majority of permanent and vegetation conversion impacts proposed to wetland and wetland/stream buffer critical areas occur at the proposed Richards

DSD 000957

Creek and Lakeside Substation parcels and are associated with the Richards Creek Substation development. Impacts generated in the transmission line corridor are significantly smaller by comparison. Mitigation is proposed at the Richards Creek Substation site and at the Somerset Substation site in the form of wetland and buffer enhancement. These sites provide mitigation opportunities suitable for mitigating by sub-basin level impacts which is consistent with the City's code.

This report is intended to satisfy the requirements of the Bellevue Land Use Code and support PSE's Conditional Use Permit application for the South Bellevue Segment of the Project in the City of Bellevue. A first draft of this report was released in August of 2017. At that time mitigation plans were still in development. This December 2018 revised report updates report content to reflect the final mitigation plans which have now been developed (Appendix A), as well as preliminary feedback from the City. No changes have been made to the Critical Areas Impact Analysis, nor the data used to generate the 2017 impact results.

Note that in May 2018 Bellevue adopted an update (Ordinance 6417) to their critical area regulations, Land Use Code (LUC) Chapter 20.25H. This revised report continues to reference the previous Chapter 20.25H which was in effect at the time of the August 2017 submittal.

2 INTRODUCTION AND PROJECT DESCRIPTION

Puget Sound Energy, Inc. (PSE) proposes the construction of a new 230 kV to 115 kV substation (Richards Creek Substation) and to upgrade approximately 16 miles of existing 115 kV transmission lines located within a 100-foot wide regional utility corridor to accommodate 230 kV power (collectively "the Project"). The Richards Creek Substation will be built to accommodate the 230kV to 115kV transformer needed to accommodate the transmission line upgrade, which is necessary to address a deficiency in electrical transmission capacity during peak periods. Combined with aggressive conservation, the Project will improve reliability for Eastside communities, including the City of Bellevue, and supply the needed electrical capacity for anticipated growth and development on the Eastside.

Within the City of Bellevue, the transmission line upgrade extends north-south for approximately 8.3 miles. This Critical Areas Report addresses the South Bellevue Segment of this line, which runs the approximate 3.4 miles between SE

26th Street and Newcastle Way (Figure 1). The South Bellevue Segment requires the removal of 44 H-frame, 6 triple-pole, and 9 monopole structures (consisting of 115 poles). PSE then plans to install 14 steel monopoles for single line circuit and 57 steel monopoles for the double circuit line. The North Bellevue Segment will be permitted at a later date.

The existing transmission lines are located in PSE's Sammamish-Lakeside-Talbot transmission line corridor, which was established in the late 1920s and early 1930s. Within the existing utility corridor, the proposed upgraded lines will place poles in generally the same locations as existing poles. In some instances, poles will be moved to accommodate landowner preferences and easement considerations, and to minimize impacts to critical areas. During construction, selective tree removal will occur within the corridor to meet federal vegetation management requirements and PSE standards.

The proposal also includes culvert and stream improvements on the new Richards Creek Substation site. The 8.46-acre site is located in south Bellevue north of I-90 and south of PSE's existing Lakeside 115 kV switching station.

The purpose of this Critical Areas Report is to document critical area impacts that are expected to occur as a result of the South Bellevue Segment.

DSD 000959

Figure 1. Map of the Energize Eastside South Bellevue Segment.

3 METHODS

A Critical Areas Impact Assessment (CAIA) was conducted for the South Bellevue Segment of the Energize Eastside Project. The analysis combined GIS-based assessment with field-verified conditions and evaluated proposed Project elements in relation to existing land cover types and regulated critical areas. The location and type of each proposed activity was used to determine impacts and mitigation needs and is based upon preliminary site plans provided by PSE (6/30/17). A detailed description of the CAIA process and methods is provided in Appendix D.

3.1 Study Area

For the purposes of this report, the study area is limited to the South Bellevue Segment, a segment of the proposed Energize Eastside corridor that spans approximately 3.4 miles from just south of SE 26th Street to Newcastle Way. The study area includes most of the existing Lakeside Substation parcel and the proposed Richards Creek Substation parcel. South of those substations the study area consists of an existing, approximately 100-foot wide regional utility corridor that extends south to the city limits with Newcastle (Figure 1). The study area is depicted in the attached maps (Appendix B).

3.2 Data Compilation

Critical areas evaluated as a part of the analysis include wetlands, streams, habitats for species of local importance, geological hazard areas, areas of special flood hazard, shorelines, and any associated critical area buffers. To facilitate the critical area impact analysis, the following data were compiled and reviewed: vegetation inventory, wetland and stream surveys, and publically available data.

Vegetation Inventory

Existing vegetation with the potential to reach a height greater than 15 feet located in the Project area corridor was inventoried between March and November 2015. Vegetation inventory methodology and results are available in the *City of Bellevue Tree Inventory Report: Puget Sound Energy – Energize Eastside Project* (The Watershed Company 2016b). Tree data used in this critical areas impact analysis were obtained and compiled from survey, GPS, and digitization using high-resolution imagery.

Wetland and Stream Surveys

Most wetlands and streams were delineated and classified between March and October 2015. The majority are documented in the *City of Bellevue Critical Areas Delineation Report: Puget Sound Energy – Energize Eastside Project* (The Watershed Company 2016). Wetland and stream data were obtained and compiled from

DSD 000961

GPS or survey data and are limited to the study area at the time of the original inventory which generally consisted a 100-foot wide corridor defined by an established PSE easement. Delineation study methodology is detailed in the previously-reference delineation report (The Watershed Company 2016).

In April 2017, a wetland and stream delineation study was conducted at the Richards Creek Substation site to update and supplement the findings of previous studies (The Watershed Company 2017). A subsequent delineation study was also conducted at the Somerset Substation site in January and February 2017 (The Watershed Company 2017b). The findings of these supplemental delineation studies have been incorporated into the critical areas impact analysis. For purposes of this critical areas analysis, data from the Somerset Substation delineation was only used in reference to work occurring in the existing transmission corridor; no work will occur at the Somerset Substation as part of this proposed Project.

Wetland and stream critical areas that were previously delineated on the Lakeside Substation parcel have also been incorporated into this analysis where appropriate. Wetland and stream locations documented in the referenced surveys were used in this analysis.

Publicly Available Data

Publicly available City of Bellevue GIS Map Data were utilized for mapping the following critical areas: coal zones, floodplains, and steep slopes. Data for landslide hazard areas was retrieved from King County's GIS Center.

As no coal mine hazard areas are located within the study area, this CAIA only assesses steep slopes and landslide hazard areas. The dataset for drainage basins was also utilized for characterizing wetland and wetland/stream buffer impacts and determining compensatory mitigation needs for these critical area types. Data used to map impervious surfaces and development include the King County Impervious and Impacted Surface data (King County 2009), supplemented with land survey data and high-resolution aerial photography provided by PSE.

3.3 Project Element Construction – Potential Impacts

Project elements that have the *potential* to impact critical areas are defined in this section and include the following:

- Permanent development of Richards Creek Substation
    - including Richards Creek culvert replacement and revised access driveway;
- Clearing limits for Richards Creek Substation;
- Pole replacement:

    - removal of old poles
    - installation of new poles
        - pole buffer (6-foot radius outside of pole footprint),
        - pole construction work area (varies by pole type, see description below);
- Access routes (approximately 20 feet wide);
- Stringing sites; and
- Vegetation management requirements.

3.3.1 Richards Creek Substation

Directly south of the Lakeside Substation and within the existing transmission corridor, PSE owns a pole yard. The pole yard consists of an access driveway leading to a partially paved and hard packed gravel surface used to store equipment and park vehicles. The existing 115 kV corridor bisects the site, as well as an existing petroleum pipeline easement. As part of the proposed Project, this pole yard will be re-developed with the Richards Creek Substation. Construction of the substation will result in two types of impacts: permanent and temporary.

- Permanent impacts will be associated with the vegetation clearing and fill associated with the installation of the substation yard base, fence, walls and equipment that is located outside of the existing developed area. For report purposes, this permanent impact will be referenced as the substation footprint.

- Impacts associated with the relocation of the existing driveway and construction limits of the substation will be predominately temporary; these disturbed areas can be re-vegetated with appropriate vegetation and left to return to their natural state.

The impacts are further analyzed and quantified in Section 7 of this report.

Richards Creek Culvert Replacement

PSE is planning to replace and upgrade a culvert carrying Stream C, a small perennial stream, beneath a driveway that provides access to its existing pole yard site and proposed Richards Creek Substation. A pair of aging and undersized culverts (two side-by-side, 18-inch diameter corrugated metal pipe culverts) have proven inadequate to carry the combined flow and sediment loading along the stream.

Construction of the new culvert will also result in two types of impacts: permanent and temporary. Construction associated with proposed culvert replacement and stream realignment will result in temporary disturbance to the

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stream, wetlands, and associated buffers, but will also result in net habitat benefits following Project implementation.

- Permanent impacts will be associated with the installation of a new culvert; wetland fill along the edge of Wetlands A (downstream) and D (upstream) is limited to area immediately adjacent to the existing access driveway where the new culvert length will be greater than existing. However, the proposed culvert replacement and stream realignment will result in permanent improvements to Stream C, which will increase streamflow conveyance capacity, improve sediment transport, facilitate sediment removal from the system, replace undersized culverts, reduce flooding that now occurs on the adjoining property to the west, improve fish passage (including passage for cutthroat trout), and improve in-stream, riparian, and wetland habitat conditions.

- Temporary impacts will be associated with the construction limits of the culvert; these disturbed areas will be re-vegetated with appropriate vegetation as part of the overall restoration plan.

The impacts are further analyzed and quantified in Section 7 of this report.

3.3.2 Pole Replacement

Existing H-frames (consisting of 2 or 3 poles) will be replaced with new monopoles (*i.e.*, a single pole); in general relocation activities will occur in close proximity to the existing H-frames, but some of the replacement poles will be moved to accommodate landowner preferences and easement considerations, and to minimize impacts to critical areas. To conduct this work, PSE created construction scenarios specific to the type of structure being installed. Table 1 below describes the scenarios applicable to the Project. These scenarios provide assumptions used to assess impacts.

Table 1. PSE construction scenarios.

Description	Scenario	
No Critical or Recreation Area Present		
Direct embed-single pole • Temporary work area is generally 2,500 square feet • Create hole (hole will be larger than diameter of the new pole) • New pole and backfill delivered to site • Place pole in hole and backfill annulus • Stabilize site	A	A1
Foundation-single pole • Temporary work area is generally 5,000 square feet • Create hole (hole will be slightly larger than direct embed pole	C	C1

Description	Scenario	
to accommodate foundation installation) • New pole and foundation materials delivered to site • Build foundation and install pole • Stabilize site		
Critical or Recreation Area Present		
Direct embed-single pole • Temporary work area is generally 2,500 square feet • Create hole (hole will be larger than diameter of the new pole) • New pole and backfill delivered to site • Place pole in hole and backfill annulus • Stabilize site • Establish construction buffer from critical area using appropriate BMPs	A	A2
Foundation-single pole • Temporary work area is generally 5,000 square feet • Create hole (hole will be slightly larger than direct embed pole to accommodate foundation installation) • New pole and foundation materials delivered to site • Build foundation and install pole • Stabilize site • Establish construction buffer from critical area using appropriate BMPs	C	C2

While the work area for each pole type is defined as a consistent size to be conservative, the shape of the disturbed area will vary depending on the presence of critical areas or other sensitive features in the Project corridor. During construction, these areas will be excluded from the disturbance area. Pole replacement will potentially result in three types of impacts: permanent, conversion, and temporary.

- Permanent impacts will be associated with the installation of new poles; which will have a base diameter ranging from 4 feet to 6 feet depending on the pole type (direct imbed or new foundation). However, some existing poles (which also contribute to permanent fill) will be removed from the critical areas. The following permanent impact scenarios were considered with regards to poles in critical areas:
    - New poles at the Richards Creek and Lakeside Substations.
    - Replacement of existing H-frame, consisting of 2 or 3 poles approximately 3-feet in diameter, with one monopole (4- to 6- feet in diameter).

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- Conversion impacts will be associated with the removal of incompatible transmission line vegetation in the pole construction work area and pole buffer. After construction, the pole construction work areas will be re-vegetated and left to return to their natural state or enhanced (using transmission line appropriate vegetation). The transmission line corridor, and associated area surrounding the poles, will experience routine vegetation management. All vegetation in the transmission line corridor, when mature, will be fifteen feet or less. During typical inspections and maintenance of the poles vegetation is routinely disturbed; as such, no trees of any size will grow within close proximity (about 6 feet) of the new poles.

- Where pole construction work areas and pole buffer areas do not require the removal of trees, the resulting impacts will be temporary. The majority of pole construction work area and pole buffer impacts are expected to be temporary due to the existing use and management of the corridor (*i.e.,* lack of trees) and consideration that existing groundcover will be restored or regenerate on its own within one growing season. Outside of the Richards Creek Substation area, many of the critical areas are located in portions of the managed right-of-way ("ROW") that are developed with a regional trail, landscaped yards, or other improvements. After construction, the temporarily disturbed areas will be re-vegetated and left to return their natural state or enhanced, including the regional trail.

BMPs will be used to minimize impacts resulting from pole replacement activities. In critical areas or buffers, mats will be placed over existing vegetation where possible. Typically, crushed vegetation rebounds within one growing season resulting in only temporary impacts to vegetation. Post construction, all disturbed areas will be re-vegetated, if necessary, and left to return to their natural state.

The impacts are further analyzed and quantified in Section 7 of this report.

3.3.3 Access routes

Access to poles in critical areas located in the transmission corridor will generally occur using existing, partially vegetated access (established during original construction and re-used over time to maintain the corridor). BMPs will be used to minimize ground disturbance in these areas, and in new areas of access. In critical areas or buffers, mats will be placed over existing vegetation where possible. Typically, crushed vegetation rebounds within one growing season resulting in only temporary impacts to vegetation. Where access route alignment

requires tree removal, impacts will be characterized as conversion. Post construction, all disturbed areas will be re-vegetated, if necessary, and left to return to their natural state in compliance with vegetation management requirements. Based on the existing conditions, proposed construction BMPs, and post-construction methods, disturbance associated with access in the transmission corridor will predominantly be temporary.

3.3.4 Stringing Sites

In order to replace the transmission conductor, stringing and tensioning equipment will be staged near new steel poles at specific locations along the corridor in preparation for the stringing of new wire. The disturbance area associated with the equipment and materials to restring the conductor wire will be isolated from wetlands and streams to the extent feasible. In critical areas and buffers, mats will be placed over existing vegetation where possible to allow access to poles for stringing activities. Typically crushed vegetation rebounds within one growing season resulting in only temporary impacts to vegetation. Tree removal activities necessary for the stringing of new wire (in the wire zone) will be performed in a manner to minimize impacts to underlying shrubs, groundcover and other trees, without disturbance to soil. The various techniques utilized to string the wire will not result in surface disturbance (*i.e.*, shooting the wire past obstacles, pulling it along established guide wire, etc.).

For this analysis, stringing sites have been identified as point locations and not polygons (Appendix B). However, each stringing site will be approximately 7,500 square feet of disturbance. Similar to pole construction work areas, the shape of the stringing site will depend upon the presence of adjacent critical areas, existing land conditions, and area needed for equipment staging based on the necessary angle needed to string the conductor. In many areas, this disturbance will overlap with various impacts quantified for proposed access, pole installation, and vegetation management. Therefore, while impacts have not been quantified for stringing sites, as they are expected to largely overlap other work areas they are not expected to require additional tree removal. Any additional impacts resulting from stringing sites, not already quantified in Section 7 through other Project elements, will be temporary in nature; temporary impact areas will be re-vegetated and left to return their natural state or enhanced following construction.

3.3.5 Vegetation Management

Vegetation in the existing corridor is routinely managed. The corridor was initially disturbed during the original transmission line construction (including soil compaction associated with construction activities for the line itself and pole yards, roads, parking lots, subdivisions, trails, and commercial development). Disturbance is regular and ongoing due to maintenance and pole replacement

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activities. With the exception of the Coal Creek Natural Area, the majority of trees in the existing corridor are ornamental and associated with existing property uses (such as residential yards and commercial landscaping).

Vegetation in a transmission line corridor that has an operational voltage of more than 200 kV must be managed in compliance with federal requirements. Vegetation management standards vary depending upon the location of vegetation management in relation to transmission wires. These specific locations are defined as follows:

- Wire Zone – Section of a utility transmission ROW extending to 10 feet from the outside transmission wire(s). Vegetation with a mature height of 15 feet or less is allowed in this zone.

- Managed ROW – The section of a transmission line ROW that extends 6 feet outside of the wire zone. Vegetation with a mature height of 15 feet or less is allowed in this zone.

- Legal ROW – The full width of the easement. While vegetation maintenance is permitted within the full extent of the legal ROW, based on communication with PSE, only a portion of the legal ROW is intended to be maintained; this area is described as the maintained legal ROW and generally extends 10 feet from the edge of the managed ROW. Maximum height of mature vegetation between the managed ROW and legal ROW is dependent upon tree species, tree health, and distance from the wires.

Consistent with federal standards, vegetation in the wire zone must have a mature height of no greater than 15 feet, unless the topographic change is sufficient to allow a 20-foot vertical clearance between the power lines and the mature height of trees under the power lines. The same vegetation requirement was applied to the managed ROW zone. The legal ROW is composed of existing and proposed easements; its width varies along the Project corridor. The area outside of the managed ROW, but still within the legal ROW, is also subject to select clearing of trees that pose a risk of damaging the lines. To facilitate the CAIA, in the maintained legal ROW, a maximum mature tree height of 70 feet was presumed. However, existing trees greater than 70 feet, or with a mature height of greater than 70 feet will not necessarily be removed. Impacts resulting from required vegetation management are characterized as conversion in Section 7 of this report.

For critical areas located within the transmission corridor, these vegetation management requirements will affect residential vegetation (predominately back yard ornamentals). PSE will be working with individual property owners to replace their vegetation with transmission line compatible ornamental species or

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tree replacement outside the corridor. In these areas, the function of the critical area will not change (maintained, back yard vegetation).

3.4 Critical Areas Impact Analysis

The CAIA was conducted by placing tree points/polygons and critical area polygons on a georeferenced base map and overlaying preliminary site plans to determine impacts. Impervious surfaces and other similar areas characterized as developed were removed from wetland and stream buffer areas for this CAIA. The resulting functioning wetland and stream buffers are shown in Appendix B.

Where Project elements (as discussed in Section 3.3) are located in critical areas or their functioning buffers, impacts are quantified based on area (square footage of impact). Impact results were generated based upon the expected long-term condition of the area compared to the existing condition and include permanent impacts, impacts that result in a vegetation conversion, temporary impacts, and activities that result in no change or no impact (see Section 7). For more detailed methodology on the CAIA, refer to Appendix C.

3.5 Limitations

The Watershed Company's technical expertise is specific to wetlands, streams, habitats for species of local importance, and shorelines. The geotechnical assessments and interpretation of impacts within geological hazard areas, including landslide hazards and steep slopes have been addressed by others and referenced into the report and incorporated as an appendix (Appendix B).

Limited availability of detailed site-specific topographic information makes it infeasible to determine top-of-bank adjacent to delineated streams. Stream buffers depicted on the accompanying delineation maps are measured from the ordinary high water mark (OHWM). The buffer limits may be revised if additional topographic data becomes available.

Off-site wetland and stream features were identified and sketched where possible; access and permission to enter properties (or lack thereof) along the corridor were secured by PSE (through an easement) with prior notification to property owners. Where critical areas extended outside of the designated study area limits, boundaries were approximated (as shown in Appendix B) using aerial imagery, topography, field notes, and best professional judgement for the purposes of mapping and wetland rating. Boundaries outside of study area limits have not been delineated or field-verified. However, Project area impacts outside of the study area limits have been quantified based on approximated boundaries. Trees located outside of study area limits have not been inventoried, assessed, or documented. An access route proposed to poles 7/1, north of Forest Drive SE, is located outside of the study area limits and in the vicinity of an area

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noted as possible wetland during field investigations. Due to property access limitations, this area has not been evaluated for presence or absence of wetland and stream critical areas. The construction access would primarily utilize the existing disturbed areas of the Forest Hill Neighborhood Trail and would be located to avoid critical areas to the extent feasible. In the event that critical areas are located in the proposed construction access route, mats would be used to minimize disturbance; any additional impacts are expected to be temporary.

This document represents a point-in-time analysis of the proposed Project, potential impacts, and approach to critical area mitigation. Refinements made as a result of ongoing design and analysis are expected to decrease Project impacts moving forward. If design changes result in increased permanent or conversion impacts that cannot be addressed in the proposed mitigation plans, a Critical Areas Report Addendum will be prepared to address those impacts.

4 EXISTING CONDITIONS

4.1 Site Location

The Project corridor through the South Bellevue Segment study area bisects the Eastgate, Factoria, Somerset, and Newport neighborhoods in the City of Bellevue. The majority of the study area is zoned single-family residential at various densities; exceptions include the I-90 vicinity, generally zoned commercial and light industrial/office and limited business. The corridor is located in the following public land survey sections: Sections 15, 22, 27, and 34 of Township 25N, Range 05E; and Sections 3, 9, 10, 15, 16, 21, 22, and 28 of Township 24N, Range 05E.

The South Bellevue Segment study area is located in the Cedar-Sammamish Watershed (WRIA 8), and spans four drainage basins, which include the Bellevue-defined Richards Creek, Sunset Creek, Coal Creek, and Newport drainage basins.

4.2 Site Description

When the corridor was constructed in the late 1920s and early 1930s, the entire corridor was cleared; construction activities resulted in a compacted subsurface in those areas where the poles were installed. Since that time, the corridor has been continually maintained by PSE through easement rights; using existing access routes/paths, poles have been replaced and vegetation has been managed. To do so, vehicles and equipment (such as cranes) have been used in the corridor. Over time, development has occurred adjacent to and within the

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corridor, including residential development, roads, parking lots, commercial development, and the establishment of trails (using overgrown access routes).

Olympic Pipeline Company also utilizes the South Bellevue Segment corridor for operation and maintenance of a below-ground petroleum pipeline. In general, vegetation management requirements of pipelines are more restrictive than the previously-described vegetation management requirements for the transmission line. For example, trees and shrubs are expected to be mowed or removed on a more regular basis than for the transmission lines to prevent damage to the pipeline by large roots. In addition, a corridor of herbaceous vegetation may be maintained both to keep the area free of large tree and shrub roots and to be able to easily, visually inspect the pipeline corridor from the ground and/or air. The pipeline easement spans the length of the South Bellevue Segment transmission line easement and acts as a regular, contributing source of ongoing disturbance to the shared corridor.

On developed parcels, vegetation in the corridor is generally limited to landscaped beds and maintained yards. On parcels that have not been further developed to a commercial or residential property and remain the managed utility corridor, vegetation is often weedy and dominated by Himalayan blackberry and various grasses; young trees and shrubs are present in some locations where they have presumably grown from seed. These areas are often regularly mowed/cleared for utility access and maintenance purposes. Exceptions are the undeveloped City of Bellevue Parks parcels along Coal Creek Parkway; these parcels contain a densely wooded ravine.

4.3 Critical Areas

This section defines City of Bellevue-regulated critical areas per Part 20.25H Critical Areas Overlay District of Bellevue's Land Use Code (LUC) and describes the general location(s) of each critical area type in the proposed Energize Eastside corridor.

4.3.1 Wetlands

The City of Bellevue defines wetlands as follows (LUC 20.25H.095):

> *Those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas. Wetlands do not include those artificial wetlands intentionally created from nonwetland sites, including, but not limited to, irrigation and drainage ditches, grass-lined swales, canals, detention facilities, wastewater treatment facilities, farm ponds, and landscape amenities, or those wetlands created after July 1, 1990, that were unintentionally created as a result of the construction of a road, street, or highway. Wetlands may include those artificial*

> *wetlands intentionally created from nonwetland areas to mitigate the conversion of wetlands.*

A total of 21 wetlands are located along the South Bellevue Segment corridor. Wetlands are generally concentrated on or near the Richards Creek Substation parcel, and Coal Creek Natural Area. Wetland classifications and buffer widths are summarized in Section 5.1 (Table 2).

A detailed discussion of proposed Project impacts to wetlands is provided in Section 7 of this report.

4.3.2 Streams

The City of Bellevue defines streams as follows (LUC 20.25H.075):

> *An aquatic area where surface water produces a channel, not including a wholly artificial channel, unless the artificial channel is:*
>
> *1. Used by salmonids; or*
>
> *2. Used to convey a stream that occurred naturally before construction of the artificial channel.*

A total of 11 streams are located along the South Bellevue Segment corridor. Streams are generally concentrated near the Richards Creek Substation parcel and Coal Creek Natural Area. Stream classifications and buffer widths are summarized in Section 5.1 (Table 3).

4.3.3 Habitat Associated with Species of Local Importance

The City of Bellevue designates habitat associated with species of local importance and naturally occurring ponds of under 20 acres as critical areas. Habitat, according to LUC 20.50.024,

> *Refers to an individual, species-specific use of a wildlife-habitat type. "Habitat" is the place, including physical and biotic conditions, where a plant or animal usually occurs and is fundamentally linked to the distribution and abundance of species. Species may depend on a Habitat or structural characteristics for part or all of its life history or may exhibit a high degree of adaptability using more than one Habitat. The relationship of species to Habitat is scale-dependent and varies from geographic range, home range, to local or site-specific Habitat components. "Habitat" includes areas of high relative density or species richness, breeding Habitat, winter range, and movement corridors. These areas may also include Habitats that are of limited availability or high vulnerability to alteration. Other examples include: remnant patches of mature mixed Puget Sound lowland forest, caves and cliffs, snag-rich areas and downed logs, riparian areas, lakes and ponds, wetlands and their buffers, and heron rookeries.*

Bellevue considers the following species as species of local importance (LUC 20.25H.150):

Birds – bald eagle, peregrine falcon, common loon, pileated woodpecker, Vaux's swift, merlin, purple martin, western grebe, great blue heron, osprey, green heron, and red-tailed hawk

Mammals – western (Townsend's) big-eared bat, Keen's myotis, long-legged myotis, and long-eared myotis

Amphibians and Reptiles – Oregon spotted frog, western toad, and western pond turtle

Fish – Chinook salmon, bull trout, coho salmon, and river lamprey

Each of these species are reviewed below with the exception of Oregon spotted frog, Chinook salmon, and bull trout which are addressed in detail in the Endangered Species Act (ESA) documentation for the south segment of the Project which includes the South Bellevue Segment, Newcastle, and Renton. As summarized in that document, on the project is not likely to adversely affect ESA-listed species based upon lack of documented use, lack of suitable habitat, and/or avoidance of in-water work and vegetation removal where listed species are known to occur (*i.e.,* the Cedar River in Renton). In the South Bellevue Segment Project area, no federally-listed species are known to occur or have designated critical habitat.

No naturally occurring ponds of under 20 acres are present in the Project area. The Project area, generally, is urban and mostly developed. The power line corridor is mostly vegetated. Vegetation in the Project area often consists of low-growing grasses, landscape plants and invasive plant species (Himalayan blackberry and reed canarygrass) typical of disturbed areas and generally offers little in terms of habitat value when compared to other urban parks and greenspaces. Exceptions, where more valuable habitat is present in the Project area, include forested areas on the Richards Creek Substation parcel and in the Coal Creek ravine. Even at these locations, existing maintenance activities associated with the power lines, established PSE programs and procedures, and the urban landscape setting reduces the likelihood that species of local importance (which require specific habitat features) will utilize power line corridor areas for breeding.

PSE implements an Avian Protection Plan to protect avian wildlife from harmful interactions with their utility equipment. The Plan includes preventing the creation of potentially harmful nests and monitoring known nest sites when construction activities occur in close proximity during the nesting season (Puget Sound Energy n.d.). Potential Project impacts to birds are mitigated through the PSE's bird protection programs and procedures.

Of Bellevue's 23 species of local importance, coho salmon is the only species known to occur in the Project area, in Coal Creek. River lamprey have also been

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presumed to occur in Coal Creek, although this has not been confirmed. Species that could breed in the Project area, but are considered unlikely to do so based on site disturbance are pileated woodpecker, green heron, red-tailed hawk, and western toad. Bald eagle, pileated woodpecker, Vaux's swift, purple martin, merlin, green heron, red-tailed hawk, and Townsend's big-eared bat also have the potential to forage in the Project area. Justification for these assessments are provided in the species review summaries below.

Species of Local Importance Review

Professional knowledge and the following sources were utilized to describe preferred habitat for species of local importance in this section when not otherwise cited: All About Birds (Powell et al. 2010), BirdWeb (Seattle Audubon Society 2005), and *The Sibley Field Guide to Birds of Western North America* (Sibley 2003). The likelihood of species presence in the Project area was determined by comparing species' preferred habitat types to available habitat.

There are several known **bald eagle** nest sites in Bellevue (WDFW n.d.). Eagles are common near Lake Washington and Lake Sammamish, located within approximately 2 and 3 miles of the corridor, respectively. They often nest in tall, mature trees located near large bodies of water. A review of Washington's Priority Habitats and Species (PHS) data indicates the nearest mapped nest is located over one mile west of the corridor near Lake Washington (WDFW n.d.). The nesting eagles depicted in the PHS data are more likely to forage over the nearby lakes than on the corridor. Although it is possible for bald eagles to utilize poles and corridor areas to forage for small mammals. The Project area does not provide suitable nesting habitat. On occasion, eagle flyovers were observed during field work activities; however, breeding or foraging behavior was not observed.

Peregrine falcons are fast-flying birds of prey that are known to nest in urban areas of central Puget Sound. Typical nesting habitat is on cliffs located near large bodies of water. In urban settings, peregrine falcons may nest on buildings and bridges located near large bodies of water such as the State Route 520 and Interstate 90 floating bridges on Lake Washington where breeding areas have been documented (WDFW n.d.). Man-made structures like electrical transmission towers in the Project area could act as a source for potential nesting sites, but are generally not used by peregrine falcons for nesting. Peregrine falcons were not observed during field work activities.

Common loons and **western grebes** are waterbirds. They generally spend their winters in open lakes, bays, and ocean areas. Common loons prefer to nest on wooded lakes, while western grebes prefer to nest on lakes with marshy vegetation. Suitable habitat does not exist in the Project area. These species are not expected to nest in the vicinity of the Project.

Pileated woodpeckers most often nest in old-growth forest and mature forest stands. However, they are increasingly found in urban areas as long as there are large trees that can provide roosting and nesting habitat. In general, the Project area does not contain the appropriate vegetation to support this species due to the vegetation management requirements associated with the power lines, however, pileated woodpeckers have been known to use utility poles for nesting. Pileated woodpeckers were observed near the Project area in Bellevue during field work activities. Suitable habitat exists near the corridor in green spaces east of the proposed Richards Creek Substation and near Eastgate Park as well as in Coal Creek Park.

If pileated woodpeckers are observed excavating poles within the Project area, PSE avian biologists will be consulted to determine whether the pole is being used for nesting or foraging. If a pole is determined to be in use for foraging by pileated woodpeckers, the Project will have minimal effects by potentially causing temporary disturbance to foraging behavior. If pileated woodpecker nests are found, depending on nest occupancy, a PSE avian biologist will develop and implement a strategy to prevent impacts to the pileated woodpeckers during the nesting season in coordination with WDFW.

Vaux's swifts and **purple martins** are both small aerial songbirds that forage in open skies, most often over forest or aquatic habitats. Vaux's swifts are closely associated with old-growth forests requiring cavities in large snags or live trees for nesting and roosting, although they are also known to nest and roost in artificial structures like chimneys (Lewis, Whalen, and Milner 2002). Purple martins also historically nested in tree cavities, but more often nest in man-made structures over water near urban areas in the lowlands of western Washington (Hays and Milner 2003). The Project corridor generally lacks suitable nesting structures (man-made or natural) for these species; however, it is possible that they may use the corridor for foraging. Any disturbance from Project-related activities would be temporary and would not impede the foraging of nearby habitats.

PHS data were reviewed for documented breeding areas associated with these species in the vicinity of the Project area. The nearest mapped purple martin breeding area is located over two miles east of the corridor (WDFW n.d.). No Vaux's swift or purple martin were observed during field work activities.

Merlins rarely breed in the lowlands of western Washington (Seattle Audubon Society 2005), but are increasingly nesting in urban areas. King County is generally considered part of the species non-breeding range; nearby merlin year-round range, where they would be more likely to breed, includes Whatcom, Skagit, and Snohomish Counties (Seattle Audubon Society 2005). Typical breeding habitat is forests with nearby openings, however, during migration and

in winter merlins may be found in a variety of habitats. The Project corridor does not provide suitable nesting habitat, however it is possible that merlins could use the Project area for foraging particularly during migration and winter. Any disturbance from Project-related activities would be temporary and would not impede the foraging of nearby habitats.

Great blue herons are large wading birds most often found near water. Great blue herons forage in a variety of habitats near streams, lakes, ponds, wetlands, saltwater shorelines, and upland fields. They nest in colonies, typically in trees near foraging habitat. There are no known great blue heron nest sites in close proximity to the Project area. The nearest documented breeding site is located over one mile from the Project corridor (WDFW n.d.). If an active heron rookery is identified along the power line corridor, a PSE avian biologist will develop and implement a strategy to prevent impacts to the heron rookery during the nesting season in coordination with WDFW.

Green herons are small wading birds that prefer secluded foraging and nesting habitat that consist of good forest or shrub cover in or near wet environments. Green herons are solitary nesters. Wetlands in the Project area are generally small and disturbed and lack qualities like large areas of seasonal/permanent ponding and connectivity to fish-bearing streams that would provide ideal habitat. Streams like Coal Creek and Richards Creek may provide nesting habitat in or adjacent to the corridor where vegetation structure is suitable. No green heron were observed during field work activities. If green heron are found nesting within the power line corridor, a PSE avian biologist will develop and implement a strategy to prevent impacts during the nesting season in coordination with WDFW.

Ospreys nest in dead trees or man-made structures located near large bodies of water where they forage for fish. Ospreys are fairly common in the greater Seattle area near lakes, rivers, and other large waterbodies. According to PHS on the Web (WDFW n.d.), the nearest breeding area is located next to Lake Washington over one mile from the Project corridor. The Project area in Bellevue provides suitable nest structures (utility poles) and while osprey typically prefer nest sites in close proximity to large water bodies, they can nest a mile or two from water. As such, the study area may provide suitable osprey habitat.

No ospreys were observed during field work activities in the corridor in Bellevue. If an osprey nest is observed within the Project area, depending on nest occupancy, the PSE avian biologists will develop and implement a strategy to prevent impacts to the osprey during the nesting season in coordination with WDFW.

Red-tailed hawks are quite common in western Washington and may be the most common hawk in North America. In western Washington nests are often built in large black cottonwood and red alder trees (Seattle Audubon Society 2005), but the species may also utilize artificial structures for nesting. Red-tailed hawks are often visible soaring over open areas or perching near roadsides. The Richards Creek Substation property may provide suitable habitat for nesting. Red-tailed hawks are generally considered unlikely to nest in the corridor due to limited availability of nest trees, but they may nest in trees near or adjacent to the Project area. It is more likely that the species utilizes the Project corridor for perching or foraging. Any disturbance from Project-related activities would be temporary and would not impede the foraging of nearby habitats.

Bats in Washington, including those listed as species of local importance, utilize a variety of habitats including caves and mines; cliffs, talus, and boulders; buildings and bridges; and trees (Hayes and Wiles 2013). Of the bat species considered here, only the Townsend's big-eared bat could potentially utilize habitat in the Project corridor. According to a Gap Analysis conducted for Washington State mammals, King County is not considered to provide core nor marginal habitat for Keen's myotis; this species is associated with old conifer forests. Furthermore, while long-legged and long-eared myotis species tolerate low-density development, mid- and high-intensity development are generally not considered good habitat (NatureMapping Foundation n.d.). All of Bellevue is mapped as Townsend's big-eared bat core habitat. Their presence in the study area is expected to be limited by available roosts most likely to be vacant buildings or trees based on the landscape setting. The Project area does not provide suitable roost sites; few vacant buildings are expected to occur in the Project area and managed vegetation in the power line corridor is generally not considered to allow for the development of tree roost sites.

Western toad range spans much of Washington state including western Washington and the greater Seattle area. The species reportedly remains common throughout much of its range but has experienced population declines. Western toad can be found in many habitats including desert springs and streams, meadows, woodland, mountain wetlands, and agricultural land (IUCN SSC Amphibian Specialist Group 2015). Western toad habitat in the study area is generally limited to aquatic and terrestrial habitats associated with Coal Creek and Richards Creek that could be used for breeding (*i.e.,* shallow slow-moving water). More suitable breeding habitat is expected to exist/extend outside the Project corridor and the likelihood of western toad in the disturbed and maintained utility corridor is expected to be low by comparison. PHS on the Web (WDFW n.d.) documents western toad occurrences in King County, but none are documented in the vicinity of the Project area. The Project avoids stream impacts, other than the culvert replacement and stream restoration activities, and minimizes wetland impacts to the extent feasible. Vegetation impacts to riparian

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areas will be limited to selective tree removal and will not result in destruction of western toad habitat.

The culvert replacement and stream restoration work occurring at Richards Creek will temporarily disturb the area, but is not expected to impact western toads. Stream restoration work will occur in a work-window defined by the Project permit, likely between July and September, to limit impacts to instream fishes. According to WDFW, western toads begin egg laying in approximately mid-April at low elevation sites in western Washington; eggs hatch within two weeks and tadpoles develop into toadlets over about two months. Using this timeline as a guide, toadlets would be expected to disperse from breeding sites in July. Instream restoration work may temporarily displace western toad, if present at this location. Young toads are likely to be terrestrially mobile and therefore would be expected to avoid proposed disturbance activities. If tadpoles are present in the stream, they would be removed with fish removal efforts associated with construction including capture by dipnets or small seines followed by electrofishing. Once work is complete, potential western toad habitat in the Richards Creek riparian area will be improved from existing conditions. Per the Richards Creek culvert replacement plan (Appendix A), the net result of the proposal to potential western toad habitat is an overall enhancement of the structural attributes and ecological functions of this habitat area, consistent with WDFW's general management recommendation goals for priority species.

Western pond turtle populations are known to occur in Klickitat and Skamania Counties; and recent individual sightings have been confirmed in Pierce and King Counties. One limiting factor in western pond turtle distribution is the availability of shallow water bodies that provide basking surfaces and vegetative cover (Nordstrom and Milner 1997). This habitat type is not present in the Project corridor. Therefore use of the corridor by this species is not anticipated.

Coho salmon and **river lamprey** are species of anadromous fish that could utilize streams and rivers in Bellevue as habitat. Historically, river lamprey likely occurred in most Washington rivers. Current species distribution is not well-known but is presumed to include Puget Sound rivers (WDFW 2015) and the Lake Washington basin (USFWS n.d.). River lamprey spawn in gravel substrates in riffle and side channel habitats of clear, cool streams. Larvae use fine silt and mud substrates and require good water quality year-round. Although not identified to species, lamprey have been observed in Coal Creek in Bellevue (City of Bellevue 2009). For the purpose of this study, river lamprey are presumed to occur in Coal Creek. Coho salmon are also known to occur in Coal Creek in the corridor (City of Bellevue 2009). No in-water work will occur as part of this Project and best management practices will be implemented to minimize the potential for sediment laden runoff; therefore impacts to these species is not anticipated.

Summary

To summarize, Coal Creek is considered a Habitat Associated with Species of Local Importance. The associated stream buffer and critical area regulations for streams are expected to adequately protect this habitat area for the duration of the Project. No other Habitats Associated with Species of Local Importance have been identified at this time. While there is some potential for certain species to breed in the Project area, it is considered to be unlikely. The foraging habitat present in the Project area is not expected to change as a result of the Project and is not recommended for regulation as Habitat Associated with Species of Local Importance.

4.3.4 Geologic hazard areas

Geologic hazard areas includes landslide hazards, steep slopes, and coal mine hazard areas; City of Bellevue defines them as follows (LUC 20.25H.120):

> *1. Landslide Hazards. Areas of slopes of 15 percent or more with more than 10 feet of rise, which also display any of the following characteristics:*
>
> > *a. Areas of historic failures, including those areas designated as quaternary slumps, earthflows, mudflows, or landslides.*
> >
> > *b. Areas that have shown movement during the Holocene Epoch (past 13,500 years) or that are underlain by landslide deposits.*
> >
> > *c. Slopes that are parallel or subparallel to planes of weakness in subsurface materials.*
> >
> > *d. Slopes exhibiting geomorphological features indicative of past failures, such as hummocky ground and back-rotated benches on slopes.*
> >
> > *e. Areas with seeps indicating a shallow ground water table on or adjacent to the slope face.*
> >
> > *f. Areas of potential instability because of rapid stream incision, stream bank erosion, and undercutting by wave action.*
>
> *2. Steep Slopes. Slopes of 40 percent or more that have a rise of at least 10 feet and exceed 1,000 square feet in area.*
>
> *3. Coal Mine Hazards. Areas designated on the Coal Mine Area Maps or in the City's coal mine area regulations, LUC 20.25H.130, as potentially affected by abandoned coal mines; provided, that compliance with the coal mine area regulations shall constitute compliance with the requirements of this chapter in regard to coal mines.*

Landslide and steep slope hazards areas are present in the South Bellevue Segment corridor. They have been assessed and evaluated separately in the *Revised Targeted Critical Areas Geologic Hazard Evaluation*, dated July 11, 2017, by GeoEngineers (hereafter GeoEngineers Report). This document was supplemented with information contained in a draft *Critical Area Supplement for*

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Energize Eastside Bellevue memorandum dated August 21, 2017. Both documents are included as Appendix C.

According to GeoEngineers, mapped steep slopes in Bellevue that include slopes 40 percent or greater were observed locally within the Project area, however many of these areas are developed and include rockeries, landscaped residential or commercial development slopes and cut slopes associated with paved roadways. GeoEngineers states that the following areas (described in terms of proposed activity) are unlikely to be adversely impacted by the Project and are excluded from the analysis:

- Two trees removed from just north of 132nd Avenue SE.
- Multiple trees removed and access just east of the intersection of Somerset Drive SE and 134th Place SE, north to Somerset Place SE.
- Multiple trees removed just east of the intersection of Somerset Drive SE and Somerset Boulevard SE.
- Multiple trees removed just east of 136th Place SE between SE 43rd Place and SE 43rd Street; and two trees between this area and the intersection of Somerset Drive SE and Somerset Boulevard SE.
- Two trees removed and access north of the intersection of SE 43rd St. and the PSE corridor.
- Multiple trees removed south of SE 42nd Street.
- Multiple trees removed between SE 37th Street and SE 36th Street.
- Access east of SE 32nd Street.
- Multiple trees removed in the Richards Creek Substation and Lakeside Substation area.
- Multiple trees removed and access south of SE 26th Street.

A localized natural area of steep slopes and mapped landslide hazards is present in the Project area that includes the Coal Creek drainage east and west along Coal Creek Parkway, and required review by the Project geotechnical consultant. The priority geologic hazard areas of the Coal Creek drainage are shown in the attached critical area maps (Appendix B). A detailed discussion of proposed Project impacts to geologic hazard areas is provided in Section 7 of this report.

As stated previously, no coal mine hazard areas are located along the Project corridor in the South Bellevue Segment.

4.3.5 Areas of Special Flood Hazard

The City of Bellevue defines areas of special flood hazard as follows (LUC 20.25H.175):

1. Land Subject to One-Hundred-Year Flood. The land in the floodplain subject to the flood having a one percent chance or greater of being equaled or exceeded in any given year as determined by customary methods of statistical analysis defined in the City of Bellevue Storm and Surface Water Engineering Standards, January 2011, or as hereafter amended. Also referred to as the 100-year flood.

2. Areas Identified on the Flood Insurance Rate Map(s). Those areas identified by the Federal Insurance Administration in a scientific and engineering report entitled "The Flood Insurance Study for King County" dated April 19, 2005, with an accompanying flood insurance map(s) and any revisions thereto. The Flood Insurance Study and accompanying map(s) are hereby adopted by reference, declared part of this part, and are available for public review at the City of Bellevue.

3. Additional Areas. Other areas designated by the Director pursuant to this section shall be considered areas of special flood hazard.

4. Designation of Areas of Special Flood Hazard. Flood Insurance Rate Maps are to be used as a guide for the City of Bellevue, project applicants, and/or property owners to identify areas of special flood hazard. Flood Insurance Rate Maps may be continuously updated as areas are reexamined or new areas are identified. Newer and more restrictive information for flood hazard area identification shall be the basis for regulation.

5. Use of Additional Information. The Director may use additional flood information that is more restrictive or detailed than that provided in the Flood Insurance Study to designate areas of special flood hazard, including data on channel migration, historical data, high water marks, photographs of past flooding, location of restrictive floodways, maps showing future build-out conditions, maps that show stream habitat areas, or similar information.

6. Flood Elevation Data. When base flood elevation data is not available (A and V zones), the Director shall obtain, review, and reasonably utilize any base flood elevation and floodway data available from a federal, state, or other source, in order to administer provisions for the area of special flood hazard. In areas of special flood hazard where the BFE has increased due to remapping efforts, the new BFE will establish the regulatory limit. (Ord. 6013, 8-1-11, § 1; Ord. 5680, 6-26-06, § 3)

Areas of special flood hazard in the South Bellevue Segment Project area include relatively small areas associated with Sunset Creek and Coal Creek, as determined by the Federal Emergency Management Agency (FEMA).

The mapped Sunset Creek floodplain is shown in an area where Sunset Creek is conveyed underground. The mapped floodplain in the corridor is located north and south of SE Allen Rd in areas developed with apartment buildings, parking areas, sidewalks, and includes some landscaped trees and mowed grass; none of which are associated with a riparian environment.

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The mapped Coal Creek floodplain in the Project area includes portions of Coal Creek Parkway and natural forested vegetation associated with the riparian zone of Coal Creek.

A detailed discussion of proposed Project impacts to flood hazard areas is provided in Section 7 of this report.

4.3.6 Shorelines

The City of Bellevue designates the following water bodies as shoreline critical areas (LUC 20.25E.017):

> *1. Lake Washington, including Mercer Slough upstream to Interstate 405 – The lake waters, underlying lands, plus associated floodways, floodplains, marshes, bogs, swamps and river deltas;*
>
> *2. Lake Sammamish – The lake waters and underlying lands, plus associated floodways, floodplains, marshes, bogs, swamps and river deltas;*
>
> *3. Lower Kelsey Creek – The creek waters, underlying lands, plus associated floodways, floodplains, marshes, bogs, swamps and river deltas; and*
>
> *4. Phantom Lake – The lake waters, underlying lands, plus associated floodways, floodplains, marshes, bogs, swamps and river deltas.*

The Project area does not include City of Bellevue shoreline critical areas.

5 REGULATIONS

5.1 Local Regulations

As noted above, critical areas are regulated under the Critical Areas Overlay District (Bellevue Land Use Code [LUC] 20.25H).

5.1.1 Wetlands and Streams

A summary of relevant wetland and stream critical area classifications and standard buffer widths provided in referenced delineation reports are presented again in Tables 2 and 3, below.

The original Delineation Report (The Watershed Company 2016) for the Project identifies Stream JB03 as a Type O stream. Since that report was issued, this feature has been determined to be a drainage feature constructed by respective homeowners (email communication between PSE and Don McQuilliams, City of Bellevue Operations Manager, August 2017). As such, JB03 was not included in this impact analysis.

Standard buffer widths for wetlands are based upon the wetland category, whether the site is undeveloped or developed, water quality and habitat scores, and wetland size. In this instance, Bellevue defines an "undeveloped site" as follows:

> *An undeveloped site is any site where the wetland and wetland buffer have not previously been included within a Native Growth Protection Area (NGPA) or Native Growth Protection Easement (NGPE), regardless of whether the site contains a primary structure.*

The Project area generally includes developed areas like the pole yard, roads, and trails. However, these conditions are not consistent with the city's definition of "developed" for determining wetland buffer widths. Furthermore, existing development along the corridor likely preceded the critical areas regulations and associated requirements for NGPEs. For the purposes of this report and in the context of wetland buffer widths, the Project corridor is considered undeveloped.

Standard buffer widths for streams are based upon the stream type and whether or not the Project site contains a primary structure. To determine the latter, delineated streams were reviewed by parcel and buffer widths were determined based upon the presence or absence of a primary structure (Table 3).

Portions of wetland and stream buffers that contained "development" were removed from standard buffers. These areas included pavement, structures, and compact gravel which were determined to be non-functioning. Specific examples occur on the Richards Creek Substation parcel, Somerset Substation, Coal Creek Parkway, and on some residential parcels. Areas characterized as commercial or residential landscaping have not been removed from functioning buffers. Non-functional portions of the standard buffer were excluded from the Critical Areas Impact Analysis since the primary purpose of the analysis was to determine project impacts and the amount of mitigation that would be required based on those impacts. Data used to map impervious surfaces and development include the King County Impervious and Impacted Surface data (King County 2009), supplemented with land survey data and high-resolution aerial photography provided by PSE, as well as review from staff biologists that conducted the wetland delineations. Only functioning buffers are shown in Appendix B.

Some of the non-functioning buffer areas (i.e primary structures) are allowed to be excluded from the standard buffer under Bellevue's code. However, some non-functioning buffers are still viewed as "standard buffer" by the City, including the existing paved driveway and gravel pad located on the Richards Creek substation parcel, ancillary residential structures, and some roadways and parking areas. The majority of excluded non-functioning buffer areas will not experience any type of new impact as a result of the proposed project (largely due to the fact that these areas have already been developed to some degree – *i.e.*,

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no trees – and transmission lines will span large areas). The only exception is the existing development at the Richards Creek Substation parcel. Here, the roadway, gravel pad, and detention pond will be redeveloped during construction of the Richards Creek Substation. A discussion of the non-functioning buffer area impacted at the substation parcel (existing developed buffer to be redeveloped) is quantified and discussed in Section 7.

Structure setbacks have not been included in the CAIA.

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Table 2. Summary of wetland critical area classifications and buffer widths.

Wetland Name[1]	2004 Ecology Wetland Rating				Category	Standard Buffer Width (feet)
	Water Quality	Hydrologic Function	Habitat	Total		
I (Lakeside)	20	8	5	33	III	60
EE (Lakeside)	6	10	14	30	III	60
D (Lakeside)	16	12	16	44	III	60
A (Richards)	6	10	21	37	III	110
B (Richards)	6	12	16	34	III	60
C (Richards)	6	12	20	38	III	110
D (Richards)	20	22	21	63	II	110
H (Richards)	6	16	21	43	III	110
JB02	0	0	7	7	IV	N/A[2]
JB03	0	0	7	7	IV	N/A[2]
JB04	2	6	9	17	IV	40
A (Somerset)	4	12	13	29	IV	40
C (Somerset)	12	4	9	25	IV	N/A[2]
D (Somerset)	12	4	11	27	IV	40
E (Somerset)	4	12	12	28	IV	40
JB05	2	6	13	21	IV	N/A[2]
JB08	8	12	21	41	III	110
MB04	4	0	17	21	IV	40
MB03	0	4	9	13	IV	N/A[2]
MB02	2	4	9	15	IV	N/A[2]
MB01	16	20	12	48	III	60

[1] Lakeside = delineated for Lakeside Substation rebuild in 2014.
Richards = delineated in anticipation of Energize Eastside Project in 2016 and 2017.
Somerset = delineation study conducted in January and February 2017.

[2] Category IV wetlands that are less than 2,500 SF are not regulated by City of Bellevue.

Table 3. Summary of stream critical area classifications and buffer widths.

Stream Name	Type	Primary Structure?	Buffer (feet)
D (Lakeside)	Type F	Yes – parcel 5453300146 No – parcel 1024059083	50 100
B (Lakeside)	Type F	No – parcels 1024059083, 1024059130	100
F (Lakeside)	Type F	No – parcels 1024059083, 1024059130	100
A (Richards)	Type N	No – parcel 1020459083, 1024059130	50
C (Richards) – Richards Creek	Type F	No – parcels 1024059130, 8135300110	100
JB02	Type F	No – parcel 8135300110	100
JB04	Type F	No	100
JB05 – Coal Creek	Type F	No	100
MB03	Type N	No	50
MB02	Type F	No	100
MB01	Type N	Yes – parcel 1951830050 No – parcels 2824059050, 1951830100	25 50

5.1.2 Priority Geologic Hazard Areas

Geologic hazard areas also require buffers per LUC 20.25H.035. According to this provision, landslide hazard areas and steep slopes require a 50-foot buffer from the top of the slope. In order to map top-of-slope buffers, steep slopes and landslide hazard areas were visually evaluated relative to 10-foot contour data provided by the City of Bellevue, and buffers were clipped to top-of-slope. (Appendix B).

Structure setbacks have not been included in the CAIA.

5.1.3 Flood Hazard Areas

Vegetation removal in the floodplain requires documentation that describes proposed impacts on the floodplain and instream habitat functions and processes and how the Project will ensure there will be no adverse effect on listed salmonids in accordance with FEMA requirements. In compliance with federal Endangered Species Act (ESA) requirements, a Biological Evaluation (BE) has been completed for the Project which includes a discussion of floodplain impacts.

5.2 Alteration of Critical Areas and Buffers

In general, the City of Bellevue will not allow critical areas to be filled, graded, or altered. The LUC requires that an applicant adjust proposed site plans to avoid and/or minimize impacts to critical areas and their respective buffers. New or expanded utility facilities and utility systems are allowed within a critical area or critical area buffer if no technically feasible alternative with less impact on the critical area or critical area buffer exists and if certain other criteria are met (see Section 8 for a review of how the Project meets these criteria).

Proposed alterations to habitat in flood hazard areas are described in detail in the ESA documentation for the Project. Requirements associated with proposed alterations to wetland, streams, landslide hazard areas, steep slopes, and associated buffers are described below.

5.2.1 Wetlands

Mitigation is required for impacts to wetlands and their buffers in order to ensure equivalent or greater protection of critical area functions and values from existing conditions. Bellevue outlines mitigation actions in order of preference, subject to location requirements, as follows (LUC 20.25H.105.A.1):

a. *Restoring wetlands on upland sites that were formerly wetlands.*
b. *Creating wetlands on disturbed upland sites such as those with vegetative cover consisting primarily of nonnative introduced species. This should only be attempted when there is a consistent source of hydrology and it can be shown that the surface and subsurface hydrologic regime is conducive for the wetland community that is being designed.*
c. *Enhancing significantly degraded wetlands.*

   Applicants proposing enhancement must justify use of this mitigation measure according to LUC 20.25H.105.D.

Per LUC 20.25H.105.B, compensatory mitigation shall be in-kind and onsite or, if onsite is not feasible, in-kind and within the same drainage sub-basin. Location of mitigation actions may be conducted off-site and outside of the drainage sub-basin if certain criteria can be met.

Mitigation ratios for permanent wetland impacts required by the LUC are provided in Table 4 by type of wetland impact. Temporary wetland impacts are typically restored in-place at a 1:1 ratio.

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Table 4. Wetland mitigation ratios for permanent wetland impacts.

Type of Wetland Impact	Restoration or Creation[1]	Enhancement[2]
Category II	3:1	6:1
Category III	2:1	4:1
Category IV	1.5:1	3:1

[1] Per Bellevue LUC, these ratios apply to mitigation that is in-kind, is onsite, is the same category of wetland, is timed prior to or concurrent with alteration and has a high probability of success.

[2] While Bellevue allows for enhancement as a mitigation option, mitigation ratios are not provided in the LUC. Recommended mitigation ratios presented in this table are derived from the Ecology publication, *Wetland Mitigation in Washington State – Part 1: Agency Policies and Guidance* (Ecology et. Al 2006), and are presumed to suffice.

Guidance for Project Scenarios not captured in the Bellevue LUC

Project impacts are expected to include wetland conversion through PSE's necessary vegetation management activities. An approach to mitigation for this type of impact is not specifically addressed in the LUC. For these scenarios, Ecology publication, *Wetland Mitigation in Washington State – Part 1: Agency Policies and Guidance* (Ecology et al. 2006), was referenced to determine appropriate wetland mitigation ratios.

In addition to permanent impacts to wetlands (conversion to a developed condition), the Project will impact some wetland areas through conversion of forested vegetation communities to shrub or emergent wetland communities. Interagency guidance for mitigating this type of impact is as follows (Ecology et al. 2006):

> *Loss of functions due to the permanent conversion of wetlands from one type to another also requires compensation. For example, when a forested wetland is permanently converted to an emergent or shrub wetland (e.g., for a utility right-of-way) some functions are permanently lost or reduced.*
>
> *The ratios for conversion of wetlands from one type to another will vary based on the type and degree of the alteration, but they are generally one-half of the typical ratios for permanent impacts.*

5.2.2 Streams

Streams may be modified when associated with a new or expanded utility facility or system; new or expanded public right-of-way, private roads, access easements or driveways; and habitat improvement projects (LUC 20.25H.080). PSE proposes to replace and upgrade the culvert carrying a small, perennial stream (Stream C, also known as Richards Creek) beneath the relocated access driveway to the Richards Creek Substation site as a part of the Project. This

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Project element will include channel realignment and restoration activities that will compensate for critical area impacts incurred by the Project.

5.2.3 Wetland and Stream Buffers

Functioning wetland and stream buffers converted to a developed condition by the Project shall be replaced at a ratio of 1:1. Mitigation for buffer impacts shall occur in the following order of preference and in the following locations (LUC 20.25H.105.A.2 and LUC 20.25H.085.A):

> *a. Onsite, through replacement of lost critical area buffer;*
>
> *b. Onsite, through enhancement of the functions and values of remaining critical area buffer;*
>
> *c. Off-site, through replacement or enhancement, in the same sub-drainage basin;*
>
> *d. Off-site, through replacement or enhancement, out of the sub-drainage basin but in the same drainage basin.*

Where functioning wetland or stream buffers are impacted by a conversion of vegetation (not fill), the proposed mitigation ratio to off-set impacts is 0.5:1, consistent with the guidance for this type of impact to wetland areas.

Temporary wetland and stream buffer impacts are typically restored in-place at a 1:1 ratio.

5.2.4 Landslide Hazard Areas and Steep Slopes

Where construction activities or vegetation removal is proposed in geologic hazard areas, assessment by a qualified professional is required. Proposed alterations to geologic hazard areas are discussed in the GeoEngineers Report (2017) included as Appendix C. In their report, GeoEngineers recommends implementation of specific BMPs and mitigation strategies in order to minimize impacts to geologic hazard areas. BMPs and mitigation strategies are discussed in more detail in Section 8 of this report.

Required performance standards for these areas are outlined in the GeoEngineers Report as well as in Section 9 of this document.

6 MITIGATION SEQUENCING

Pursuant to LUC 20.25H.215, the substation design and pole replacement locations avoid and minimize impacts to critical areas and associated buffers located in the Project corridor to the greatest extent feasible.

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Avoidance

Every effort has been made to relocate poles out of critical areas where possible. Completely avoiding impacts to all critical areas and associated buffers as part of the South Bellevue Segment is not achievable. For example, the location of the Richards Creek Substation is dependent upon proximity to existing infrastructure, the existing location of other developed substations such as the Lakeside Substation to the north, and the required connections to other PSE transmission lines. The substation has been located outside of the critical areas to the extent possible, re-using as much of the existing pole yard as feasible. Furthermore, construction access has been modified to avoid impacting critical areas and pole construction areas have been adjusted to exclude critical areas on a pole by pole basis.

Even though poles have been moved outside of critical areas, some pole locations and pole replacement activities associated with the transmission line upgrade must occur in specific locations for proper functioning of the electrical system due to complex engineering considerations. Where avoidance is not possible, PSE worked with engineers to locate poles to minimize impacts.

Minimization

Minimization techniques were utilized during the design process in order to limit impacts to critical areas and their associated buffers. Minimization measures included the following:

1. Utilizing the existing transmission line corridor; which has experienced significant disturbance as a result of adjacent development and ongoing corridor maintenance.

2. When working within a critical area, limiting the construction disturbance to the minimum feasible size around each pole and access point.

3. Installing 230 kV transmission lines between poles with minimal site disturbance. Where feasible given maximum distance allowed between poles, the poles will be located outside of critical areas. Transmission lines will span above critical areas, minimizing ground disturbance, vegetation removal, and loss of critical area function.

Mitigation

To off-set unavoidable critical area impacts associated with the Project, compensatory mitigation will occur. Mitigation will include restoration of temporary impacts (including maintenance of slope stability) wetland enhancement, and critical area buffer enhancement in order to achieve equivalent or greater critical area functions and values compared to existing

conditions. Some of the wetland enhancement will occur within the boundaries of the culvert replacement and stream restoration project also occurring on the Richards Creek Substation parcel. Additional non-compensatory restoration associated with the stream project is also proposed. Mitigation needs have been calculated based upon anticipated impacts in each of the two sub-basins within the south Bellevue project area. A mitigation plan has been prepared for each sub-basin (Appendix A). See Section 8 for further discussion of the plans.

7 Unavoidable Project Impacts and Required Mitigation

Impact types resulting from the Project have been quantified based upon the long-term condition of the proposed work and existing land cover types in the corridor. Quantified impacts have been characterized as one of four types using this analysis and include permanent, conversion, temporary, and no change. A summary of the impact types based on proposed work and existing land cover is provided in Table 7.

Permanent impacts are characterized as a change from a vegetated critical area to a utility pole, culvert footprint, substation footprint, or other associated developed condition. The quantity of permanent impacts occurring in wetlands and wetland/stream buffers is used to determine mitigation needs based upon the mitigation ratios presented in Table 4. No permanent impacts are proposed in geologic hazard areas. Quantified permanent impacts to flood hazard areas (pole footprints) are provided for thoroughness and to aid in the qualitative discussion of impacts; however, there is no direct mitigation requirement associated with flood hazard areas as there is for wetlands or wetland/stream buffers.

Impacts that result in vegetation conversion are caused by vegetation management activities resulting in a shift from forested to shrubby or herbaceous vegetation. These impacts will be limited to disturbance of vegetation; soils will remain intact. These types of impacts also require mitigation for wetlands and wetland/stream buffers, but since the magnitude of impact is less than permanent impacts, a reduced mitigation ratio is proposed using interagency guidance (Ecology et al. 2006). Impacts that result in a vegetation conversion will be mitigated at one-half the typical ratios for permanent impacts (Table 4) when they occur in wetlands and wetland/stream buffers.

Quantified vegetation conversion impacts are also presented for geologic and flood hazard areas. However, this measure of impact was not relied upon by

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respective professionals when assessing Project impacts in these critical areas. For example, GeoEngineers based their analysis on a review of geologic maps and geologic hazard maps, digital imagery, site visits, and PSE site plans (which included trees to be removed but not canopy loss). Conversion impacts are presented for consistency in geologic and flood hazard areas and to also provide the reader's with a comprehensive understanding of Project impacts. Conversion impacts in geologic hazard areas and flood hazard areas do not directly correlate to mitigation requirements as they do for wetlands and wetland/stream buffers.

Temporary impacts will occur as part of the following activities: pole installation, maintenance, and removal; construction access route re-establishment/use; and construction limits of the Richards Creek Substation and the culvert replacement. These areas will be restored in-place after construction work is complete.

Where no change is anticipated, due to the existing land cover type in the Project area, no mitigation is required. Impacts results categorized as no change have not been reported.

Project impacts will occur in wetlands, flood hazard areas, landslide hazards, and steep slope critical areas as well as critical area buffers. In addition to quantifying impacts by area, impacts have been qualitatively assessed by a qualified professional for each critical area type to be impacted. The results of the quantitative and qualitative analyses are discussed in the following sub-sections.

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Table 5. Matrix used for determining impact types based upon long-term condition of proposed activities and existing land cover types in critical areas and associated buffers.

			Existing Land Cover Types					
			Forested to be Removed		Forested to Remain		Understory only	Other (mostly lawn)
	Impact Description	**Long Term Condition[1]**	with understory	no understory	with understory	no understory		
Proposed Activities	Pole footprint (actual footprint of pole structure based on engineering drawings from PSE)	Developed	P	P	P	P	P	P
	Permanent development of the Richards Creek Substation	Developed	P	P	P	P	P	P
	Clearing limits for Richards Creek Substation	Mixed vegetation[2]	C	C	T	T	T	T
	Pole buffer (6 foot radius outside of pole footprint)	Mixed vegetation[2]	C	C	T	T	T	T
	Access routes (20 foot width based on alignments from PSE)	Mixed vegetation[2]	C	C	T	T	T	T

		Existing Land Cover Types					
		Forested to be Removed		Forested to Remain		Understory only	Other (mostly lawn)
Impact Description	**Long Term Condition[1]**	with understory	no understory	with understory	no understory		
Wire Zone	Mixed vegetation[2]	C	C	NC	NC	NC	NC
Managed ROW	Mixed vegetation[2]	C	C	NC	NC	NC	NC
Pole construction work area	Mixed vegetation[2]	C	C	T	T	T	T
Limits of Vegetation Management for Richards Creek Substation	Mixed vegetation[2]	C	C	NC	NC	NC	NC
Legal ROW	Mixed vegetation[2]	C	C	NC	NC	NC	NC

Type of Impact based on proposed activity, long term condition, and existing land cover type: P = Permanent, C = Conversion, T = Temporary, NC = No Change

[1] Long term condition determined in coordination with PSE.
[2] Subject to varying height restrictions described in Section 3.3.5.

7.1 Critical Area Impacts

7.1.1 Wetlands

Impacts are proposed to a Category II, Category III, and Category IV wetlands; no Category I wetlands are located in the Project limits. No impacts will occur in the Sunset Creek and Newport drainage basins. Wetland impacts are quantified in Tables 6 through 9, below. Impacts characterized as permanent and conversion will be mitigated according to the ratios presented in Section 5.2.

The vast majority of Project impacts occur in the Richards Creek sub-basin and, more specifically, at or immediately adjacent to the proposed Richards Creek Substation parcel (including impacts at Lakeside Substation to the north) (Table 6). Of the total permanent impacts, 98 percent occur on the Richards Creek or Lakeside Substation properties. Similarly, 88 percent of vegetation conversion impacts occur on the Richards Creek or Lakeside Substation properties.

Project impacts generated in the transmission line corridor are relatively minor. This is due to the existing maintenance of the corridor for existing 115kV transmission lines and the petroleum pipeline. Impacts in the transmission line corridor (from new pole footprints) are also offset by the removal of existing poles. Two poles contributing 12 SF of fill will be removed from Wetland A (Richards); one pole contributing 6 SF of fill will be removed from the buffer of Wetland A (Richards) near Lakeside Substation. The area of pole removal in wetland and wetland/stream buffer critical areas has been removed from the total impact area and is reported as area of *net* impact in Tables 6 through 9.

A qualitative description of impacts can be found in Section 7.2 (Functional Lift Analysis) followed by a description of the mitigation activities proposed to compensate for the proposed impact.

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Table 6. Project impacts at the Richards Creek Substation (including impacts at Lakeside Substation) versus transmission line corridor by sub-basin.

	Location	Net Permanent Impact	Vegetation Conversion
Richards Creek sub-basin	Richards Creek Substation	2,531 SF (98 %)	10,045 SF (88 %)
	Transmission Line Corridor	44 SF (2 %)	73 SF (1 %)
Coal Creek sub-basin	Transmission Line Corridor	0	1,223 SF (11 %)
	TOTALS:	2,575 SF	11,341 SF

Table 7. Project impacts to Category II wetlands by sub-basin.

	Category II Wetland Impacts	Area of Net Impact (SF)	Source of Impact
Richards Creek Sub-basin	Permanent	41	Development of Richards Creek Substation in Wetland D (Richards)
	Conversion	100	Legal ROW in Wetland D (Richards)
	Temporary	731	Clearing limits of Richards Creek Substation in Wetland D (Richards)

Table 8. Project impacts to Category III wetlands by sub-basin.

	Category III Wetland Impacts	Area of Net Impact (SF)	Source of Impact
Richards Creek Sub-basin	Permanent	2,534	Development of Richards Creek Substation in Wetlands A and B (Richards) and pole footprints in Wetlands A and H (Richards)
	Conversion	10,018	Legal ROW, managed ROW, wire zone, pole work area, access route, and/or pole buffer in the following Wetlands: A (Richards)and H (Richards)
	Temporary	8,252	Clearing limits of Richards Creek Substation, pole work area, pole buffer, and/or access route in Wetland A (Richards) and Wetland H (Richards)

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	Category III Wetland Impacts	Area of Net Impact (SF)	Source of Impact
Coal Creek Sub-basin	Permanent	0	None
	Conversion	1,145	Wire zone and managed ROW in Wetland MB01
	Temporary	0	None

Table 9. Project impacts to Category IV wetlands by sub-basin.

	Category IV Wetland Impacts	Area of Net Impact (SF)	Source of Impact
Coal Creek Sub-basin	Permanent	0	None
	Conversion	0	None
	Temporary	1,155	Pole buffer in Wetland A (Somerset); pole work area in Wetland D (Somerset)

7.1.2 Wetland and Stream Buffer Impacts

Impacts are proposed to wetland and stream buffers in the South Bellevue Segment. Buffer impacts are largely generated by proposed activities occurring at the Richards Creek Substation parcel and required vegetation management. Wetland and stream buffer impacts are quantified in Table 10, below. Impacts characterized as permanent and conversion will be mitigated according to the ratios presented in Section 5.2.3.

A qualitative description of buffer impacts can be found in Section 7.2 (Functional Lift Analysis) followed by a description of the mitigation activities proposed to compensate for the proposed impact.

As noted in Section 5.1.1, the functioning buffer was used in the CAIA to generate the impacts shown in the tables below. The majority of excluded non-functioning buffer areas do not experience any type of new impact as a result of the proposed project (largely due to the fact that these areas have already been developed to some degree – i.e., no trees – and transmission lines will span large areas). The only exception is the existing development at the Richards Creek

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substation parcel. Here, the roadway, gravel pad, and detention pond will be redeveloped during construction of the Richards Creek Substation.

The total buffer area being permanently impacted in the Richards Creek sub-basin reported in Table 10 below is 23,893 square feet (SF). This number does not include the roadway, gravel pad, and detention pond on the Richards Creek substation parcel (they were considered "non-functioning") that will also be impacted by the project; these buffer areas total 47,512 SF.

Therefore, the total buffer area to be permanently impacted (including non-functional areas) is 71,405 SF. Table 17 indicates that mitigation for only 23,893 SF of permanent buffer impact is required, which excludes the non-functioning areas. The driveway and gravel pad on the Richards Creek substation parcel were determined to provide little water quality/hydrology/habitat function to nearby areas as a result of being paved or consisting of compact, crushed gravel. The detention pond was removed from the buffer based on its association with the impacted/developed condition of the substation parcel and direction from PSE that precedent had been set at other developed substation sites where detention ponds were not considered buffer.

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Table 10. Wetland and stream buffer impacts by sub-basin.

	Wetland and Stream Buffer Impacts	Area of Net Impact (SF)	Source of Impact
Richards Creek Sub-basin	Permanent	23,893	Development of Richards Creek Substation and pole footprint
	Conversion	22,885	Richards Creek Substation limit of vegetation management, Richards Creek Substation clearing limits, legal ROW, managed ROW, pole buffer, pole work area, access route, and wire zone
	Temporary	35,362	Richards Creek Substation clearing limits, pole buffer, pole work area, and access route
Coal Creek Sub-basin	Permanent	35	Pole footprint
	Conversion	7,734	Legal ROW, managed ROW, and wire zone.
	Temporary	5,407	Access route, pole buffer, and pole work area

7.1.3 Geologic Hazard Area Impacts and Associated Buffer Impacts

Impacts to geologic hazard areas and associated buffers have been reviewed by GeoEngineers based on PSE's proposed activities. As stated previously, many areas of mapped steep slopes were eliminated from the impact analysis because of their existing land use (engineered road slopes, engineered landscaping, etc.) and the proposed activities at those locations.

Quantified impacts to landslide hazard areas and steep slopes result from vegetation management in the legal ROW, managed ROW, and wire zone in the Coal Creek drainage area and total 5,031 SF and 4,447 SF, respectively. No permanent or temporary impacts are proposed in the priority geologic hazard areas. Buffer impacts to priority geologic hazard areas are also proposed, resulting from access routes, pole buffer, pole work area, and vegetation management. One new pole is proposed in geologic hazard area buffers to replace 5 existing poles to be removed resulting in an overall decrease in fill in this critical area type.

GeoEngineers' review of priority geologic hazard areas included a site visit to the legal ROW in the Coal Creek drainage in which they observed no indication of slope movement. Additionally, the utility corridor was found to be actively maintained as a result of the existing utilities, especially the pipeline (regularly

mowed grass, no trees). GeoEngineers determined that PSE's proposed work would be consistent with management activities of the existing pipeline and was not anticipated to impact the mapped geologic hazard areas of the Coal Creek drainage. This assessment was made in conjunction with recommendations aimed at mitigating potential impacts through implementation of BMPs and TESC measures. Those recommended mitigation strategies are discussed in Section 8 of this report.

Refer to GeoEngineers Report (2017) for additional details (Appendix C).

7.1.4 Flood Hazards Areas

As part of the proposed Project, two existing H-frame structures which include a total of four poles, will be removed from a flood hazard area associated with Sunset Creek and replaced with two new poles. The existing H-frame poles are currently situated in a highly developed area with medium to high density residential development and paved roads and parking areas. Existing pole footprints are approximately 6 SF each, totaling approximately 24 SF of area. The proposed new pole footprints[1] total 56 SF (Table 11). According to LUC 20.25H.180 "post and piling techniques are preferred and are presumed to produce no increase in the Base Flood Elevation (BFE). Demonstration of no net rise in the BFE through calculation is not required." There will be no impact to the flood storage capacity of the flood hazard area.

Vegetation management impacts to 100-year floodplains in the Project area are also anticipated. Vegetation impacts may result from a number of proposed activities that can be characterized as a conversion of vegetation. Vegetation conversion impacts in the Sunset Creek floodplain are resulting from activities associated with installation of new poles and vegetation management in the legal ROW, managed ROW, and wire zone. The trees that will be removed are located in maintained landscaped areas on Bellevue School District property and nearby apartment buildings. They are not considered to be located in a riparian landscape setting (Sunset Creek flows underground at this location) and are not considered to provide significant habitat value to the mapped floodplain.

Similarly, vegetation management activities will require selective removal of trees located in the Coal Creek floodplain. The Coal Creek floodplain differs in character than the Sunset Creek floodplain; vegetation is predominantly native trees associated with an above-ground stream channel. Vegetation removal will be selective and not significantly impact the canopy cover of the stream at this location. Minimization measures to limit impacts to the floodplain will be

[1] New poles will range in size from 4 to 6 feet in diameter. For the purposes of this analysis, the largest diameter was used to calculate Project impacts. If it is determined that the Project intent can be accomplished using smaller-diameter poles at this location, impacts would be reduced accordingly.

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utilized for tree removal and include foot-access only and BMPs to limit erosion and sediment-laden runoff. Stumps will be left in the ground and cut vegetation will be chipped, dispersed, or removed as appropriate. As stated previously, in compliance with federal ESA requirements, a BE has also been completed for the Project which includes discussion of floodplain habitat impacts summarized previously.

Table 11. 100-year floodplain and floodplain vegetation impacts.

	Floodplain Impacts	Area of Net Impact (SF)	Source of Impact
Zone AE (Sunset Creek)	Permanent	32	Pole footprints in floodplain associated with Sunset Creek
	Conversion	4,508	Pole buffer, pole work area, access route, legal ROW, managed ROW, and wire zone in Sunset Creek floodplain
	Temporary	1,679	Access route, pole buffer, and pole work area
Zone A (Coal Creek)	Permanent	0	None
	Conversion	2,777	Legal ROW, managed ROW, and wire zone in Coal Creek floodplain.
	Temporary	0	None

7.2 Mitigation Required

As stated in Section 5, Bellevue requires that compensatory wetland mitigation is developed to satisfy the City's preferred mitigation location followed by preferred mitigation action. Bellevue prioritizes onsite mitigation followed by mitigation in the same drainage sub-basin; the City also prefers wetland restoration or creation over enhancement.

In order to determine a mitigation strategy and satisfy City preferences, locations for potential mitigation actions were first determined. Since the Project is long and linear in nature, it passes through, and generates impacts, across many "sites." However, the overwhelming majority of Project impacts occur at the Richards Creek Substation/Lakeside Substation site. As such, the Richards Creek Substation parcel was reviewed for mitigation potential. Wetland restoration and creation were considered for the property, but determined to be infeasible due to existing site conditions (most of the remaining vegetated area onsite is already wetland or stream) and the inability to appropriately buffer any new or restored

wetland area. Existing wetland and wetland/stream buffers are degraded on the Richards Creek Substation site and provide ample opportunity for enhancement.

The Richards Creek Substation site provides enough opportunity and area to mitigate for all wetland and wetland/stream buffer impacts that occur in the Richards Creek sub-basin. It is also the site in the South Bellevue Segment that sustains the majority of Project impacts (by a significant margin). In general, mitigation sites are more successful when combined into fewer larger areas, rather than piecemealed across several smaller sites. Furthermore, the wetlands located at the Richards Creek site are situated in a landscape position (adjacent to streams) that makes mitigation more valuable at this location than at small isolated wetlands in the corridor. Lastly, PSE's ownership of the Richards Creek Substation parcel will allow for mitigation areas to be easily accessed, installed, maintained, and monitored without requiring special property access or homeowner coordination, which could be a complicating factor for other areas along the corridor if a strict mitigation-by-site approach was taken.

Similarly, impacts generated by the Project in the Coal Creek sub-basin will be mitigated for within that sub-basin, but combined into one accessible area that appropriately mitigates for the functions and values affected by the Project in this sub-basin.

The proposed mitigation plans are designed to enhance wetland and stream critical areas in the study area. The plan will account for long-term pole access and maintenance needs, the existing gas pipeline easement, site topography, habitat connectivity, and vegetation height restrictions.

The final permit plan set (Appendix A) includes notes that fulfill the requirements of LUC 20.25H.220.B and provide clear direction for mitigation goals, performance standards, monitoring and maintenance protocols, and contingencies for the duration of the required five-year monitoring period.

As noted above, enhancement is the proposed mitigation strategy. Tables 12 and 13 summarize the wetland mitigation required to compensate for Project impacts by drainage sub-basin. Table 14 summarizes the wetland and stream buffer mitigation required by drainage sub-basin.

Proposed enhancement efforts consist of removing/reducing the presence of non-native plant species and installing a diverse native plant community consistent with the vegetation management requirements of the particular site. See Section 8 for a complete discussion of the mitigation strategy for each sub-basin.

Table 12. Calculation of mitigation needs for wetland impacts in Richards Creek sub-basin.

	Impact	Impact Quantity (SF)	Proposed Wetland Enhancement Mitigation Ratios	Mitigation Required (SF)
Category II	Permanent	41	6:1	246 RH
	Conversion	100	3:1	300 RH
Category III	Permanent	2,534	4:1	10,136 RH
	Conversion	10,018	2:1	20,036 RH
Category IV	Permanent	0	3:1	0
	Conversion	0	1.5:1	0
			Total:	30,718 RH (0.71 acres)

Table 13. Calculation of mitigation needs for wetland impacts in Coal Creek sub-basin.

	Impact	Impact Quantity (SF)	Proposed Wetland Enhancement Mitigation Ratios	Mitigation Required (SF)
Category III	Permanent	0	4:1	0
	Conversion	1,145	2:1	2,290 RH
Category IV	Permanent	0	3:1	0
	Conversion	0	1.5:1	0
			Total:	2,290 RH (0.05 acres)

Table 14. Calculation of mitigation needs for wetland and stream functioning buffer impacts.

	Wetland and Stream Buffer Impacts (overlapping)	Area of Impact (SF)	Proposed Mitigation Ratio	Buffer Mitigation Required (SF)
Richards Creek Sub-basin	Permanent	23,893[1]	1:1	23,893
	Conversion	22,885	0.5:1	11,443
			Total:	35,336 (0.81 acres)
Coal Creek Sub-basin	Permanent	35	1:1	35
	Conversion	7,734	0.5:1	3,867
			Total:	3,902 (0.09 acres)

1. Excludes 47,512 SF of non-functioning buffer being redeveloped on the Richards Creek substation parcel. As buffer is already developed, no functions will be lost and mitigation is not required.

7.3 No Net Loss Evaluation

Wetland and stream critical areas and their associated functional buffers have been qualitatively assessed, in addition to the quantitative analysis presented above. For the purposes of this section, the pre-existing condition of the Project area is compared against the post-Project condition to ensure that no net loss of critical area functions is achieved. With mitigation, a net increase in functions is expected post-Project in accordance with LUC 20.25H.

In general, proposed permanent wetland impact and mitigation areas are disturbed and dominated by invasive plants such as non-native blackberry and reed canarygrass. Wetland impacts classified as vegetation conversion involve removal of native and non-native trees from wetland areas. Table 15 below summarizes impacts, existing conditions, and proposed conditions. An analysis and comparison of the specific functions and values provided by the pre-existing sites and the post-Project sites for each of the two mitigation areas is provided in Chapter 8. The functional lift analysis describes how the mitigation plan will provide equivalent or greater critical area functions when compared to existing conditions.

Proposed mitigation will maintain wetland and buffer functions and values through wetland and buffer enhancement and restoration of temporary impacts. Permanent wetland impacts will be mitigated through enhancement of degraded wetland areas.

A greater area of native habitat will result from the proposal. Enhanced areas will be more suitable overall for urban songbird and small mammal species than they are presently; the understory will contain more woody vegetation and a greater structural complexity, which is more attractive to songbirds and small mammals than is low-growing, homogeneous vegetation. As well, a greater mix of flowering, fruiting and seeding plants will provide forage over a longer yearly timespan than the relatively uniform existing invasive vegetation and sparse understory areas. Wildlife species of the Pacific Northwest are also better adapted to forage provided by native plants than non-native species.

Table 15. Descriptions of general impact area conditions and proposed changes.

Impact Location and Quantity	Existing condition	Proposed action
Wetland A (Richards) Permanent Impacts: 397 SF Vegetation Conversion: 9,945 SF	Wetland A is a large slope wetland that crosses existing PSE transmission line corridor. As a result, areas that have experience past impacts or disturbance from the transmission line are degraded and consist of Himalayan blackberry and reed canarygrass monocultures.	Wetland fill associated with development of Richards Creek Substation, including culvert replacement and pole footprints. Conversion from forested wetland area to shrub wetland area to accommodate new, higher voltage transmission lines and substation. Temporary impacts associated with clearing limits for Richards Creek Substation and pole work areas. Stream & wetland enhancement: wetland enhanced with removal of invasive vegetation, installation of native vegetation, realigned stream channel, installation of LWD. The stream realignment allows for the creation of more complex and higher quality riparian wetlands and buffers of substantial width along both sides of the stream, whereas the existing alignment is straight, borders a paved area, and is largely lined with reed canarygrass and nightshade.
Wetland B (Richards) Permanent Impacts: 2,060 SF	Wetland B is a small slope wetland that is dominated by an understory of dense Himalayan blackberry. Some native plants are present to a lesser extent and include Pacific willow, red alder, salmonberry, giant horsetail, and lady fern.	Wetland fill associated with development of Richards Creek Substation. Mitigation for wetland loss provided through enhancement of Wetlands A and D.

Impact Location and Quantity	Existing condition	Proposed action
Wetland D (Richards) Permanent Impacts: 41 SF Vegetation Conversion: 100 SF	Wetland D is a riverine wetland dominated by an overstory of Pacific willow and red alder, and an understory significantly degraded with reed canarygrass, Himalayan blackberry, and nightshade.	Wetland fill associated with development of Richards Creek Substation culvert replacement. Conversion from forested wetland area to shrub wetland area to accommodate new, higher voltage transmission lines. Temporary impacts associated with clearing limits for Richards Creek Substation. Stream & wetland enhancement: wetland enhanced with removal of invasive vegetation, installation of native vegetation, realigned stream channel. The stream realignment allows for the creation of more complex and higher quality riparian wetlands and buffers of substantial width along both sides of the stream.
Wetland H (Richards) aka Wet JB01 Permanent Impacts: 77 SF Vegetation Conversion: 73 SF	Wetland H is a slope wetland that consists of native and non-native plant species. Prevalent invasive, non-native species are located in the existing transmission line corridor and include reed canarygrass, birdsfoot trefoil, and Himalayan blackberry.	Wetland fill associated with pole footprints. Conversion from forested wetland area to shrub wetland area to accommodate new, higher voltage transmission lines. Temporary impacts associated with clearing limits for Richards Creek Substation, pole work areas, and access routes. Mitigation for wetland loss and conversion provided through enhancement of Wetland D.

Impact Location and Quantity	Existing condition	Proposed action
Wetland MB01 (Coal Creek sub-basin) Vegetation Conversion: 1,146 SF	Wetland MB01 is a depressional wetland located in the existing transmission line corridor and adjacent to a well-used trail. It is dominated by a mix of native and non-native species that includes Pacific willow, red-osier dogwood, bittersweet nightshade, and Himalayan blackberry.	Conversion from forested wetland area to shrub wetland area to accommodate new, higher voltage transmission lines. Wetland enhancement at Somerset Substation: removal of invasive vegetation, installation of native vegetation.
Wetland & stream buffers (Richards sub-basin) Permanent Impacts: 23,893 SF Vegetation Conversion: 22,886 SF	Buffer impacts are generally located on the Lakeside or Richards Creek Substation parcels or in the existing transmission line corridor. Due to previous development/disturbance and existing land uses, buffer areas are mostly degraded, consisting of compact soils and invasive vegetation (predominantly Himalayan blackberry and reed canarygrass).	Buffer loss associated with development of Richards Creek Substation and pole footprints. Conversion from forested buffer area to shrub buffer area to accommodate new, higher voltage transmission lines. Temporary impacts associated with clearing limits for Richards Creek Substation and pole work areas. Stream & wetland buffer enhancement: removal of invasive vegetation, installation of native vegetation. The stream realignment allows for the creation of more complex and higher quality riparian wetlands and buffers of substantial width along both sides of the stream, whereas the existing alignment is straight, borders a paved area, and is largely lined with reed canarygrass and nightshade.

Impact Location and Quantity	Existing condition	Proposed action
Wetland & stream buffers (Coal Creek sub-basin) Permanent Impacts: 35 SF Vegetation Conversion: 7,734 SF	Buffer impacts are generally located in the existing transmission line corridor. Due to previous development/disturbance and existing land uses, buffer areas are mostly degraded, consisting of compact soils and invasive vegetation (predominantly Himalayan blackberry and reed canarygrass).	Buffer loss associated with pole footprints. Conversion from forested buffer area to shrub buffer area to accommodate new, higher voltage transmission lines. Temporary impacts associated with access route and pole work areas. Wetland buffer enhancement at Somerset Substation: removal of invasive vegetation, installation of native vegetation.

7.4 Cumulative Impacts

Impacts from past actions have shaped the project vicinity since the mid-19th century, and continue to shape how Seattle and the Eastside are changing in response to development activities and trends. In general, landscape-scale and basin-level functions and processes are negatively impacted by increased impervious surface, critical area and buffer vegetation removal, and buffer area losses. This is common to urban areas like Bellevue which have experienced a general loss of upland forested, riparian, and wetland habitat areas due to development. Urbanization, which Bellevue has experienced in recent decades, tends to cause flashy stream hydrology, increased pollutant loads, sedimentation, and overall habitat loss, resulting in only a few areas of high-value fish and wildlife habitat remaining. Other large projects such as Sound Transit's East Link Light Rail overlap with the proposed Energize Eastside project and contribute to these ongoing trends and cumulative impacts on high-value uplands and wetlands in the vicinity. These changes, along with additional urban development, continue to incrementally reduce remaining habitat areas and aquatic resources.

Although urbanization has resulted in an overall loss and degradation of available fish and wildlife habitat throughout the study area, current regulations have slowed the trend of habitat loss to a degree, and in the case of fish passage in particular, future permitted projects are likely to incrementally provide net benefit to habitat. Mitigation measures for these projects may include restoration or enhancement of degraded streams and wetlands and their associated buffers, thus providing water quality treatment for impervious surfaces that currently receive no treatment, removal of fish passage barriers, and planting of disturbed areas with native vegetation. These mitigation measures benefit fish and wildlife

habitat when compared to existing conditions and improve conditions for federally listed threatened or endangered species, if present.

The Energize Eastside Project would contribute to the trend of degradation directly by removing trees and altering available habitat conditions, and indirectly by continuing to supply energy to support a growing, developing region. Project mitigation would help to reduce cumulative impacts, but will not immediately replace all habitat lost. Replacing large significant trees with smaller planting-sized trees would not fully replace the habitat functions provided by the existing conditions. Including snags and large woody debris in mitigation plans will help to address the loss of forested habitat values in the short term, and over time the loss of function would be further addressed as mitigation areas mature.

The Project also includes a culvert replacement and stream channel realignment and restoration. These activities are expected to improve both fish habitat and alleviate current sedimentation problems from existing conditions. Permanent wetland and buffer impacts will be appropriately mitigated in order to minimize the Project's cumulative impacts to each sub-basin (Richards Creek and Coal Creek). No long-term impacts to water resources are expected as a result of the Project. A mitigation plan to compensate for impacts identified in this report is in progress. While the vegetation structure within the Project area will be altered, a net increase in native habitat area is expected in the long-term with mitigation.

8 MITIGATION STRATEGY

8.1 Richards Creek Drainage Sub-basin

8.1.1 Wetland Mitigation

As stated previously, wetland impacts occurring in the Richards Creek sub-basin will be mitigated for at the Richards Creek Substation site based upon the location of the majority of wetland impacts, site access considerations, and in an effort to limit the number of small disconnected mitigation sites in the corridor. The wetland mitigation required in the Richards Creek sub-basin based on calculated impacts consists of 30,718 SF (0.71 acres) of enhancement. The Richards Creek Substation Mitigation Plan (Appendix A) proposes 30,718 SF of wetland enhancement to meet this mitigation need. Enhancement is proposed within degraded portions of Wetland A and Wetland D.

The Richards Creek culvert and stream restoration project also proposed on the Substation property was conceived separately from the mitigation for Energize Eastside. However, as they would occur on the same parcel, ideally at the same time, it is beneficial for all involved, and would have greater ecosystem benefits, if the projects were designed and executed together. Therefore, a portion of the wetland enhancement mitigation (13,396 SF) is proposed to occur to wetland areas within the boundaries of the stream restoration project. However, no out-of-kind mitigation is being proposed. The stream restoration itself, including the both the habitat improvements and flooding alleviation it is expected to bring, is not proposed as mitigation for the wetland impacts generated by Energize Eastside. These are considered extra restoration efforts occurring on the parcel which are beyond what is required by code to mitigate the Energize Eastside project. The stream realignment and restoration proposal will not result in permanent impacts to wetland function. Rather, it will enhance the functions of the interrelated and interdependent stream and wetland system and will help provide a greater functional lift to the restored wetlands within the stream project area.

Stream C Improvements in Wetlands A and D at Richards Creek Substation Site

PSE is planning to replace and upgrade the culvert carrying a small, perennial stream beneath the access driveway to the existing pole yard located beyond the east end of SE 30th Street in the City of Bellevue, just north of I-90 and 0.75 miles east of I-405. A pair of aging and undersized culverts (two side-by-side, 18-inch diameter corrugated metal pipe culverts) have proven inadequate to carry the combined flow and sediment loading along the stream. The scope of the proposed work includes a new culvert crossing and restoring or enhancing

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affected adjoining habitat areas. These include affected wetlands and the realigned and enhanced stream sections extending upstream and downstream of the crossing.

Construction associated with proposed culvert replacement and stream realignment will result in temporary disturbance to streams, wetlands, and their associated buffers, but is self-mitigating in that it will also result in net functional improvements to the stream, wetlands, buffers and associated habitat benefits following Project implementation. During construction, any fish isolated in the localized instream work area will be removed by the stream restoration specialist in the work area. Given the size and characteristics of the existing stream, it is expected that stranded fish can be located and captured using dipnets or small seines followed by electrofishing. Efforts to capture and relocate fish by netting methods will precede electrofishing. Captured fish will be released in unaffected reaches downstream of the Project area.

The proposed culvert replacement and stream realignment will increase streamflow conveyance capacity, improve sediment transport, facilitate sediment removal from the system, replace undersized culverts, reduce flooding that now occurs on the adjoining property to the west, improve fish passage, and improve in-stream and riparian habitat conditions.

The restored stream will have a defined channel and floodplain benches, as well as the capacity to convey the predicted 1-year peak flow rate. The stream channel has been designed to flood at a 2-year peak flow rate and contribute to the surrounding wetland hydrology. A meandering channel design combined with woody debris placement, native revegetation, and wetland enhancements will create a complex and diverse aquatic habitat beneficial for fish and macroinvertebrates as well as other wildlife. This approach also produces varied flow velocities allowing for natural sediment movement and deposition patterns to occur. The channel alignment has been laid out to minimize impacts to wetlands, preserve as many trees onsite as feasible, and provide a more functional buffer. The original stream bed along the west property line of the subject site will not be filled in after stream flow is diverted into the new channel. The remnant channel is anticipated to continue to capture seepage and shallow groundwater and will continue to provide ecological diversity and function as wetland given the nature of the site hydrology. Tree trunks and roots wads will be strategically located along the restored reach to create and maintain scour pools and areas of refuge for fish as well as provide channel diversity and stability.

In summary, the proposed culvert replacement and stream realignment will increase streamflow conveyance capacity, improve sediment transport, facilitate sediment removal from the system, replace undersized culverts, reduce flooding

that now occurs on the adjoining property to the west, improve fish passage, and improve in-stream conditions. However, as noted above, these *functional improvements directly related to the stream project itself are not intended to mitigate for the Energize Eastside wetland impacts. Only the direct enhancement of the wetlands within the stream project area is counted as mitigation.* These existing, degraded, wetland areas could be enhanced without realigning the stream channel, but the potential function lift would be less than if the whole system were cohesively improved as is proposed through the associated stream realignment.

8.1.2 Wetland and Stream Buffer Mitigation

Required buffer mitigation in the Richards Creek sub-basin is 35,336 SF or approximately 0.81 acres. The Richards Creek Substation Mitigation Plan (Appendix A) proposes 35,336 SF of buffer enhancement to meet this mitigation need. Enhancement is proposed within degraded portions of the combined buffers of Wetland A, Wetland D and Stream C (Appendix A, Richards Creek Sub-basin Mitigation Plan, Sheet W4).

8.1.3 Functional Lift

The below text describes the existing and proposed conditions at the Richards Creek Substation parcel and how the proposed improvements will enhance the functions of the interrelated and interdependent stream and wetland system.

Existing Site Conditions

Site visits were made on November 20, 26, and December 4, 2018 to document current site conditions. Native vegetation throughout the project area was noted as being simple and non-diverse (Photos 1, 10, 12). Interspersed non-native vegetation is abundant, consisting primarily of Himalayan blackberry, reed canarygrass, and nightshade (Photo 3). Once these are removed, the remaining, native, vegetation will consist primarily of willows (spp.), red alder, salmonberry, and red-osier dogwood. There are essentially no conifers present. Removal of the non-native vegetation would leave a non-diverse, species-poor native vegetation remnant behind. Opportunities would then be present to in-plant with additional native plant species, including conifer trees, to increase diversity and improve wildlife habitat.

While Wetland D rates as a Category II wetland, it is overwhelmed by the invasive species described above. A higher category rating does not necessarily mean the wetland is less disturbed that a lower category wetland. The Category II score is driven by features present in the wetland, including the stream itself, which contribute points to certain functions, but do not reflect some of the actual degradation which is present. A canopy of willows and alder is present but the understory is heavily dominated by reed canarygrass, as well as blackberry and nightshade. Therefore, there is high opportunity to increase diversity and

improve wildlife habitat. There is also opportunity to improve the quality of some functions provided. For example, dense reed canarygrass contributes to water quality function, but replacing reed canrygrass with native species will improve the efficiency of stormwater filtration as well as improving habitat function.

As a slope wetland, Wetland A has an inherently lower score than most riverine wetlands as slope wetlands have a lower opportunity for providing some functions. Wetland A has also been impacted from past disturbance within the transmission line corridor and is heavily dominated by Himalayan blackberry and reed canarygrass monocultures. A limited area of overstory and less degraded understory is present near the middle of Wetland A, outside of the stream restoration area.

A primary observation made during the November site visits is that out-of-channel flows upstream of the access road are now prevalent even under low-flow conditions, further degrading the existing stream function as described below. Flows as observed on November 20, 2018 were at base (low) flow levels. Primary, clear flows from the main channel were clearly traced as heading directly downslope as channel definition faded, thereby missing the entrances to the paired culverts under the access road entirely and ending up in the SE 30th Street storm drainage system instead of continuing along the stream. Flows entering the existing culvert pair on that date consisted primarily of cloudy groundwater seepage collected in a separate, upslope channel. The groundwater source was indicated by the orange, iron bacteria precipitate along that channel (see Photos 4 and 6).

Water levels in the "channel" immediately downstream of the access road culvert pair were noted as being quite high on November 20, even though stream flows were low, and much or most of the flow missed the culvert entrances entirely and ended up in the SE 30th Street storm drainage system instead. Water levels at the culvert outlet were not more than a foot below the road surface, and remnant sand bags along the left bank extending downstream rose only a few inches above the water level. This is an indication that channel capacity continues to diminish due to combined sediment deposition and the growth of fine-stemmed vegetation, particularly reed canarygrass and nightshade. In fact, Photos 13 and 14, below, taken 5 days later on November 26, show stream flow overtopping the sand bag streambank at that location and spilling out to flow westward along the north side of SE 30th Street.

System Degradation

Existing degradation includes a very low-habitat-quality stream channel which is straight, narrow, lacks wood, and is choked in places with non–native vegetation, primarily Himalayan blackberry, reed canarygrass, and nightshade

(Photos 10, 12). Wetland areas adjacent to the stream (Wetland A and Wetland D) are similarly degraded with invasive species as described above. Additionally, the epicenter of coarse deposition that has filled the stream channel and caused it to lose definition and spill flows overland is in Wetland D, essentially providing a source of fill to the wetland. The approximate extent of this area is depicted on the existing conditions sheet W1 in Appendix A.

The stream's substrate is too high in fines to provide spawning habitat for cutthroat trout and other fish that might live there. This existing channel allows much room for improvement as both fish and other wildlife habitat. A combination of high flows, clogging vegetation, and deposition inhibits the channel's ability to carry flow. Since overbank areas to the west, both upstream and downstream of the access road, are lower than the channel, once flows leave the channel they don't return except through storm drains and not until far downstream. Flows leaving the channel upstream of the access road end up in the SE 30th Street storm drainage system and those leaving downstream end up in the paved HD Fowler storage yard (Photos 11, 14, and 17).

Ongoing efforts to sandbag the channel to reduce overbank flood flows (Photos 5-9, 13), as well as sediment removal at the existing culverts entrances to keep them open, have actually masked the existing degradation to some degree. Even with (but especially without) ongoing sandbagging and sediment removal, sedimentation, loss of channel definition, and loss of channel flow-carrying capacity will continue to worsen. This sedimentation should not be viewed as a natural process in this instance, in view of past channel relocation and basin urbanization which has likely increased sediment transport and deposition rates manifold.

A strong case can be made that this ongoing, accelerated deposition rate throughout the overbank wetland areas is a detriment to wetland hydrology. It is most assuredly anthropogenic wetland fill, even though it isn't being done using trucks, excavators, and dozers. As with any wetland fill, as ground levels rise, depth to saturated soils may increase such that wetland characteristics diminish and wetland is converted to non-wetland.

Note that the proposed new, wide box culvert crossing will include a vault beneath it for sediment entrapment, storage, and removal. Both the wetlands and the stream will benefit from sediment removal at the box culvert crossing.

If the proposed stream and culvert replacement work is not done, including sediment removal maintenance at the crossing, then deposition will continue to occur in and along the existing stream channel. Its flow capacity will continue to decrease and flooding will worsen. As mentioned, this is especially true if stopgap channel sandbagging and culvert inlet sediment removal measures are

discontinued. Though increased overbank flow may occur during high-flow (storm) events due to channel constriction, this may not improve wetland hydrology overall since these events are infrequent and relatively brief. Rising ground levels due to deposition, which is wetland fill resulting from urbanization, will likely reduce wetland hydrology and wetland area overall and over time if left unaddressed.

Photo 1 – Typical vegetation within the project area – most native and non-native species mentioned in the text are included. The HD Fowler storage yard can be seen in the background; the existing, reed canarygrass-choked channel lies along the border between the yard and vegetated areas. 11/20/18

Photo 2 – Access road stream crossing location is near the concrete blocks on the left. 11/20/18

Photo 3 – Non-natives nightshade (red berries), Himalayan blackberry, and reed canarygrass growing interspersed on-site. 11/20/18

Photo 4 – Note iron bacteria orange precipitate indicating nearby groundwater source of flow. 11/20/18

Photo 5 – Sandbagging has been used below the culvert outlet as a stopgap measure to keep (most) flows within the steam channel at normal flows. 10/19/16

Photo 6 – Remnants of the sand bag streambank placed in the fall of 2016 are on the right side. This 11/20/18 photo shows that the water level at culvert outlet is high. Orangish iron bacteria indicating groundwater flow source can be seen (faintly) in the water, access road in the background.

Photo 7 – Sandbagging extending farther downstream from the culvert outlet in an effort to keep flows from spilling into the Fowler storage yard. 10/19/16

Photo 8 – Downstream from the access road showing the proximity to SE 30th Street on the left side of the photo. Flows which jump the ill-defined channel upstream (behind the photographer) do not re-enter the stream but rather end up in the SE 30th storm drainage system, or on the street surface if the drains are overwhelmed. 10/19/16

Photo 9 – Sandbags placed two years ago in 2016 are overgrown and deteriorating such that the sand is spilling out and the top of the barrier is lower, offering diminished protection. 11/20/18

Photo 10 – Representative tangle of willow and reed canarygrass along the site boundary. 11/20/18

Photo 11 – Western project area boundary along the Fowler storage yard. Note the perpetually wet pavement due to seepage from the stream, which is perched higher than the yard along this section. 11/20/18

Photo 12 – The channel is present but unidentifiable in this project area photo, hidden in reed canarygrass, Himalayan blackberry, nightshade, and willow. 11/20/18

Photo 13 – Following moderately rainy weather, water is spilling out of the channel just downstream of the culvert crossing. 11/26/18

Photo 14 – Water spilling out of the channel just downstream of the access road flows across an access drive to the Fowler yard off of SE 30th, shown here, then continues westward along the north side of the road. 11/26/18

Photo 15 – Upstream of the access road, gravelly and cobbly deposition along with non-native vegetation growth has caused the channel to lose definition. Flows disperse at and downstream of the location pictured. Some flows rejoin via surface and subsurface pathways to flow under the access road. The rest collects to enter the SE 30th Street storm drainage system. 11/26/18

Photo 16 – Pictured is a hole in the ecology block wall separating the stream channel from the Fowler yard – with water flowing through. 11/26/18

Photo 17 – Water from the hole in the wall in the previous photo sheet-flowing across the Fowler yard. 11/26/18

Proposed Site Conditions

The enhanced stream and wetland system will provide equivalent or greater critical area functions when compared to the existing conditions described above. Table 16 summarizes the expected functional improvement.

Proposed culvert replacement and stream realignment will increase streamflow conveyance capacity, improve sediment transport, facilitate sediment removal from the system, replace undersized culverts, reduce flooding that now occurs on the adjoining property to the west, improve fish passage, and improve in-stream conditions. However, as explained above, the functional improvements of the stream project are not provided as mitigation for the Energize Eastside wetland impacts. Only the direct enhancement of the wetlands within the stream project area is counted as mitigation in this report. These existing, degraded, wetland areas could be enhanced without realigning the stream channel, but the potential function lift would be less than if the whole system were cohesively improved as is proposed through the associated stream realignment.

Table 16. Functional Lift Analysis- Richards Creek Sub-basin.

Critical Area/ Buffer Functions	Existing Conditions	Proposed Conditions	Functional Improvement?
Water Quality	Most of existing wetland and buffer impact area is dominated by invasive vegetation including blackberry, reed canarygrass, and nightshade. Soils are compacted. While they provide some water quality function, these invasive weedy plant species prevent the growth of native plants, which are generally more efficient at filtering stormwater. Much of the upstream drainage basin at the Richards Creek Substation site is built-out and urbanized. Stream flow includes storm runoff from significant areas of paved, pollution-	Native trees, shrubs, and groundcover will be added to the existing and expanded wetland, stream and buffer areas. The most degraded portions of Wetlands A and D will be enhanced through invasive species removal and native plantings. The stream channel will be relocated such that functional riparian buffers, including wetland, can be provided along both sides of the stream instead of only one. Functional buffers will also be wider, and the prevalence of invasive plant cover will be reduced.	Weedy vegetation will be replaced with native vegetation providing improved quality and efficiency of water quality function in the wetland areas. Wider and more fully vegetated buffers along both sides of the stream will increase their capacity to provide biofiltration function. This will help to improve water quality from stormwater originating off-site upstream as well as helping to filter storm water originating onsite prior to it reaching the stream onsite. See also sediment transport, below. Preventing flows from spilling out during high-

Critical Area/ Buffer Functions	Existing Conditions	Proposed Conditions	Functional Improvement?
	generating surfaces, and so can be assumed to carry a variety of pollutants typical of urban runoff. Existing stream channel and limited (one side of channel only) riparian areas are not optimized to provide effective biofiltration to remove these pollutants and so improve water quality.		flow events onto 30th Street, into its storm drainages, and onto a lower, paved industrial area adjoining to the west will reduce the entrainment of pollutants from this pollution-generating surface.
Hydrologic	Areas of dense invasive species along the existing stream channel, typically reed canarygrass, water-cress, and Himalayan blackberry, are impeding proper drainage and habitat functions.	Invasive, channel-clogging vegetation will be removed and replaced with bare root or container native trees and shrubs, as well as live stakes. Restore degraded wetland, and wetland/ stream buffer areas with native shrubs and groundcover.	New native plantings will provide increased soil stability and native vegetation that will reduce velocity of peak flows; improving wetland and stream buffer functions, along with increased channel dimensions and flow-carrying capacity.
Habitat	Blackberry and some existing native vegetation provides limited food and cover for birds and small mammals. The lack of plant species and structural diversity limits food sources and cover opportunities for most wildlife species. The stream channel segment is used by some cutthroat trout, but it is straight and choked with grass and vines in places. It lacks deep pool habitat with intervening riffles, and there is very little	Native shrubs and groundcover will be added to wetland and buffer enhancement areas. A meandering channel design combined with woody debris placement, native revegetation, and wetland enhancements will create a complex and diverse aquatic habitat beneficial for fish and macroinvertebrates as well as other wildlife. This approach also produces varied flow velocities allowing for natural sediment movement and deposition patterns to occur. The channel alignment has been laid out to minimize	Stream, wetland, and buffer areas will be enhanced with new native plantings, which will provide a net increase in species and structural diversity. The function of the 30 trees proposed from removal in the stream restoration project area will be replaced by planting approximately 260 trees. Culvert replacement and stream restoration will result in net habitat benefits following Project implementation. It will

Critical Area/ Buffer Functions	Existing Conditions	Proposed Conditions	Functional Improvement?
	wood for protective cover or to provide scour to form and maintain pools. It has a western exposure due to an adjoining paved industrial supply storage area. As a result, it is exposed to direct afternoon sunlight from the west which has a tendency to harmfully increase water temperatures.	impacts to wetlands and to preserve as many trees onsite as feasible. The original stream bed along the west property line of the subject site will not be filled in after stream flow is diverted into the new channel. The remnant channel is anticipated to continue to capture seepage and shallow groundwater and will continue to provide ecological diversity and function as a wetland given the nature of the site hydrology. Tree trunks and roots wads will be strategically located along the restored reach to create and maintain scour pools and areas of refuge for fish as well as provide channel diversity and stability.	improve fish passage, and improve in-stream and riparian habitat conditions. Additionally, temporary impact areas will be restored. New plantings will provide organic matter and foraging and nesting opportunities for terrestrial wildlife, including several songbird species.
Sediment Transport and Management	The stream channel gradient is much steeper upstream of the existing pair of culverts and becomes flatter below, causing sediments to accumulate at the culvert inlet, blocking flow. Frequent maintenance is needed to unclog the culverts to maintain flow. The channel downstream of the culverts also fills with sediment, causing flows to spill out onto an adjacent, lower paved industrial area.	The proposed replacement culvert for the access route crossing will meet current design standards for fish passage (WDFW, 2013), provide flow conveyance for up to the 1-year peak flow rate, and facilitate sediment management. The stream channel has been designed to flood at a 2-year peak flow rate and contribute to the surrounding wetland hydrology. The replacement culvert will contain a sediment trap beneath the access route with a road-accessible cleanout. Culvert replacement and stream realignment will help remove flood-flow-deposited gravel from Wetland D and prevent future deposition of streambed gravel into the	The proposed culvert replacement and stream realignment will increase streamflow conveyance capacity, improve sediment transport, facilitate sediment removal from the system, replace undersized culverts, reduce flooding that now occurs on the adjoining property to the west. The completed Project will contain all flows from large storms within a stable channel and floodplain and trap sediments in a planned location for relatively easy, low-impact removal.

Critical Area/ Buffer Functions	Existing Conditions	Proposed Conditions	Functional Improvement?
		downstream wetlands, thereby removing a source of wetland "fill".	
Net Condition	Degraded stream, wetland, and buffer areas on PSE properties and existing transmission line corridor.	Enhanced and restored ecological condition of stream, wetland, and buffer areas as described above.	Stream, wetland, and buffer areas restored with an increase in native vegetation; filtering of stormwater by native plantings; increased habitat structural and compositional complexity, LWD, and an increase in organic material to the food chain. Proposed mitigation will maintain and improve wetland and buffer functions and values. Permanent wetland and buffer impacts will be mitigated through enhancement of degraded wetland and buffer areas.

In response to preliminary City comments, hydrology monitoring will be conducted in the area of Wetland A between the old and new stream channel to ensure sufficient wetland hydrology is maintained. This area will also be enhanced by invasive species removal and native underplantings. This enhancement is in addition to the enhancement proposed as compensatory mitigation in Wetland A. Similarly, additional enhancement is proposed in Wetland D outside of the stream project area, beyond what is required as compensatory mitigation (see Table 17).

8.1.4 Summary

Table 17 below summarizes the impacts, compensatory mitigation, and additional restoration proposed within wetland and stream critical areas in the Richards Creek Drainage Sub-basin.

DSD 001029

Table 17. Activities affecting wetland and stream critical areas in South Bellevue - Richards Creek Drainage Sub-basin[1].

IMPACTS and COMPENSATORY MITIGATION						
Critical Area Name	**Category**	**Type of Impact**	**Quantity (SF)**	**Mitigation Ratio**	**Mitigation Required (SF)**	**Amount (SF) and Location of Mitigation Proposed[2]**
Wetlands						
Wetland A	III	Conversion	9,945	2:1	19,890	19,890 Wetland A
Wetland A	III	Permanent	397	4:1	1,588	1,588 Wetland A
Wetland B	III	Permanent	2,060	4:1	8,240	3,587 Wetland A 4,653 Wetland D
Wetland D	II	Conversion	100	3:1	300	300 Wetland D
Wetland D	II	Permanent	41	6:1	246	246 Wetland D
Wetland H	III	Conversion	73	2:1	146	146 Wetland D
Wetland H	III	Permanent	77	4:1	308	308 Wetland D
				TOTAL	**30,718**	**30,718**
Buffers						
Combined Buffers	N/A	Permanent	23,893	1:1	23,893	23,893 Combined Wetland A/Wetland D/Stream C buffer
Combined Buffers	N/A	Conversion	22,886	0.5:1	11,443	11,443 Combined Wetland A/Wetland D/Stream C buffer
Combined Buffers	N/A	Redevelopment [3]	47,512[3]	N/A[3]	0[3]	NA
				TOTAL	**35,336**	**35,336**
ADDITIONAL RESTORATION (not required to mitigate impacts)						
Critical Area Name	**Category**	**Type of Activity**	**Quantity (SF)**			**Description**
Stream C	N/A	Restoration (Realignment)[4]	3,557			New stream channel
Wetland A	III	Enhancement	6,215			Area between new and old stream channel, outside of stream project grading boundaries
Wetland D	II	Enhancement	12,050			Area of Wetland D outside of stream project grading boundaries

1. Only activities resulting in a long-term change are included. Temporary impacts will be restored in place and are not shown in this table.
2. All wetland mitigation proposed is wetland enhancement.
3. This buffer area is already developed and is considered non-functioning; therefore, no mitigation is required.
4. Existing stream channel will be abandoned (not filled) with stream restoration/realignment activities.

DSD 001030

8.2 Coal Creek Drainage Sub-basin

8.2.1 Wetland Mitigation

Required wetland mitigation in the Coal Creek sub-basin is 2,290 SF (0.05 acres) of enhancement. Opportunity to accomplish the wetland mitigation required exists on the Somerset Substation parcel located east of Coal Creek Parkway.

8.2.2 Wetland and Stream Buffer Mitigation

Required buffer mitigation in the Coal Creek sub-basin is 3,902 SF (0.09 acres) of enhancement. Opportunity to fulfill this buffer mitigation need exists on the Somerset Substation parcel located east of Coal Creek Parkway.

8.2.3 Functional Lift

Existing Site Conditions

Wetland enhancement is proposed within Wetland A on the Somerset Substation parcel. Buffer enhancement is proposed in the overlapping buffer of Wetlands A, D and C, adjacent to the wetland enhancement area. Wetland A is a Category IV, slope wetland with limited woody vegetation, a low interpersion of habitat types and poor species diversity. It is adjacent to the gravel substation pad. Non-native, invasive Himalayan blackberry dominates the understory with salmonberry and giant horsetail beneath a red alder canopy.

Proposed Site Conditions

Invasive species will be removed from Wetland A and its buffer and will be replaced with native tree, shrub and groundcover species. Large woody debris will be placed at the edge of the enhanced wetland.

The enhanced wetland and wetland buffer will provide greater critical area functions when compared to the existing conditions described above. Table 18 summarizes the expected functional improvement.

Table 18. Functional Lift Analysis- Coal Creek Sub-basin

Critical Area/ Buffer Functions	Existing Conditions	Proposed Conditions	Functional Improvement?
Water Quality	Herbaceous vegetation that can trap sediments and pollutants is limited.	Increased dense woody and herbaceous native species in wetland and buffer.	Addition of persistent and woody native plantings and herbaceous species will help to filter stormwater prior to it reaching Wetland A and downstream areas.

Critical Area/ Buffer Functions	Existing Conditions	Proposed Conditions	Functional Improvement?
Hydrologic	Presence of weedy species limits the ability to slow surface runoff and provides only moderate transpiration rates.	Invasive species removal and increased persistent and woody native species.	New native plantings will provide increased roughness and transpiration will slow surface water flows to wetland.
Habitat	Invasive species and a low interspersion of habitat types limits cover, nesting and foraging opportunities.	Increase tree and shrub density and diversity, add a native herbaceous vegetation class and large woody debris.	Cover, nesting and foraging for wildlife species will be improved.
Net Condition	Degraded wetland and buffer	Increased native tree and shrub cover, removal of invasive species, addition of large woody debris.	Wetland and buffer enhanced with an increase in native vegetation; filtering of stormwater by native plantings; increased habitat structural and compositional complexity, and an increase in organic material to the food chain.

8.2.4 Summary

Table 19 below summarizes the impacts and mitigation proposed within wetland and stream critical areas in the Coal Creek Drainage Sub-basin.

Table 19. Activities affecting wetland critical areas in South Bellevue - Coal Creek Drainage Sub-basin[1].

IMPACTS					
Critical Area Name	**Category**	**Type of Activity**	**Quantity (SF)**	**Mitigation Ratio**	**Mitigation Required (SF)**
Wetland MB01	III	Conversion	1,146	2:1	2,292
Combined Buffers	na	Permanent	35	1:1	35
Combined Buffers	na	Conversion	7,734	0.5:1	3,867

RESTORATION			
Critical Area Name[2]	**Category**	**Type of Activity**	**Quantity (SF)**
Somerset Wetland A	IV	Enhancement	2,300
Combined Somerset Buffers	NA	Enhancement	3,950

IMPACT & RESTORATION SUMMARY					
				Mitigation Proposed	
Critical Area Type	**Type of Activity**	**Quantity (SF)**	**Total Mitigation Required (SF)**	**Type**	**Qty (SF)**
Wetland	Conversion	1,146	2,292	Enhancement	2,300
	Permanent	0			
Buffer	Conversion	7,734	3,902	Enhancement	3,950
	Permanent	35			

1. Only activities resulting in a long-term change are included. Temporary impacts will be restored in place and are not shown in this table.
2. Critical Areas as identified in the Somerset Substation wetland delineation (The Watershed Company, February 2017) and delineation report, documented separately from the Energize Eastside delineation study.

8.3 Geologic Hazard Area Mitigation

GeoEngineers has proposed mitigation strategies to minimize impacts to geologic hazard areas in the corridor in their analysis report (Appendix C). As stated previously, and in their report, with implementation of these strategies, proposed activities are not expected to impact the geologic hazard areas in the Coal Creek drainage; proposed activities are consistent with the management activities of the existing corridor.

Where vegetation clearing is required to reestablish access on existing trails or old access routes, BMPs will be implemented; these BMPs may include, but are not limited to, outsloping road surfaces, crowning road surfaces (where appropriate, such as at ridge tops and where roads climb gently inclined surfaces) and installing water bars or rolling dips at regularly spaced intervals to avoid concentrating surface water flow along the road surface. After construction, disturbed areas should be graded to a stable free-draining

configuration, treated with appropriate erosion control measures, and seeded. Grading associated with reestablishment and post construction stabilizing will be conducted on an as needed basis and limited in vertical and horizontal extent. Most, if not all, access routes can be abandoned following construction using erosion control measures and seeding.

BMPs for pole installation will be implemented during construction and the disturbed area will be restored after pole installation by seeding or revegetating, essentially covering the disturbed areas. In the event that work areas are wet or have standing water, driving mats should be used under all equipment. Additionally, for poles located in geological hazard areas, the old poles should be cut off approximately 1-2 feet below the ground surface and the remaining portion of each pole left in place.

Options for mitigation of vegetation management and tree removal in geologic hazard areas include limiting disturbance to these areas by large equipment (only by foot and hand-cutting with chainsaws), leaving cut stumps in place, and chipping or scattering tree debris where feasible. In areas where tree removal is clustered, erosion control BMPs, such as grass seeding, leaving stumps, scattering straw and/or replacement planting of native shrubs or small trees, should be implemented to reduce concentrated flows and minimize disturbance. On private property, coordination with the property owner will direct mitigation strategies to be implemented.

9 CODE COMPLIANCE

When a project proposes impacts to critical areas, compliance with applicable city code provisions (LUC 20.25H – Critical Areas) must be demonstrated. New or expanded utility facilities and utility systems, including all structures and improvements, are allowed within critical areas and their associated buffers pursuant to LUC 20.25H.055, provided applicable performance standards for new and expanded uses or development (LUC 20.25H.055.C.2) and for each critical area type to be impacted, are met. Specific code provisions applicable to this project are presented below (italicized), followed by a Project-specific description that documents compliance.

Any proposal to modify a stream channel must be approved through a Critical Areas Report process. Therefore, as the Project proposes to modify the stream on the Richards Creek Substation parcel as part of the mitigation for Project impacts, compliance with the Critical Areas Report submittal requirements and decision criteria are also described below.

Specific mitigation and restoration requirements (LUC 20.25H.210 through 20.25H.225) and associated performance standards (LUC 20.25H.085, 20.25H.105, 20.25H.135) have been considered in the preparation of the conceptual mitigation plan and specific requirements will be incorporated into the Final Mitigation Plan (in progress). These code sections will be addressed in the Mitigation Plan design and notes and are not specifically addressed here.

9.1 LUC 20.25H.055 Uses and development allowed within critical areas – Performance standards

Compliance with applicable performance standards for allowed new uses and development is described below.

C. Performance Standards.

The following performance standards apply as noted in the table in subsection B of this section. The critical areas report may not be used to modify the performance standards set forth in this subsection C:

2. New and Expanded Uses or Development. As used in this section, "facilities and systems" is a general term that encompasses all structures and improvements associated with the allowed uses and development described in the table in subsection B of this section:

a. New or expanded facilities and systems are allowed within the critical area or critical area buffer only where no technically feasible alternative with less impact on the critical area or critical area buffer exists. A determination of technically feasible alternatives will consider:

i. The location of existing infrastructure;

Response: The proposed route is within an existing corridor with 115 kV transmission lines. These lines are supported by H-frame poles, which are grouped in sets of two or three and generally run two to three feet in diameter. The location of the existing poles in the South Bellevue Segment can be seen on the Critical Areas Assessment Maps in Appendix B.

ii. The function or objective of the proposed new or expanded facility or system;

Response: The objective of the Energize Eastside Project, including the Richards Creek Substation and South Bellevue Segment, is to increase the capacity of the Eastside electric grid to keep pace with projected increases in electricity demands during peak periods. This need was independently verified by the City of Bellevue (Utility System Efficiencies, Inc. 2015 and Exponent 2012).

iii. Demonstration that no alternative location or configuration outside of the critical area or critical area buffer achieves the stated function or objective, including construction of new or expanded facilities or systems outside of the critical area;

Response: Given the location of existing facilities, legal ROW, and surrounding critical area encumbrances, impacts have been avoided and minimized to the extent feasible. Alternative routes were evaluated prior to selection of the proposed route. The alternative routes would also require critical area impacts. No feasible alternate routes were identified that could completely avoid critical area impacts. The chosen route utilizes the existing utility corridor which helps to minimize new impacts to critical areas. Additionally, the Project design has been modified to remove impacts from critical areas and buffers to the greatest extent possible. Complete avoidance of wetlands is not possible in this area due to the fixed location of the substation parcel. The substation will be located at the proposed Richards Creek parcel due to the proximity of existing infrastructure, the existing location of other developed substations such as the Lakeside Substation to the north, and the required connections to other PSE transmission lines. Access has been sited to use existing routes to the extent feasible. Furthermore, use of the existing corridor and locating the new poles generally close to the existing poles allows use of existing access points in many instances.

iv. Whether the cost of avoiding disturbance is substantially disproportionate as compared to the environmental impact of proposed disturbance; and

Response: To avoid the proposed critical area impacts and achieve the utility service improvement objectives, relocation of existing infrastructure and creation of new infrastructure would be required. This would be more expensive than the proposed Project; and critical area impacts would likely be incurred nonetheless. As a linear project spanning 3.4 miles, with specific siting requirements, total avoidance of all critical areas is not achievable. Use of the existing, maintained corridor, which is generally within urban/developed areas, helps to reduce both the cost of the Project and the environmental impacts. No feasible alternate routes were identified that could completely avoid critical area impacts.

v. The ability of both permanent and temporary disturbance to be mitigated.

Response: Temporary critical area disturbance will be restored in place and permanent disturbance, including conversion from one vegetation community to another, will be mitigated in accordance with the City of Bellevue's code and methods supported by the best available science as described in Section 8 of this report.

b. If the applicant demonstrates that no technically feasible alternative with less impact on the critical area or critical area buffer exists, then the applicant shall comply with the following:

i. Location and design shall result in the least impacts on the critical area or critical area buffer;

Response: Impacts to critical areas and critical area buffers will be avoided and minimized through design practices and engineering controls. For example, the PSE design has located poles out of wetlands wherever technically feasible in order to avoid most direct wetland impact and pole construction work areas will be adjusted to avoid critical areas on a pole by pole basis. Construction access has been planned to exclude critical areas and/or provide only temporary impact wherever feasible.

ii. Disturbance of the critical area and critical area buffer, including disturbance of vegetation and soils, shall be minimized;

Response: Critical area and critical area buffer disturbances will be minimized through design practices and engineering controls. BMPs will be used to minimize ground disturbance during construction, including during the use of existing, vegetated access routes. Access to poles which must be located in critical areas will generally occur using existing, partially vegetated access (established during original construction and re-used over time to maintain the corridor). Post construction, disturbed areas will be re-vegetated and left to return to their natural state.

In critical areas, mats will be placed over existing vegetation where possible to allow access for installation of new poles. Typically crushed vegetation rebounds within one growing season resulting in only temporary impacts to vegetation. Tree removal activities are performed in a manner to minimize impacts to underlying shrubs, groundcover and other trees, without disturbance to soil.

Any equipment or vehicles will be staged and refueled outside of critical areas and critical area buffers. If this is not possible, a "safe area" within the buffer will be identified and used for staging and refueling. Containment measures will be included in the Project specific Spill Prevention, Control and Countermeasure (SPCC) plan.

Areas disturbed for temporary access and staging will be restored in place following completion of construction activities. Only native seed mixes and/or native plantings will be installed in critical areas or critical area buffers.

iii. Disturbance shall not occur in habitat used for salmonid rearing or spawning or by any species of local importance unless no other technically feasible location exists;

Response: Construction associated with the proposed culvert replacement and stream realignment will result in temporary disturbance to the stream. However, no permanent adverse impacts are expected. Rather, long-term improvements to salmonid habitat will occur as a result of the stream re-alignment and enhancement. During construction, any fish isolated in the localized instream work area will be removed by the Project specific fish biologist in the work area. Given the size and characteristics of the existing stream, it is expected that stranded fish can be located and captured using dipnets or small seines followed by electrofishing. Efforts to capture and relocate fish by netting methods will precede electrofishing. Captured fish will be released in unaffected reaches downstream of the project area.

The Project will not result in impacts to habitats associated with species of local importance (see Section 4.3.3). Proposed mitigation will result in net habitat benefits following Project implementation. In addition to reducing flooding, increasing streamflow conveyance capacity and improving sediment transport and removal, the proposed culvert replacement and stream realignment will improve fish passage and in-stream and riparian habitat conditions.

iv. Any crossing over of a wetland or stream shall be designed to minimize critical area and critical area buffer coverage and critical area and critical area buffer disturbance, for example by use of bridge, boring, or open cut and perpendicular crossings, and shall be the minimum width necessary to accommodate the intended function or objective; provided, that the Director may require that the facility be designed to accommodate additional facilities where the likelihood of additional facilities exists, and one consolidated corridor would result in fewer impacts to the critical area or critical area buffer than multiple intrusions into the critical area or critical area buffer;

Response: No new permanent wetland or stream crossings are proposed. The Project includes replacing and upgrading the culvert carrying a small, perennial stream beneath the access driveway to the Richards Creek Substation site. In addition to the new culvert crossing, the Project will restore and/or enhance adjoining habitat areas. This includes realigning and enhancing the stream sections extending upstream and downstream of the crossing and enhancing the new stream buffer including associated wetland areas.

As part of the Project, access to poles in critical areas of the transmission corridor will generally occur using existing, partially vegetated access (established during original construction and re-used over time to maintain the corridor). BMPs will be used to minimize ground disturbance in these areas, and in areas of new

access. In critical areas or buffers, mats will be placed over existing vegetation where possible. When installing the new conductor, techniques will be used to avoid impacts to critical areas (*i.e.*, shooting the wire from pole to pole or using guide wires). Stringing sites will be located outside of critical areas where possible. Any additional critical area impacts resulting from stringing sites, not already quantified in other Project elements described herein, will be temporary in nature; temporary impact areas will be re-vegetated and left to return their natural state or enhanced following construction.

Typically crushed vegetation rebounds within one growing season resulting in only temporary impacts to vegetation. Post-construction, all disturbed areas will be re-vegetated, if necessary, and left to return to their natural state. Based on the existing conditions, proposed construction BMPs, and post construction methods; disturbance associated with access in the transmission corridor will be temporary.

v. All work shall be consistent with applicable City of Bellevue codes and standards;

Response: This Project will comply with applicable City of Bellevue codes and standards.

vi. The facility or system shall not have a significant adverse impact on overall aquatic area flow peaks, duration or volume or flood storage capacity, or hydroperiod;

Response: Project element impacts and associated mitigation measures will be designed to maintain or improve critical area hydrology and water quality to the extent possible. The proposed stream restoration project will result in an improvement in hydrologic function. It is designed to increase streamflow conveyance capacity, improve sediment transport, facilitate sediment removal from the system, and reduce flooding that now occurs on the adjoining property to the west.

vii. Associated parking and other support functions, including, for example, mechanical equipment and maintenance sheds, must be located outside critical area or critical area buffer except where no feasible alternative exists; and

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Response: Project elements which must be located within critical areas or buffers are limited to pole footprints, portions of the Richards Creek Substation including the culvert replacement at the entry road, and access driveway. The Project has gone through multiple design revisions, and no other feasible alternative exists for the location of these features. Other proposed critical area impacts are due to required vegetation maintenance activities in the vicinity of

the power lines which, in some areas, will result in long term changes to vegetation composition.

viii. Areas of new permanent disturbance and all areas of temporary disturbance shall be mitigated and/or restored pursuant to a mitigation and restoration plan meeting the requirements of LUC 20.25H.210.

Response: The Mitigation Plans fulfill the requirements of LUC 20.25H.210, including mitigation goals, performance standards, monitoring and maintenance protocols, and contingencies for the duration of the monitoring period. See Section 8 for a discussion of the proposed mitigation strategies. Mitigation plans for the Richards Creek Substation parcel and Somerset Substation parcel are included in Appendix A.

9.2 LUC 20.25H.080 Performance Standards for Streams

Compliance with applicable performance standards for projects on sites with streams is described below.

LUC 20.25H.080.A- General

Development on sites with a type S or F stream or associated critical area buffer shall incorporate the following performance standards in design of the development, as applicable:

1. Lights shall be directed away from the stream.

Response: New lighting is only proposed at the substation site. It will be contained within the fenced, developed area, and will be directed away from the stream restoration area.

2. Activity that generates noise such as parking lots, generators, and residential uses shall be located away from the stream or any noise shall be minimized through use of design and insulation techniques.

Response: Noise generated from the Project after completion is expected to be minimal and limited mainly to the substation. Noise generated from the substation will be within the noise thresholds for the zoning district. The proposed substation is consistent with other uses in the area and all equipment will be located within an enclosed area mainly upslope and away from onsite critical areas. Transmission lines within the corridor will generate noise similar to the existing condition of the corridor.

3. Toxic runoff from new impervious area shall be routed away from the stream.

Response: New impervious area is limited to the Richards Creek Substation. New transformers will be constructed on top of - and within an engineered pad lined with a berm to contain potential releases, referred to as a SPCC curb. The engineered pad beneath the transformers will be lined with a bentonite layer at an appropriate depth that (with the aid of the berm/SPCC curb that surrounds

the transformer pad) will collect and hold unanticipated releases; preventing off-site migration to sensitive areas.

As such, containment measures at the substation will prevent toxic runoff from entering the stream. Additionally, there will be a stormwater vault located beneath the substation which will discharge into flow dispersion riprap before entering into the stream. Additional water quality treatment is not proposed as the site should be classified as an "infrequently used maintenance access route" (for both access driveway and internal substation driveway) per the City's definition of PGIS and "vehicular use".

4. *Treated water may be allowed to enter the stream critical area buffer.*

Response: There will be a stormwater vault located beneath the substation which will discharge into flow dispersion riprap before entering into the stream.

5. *The outer edge of the stream critical area buffer shall be planted with dense vegetation to limit pet or human use. Preference shall be given to native species.*

Response: The final mitigation plan includes dense, native critical area buffer plantings. Realigning Stream C and enhancing the new buffer area will create a dense, functional buffer more protective of the stream than the existing condition.

6. *Use of pesticides, insecticides and fertilizers within 150 feet of the edge of the stream critical area buffer shall be in accordance with the City of Bellevue's "Environmental Best Management Practices," now or as hereafter amended.*

Response: Generally, weed control efforts in stream buffer will employ manual removal. The Mitigation plan calls for aquatic certified glyphosate to be used in reed canarygrass infested areas. If any persistent weed or pest problems require pesticide control beyond what is specified in the plans, the City would be contacted to verify compliance with City of Bellevue BMPs and, if allowed, a licensed pesticide applicator would be hired.

LUC 20.25H.080.B- Modification of Stream Channel

1. *When Allowed. A stream channel shall not be modified by relocating the open channel, or by closing the channel through pipes or culverts unless in connection with the following uses allowed under LUC 20.25H.055:*

   a. A new or expanded utility facility or system;

   b. A new or expanded essential public facility;

   c. Public flood control measures;

   d. In-stream structures;

   e. New or expanded public right-of-way, private roads, access easements or driveways;

   f. Habitat improvement project; or

   g. Reasonable use exception; provided, that a modification may be allowed under this section for a reasonable use exception only where the applicant demonstrates that no other alternative exists to achieve the allowed development.

A critical areas report may not be used to modify the uses set forth in this subsection B.1.

Response: Stream channel modification is proposed on the Richards Creek substation parcel in conjunction with the culvert replacement work and to enhance fish and wildlife habitat on site, increase streamflow conveyance capacity, improve sediment transport, facilitate sediment removal from the system, and reduce flooding that now occurs on the adjoining property to the west. This work is proposed as part of the overall restoration strategy at the Richards Creek Substation parcel. As a habitat improvement Project related to development of a utility facility, it meets the definition of an allowed use under LUC 20.25H.055.

2. *Critical Areas Report Required. Any proposal to modify a stream channel under this section may be approved only through a critical areas report.*

Response: This narrative is intended to satisfy the critical areas report requirement and details how the stream channel modifications will improve stream, stream buffer, and associated wetland functions and values. See subsections 9.6 through 9.7 below addressing compliance with specific critical areas report submittal requirements and decision criteria.

9.3 LUC 20.25H.100 Performance Standards for Wetlands

Compliance with performance standards for projects on sites with wetlands is described below.

LUC 20.25H.100

Development on sites with a wetland or wetland critical area buffer shall incorporate the following performance standards in design of the development, as applicable:

A. Lights shall be directed away from the stream (or wetland).

Response: New lighting is only proposed at the substation site. It will be contained within the fenced, developed area, and will be directed away from the stream restoration area.

B. Activity that generates noise such as parking lots, generators, and residential uses shall be located away from the wetland or any noise shall be minimized through use of design and insulation techniques.

Response: Noise generated from the Project after completion is expected to be minimal and limited mainly to the substation. The proposed stream restoration and buffer/wetland enhancement plantings at the substation site will help to screen the critical areas from the developed area and reduce any noise within critical areas. Noise generated from the substation will be within the noise thresholds for the zoning district. The proposed substation is consistent with other uses in the area and all equipment will be located within an enclosed area mainly upslope and away from onsite critical areas. Transmission lines within the corridor will generate noise similar to the existing condition of the corridor.

C. Toxic runoff from new impervious area shall be routed away from the wetland.

Response: New impervious area is limited to the Richards Creek substation. New transformers will be constructed on top of - and within an engineered pad lined with a berm to contain potential releases, referred to as a SPCC curb. The engineered pad beneath the transformers will be lined with a bentonite layer at an appropriate depth that (with the aid of the berm/SPCC curb that surrounds the transformer pad) will collect and hold unanticipated releases; preventing off-site migration to sensitive areas. As such, containment measures at the substation will prevent toxic runoff from entering the stream.

Additionally, there will be a stormwater vault located beneath the substation which will discharge into flow dispersion riprap before entering into Stream C. Additional water quality treatment is not proposed as the site should be classified as an "infrequently used maintenance access road" (for both access driveway and internal substation driveway) per the City's definition of PGIS and "vehicular use".

D. Treated water may be allowed to enter the wetland critical area buffer.

Response: There will be a stormwater vault located beneath the substation which will discharge into flow dispersion riprap before entering into the stream.

E. The outer edge of the wetland critical area buffer shall be planted with dense vegetation to limit pet or human use. Preference shall be given to native species.

Response: The final mitigation plan includes dense, native critical area buffer plantings. Realigning Stream C and enhancing the new buffer area will create a dense, functional buffer more protective of the stream than the existing condition. Additionally, the Richards Creek Substation property is owned and operated by PSE; as such, human use outside of the developed substation is discouraged. Wetlands and buffers elsewhere in the corridor are generally degraded as a result of human development and extensive use of the corridor. Buffer mitigation planting is directed to sites in the Richards Creek and Coal Creek basins that allow for the greatest functional improvement to the overall critical areas functions in the Project area, and allow for limiting human and pet intrusion into the mitigation areas.

F. Use of pesticides, insecticides and fertilizers within 150 feet of the edge of the wetland critical area buffer shall be in accordance with the City of Bellevue's "Environmental Best Management Practices," now or as hereafter amended.

Response: Generally, weed control efforts in wetland buffer will employ manual removal. The mitigation plan calls for aquatic certified glyphosate to be used in reed canarygrass infested areas. If any persistent weed or pest problems require pesticide control beyond what is specified in the plans, the City would be contacted to verify compliance with City of Bellevue BMPs and, if allowed, a licensed pesticide applicator would be hired. However, PSE cannot control how private property owners in the corridor manage the vegetation within their properties.

9.4 LUC 20.25H.105.D Wetlands Enhancement as Mitigation

Impacts to wetland critical area functions may be mitigated by enhancement of existing significantly degraded wetlands. Applicants proposing to enhance wetlands must produce a critical areas report meeting the requirements of LUC 20.25H.110 and 20.25H.230 that identifies how enhancement will increase the functions of the degraded wetland and how this increase will adequately mitigate for the loss of wetland area and function at the impact site. An enhancement proposal must also show whether existing wetland functions will be reduced by the enhancement actions.

Response: Wetland enhancement is proposed at both the Richards Creek Substation site and the Somserset Substation site to mitigate for impacts generated in the Richards Creek and Coal Creek drainage sub-basins, respectively. Wetlands proposed for enhancement are significantly degraded by non-native, invasive species. Proposed enhancement will improve the species and structural diversity in these degraded wetlands and replace invasive species with native species which will improve functions. See Sections 7.3, 8.1.3 and 8.2.3 for a discussion of the functional lift expected.

9.5 LUC 20.25H.180.C General performance standards for development in the area of special flood hazard

Compliance with applicable performance standards for general development in the area of special flood hazard described below.

LUC 20.25H.180.C

Where use or development is allowed pursuant to LUC 20.25H.055, the following general performance standards apply:

1. Intrusion Over the Area of Special Flood Hazard Allowed. Any structure may intrude over the area of special flood hazard if:

a. The intrusion is located above existing grade, and does not alter the configuration of the area of special flood hazard;

b. The intrusion is at an elevation and orientation which maintains the existing vegetation of the area of special flood hazard in a healthy condition. Solar access to vegetation must be maintained at least 50 percent of daylight hours during the normal growing season; and

c. The intrusion does not encroach into the regulated floodway except in compliance with subsection C.5 of this section.

Response: The proposal does not include any structures. Impacts within the Area of Special Flood Hazard are limited to vegetation removal and the installation of one new pole which will be replacing four existing poles that are currently situated in a highly developed area with medium to high density residential development and paved roads and parking areas. Areas of special flood hazard include relatively small areas associated with Sunset Creek and Coal Creek, as determined by the Federal Emergency Management Agency (FEMA).

The mapped Sunset Creek floodplain is shown in an area where Sunset Creek is conveyed underground. The mapped floodplain in the corridor is located north and south of SE Allen Rd in areas developed with apartment buildings, parking areas, sidewalks, and includes some landscaped trees and mowed grass; none of which are associated with a riparian environment.

The mapped Coal Creek floodplain in the Project area includes portions of Coal Creek Parkway and natural forested vegetation associated with the riparian zone of Coal Creek. Floodplain habitat is discussed in detail in the ESA documentation for the Project.

Development not meeting the requirements of this subsection C.1 may be allowed pursuant to LUC 20.25H.055 and only in accordance with the requirements set forth in the remainder of this section C.

3. Construction Materials and Methods.

a. Site Design. All structures, utilities, and other improvements shall be located on the buildable portion of the site out of the area of special flood hazard unless there is no buildable site out of the area of special flood hazard. For sites with no buildable area out of the area of special flood hazard, structures, utilities, and other improvements shall be placed on the highest land on the site, oriented parallel to flow rather than perpendicular, and sited as far from the stream and other critical areas as possible. Located in flood-fringe where flood flow velocities are less than three feet per second and flood depths are less than three feet. If the Director detects any evidence of active hyporheic exchange on a site, the development shall be located to minimize disruption of such exchange.

b. Methods That Minimize Flood Damage. All new construction and substantial improvements shall be constructed using flood-resistant materials and using methods and practices that minimize flood damage.

c. Utility Protection. Electrical, heating, ventilation, plumbing, air-conditioning equipment, and other service facilities shall be designed and/or otherwise elevated or located so as to prevent water from entering or accumulating within the components during conditions of flooding.

d. Anchoring. All new construction and substantial improvements shall be anchored to prevent flotation, collapse, or lateral movement of the structure.

Response: Alterations within the floodplain are limited to vegetation removal and installation of one new utility pole. The pole is sited as far from critical areas as possible. The pole is not expected to impact flood flows and is constructed such that it will not be susceptible to flood damage.

4. No Rise in the Base Flood Elevation (BFE). Any allowed use or development shall not result in a rise in the BFE.

a. Post and Pile. Post and piling techniques are preferred and are presumed to produce no increase in the BFE. Demonstration of no net rise in the BFE through calculation is not required.

b. Compensatory Storage. Proposals using compensatory storage techniques to assure no rise in the BFE shall demonstrate no net rise in the BFE through the calculation by methods established in the Utilities Storm and Surface Water Engineering Standards, January 2011, Section D4-04.5, Floodplain/Floodway Analysis, now or as hereafter amended.

Response: Impacts in the Area of Special Flood Hazard are limited to vegetation removal and pole installation (replacement of two existing H-frame structures which include a total of four poles, with two new poles). As noted in a) above, post and piling techniques are preferred and are presumed to produce no increase in the Base Flood Elevation. Pole installation is considered to be a post

and piling technique. Demonstration of no net rise in the BFE through calculation is not required. As such, there will be no impact to the flood storage capacity of the flood hazard area. Vegetation removal would not result in a rise in the BFE.

5. Development in the Regulatory Floodway.

> *a. Encroachment into Regulatory Floodway Prohibited. Encroachments, including, but not limited to, fill, new construction, substantial improvements, and other development, are prohibited, unless a registered professional engineer certifies that the proposed encroachment into the regulatory floodway shall not result in any rise in the BFE using hydrological and hydraulic analysis performed in accordance with City of Bellevue Storm and Surface Water Engineering Standards, January 2011, or as hereafter amended. All new construction and substantial improvements shall comply with this section.*

Response: No development is proposed in the regulatory floodway. Pole installation is a post and piling technique which is presumed to produce no increase in the Base Flood Elevation. And based on #4 above, the Project does not require a demonstration of no net rise in the BFE.

6. Modification of Stream Channel. Alteration of open stream channels shall be avoided, if feasible. If unavoidable, the following provisions shall apply to the alteration:

> *a. Modifications shall only be allowed in accordance with the habitat improvement projects.*
>
> *b. Modification projects shall not result in blockage of side channels.*
>
> *c. The City of Bellevue shall notify adjacent communities, the state departments of Ecology and Fish and Wildlife, and the Federal Insurance Administration about the proposed modification at least 30 days prior to permit issuance.*
>
> *d. The applicant shall maintain the altered or relocated portion of the stream channel to ensure that the flood-carrying capacity is not diminished. Maintenance shall be bonded for a period of five years, and be in accordance with an approved maintenance program.*

Response: The Project proposes to modify the open stream channel adjacent to the culvert replacement on the Richards Creek substation parcel. As part of the mitigation for Project impacts, the stream will be realigned and enhanced upstream and downstream of the crossing. Adjacent habitat areas, including wetlands will also be enhanced.

The modification and enhancement will result in net habitat benefits following Project implementation. The proposed culvert replacement and stream realignment will increase streamflow conveyance capacity, improve sediment transport, facilitate sediment removal from the system, replace undersized culverts, reduce flooding that now occurs on the adjoining property to the west, improve fish passage, and improve in-stream and riparian habitat conditions.

The completed Project will contain all flows from large storms within a stable channel and floodplain and trap sediments in a planned location for relatively easy, low-impact removal. The design includes channel grading and realignment, culvert replacement, and sediment removal/management features and protocol.

The restored stream will have a defined channel and floodplain benches, as well as the capacity to convey the predicted 1-year peak flow rate. The stream channel has been designed to flood at a 2-year peak flow rate and contribute to the surrounding wetland hydrology. A meandering channel design combined with woody debris placement, native revegetation, and wetland enhancements will create a complex and diverse aquatic habitat beneficial for fish and macroinvertebrates as well as other wildlife. This approach also produces varied flow velocities allowing for natural sediment movement and deposition patterns to occur. The channel alignment has been laid out to minimize impacts to wetlands, preserve as many trees onsite as feasible, and provide a more functional buffer. The original stream bed along the west property line of the subject site will not be filled in after stream flow is diverted into the new channel. The remnant channel is anticipated to continue to capture seepage and shallow groundwater and will continue to provide ecological diversity and function as wetland given the nature of the site hydrology. Tree trunks and roots wads will be strategically located along the restored reach to create and maintain scour pools and areas of refuge for fish as well as provide channel diversity and stability.

PSE has had coordination with WDFW and affected Tribes and is seeking all appropriate state and federal permits for this work. A five-year maintenance and monitoring plan will be included with the final Mitigation Plan.

7. Compensatory Storage. Development proposals must not reduce the effective base flood storage volume of the area of special flood hazard. Grading or other activity that would reduce the effective storage volume must be mitigated by creating compensatory storage on the site. The compensatory storage must:

a. Provide equivalent elevations to that being displaced;

b. Be hydraulically connected to the source of flooding;

c. Be provided in the same construction season and before the flood season begins on September 30th;

d. Occur on site or off site if legal arrangements can be made to assure that the effective compensatory storage volume will be preserved over time;

e. Be supported by a detailed hydraulic analysis that:

i. Is prepared by a licensed engineer;

ii. Demonstrates that the proposed compensatory storage does not adversely affect the BFE; and

f. Meet all other critical areas rules subject to this part. If modification to a critical area or critical area buffer is required to complete the compensatory storage requirement, such modification shall be mitigated pursuant to an approved mitigation and restoration plan, LUC 20.25H.210.

Response: Project actions within the floodplain are not expected to reduce flood storage capacity.

9.6 LUC 20.25H.125- Performance Standards for landslide hazards and steep slopes

Compliance with applicable performance standards for geologic hazard areas has been described by the Project's geotechnical experts. Note that the responses below have been revised slightly by PSE to correct and clarify language based on changes in Project description. The complete geologic hazard evaluation is included in Appendix B.

In addition to generally applicable performance standards set forth in LUC 20.25H.055 and 20.25H.065, development within a landslide hazard or steep slope critical area or the critical area buffers of such hazards shall incorporate the following additional performance standards in design of the development, as applicable. The requirement for long-term slope stability shall exclude designs that require regular and periodic maintenance to maintain their level of function.

A. Structures and improvements shall minimize alterations to the natural contour of the slope, and foundations shall be tiered where possible to conform to existing topography;

Response: No structures will be constructed as part of the proposed Project. Site improvements (pole removal, pole replacement, access routes, and vegetation management) are not anticipated to adversely impact the natural contour of the slope. The proposed site activities that include vegetation management, tree

removal, and temporary access routes (associated with the proposed pole replacement activities) will maintain overall existing site topography. The grade changes associated with the substation development are discussed below in the responses for code requirements LUC 20.25H. 125 D through J.

B. Structures and improvements shall be located to preserve the most critical portion of the site and its natural landforms and vegetation;

Response: No structures will be constructed as part of the proposed Project. Site improvements include localized vegetation management, including tree removal, and use of existing access routes (associated with the proposed pole replacement activities). The proposed tree removal and surface disturbance will be limited to reduce potential impacts to natural landforms and vegetation. The grade changes associated with the substation development are discussed below in the responses for code requirements LUC 20.25H. 125 D through J.

C. The proposed development shall not result in greater risk or a need for increased buffers on neighboring properties;

Response: The proposed development includes vegetation management, including tree removal and use of existing access routes (associated with the proposed pole replacement activities) that will be followed by mitigation measures to reduce potential impacts to geologic hazards that include landslide and steep slope hazards. Mitigation measures include a variety of BMPs to reduce potential impacts to geologic hazards in the vicinity of neighboring properties. BMPs include plant replacement, scattering trimmed or removed tree debris, and chipping wood to reduce potential impacts to work areas as appropriate. Removal of vegetation by hand and/or using limited access machinery will reduce potential impacts to landslide and steep slope hazard areas. It is our opinion that the proposed Project will not require additional buffers. The grade changes associated with the substation development are discussed below in the responses for code requirements LUC 20.25H. 125 D through J.

D. The use of retaining walls that allow the maintenance of existing natural slope area is preferred over graded artificial slopes where graded slopes would result in increased disturbance as compared to use of retaining wall;

Response: In the transmission corridor, no retaining walls or grading activities are proposed relative to the proposed vegetation management, tree removal and access route activities (associated with the proposed pole replacement activities). The development of soldier pile walls and retaining walls for the Richards Creek Substation is discussed in detail in the substation-specific geotechnical engineering report dated September 23, 2016, and in an addendum report dated April 4, 2017. The use of retaining walls for the new substation will reduce

disturbance and grading of the existing natural slopes, which would be otherwise necessary without construction of the walls.

E. Development shall be designed to minimize impervious surfaces within the critical area and critical area buffer;

Response: No new impervious surfaces are proposed relative to the proposed vegetation management, tree removal and access route activities (associated with the proposed pole replacement activities) within mapped critical area and mapped critical area buffers of the transmission corridor. Five narrow, and relatively small (low square footage), steep slopes are located on the future Richards Creek Substation property (comprising 8.46 acres), which is partially developed with an existing pole yard (existing hard surface/impervious surface of 1.58 acres). As discussed previously, many areas of mapped steep slopes were eliminated from the impact analysis because of their existing land use (engineered road slopes, engineered landscaping, etc.) and the proposed activities at those locations. None of the steep slopes on the Richards Creek Substation property have been identified as priority steep slopes. Therefore, no increase in impervious surface will occur to mapped priority steep slope areas.

F. Where change in grade outside the building footprint is necessary, the site retention system should be stepped and regrading should be designed to minimize topographic modification. On slopes in excess of 40 percent, grading for yard area may be disallowed where inconsistent with this criteria;

Response: No change in grade is proposed relative to the proposed vegetation management, tree removal and access route activities (associated with the proposed pole replacement activities) within the transmission corridor. Within the new substation, grade transitions along the east side (up to 24 feet in height) will be supported with a soldier pile wall (cantilever and with tiebacks). Grade transitions along the west side (up to 6 feet in height) will be supported by fill slopes and a cast-in-place retaining wall.

G. Building foundation walls shall be utilized as retaining walls rather than rockeries or retaining structures built separately and away from the building wherever feasible. Freestanding retaining devices are only permitted when they cannot be designed as structural elements of the building foundation;

Response: No retaining walls are proposed relative to the proposed vegetation management and tree removal activities associated with the proposed pole replacement activities within the transmission corridor. However, for stability purposes, drilled pier foundations will be utilized on select poles in the corridor where appropriate. The new substation is not a building and, thus, does not have typical foundation walls; as such, soldier pile and retaining walls will be necessary to retain the required grade changes. PSE does not propose the use of rockeries.

H. On slopes in excess of 40 percent, use of pole-type construction which conforms to the existing topography is required where feasible. If pole-type construction is not technically feasible, the structure must be tiered to conform to the existing topography and to minimize topographic modification;

Response: No pole-type structures are proposed relative to the proposed vegetation management and tree removal activities. The new poles will meet the preferred construction type (which is pole-type construction). The new substation cannot be tiered and was situated east of the existing Olympic pipeline. This requires construction of a soldier pile wall east of the existing steep slope area. While this results in grading in the steep slope area, the area of disturbance is minimized by construction of a vertical wall.

I. On slopes in excess of 40 percent, piled deck support structures are required where technically feasible for parking or garages over fill-based construction types; and

Response: No structures requiring pile deck support are proposed relative to the proposed vegetation management and tree removal activities. The new poles will meet the preferred construction type (which is pole-type construction). No parking or garage structures are planned for the new substation. Pile-supported deck structures are not feasible for a substation. The substation grades will require cutting into the steep slope on the east side, which will then be retained with a soldier pile wall.

J. Areas of new permanent disturbance and all areas of temporary disturbance shall be mitigated and/or restored pursuant to a mitigation and restoration plan meeting the requirements of LUC 20.25H.210.

Response: Temporary disturbance for the proposed vegetation management and tree removal activities and access routes (associated with the proposed pole replacement activities) within the existing transmission corridor will be mitigated by scattering and/or chipping trimmed limbs and logs, replanting vegetation, and using limited access equipment or accessing only by foot as appropriate. For steep slope areas in the vicinity of the new substation that will be disturbed during construction, the disturbed areas should be restored by seeding/revegetating and covering the planted area with mulch or other appropriate BMPs.

9.7 LUC 20.25H.250 Critical areas report – Submittal requirements

The proposal includes modification of a stream channel at the Richards Creek Substation site. The realignment and enhancement of Stream C and adjoining buffer areas, including wetland, is proposed as part of the overall restoration strategy at the Richards Creek Substation parcel. As noted above, LUC 20.25H.080.B allows for modification of a stream channel when certain performances standards are met. Any proposal to modify a stream channel under

this section may be approved only through a Critical Areas Report. Therefore, compliance with the applicable Critical Areas Report submittal requirements and decision criteria is described below. (Note that only the Richards Creek sub-basin portion of the project is addressed in this section as the activities within the Coal Creek basin do not include stream modification nor any other activity triggering a Critical Areas Report process.)

A. Specific Proposal Required.

A critical areas report must be submitted as part of an application for a specific development proposal. In addition to the requirements of this section, additional information may be required for the permit applicable to the development proposal.

Response: This report is being submitted as part of a Critical Areas Land Use Application package for the PSE Energize Eastside Project – South Bellevue segment.

B. Minimum Report Requirements.

The critical areas report shall be prepared by a qualified professional and shall at minimum include the content identified in this section. The Director may waive any of the report requirements where, in the Director's discretion, the information is not necessary to assess the impacts of the proposal and the level of protection of critical area function and value accomplished. At a minimum, the report shall contain the following:

1. *Identification and classification of all critical areas and critical area buffers on the site;*

Response: See Section 4.3 and 5.1.

2. *Identification and characterization of all critical areas and critical area buffers on those properties immediately adjacent to the site;*

Response: See Section 4.3 and 5.1.

3. *Identification of each regulation or standard of this code proposed to be modified;*

Response: CAR Section 9 contains a detailed Project-based review of all applicable city code provisions.

3. *A habitat assessment consistent with the requirements of LUC 20.25H.165;*

Response: Discussion of habitat, in accordance with the requirements of LUC 20.25H.165 (below), is discussed throughout this CAR and summarized below. The Project will not impact known habitats associated with species of local importance. Therefore, no modifications to the performance standards for habitat associated with species of local importance are proposed.

Detailed description of vegetation and habitat on and adjacent to the site;

Response: See Sections 4.2 and 4.3.

Identification of any species of local importance that have a primary association with habitat on or adjacent to the site and assessment of potential project impacts to the use of the site by the species;

Response: See Section 4.3.3.

A discussion of any federal, state, or local special management recommendations, including Washington Department of Fish and Wildlife habitat management recommendations, that have been developed for species or habitats located on or adjacent to the site;

Response: See Section 4.3.3.

A detailed discussion of the direct and indirect potential impacts on habitat by the project, including potential impacts to water quality;

Response: Sections 7 and 8 provide a description of impacts in relation to critical area functions. The functional lift analysis (Section 8.1.3) describes the expected net change in critical area functions overall once mitigation is considered.

A discussion of measures, including avoidance, minimization, and mitigation, proposed to preserve existing habitats and restore any habitat that was degraded prior to the current proposed use or activity and to be conducted in accordance with the mitigation sequence set forth in LUC 20.25H.215*; and*

Response: See Section 6 for a discussion of mitigation sequencing.

A discussion of ongoing management practices that will protect habitat after the site has been developed, including proposed monitoring and maintenance programs.

Response: See Section 4.3.3 for a discussion of standard PSE habitat protection practices. See also Section 8. The attached Richards Creek Sub-Basin Mitigation Plan includes monitoring and maintenance provisions in accordance with LUC 20.25H.220.B. In response to City comments, monitoring includes hydrology monitoring for the additional (non-compensatory) enhancement area of Wetland A outside of the stream project area.

4. *An assessment of the probable cumulative impacts to critical areas resulting from development of the site and the proposed development;*

Response: See Section 7.4.

5. *An analysis of the level of protection of critical area functions and values provided by the regulations or standards of this code, compared with the level of protection provided by the proposal. The analysis shall include:*

    a. *A discussion of the functions and values currently provided by the critical area and critical area buffer on the site and their relative importance to the ecosystem in which they exist;*

Response: See Section 8.1.

    b. *A discussion of the functions and values likely to be provided by the critical area and critical area buffer on the site through application of the regulations and standards of this Code over the anticipated life of the proposed development; and*

Response: As described above, the regulations and standards of LUC 20.25H allow the proposed Project to occur within critical areas and their associated buffers, provided certain criteria are met. Additionally, the stream modification, is also allowed as it is a habitat improvement project, but must be approved through a Critical Areas Report process. Through the avoidance and minimization measures and the proposed compensatory mitigation discussed in this CAR, critical area functions overall will be preserved or improved in the Project area. Furthermore, without the proposed critical area alterations, and resulting proposed restoration, existing degraded critical areas and associated buffers would remain in their present condition with no enhancement.

    c. *discussion of the functions and values likely to be provided by the critical area and critical area buffer on the site through the modifications and performance standards included in the proposal over the anticipated life of the proposed development;*

Response: See Section 8.1. Stream, wetland, and buffer areas are proposed to be enhanced which will result in an increase in native vegetation; filtering of stormwater by native plantings; increased habitat structural and compositional complexity, LWD, and an increase in organic material to the food chain.

Proposed enhancement will maintain and improve wetland and buffer functions and values. Permanent wetland and buffer impacts will be mitigated through enhancement of degraded wetland and buffer areas. Additional wetland enhancement, beyond what is required to mitigate for Energize Eastside Project impacts, is also proposed. A discussion of the performance standards applicable to the critical area and proposed activity pursuant to LUC 20.25H.160, and recommendation for additional or modified performance standards, if any;

Response: Not applicable; the Project will not cause impacts to habitat associated with species of local importance.

6. A discussion of the mitigation requirements applicable to the proposal pursuant to LUC 20.25H.210, and a recommendation for additional or modified mitigation, if any; and

Response: See Sections 7.2 and 8.1. Consistent with the description above, mitigation for the Project is being designed to be in compliance with LUC 20.25H.210 through 25.25H.225. The wetland mitigation required in the Richards Creek sub-basin based on calculated impacts consists of 30,718 SF of enhancement. The Richards Creek Substation Mitigation Plan (Appendix A) proposes 30,718 SF of wetland enhancement to meet this mitigation need. Enhancement is proposed within degraded portions of Wetland A and Wetland D.

A portion of the wetland enhancement mitigation (13,396 SF) is proposed to occur to wetland areas within the boundaries of the stream restoration project. However, no out-of-kind mitigation is being proposed. The stream restoration itself, including the both the habitat improvements and flooding alleviation it is expected to bring, is not proposed as mitigation for the wetland impacts generated by Energize Eastside. The stream realignment and restoration proposal will not result in permanent impacts to wetland function. Rather, it will enhance the functions of the interrelated and interdependent stream and wetland system and will help provide a greater functional lift to the restored wetlands within the stream project area. Additional enhancement is also proposed in Wetlands A and D, outside of the stream project area and above what is required to mitigate for project impacts (See Table 17).

7. Any additional information required for the specific critical area as specified in the sections of this part addressing that critical area.

Response: A delineation report has been prepared which documents wetlands and streams in the proposed Project area (The Watershed Company 2016). Additional delineation reports were prepared for the Richards Creek Substation sites (The Watershed Company 2017 and 2017b, respectively).

C. Additional Report Submittal Requirements.

1. Unless otherwise provided, a critical areas report may be supplemented by or composed, in whole or in part, of any reports or studies required by other laws and regulations or previously prepared for and applicable to the development proposal site, as approved by the Director.

Response: The stream re-alignment and enhancement project design is included in the Richards Creek Sub-basin Mitigation Plan that is attached to this report. Further, this CAR relies on two relevant environmental reports (City of Bellevue Critical Areas Delineation Report: Puget Sound Energy – Energize Eastside Project (The Watershed Company 2016) and City of Bellevue Tree Inventory Report: Puget Sound Energy – Energize Eastside Project (The Watershed

Company 2016b)) and is supplemented by the Biological Evaluation completed as part of the Project's ESA review.

2. *Where a project requires a critical areas report and a mitigation or restoration plan, the mitigation or restoration plan may be included with the critical areas report, and may be considered in determining compliance with the applicable decision criteria, except as set forth in subsection C.4 of this section.*

Response: Mitigation Plans are included in Appendix A.

3. *The applicant may consult with the Director prior to or during preparation of the critical areas report to obtain approval of modifications to the required contents of the report where, in the judgment of a qualified professional, more or less information is required to adequately address the potential critical area impacts and required mitigation.*

Response: PSE standards and federal regulations require vegetation management compatible with overhead 230 kV transmission lines. Where mitigation is proposed under transmission lines, the proposed mitigation plan will provide for species that will enhance existing buffers and wetlands, while meeting vegetation management standards.

D. Incorporation of Previous Study.

Where a valid critical areas report or report for another agency with jurisdiction over the proposal has been prepared within the last five years for a specific site, and where the proposed land use activity and surrounding site conditions are unchanged, said report may be incorporated into the required critical areas report. The applicant shall submit an assessment detailing any changed environmental conditions associated with the site. (Ord. 5680, 6-26-06, § 3)

Response: The City of Bellevue Critical Areas Delineation Report: Puget Sound Energy –Energize Eastside Project (The Watershed Company 2016) and City of Bellevue Tree Inventory Report: Puget Sound Energy – Energize Eastside Project (The Watershed Company 2016b) have been prepared for the proposed Project. In addition, updated delineation reports for the Richards Creek Substation site and Somerset Substation site were recently prepared (The Watershed Company 2017 and 2017b, respectively). No environmental conditions are known to have changed from the conditions documented in those reports. Additionally, the Revised Targeted Critical Areas Geologic Hazard Evaluation (GeoEngineers 2017) was prepared to evaluate the Project's potential impact to geologic hazard areas.

9.8 LUC 20.25H.255 Critical areas report – Decision criteria

Compliance with applicable critical areas report decision criteria is described below.

A. General.

Except for the proposals described in subsection B of this section, the Director may approve, or approve with modifications, the proposed modification where the applicant demonstrates:

1. *The modifications and performance standards included in the proposal lead to levels of protection of critical area functions and values at least as protective as application of the regulations and standards of this code;*

Response: As explained above, as required by the City's code, Project mitigation requires the enhancement of 0.76 acres of wetland split between Richards Creek and Coal Creek drainage sub-basins (the majority of wetland enhancement to occur in the Richards Creek sub-basin). The proposed functional lift described in Sections 8.1.3 and 8.2.3 details the anticipated net gain in critical areas functions expected to result from the proposed enhancement work on the Richards Creek Substation and Somerset Substation parcels. Construction associated with the proposed culvert replacement and stream realignment will result in temporary disturbance to streams, wetlands, and their associated buffers, but will also result in net habitat benefits following Project implementation. Instream enhancements, creation of a more functional buffer/riparian area than currently exists, and enhancement of adjacent wetland areas is proposed and will improve the functions of the interrelated and interdependent stream and wetland system.

The restored stream will have a defined channel and floodplain benches, as well as the capacity to convey the predicted 1-year peak flow rate. The stream channel has been designed to flood at a 2-year peak flow rate and contribute to the surrounding wetland hydrology. A meandering channel design combined with woody debris placement, native revegetation, and wetland enhancements will create a complex and diverse aquatic habitat beneficial for fish and macroinvertebrates as well as other wildlife. This approach also produces varied flow velocities allowing for natural sediment movement and deposition patterns to occur. The channel alignment has been laid out to minimize impacts to wetlands, preserve as many trees onsite as feasible, and provide a more functional buffer. The original stream bed along the west property line of the subject site will not be filled in after stream flow is diverted into the new channel. The remnant channel is anticipated to continue to capture seepage and shallow groundwater and will continue to provide ecological diversity and function as wetland given the nature of the site hydrology. Tree trunks and roots wads will be strategically located along the restored reach to create and maintain scour pools and areas of refuge for fish as well as provide channel diversity and stability. In sum, the Project will provide a net increase in critical area functions and values in the Project area.

2. *Adequate resources to ensure completion of any required mitigation and monitoring efforts;*

Response: PSE has adequate resources to ensure completion of any required mitigation and monitoring efforts.

3. *The modifications and performance standards included in the proposal are not detrimental to the functions and values of critical area and critical area buffers off-site; and*

Response: No part of the proposal will be detrimental to off-site areas. Enhancement of the stream, wetland and buffer areas will increase the overall habitat function of the area, thereby potentially improving habitat functions on adjacent properties. The culvert replacement and stream realignment will increase streamflow conveyance capacity, improve sediment transport, facilitate sediment removal from the system, and reduce the flooding that now occurs on the adjoining property to the west. Fish passage will also be improved.

4. *The resulting development is compatible with other uses and development in the same land use district.*

Response: This issues was analyzed in detail in Chapter 3.1 of the Energize Eastside Project Phase 2 Draft Environmental Impact Statement. The proposed Project will be compatible with adjacent properties and surrounding development. The substation site is located within the Light Industrial (LI) zoning district and the site is surrounded by compatible uses including an existing substation, the King County Transfer Station and a water and wastewater supply company. The transmission corridor is predominantly surrounded by residential uses with some commercial and park/public open space uses. The corridor currently contains transmission lines. The purpose of the Project is to serve homes and businesses with higher capacity transmission lines. As the proposed transmission line facilities upgrades are in areas that already house such facilities, the likelihood of a materially detrimental impact is significantly reduced. Furthermore, as the transmission line facilities support adjacent uses (residences and businesses), they are not materially detrimental.

9.9 LUC 20.30P.140 Critical Areas Land Use Permit decision criteria

Compliance with the critical areas land use permit decision criteria is described below.

LUC 20.30P.140

The Director may approve or approve with modifications an application for a Critical Areas Land Use Permit if:

Development on sites with a type S or F stream or associated critical area buffer shall incorporate the following performance standards in design of the development, as applicable:

A. The proposal obtains all other permits required by the Land Use Code; and

Response: In addition to the Critical Areas Land Use Permit (LO) which is being applied for to modify critical area/buffers and to provide mitigation for impacts, the Project will apply for a Conditional Use Permit. No other City of Bellevue land use permits will be required of the Project at this time.

B. The proposal utilizes to the maximum extent possible the best available construction, design and development techniques which result in the least impact on the critical area and critical area buffer; and

Response: The Project has been through multiple design revisions and has considered alternate routes in order to ensure the least impact to critical areas that is reasonably feasible. Unavoidable impacts will be minimized through design practices and engineering controls. PSE is not aware of any less impactful construction, design and development techniques and regularly reviews its practices consistent with this goal.

C. The proposal incorporates the performance standards of Part 20.25H LUC to the maximum extent applicable; and

Response: See above Sections 9.2 through 9.6 for compliance with applicable performance standards for each critical area type to be impacted by the Project.

D. The proposal will be served by adequate public facilities including streets, fire protection, and utilities; and

Response: The objective of the Energize Eastside Project is to increase the capacity of the Eastside electric grid, to ensure reliable utility service is available. The Project will be served by adequate public facilities. Temporary and some potentially permanent access routes will be needed to service the Project but no new streets are necessary. Fire and police protection are currently available in the Project vicinity. This issues was analyzed in detail in Chapter 3 of the Energize Eastside Project Phase 2 Draft Environmental Impact Statement.

E. The proposal includes a mitigation or restoration plan consistent with the requirements of LUC 20.25H.210; except that a proposal to modify or remove vegetation pursuant to an approved Vegetation Management Plan under LUC 20.25H.055.C.3.i shall not require a mitigation or restoration plan; and

Response: The final mitigation plan has been prepared in accordance with the requirements of LUC 20.25H.210.

F. The proposal complies with other applicable requirements of this code.

Response: The proposed Project complies with all other applicable City of Bellevue Land Use Codes.

10 DISCLAIMER

The information contained in this report is based on the application of technical guidelines currently accepted as the best available science. All discussions, conclusions and recommendations reflect the best professional judgment of the author(s) and are based upon information available at the time the study was conducted. All work was completed within the constraints of budget, scope, and timing. The findings of this report are subject to verification and agreement by the appropriate local, state and federal regulatory authorities. No other warranty, expressed or implied, is made.

DSD 001061

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DSD 001062

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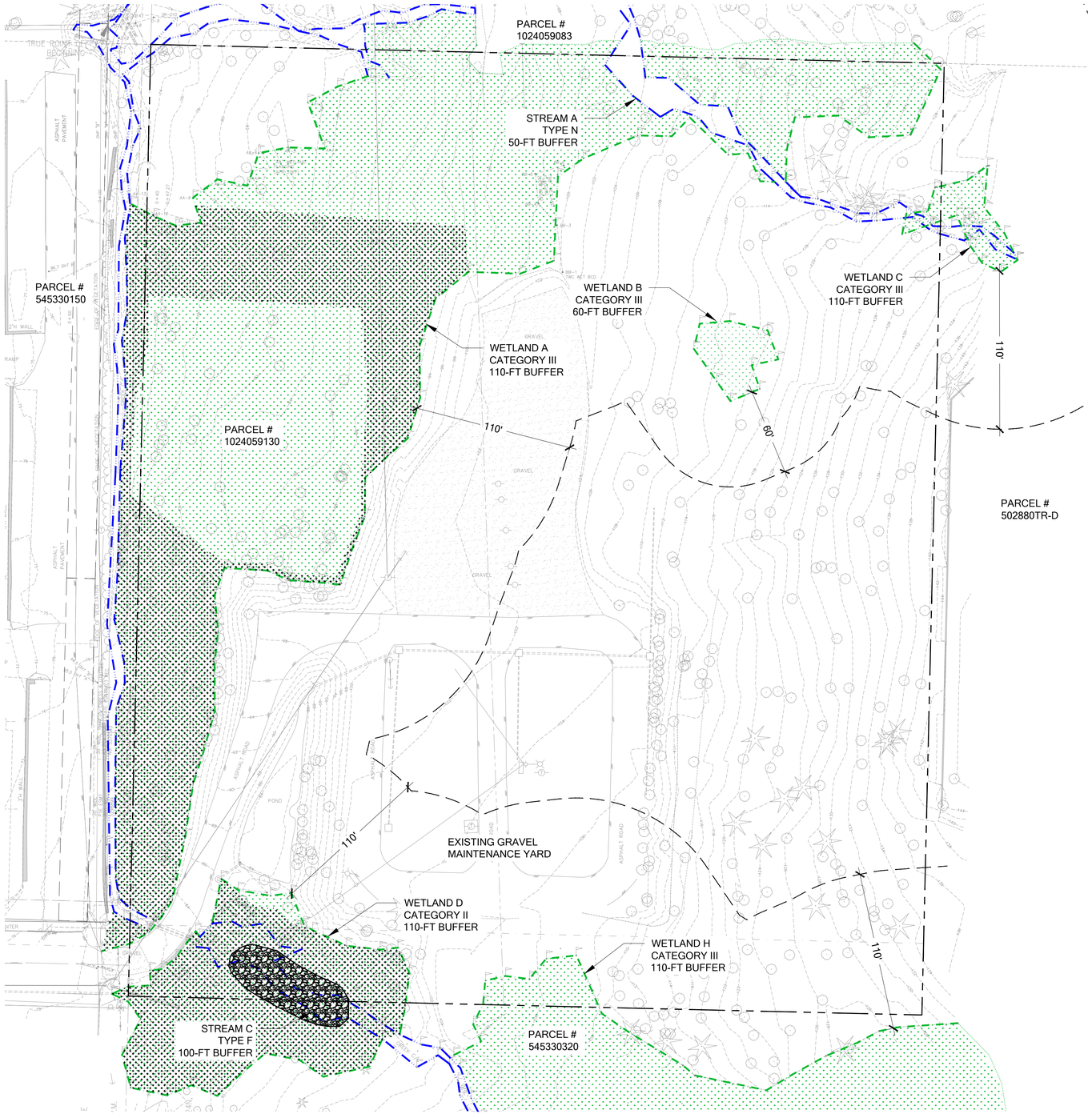
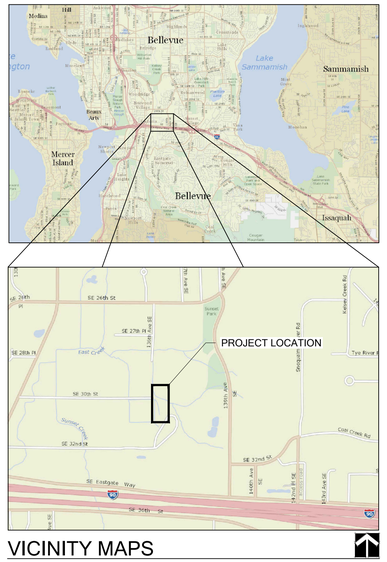
APPENDIX A

Mitigation Plans





VICINITY MAPS

LEGEND

- WETLAND BOUNDARY
- WETLAND BOUNDARY (APPROXIMATE)
- STREAM BOUNDARY (OHWM)
- CRITICAL AREA BUFFER
- PROPERTY BOUNDARY
- DEGRADED WETLAND WITHIN PROJECT AREA
- COARSE DEPOSITION

NOTES

1. CRITICAL AREAS DELINEATED BY THE WATERSHED COMPANY IN OCTOBER 2016, FEBRUARY 2017 AND APRIL 2017.
2. SURVEY RECEIVED FROM APS SURVEY & MAPPING. 13221 S.E. 26TH STREET, SUITE A, BELLEVUE, WA 98005. PHONE: (425) 746-3200.

SHEET INDEX

W1 EXISTING CONDITIONS
W2 SITE PREPARATION & TESC PLAN
W3 GRADING & LARGE WOODY DEBRIS PLAN
W4 ENHANCEMENT PLAN
W5 PLANTING PLAN & SCHEDULE
W6 PLANTING NOTES & DETAILS
W7 MITIGATION NOTES

EXISTING CONDITIONS

SCALE: 1" = 40'

0 20' 40' 80' 160'

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750 Sixth Street South
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p 425.822.5242 f 425.827.8136
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Science & Design

PSE RICHARDS CREEK SUBSTATION

RICHARDS CREEK SUB-BASIN MITIGATION PLAN
PREPARED FOR: PUGET SOUND ENERGY
ENERGIZE EASTSIDE, SOUTH BELLEVUE SEGMENT
PARCELS #: 1024059130, 1024059083, 5453300150
BELLEVUE, WA

SUBMITTALS & REVISIONS

NO.	DATE	DESCRIPTION	BY
1	04-18-2018	MITIGATION PLAN	LM
2	12-03-2018	RESPONSE TO CITY COMMENTS	LM

GENERAL NOTES:

SHEET SIZE:
ORIGINAL PLAN IS 24" X 36".
SCALE ACCORDINGLY.

PROJECT MANAGER: JC
DESIGNED: LM
DRAFTED: LM
CHECKED: JC / AM
JOB NUMBER:
111103.11
SHEET NUMBER:
W1 OF 7

FILENAME: MITIGATION_PLAN.DWG
PRINTED BY: LOGAN MCCLISH
DATE: 12/5/2018

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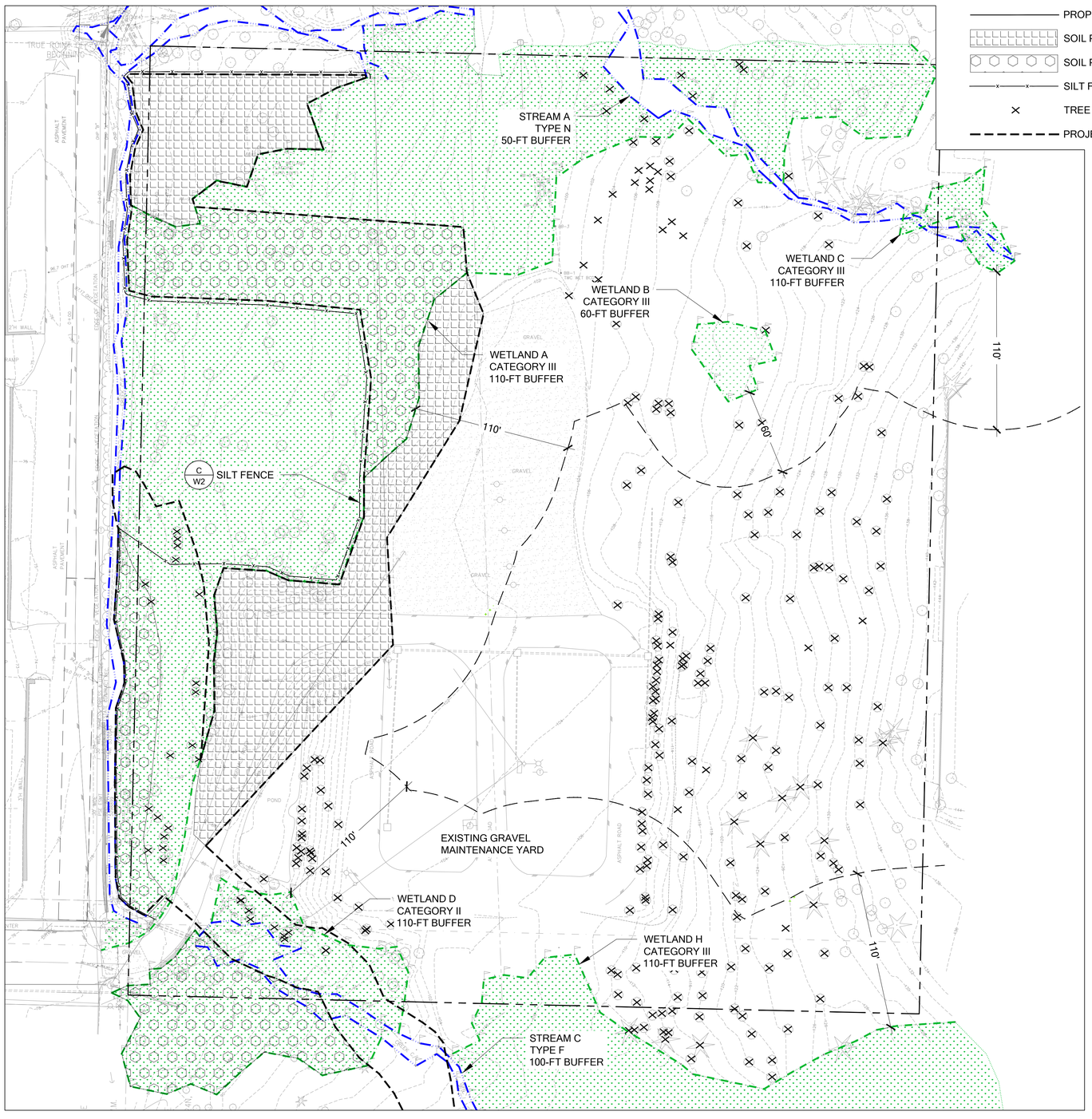


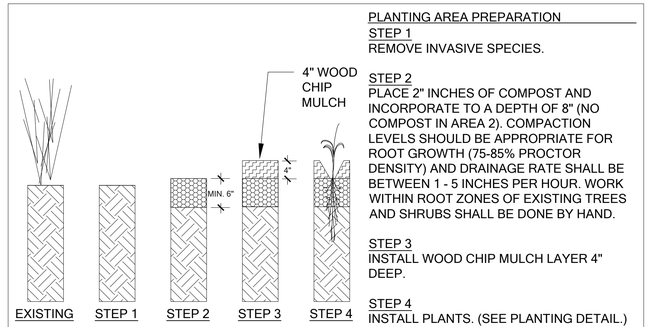
LEGEND

- WETLAND BOUNDARY
- WETLAND BOUNDARY (APPROXIMATE)
- STREAM BOUNDARY (OHWM)
- CRITICAL AREA BUFFER
- PROPERTY BOUNDARY
- SOIL PREP AREA 1 (A / W2)
- SOIL PREP AREA 2 (B / W2)
- SILT FENCE (C / W2)
- TREE TO BE REMOVED
- PROJECT BOUNDARY

SITE PREPARATION & TESC PLAN

SCALE: 1" = 40'

0 20' 40' 80' 160'



PLANTING AREA PREPARATION

STEP 1
REMOVE INVASIVE SPECIES.

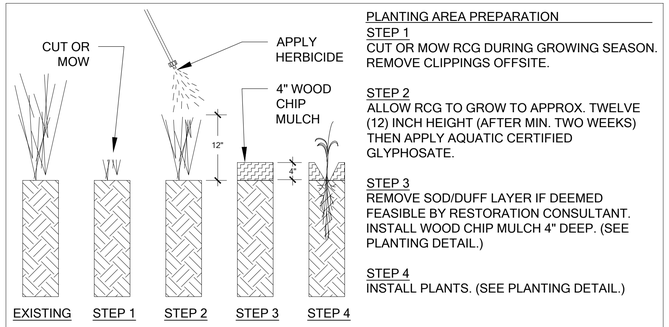
STEP 2
PLACE 2" INCHES OF COMPOST AND INCORPORATE TO A DEPTH OF 8" (NO COMPOST IN AREA 2). COMPACTION LEVELS SHOULD BE APPROPRIATE FOR ROOT GROWTH (75-85% PROCTOR DENSITY) AND DRAINAGE RATE SHALL BE BETWEEN 1 - 5 INCHES PER HOUR. WORK WITHIN ROOT ZONES OF EXISTING TREES AND SHRUBS SHALL BE DONE BY HAND.

STEP 3
INSTALL WOOD CHIP MULCH LAYER 4" DEEP.

STEP 4
INSTALL PLANTS. (SEE PLANTING DETAIL.)

A SOIL PREPARATION AREA 1

SEQUENCE OF WORK - NOT TO SCALE



PLANTING AREA PREPARATION

STEP 1
CUT OR MOW RCG DURING GROWING SEASON. REMOVE CLIPPINGS OFFSITE.

STEP 2
ALLOW RCG TO GROW TO APPROX. TWELVE (12) INCH HEIGHT (AFTER MIN. TWO WEEKS) THEN APPLY AQUATIC CERTIFIED GLYPHOSATE.

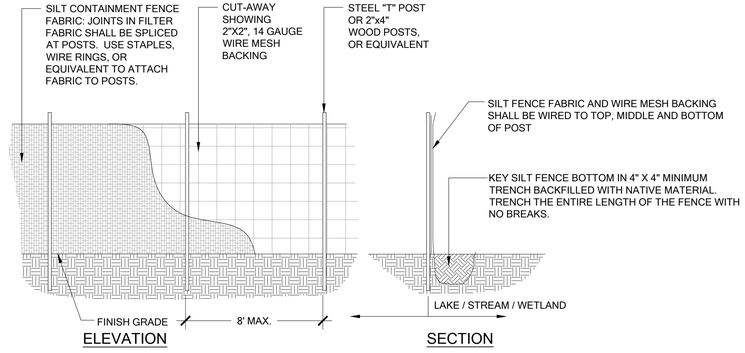
STEP 3
REMOVE SOD/DUFF LAYER IF DEEMED FEASIBLE BY RESTORATION CONSULTANT. INSTALL WOOD CHIP MULCH 4" DEEP. (SEE PLANTING DETAIL.)

STEP 4
INSTALL PLANTS. (SEE PLANTING DETAIL.)

B SOIL PREPARATION AREA 2

SEQUENCE OF WORK - NOT TO SCALE

SILT FENCE MAINTENANCE STANDARDS:
1. ANY DAMAGE SHALL BE REPAIRED IMMEDIATELY.
2. SEDIMENT SHALL BE REMOVED WHEN ACCUMULATION EXCEEDS 6" IN DEPTH.



C SILT FENCE

Scale: NTS

NOTE

1. SEE STREAM RESTORATION AND CULVERT REPLACEMENT PLAN FOR STREAM WORK TESC.

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SHEET NUMBER:
W2 OF 7

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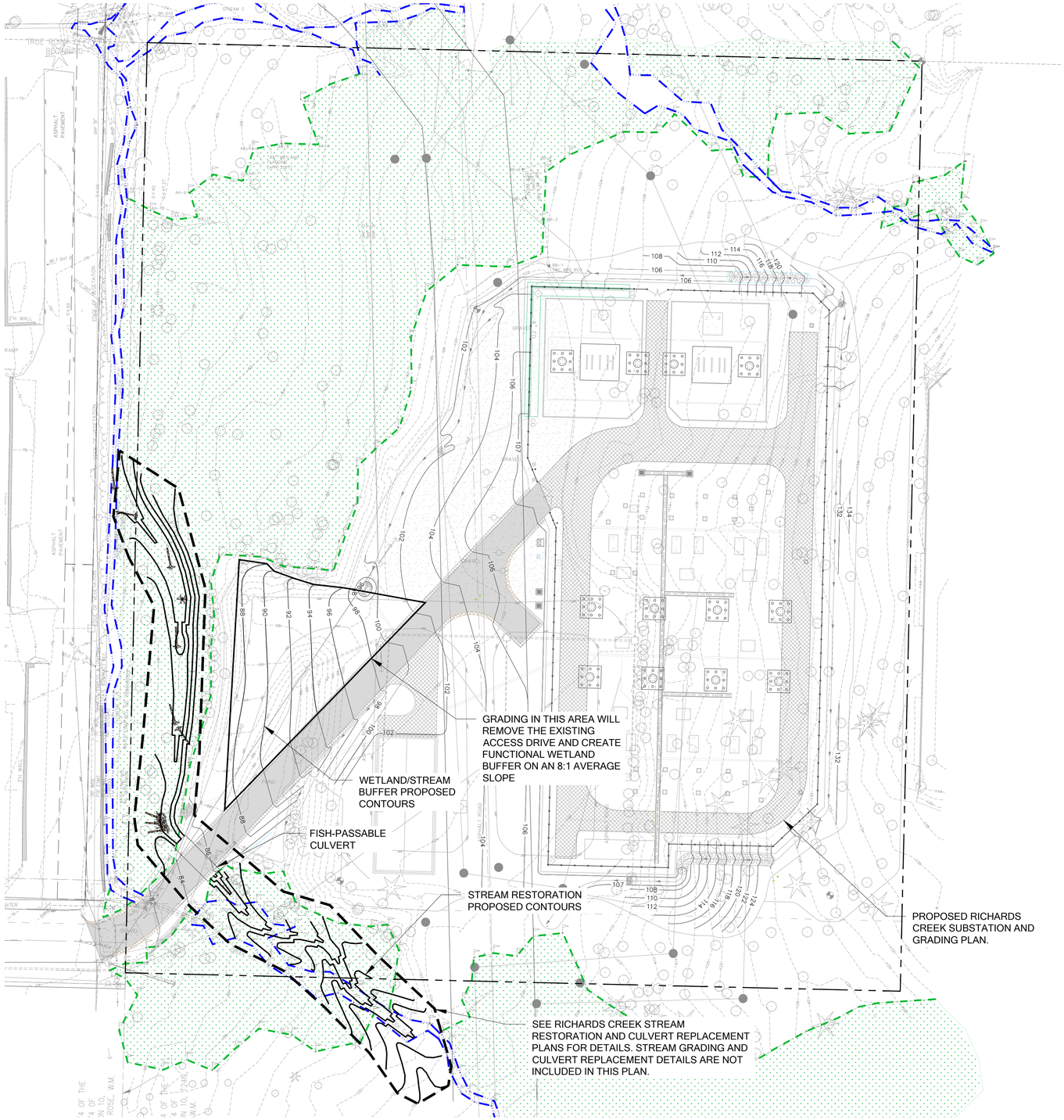

GRADING AND LARGE WOODY DEBRIS PLAN

SCALE: 1" = 40'

NOTES

1. REMOVAL OF THE EXISTING ACCESS DRIVE AND REGRADING WILL CHANGE THE EXISTING 3:1 SLOPE TO AN AVERAGE 8:1 SLOPE.

LEGEND

- WETLAND BOUNDARY
- WETLAND BOUNDARY (APPROXIMATE)
- STREAM BOUNDARY (OHWM)
- CRITICAL AREA BUFFER
- PROPERTY BOUNDARY
- PROPOSED STREAM/BUFFER CONTOURS
- PROPOSED SUBSTATION CONTOURS
- STREAM PROJECT AREA
- LARGE WOODY DEBRIS

0 20' 40' 80' 160'

Know what's **below.** **Call** before you dig.

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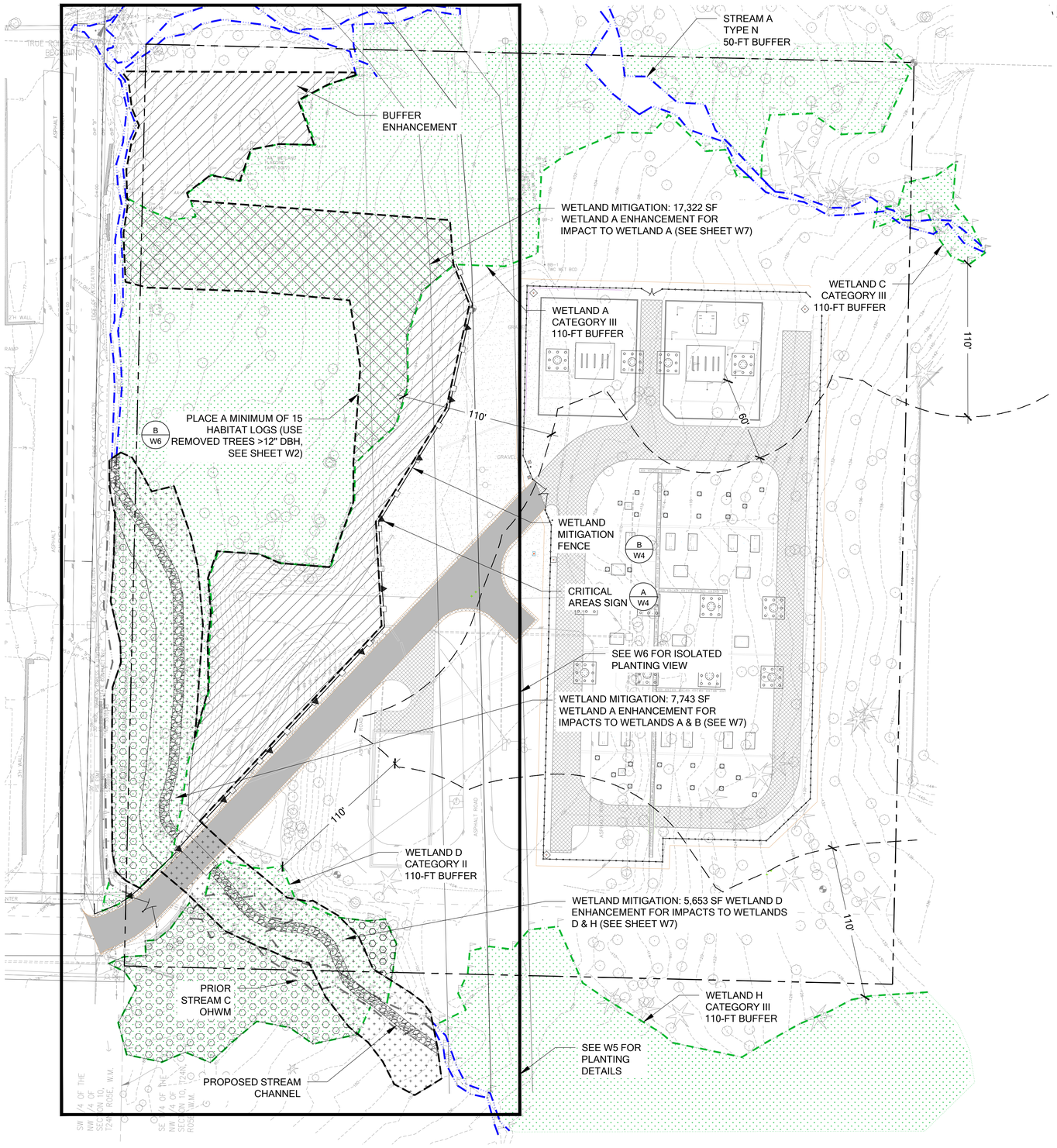
DSD 001067



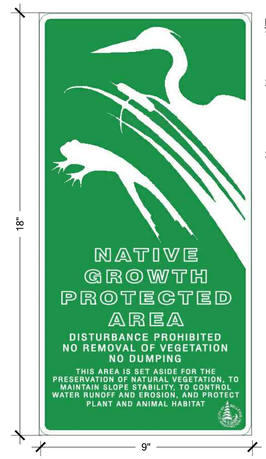
ENHANCEMENT PLAN

SCALE: 1" = 40'

0 20' 40' 80' 160'

NOTES

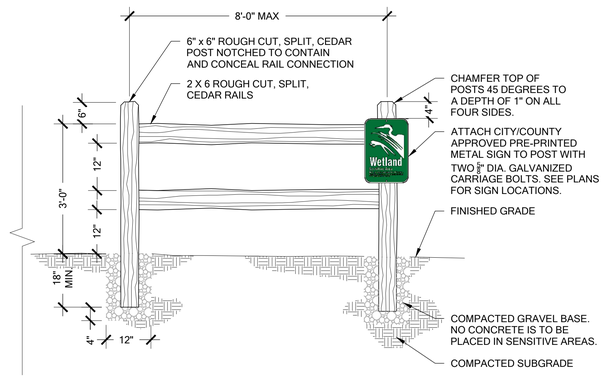
1. THE EXISTING CHANNEL WILL NOT BE FILLED IN AFTER STREAM FLOW IS DIVERTED INTO THE NEW CHANNEL. THE REMNANT CHANNEL IS ANTICIPATED TO CONTINUE TO CAPTURE SEEPAGE AND SHALLOW GROUNDWATER AND WILL CONTINUE TO PROVIDE ECOLOGICAL DIVERSITY AND IS EXPECTED TO FUNCTION AS WETLAND.



NOTES:
1. SIGNAGE TO APPEAR LIKE IMAGE WITH A GREEN BACKGROUND AND SIZED AS NOTED.
2. SIGN TO BE FABRICATED IN ALUMINUM, BY A CITY APPROVED VENDOR, OR EQUIVALENT MANUFACTURER.
3. SIGNAGE TO BE PLACED ON CHAIN LINK FENCE OR POST EVERY 50-FT.

A NGPA SIGN

Scale: NTS



B SPLIT RAIL FENCE WITH CRITICAL AREA SIGN (SEE W3)

Scale: NTS

LEGEND

- WETLAND BOUNDARY
- WETLAND BOUNDARY (APPROXIMATE)
- STREAM BOUNDARY (OHWM)
- CRITICAL AREA BUFFER
- PROPERTY BOUNDARY
- WETLAND A MITIGATION ENHANCEMENT (17,322 SF)
- WETLAND / STREAM BUFFER MITIGATION ENHANCEMENT (32,013 SF)
- PROJECT BOUNDARY
- CRITICAL AREAS FENCE AND SIGNS
- STREAM RESTORATION PROJECT: INCLUDES 13,396 SF WETLAND MITIGATION ENHANCEMENT (7,743 SF IN WETLAND A AND 5,653 IN WETLAND D) AND 3,323 SF WETLAND/STREAM BUFFER MITIGATION ENHANCEMENT
- ADDITIONAL, NON-COMPENSATORY ENHANCEMENT (6,215 SF IN WETLAND A AND 12,050 SF IN WETLAND D)

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PSE RICHARDS CREEK SUBSTATION
RICHARDS CREEK SUB-BASIN MITIGATION PLAN
PREPARED FOR: PUGET SOUND ENERGY
ENERGIZE EASTSIDE, SOUTH BELLEVUE SEGMENT
PARCELS #: 1024059130, 1024059083, 5453300150
BELLEVUE, WA

SUBMITTALS & REVISIONS

NO.	DATE	DESCRIPTION	BY
1	04-18-2018	MITIGATION PLAN	LM
2	12-06-2018	RESPONSE TO CITY COMMENTS	LM

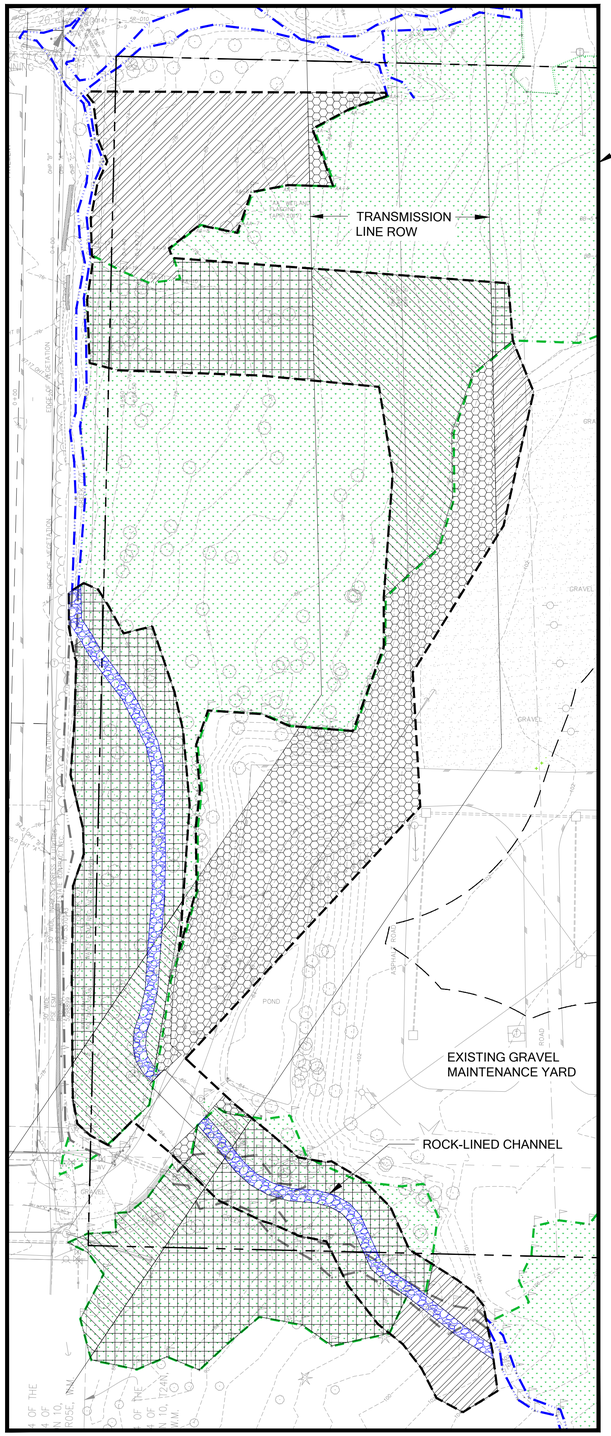
GENERAL NOTES:

SHEET SIZE:
ORIGINAL PLAN IS 24" X 36".
SCALE ACCORDINGLY.

PROJECT MANAGER: JC
DESIGNED: LM
DRAFTED: LM
CHECKED: JC / AM
JOB NUMBER:
111103.11
SHEET NUMBER:
W4 OF 7

FILENAME: MITIGATION_PLAN.DWG
PRINTED BY: LOGAN MCCLISH
DATE: 12/12/2018

DSD 001068



LEGEND

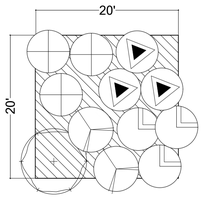
- WETLAND BOUNDARY
- WETLAND BOUNDARY (APPROXIMATE)
- STREAM BOUNDARY (OHWM)
- CRITICAL AREA BUFFER
- PROPERTY BOUNDARY
- PROJECT BOUNDARY

NOTES

1.* FOCUS SITKA SPRUCE IN AREAS HEAVILY DOMINATED BY REEDCANARY GRASS
2. PIT PLANTING ONLY IN AREAS OF EXISTING NATIVE VEGETATION. NATIVE VEGETATION MUST BE FLAGGED BY A RESTORATION SPECIALIST PRIOR TO PLANT INSTALLATION.

WETLAND ENHANCEMENT PLANTING TYPICAL (ROW)

TOTAL AREA = 16,175

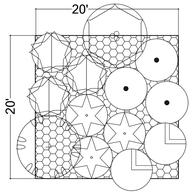


	SIZE	SPACING	SIZE
TREES			
SALIX LUCIDA / PACIFIC WILLOW	80	9 O.C.	2 GAL.
SALIX SITCHENSIS / SITKA WILLOW	80		2 GAL.
			2 GAL.
SHRUBS			
CORNUS SERICEA / RED-OSIER DOGWOOD	116	6' O.C.	1 GAL.
ROSA NUTKANA / NOOTKA ROSE	116		1 GAL.
RUBUS SPECTABILIS / SALMONBERRY	116		1 GAL.
PHYSOCARPUS CAPITATUS/ PACIFIC NINEBARK	116		1 GAL.
GROUNDCOVER			
*ALL SPECIES TO BE SPACED TRIANGULARLY			
ATHYRIUM FILIX-FEMINA/ LADY FERN (NO INUNDATION)	1280	24" O.C.	1 GAL
TOLMIEA MENZIESII /PIGGYBACK PLANT (NO INUNDATION)	1280		1 GAL
SCIRPUS MICROCARPUS / SMALL FRUITED BULRUSH	1280		1 GAL.

(PLANT BY SPECIES IN ODD GROUPS OF 9-15)

BUFFER ENHANCEMENT PLANTING TYPICAL (ROW)

TOTAL AREA = 19,010

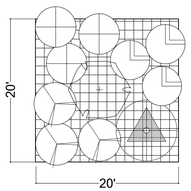


	QTY	SPACING	SIZE
TREES			
SALIX SCOULERIANA / SCOULER'S WILLOW	114	9 O.C.	2 GAL
AMELANCHIER ALNIFOLIA / PACIFIC SERVICEBERRY	114		2 GAL
SHRUBS			
RUBUS SPECTABILIS / SALMONBERRY	120	6' O.C.	1 GAL
SYMPHORICARPUS ALBUS / SNOWBERRY	120		1 GAL
OEMLERIA CERASIFORMIS / OSOBERRY	120		1 GAL
MAHONIA AQUIFOLIUM / TALL OREGON GRAPE	120		1 GAL
ACER CIRCINATUM / VINE MAPLE	120		1 GAL
GROUNDCOVER			
*ALL SPECIES TO BE SPACED TRIANGULARLY			
POLYSTICHUM MUNITUM / SWORD FERN	2320	24" O.C.	1 GAL
BLECHNUM SPICANT / DEER FERN	2320		1 GAL

(PLANT BY SPECIES IN ODD GROUPS OF 9-15)

WETLAND ENHANCEMENT PLANTING TYPICAL

TOTAL AREA = 31,650

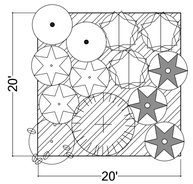


	QTY	SPACING	SIZE
TREES (66)			
ALNUS RUBRA / RED ALDER	38	9' O.C.	2 GAL.
FRAXINUS LATIFOLIA / OREGON ASH	38		2 GAL.
SALIX LUCIDA / PACIFIC WILLOW	38		2 GAL.
PICEA SITCHENSIS / SITKA SPRUCE*	76		2 GAL.
SALIX SITCHENSIS / SITKA WILLOW	38		2 GAL.
SHRUBS (600)			
CORNUS SERICEA / RED-OSIER DOGWOOD	150	6' O.C.	1 GAL.
ROSA NUTKANA / NOOTKA ROSE	150		1 GAL.
RUBUS SPECTABILIS / SALMONBERRY	150		1 GAL.
PHYSOCARPUS CAPITATUS/ PACIFIC NINEBARK	150		1 GAL.
GROUNDCOVER (3600)			
*ALL SPECIES TO BE SPACED TRIANGULARLY			
ATHYRIUM FILIX-FEMINA/ LADY FERN (NO INUNDATION)	1160	24" O.C.	1 GAL
TOLMIEA MENZIESII /PIGGYBACK PLANT (NO INUNDATION)	1160		1 GAL
SCIRPUS MICROCARPUS / SMALL FRUITED BULRUSH	1160		1 GAL.
CAREX OBNUPTA/ SLOUGH SEDGE (BACKWATER AREAS)	1160		1 GAL.

(PLANT BY SPECIES IN ODD GROUPS OF 9-15)

BUFFER ENHANCEMENT PLANTING TYPICAL

TOTAL AREA = 13,435



	QTY	SPACING	SIZE
TREES (48)			
PSEUDOTSUGA MENZIESII / DOUGLAS-FIR	26	9' O.C.	2 GAL
THUJA PLUCATA / WESTERN RED CEDAR	26		2 GAL
ARBUTUS MENZIESII / PACIFIC MADRONE (PLANT NEXT TO DOUGLAS-FIR)	26		2 GAL
PRUNUS EMARGINATA / BITTER CHEERY	26		
SALIX SCOULERIANA / SCOULER'S WILLOW	26		2 GAL
ACER MACROPHYLLUM / BIG LEAF MAPLE (AWAY FROM ACCESS DRIVE)	26		2 GAL
SHRUBS (240)			
RUBUS SPECTABILIS / SALMONBERRY	70	6' O.C.	1 GAL
SYMPHORICARPUS ALBUS / SNOWBERRY	70		1 GAL
OEMLERIA CERASIFORMIS / OSOBERRY	70		1 GAL
MAHONIA NERVOSA / LOW OREGON GRAPE	70		1 GAL
MAHONIA AQUIFOLIUM / TALL OREGON GRAPE	70		1 GAL
ACER CIRCINATUM / VINE MAPLE	70		1 GAL
GROUNDCOVER (3290)			
*ALL SPECIES TO BE SPACED TRIANGULARLY			
POLYSTICHUM MUNITUM / SWORD FERN	1640	24" O.C.	1 GAL
BLECHNUM SPICANT / DEER FERN	1640		1 GAL

(PLANT BY SPECIES IN ODD GROUPS OF 9-15)

PLANTING PLAN & SCHEDULE

SCALE: 1" = 40'

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2	12-03-2018	RESPONSE TO CITY COMMENTS	LM

GENERAL NOTES:

SHEET SIZE:
ORIGINAL PLAN IS 24" X 36".
SCALE ACCORDINGLY.

PROJECT MANAGER: JC
DESIGNED: LM
DRAFTED: LM
CHECKED: JC / AM
JOB NUMBER:
111103.11
SHEET NUMBER:
W5 OF 7

DATE: 12/5/2018 | PRINTED BY: LOGAN MCCLISH | FILENAME: MITIGATION_PLAN.DWG

PLANT INSTALLATION SPECIFICATIONS

GENERAL NOTES

QUALITY ASSURANCE
1. PLANTS SHALL MEET OR EXCEED THE SPECIFICATIONS OF FEDERAL, STATE, AND LOCAL LAWS REQUIRING INSPECTION FOR PLANT DISEASE AND INSECT CONTROL.
2. PLANTS SHALL BE HEALTHY, VIGOROUS, AND WELL-FORMED, WITH WELL DEVELOPED, FIBROUS ROOT SYSTEMS, FREE FROM DEAD BRANCHES OR ROOTS. PLANTS SHALL BE FREE FROM DAMAGE CAUSED BY TEMPERATURE EXTREMES, LACK OR EXCESS OF MOISTURE, INSECTS, DISEASE, AND MECHANICAL INJURY. PLANTS IN LEAF SHALL BE WELL FOLIATED AND OF GOOD COLOR. PLANTS SHALL BE HABITUATED TO THE OUTDOOR ENVIRONMENTAL CONDITIONS INTO WHICH THEY WILL BE PLANTED (HARDENED-OFF).
3. TREES WITH DAMAGED, CROOKED, MULTIPLE OR BROKEN LEADERS WILL BE REJECTED. WOODY PLANTS WITH ABRASIONS OF THE BARK OR SUN SCALD WILL BE REJECTED.
4. NOMENCLATURE: PLANT NAMES SHALL CONFORM TO FLORA OF THE PACIFIC NORTHWEST BY HITCHCOCK AND CRONQUIST, UNIVERSITY OF WASHINGTON PRESS, 1973 AND/OR TO A FIELD GUIDE TO THE COMMON WETLAND PLANTS OF WESTERN WASHINGTON & NORTHWESTERN OREGON, ED. SARAH SPEAR COOKE, SEATTLE AUDUBON SOCIETY, 1997.

DEFINITIONS
1. PLANTS/PLANT MATERIALS. PLANTS AND PLANT MATERIALS SHALL INCLUDE ANY LIVE PLANT MATERIAL USED ON THE PROJECT. THIS INCLUDES BUT IS NOT LIMITED TO CONTAINER GROWN, B&B OR BAREROOT PLANTS; LIVE STAKES AND FASCINES (WATTLES); TUBERS, CORMS, BULBS, ETC..; SPRIGS, PLUGS, AND LINERS.
2. CONTAINER GROWN. CONTAINER GROWN PLANTS ARE THOSE WHOSE ROOTBALLS ARE ENCLOSED IN A POT OR BAG IN WHICH THAT PLANT GREW.

SUBSTITUTIONS
1. IT IS THE CONTRACTOR'S RESPONSIBILITY TO OBTAIN SPECIFIED MATERIALS IN ADVANCE IF SPECIAL GROWING, MARKETING OR OTHER ARRANGEMENTS MUST BE MADE IN ORDER TO SUPPLY SPECIFIED MATERIALS.
2. SUBSTITUTION OF PLANT MATERIALS NOT ON THE PROJECT LIST WILL NOT BE PERMITTED UNLESS AUTHORIZED IN WRITING BY THE RESTORATION CONSULTANT.
3. IF PROOF IS SUBMITTED THAT ANY PLANT MATERIAL SPECIFIED IS NOT OBTAINABLE, A PROPOSAL WILL BE CONSIDERED FOR USE OF THE NEAREST EQUIVALENT SIZE OR ALTERNATIVE SPECIES, WITH CORRESPONDING ADJUSTMENT OF CONTRACT PRICE.
4. SUCH PROOF WILL BE SUBSTANTIATED AND SUBMITTED IN WRITING TO THE CONSULTANT AT LEAST 30 DAYS PRIOR TO START OF WORK UNDER THIS SECTION.

INSPECTION
1. PLANTS SHALL BE SUBJECT TO INSPECTION AND APPROVAL BY THE RESTORATION CONSULTANT FOR CONFORMANCE TO SPECIFICATIONS, EITHER AT TIME OF DELIVERY ON-SITE OR AT THE GROWER'S NURSERY. APPROVAL OF PLANT MATERIALS AT ANY TIME SHALL NOT IMPAIR THE SUBSEQUENT RIGHT OF INSPECTION AND REJECTION DURING PROGRESS OF THE WORK.
2. PLANTS INSPECTED ON SITE AND REJECTED FOR NOT MEETING SPECIFICATIONS MUST BE REMOVED IMMEDIATELY FROM SITE OR RED-TAGGED AND REMOVED AS SOON AS POSSIBLE.
3. THE RESTORATION CONSULTANT MAY ELECT TO INSPECT PLANT MATERIALS AT THE PLACE OF GROWTH. AFTER INSPECTION AND ACCEPTANCE, THE RESTORATION CONSULTANT MAY REQUIRE THE INSPECTED PLANTS BE LABELED AND RESERVED FOR PROJECT. SUBSTITUTION OF THESE PLANTS WITH OTHER INDIVIDUALS, EVEN OF THE SAME SPECIES AND SIZE, IS UNACCEPTABLE.

MEASUREMENT OF PLANTS
1. PLANTS SHALL CONFORM TO SIZES SPECIFIED UNLESS SUBSTITUTIONS ARE MADE AS OUTLINED IN THIS CONTRACT.
2. HEIGHT AND SPREAD DIMENSIONS SPECIFIED REFER TO MAIN BODY OF PLANT AND NOT BRANCH OR ROOT TIP TO TIP. PLANT DIMENSIONS SHALL BE MEASURED WHEN THEIR BRANCHES OR ROOTS ARE IN THEIR NORMAL POSITION.
3. WHERE A RANGE OF SIZE IS GIVEN, NO PLANT SHALL BE LESS THAN THE MINIMUM SIZE AND AT LEAST 50% OF THE PLANTS SHALL BE AS LARGE AS THE MEDIAN OF THE SIZE RANGE. (EXAMPLE: IF THE SIZE RANGE IS 12" TO 18", AT LEAST 50% OF PLANTS MUST BE 15" TALL.).

SUBMITTALS

PROPOSED PLANT SOURCES
1. WITHIN 45 DAYS AFTER AWARD OF THE CONTRACT, SUBMIT A COMPLETE LIST OF PLANT MATERIALS PROPOSED TO BE PROVIDED DEMONSTRATING CONFORMANCE WITH THE REQUIREMENTS SPECIFIED. INCLUDE THE NAMES AND ADDRESSES OF ALL GROWERS AND NURSERIES.

PRODUCT CERTIFICATES
1. PLANT MATERIALS LIST - SUBMIT DOCUMENTATION TO CONSULTANT AT LEAST 30 DAYS PRIOR TO START OF WORK UNDER THIS SECTION THAT PLANT MATERIALS HAVE BEEN ORDERED. ARRANGE PROCEDURE FOR INSPECTION OF PLANT MATERIAL WITH CONSULTANT AT TIME OF SUBMISSION.
2. HAVE COPIES OF VENDOR'S OR GROWERS' INVOICES OR PACKING SLIPS FOR ALL PLANTS ON SITE DURING INSTALLATION. INVOICE OR PACKING SLIP SHOULD LIST SPECIES BY SCIENTIFIC NAME, QUANTITY, AND DATE DELIVERED (AND GENETIC ORIGIN IF THAT INFORMATION WAS PREVIOUSLY REQUESTED).

DELIVERY, HANDLING, & STORAGE

NOTIFICATION
CONTRACTOR MUST NOTIFY CONSULTANT 48 HOURS OR MORE IN ADVANCE OF DELIVERIES SO THAT CONSULTANT MAY ARRANGE FOR INSPECTION.

PLANT MATERIALS
1. TRANSPORTATION - DURING SHIPPING, PLANTS SHALL BE PACKED TO PROVIDE PROTECTION AGAINST CLIMATE EXTREMES, BREAKAGE AND DRYING. PROPER VENTILATION AND PREVENTION OF DAMAGE TO BARK, BRANCHES, AND ROOT SYSTEMS MUST BE ENSURED.
2. SCHEDULING AND STORAGE - PLANTS SHALL BE DELIVERED AS CLOSE TO PLANTING AS POSSIBLE. PLANTS IN STORAGE MUST BE PROTECTED AGAINST ANY CONDITION THAT IS DETRIMENTAL TO THEIR CONTINUED HEALTH AND VIGOR.
3. HANDLING - PLANT MATERIALS SHALL NOT BE HANDLED BY THE TRUNK, LIMBS, OR FOLIAGE BUT ONLY BY THE CONTAINER, BALL, BOX, OR OTHER PROTECTIVE STRUCTURE, EXCEPT BAREROOT PLANTS SHALL BE KEPT IN BUNDLES UNTIL PLANTING AND THEN HANDLED CAREFULLY BY THE TRUNK OR STEM.
4. LABELS - PLANTS SHALL HAVE DURABLE, LEGIBLE LABELS STATING CORRECT SCIENTIFIC NAME AND SIZE. TEN PERCENT OF CONTAINER GROWN PLANTS IN INDIVIDUAL POTS SHALL BE LABELED. PLANTS SUPPLIED IN FLATS, RACKS, BOXES, BAGS, OR BUNDLES SHALL HAVE ONE LABEL PER GROUP.

WARRANTY

PLANT WARRANTY
PLANTS MUST BE GUARANTEED TO BE TRUE TO SCIENTIFIC NAME AND SPECIFIED SIZE, AND TO BE HEALTHY AND CAPABLE OF VIGOROUS GROWTH.

REPLACEMENT
1. PLANTS NOT FOUND MEETING ALL OF THE REQUIRED CONDITIONS AT THE CONSULTANT'S DISCRETION MUST BE REMOVED FROM SITE AND REPLACED IMMEDIATELY AT THE CONTRACTOR'S EXPENSE.
2. PLANTS NOT SURVIVING AFTER ONE YEAR TO BE REPLACED AT THE CONTRACTOR'S EXPENSE.

PLANT MATERIAL

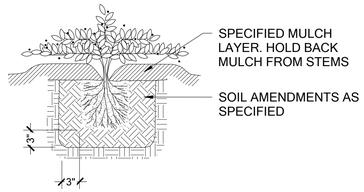
GENERAL
1. PLANTS SHALL BE NURSERY GROWN IN ACCORDANCE WITH GOOD HORTICULTURAL PRACTICES UNDER CLIMATIC CONDITIONS SIMILAR TO OR MORE SEVERE THAN THOSE OF THE PROJECT SITE.
2. PLANTS SHALL BE TRUE TO SPECIES AND VARIETY OR SUBSPECIES. NO CULTIVARS OR NAMED VARIETIES SHALL BE USED UNLESS SPECIFIED AS SUCH.

QUANTITIES
SEE PLANT LIST ON ACCOMPANYING PLANS AND PLANT SCHEDULES.

ROOT TREATMENT
1. CONTAINER GROWN PLANTS (INCLUDES PLUGS): PLANT ROOT BALLS MUST HOLD TOGETHER WHEN THE PLANT IS REMOVED FROM THE POT, EXCEPT THAT A SMALL AMOUNT OF LOOSE SOIL MAY BE ON THE TOP OF THE ROOTBALL.
2. PLANTS MUST NOT BE ROOT-BOUND; THERE MUST BE NO CIRCLING ROOTS PRESENT IN ANY PLANT INSPECTED.
3. ROOTBALLS THAT HAVE CRACKED OR BROKEN WHEN REMOVED FROM THE CONTAINER SHALL BE REJECTED.

PLANTING NOTES & DETAILS

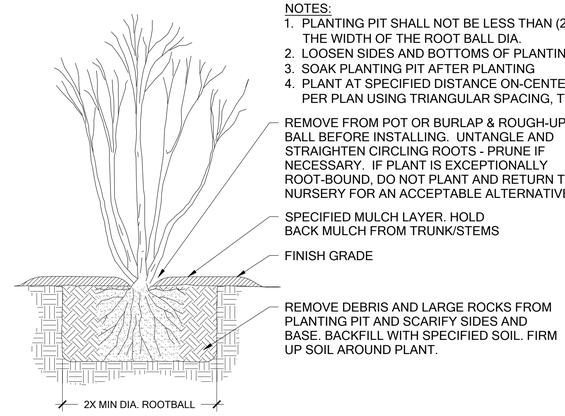
NOTES:
1. PLANT GROUNDCOVER AT SPECIFIED DISTANCE ON-CENTER (O.C.) USING TRIANGULAR SPACING, TYP.
2. LOOSEN SIDES AND BOTTOM OF PLANTING PIT AND REMOVE DEBRIS
3. LOOSEN ROOTBOUND PLANTS BEFORE INSTALLING
4. SOAK PIT BEFORE AND AFTER INSTALLING PLANT



A TREE AND SHRUB PLANTING

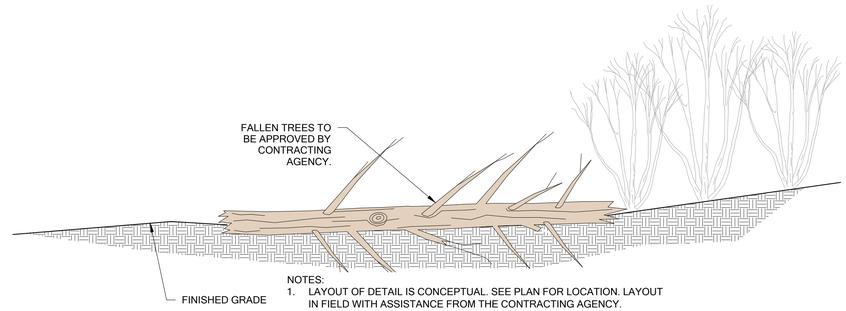
Scale: NTS

NOTES:
1. PLANTING PIT SHALL NOT BE LESS THAN (2) TIMES THE WIDTH OF THE ROOT BALL DIA.
2. LOOSEN SIDES AND BOTTOMS OF PLANTING PIT
3. SOAK PLANTING PIT AFTER PLANTING
4. PLANT AT SPECIFIED DISTANCE ON-CENTER (O.C.) PER PLAN USING TRIANGULAR SPACING, TYP.



C GROUNDCOVER PLANTING

Scale: NTS



NOTES:
1. LAYOUT OF DETAIL IS CONCEPTUAL. SEE PLAN FOR LOCATION. LAYOUT IN FIELD WITH ASSISTANCE FROM THE CONTRACTING AGENCY.
2. LAY TREE PARALLEL TO CONTOURS PER GEOTECH REPORT.
3. TREES SHALL BE FROM THOSE REMOVED ONSITE. DO NOT IMPORT.

B HABITAT LOG

Scale: NTS

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2	12-03-2018	RESPONSE TO CITY COMMENTS	LM

GENERAL NOTES:

SHEET SIZE:
ORIGINAL PLAN IS 24" X 36".
SCALE ACCORDINGLY.

PROJECT MANAGER: JC
DESIGNED: LM
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CHECKED: JC / AM

JOB NUMBER:
111103.11

SHEET NUMBER:
W6 OF 7

PRINTED BY: LOGAN MCCLISH
DATE: 12/5/2018
FILENAME: MITIGATION_PLAN.DWG

DSD 001070

MITIGATION PLAN NOTES

MITIGATION AND MONITORING NOTES

EXECUTIVE SUMMARY

PSE'S ENERGIZE EASTSIDE PROJECT (THE PROJECT) PROPOSES TO UPGRADE EXISTING TRANSMISSION LINES IN SOUTH BELLEVUE IN ORDER TO INCREASE TRANSMISSION SYSTEM CAPACITY TO 230KV POWER. PROJECT ELEMENTS, EXISTING CONDITIONS, MITIGATION SEQUENCING, AND PROJECT IMPACTS TO CRITICAL AREAS ARE DISCUSSED IN THE REVISED *CITY OF BELLEVUE CRITICAL AREAS REPORT: PUGET SOUND ENERGY-ENERGIZE EASTSIDE PROJECT SOUTH BELLEVUE SEGMENT* (SOUTH BELLEVUE CAR) PREPARED BY THE WATERSHED COMPANY, DECEMBER 2018. THIS MITIGATION PLAN IS INTENDED TO REPRESENT THE FINAL RICHARDS CREEK SUBBASIN MITIGATION PLAN REFERENCED IN THE SOUTH BELLEVUE CAR. IT HAS BEEN DESIGNED TO APPROPRIATELY MITIGATE FOR PROJECT IMPACTS OCCURRING IN WETLANDS AND WETLAND AND STREAM BUFFERS IN THE RICHARDS CREEK SUBBASIN, AS DESCRIBED IN THE SOUTH BELLEVUE CAR AND REQUIRED BY THE BELLEVUE MUNICIPAL CODE (BMC). A SEPARATE MITIGATION PLAN IS PROPOSED FOR PROJECT IMPACTS OCCURRING IN THE COAL CREEK BASIN.

PROPOSED PROJECT ACTIVITIES IMPACT WETLANDS AND BUFFERS IN ONE OF FOUR WAYS: PERMANENT FILL RESULTING FROM DEVELOPMENT OF THE RICHARDS CREEK SUBSTATION AND TRANSMISSION POLE INSTALLATION/REPLACEMENT (PERMANENT), PERMANENT VEGETATION CONVERSION FROM A FORESTED VEGETATION TYPE DUE TO VEGETATION MANAGEMENT REQUIREMENTS (CONVERSION), DEVELOPMENT OF AN ALREADY IMPACTED, NON-FUNCTIONAL BUFFER AREA (REDEVELOPMENT), AND TEMPORARY IMPACTS ASSOCIATED WITH CONSTRUCTION ACTIVITIES (TEMPORARY). PERMANENT AND CONVERSION BUFFER IMPACTS REQUIRE MITIGATION AS SUMMARIZED IN THE TABLE BELOW.

IMPACTS and COMPENSATORY MITIGATION						
Critical Area Name	**Category**	**Type of Impact**	**Quantity (SF)**	**Mitigation Ratio**	**Mitigation Required (SF)**	**Amount (SF) and Location of Mitigation Proposed[2]**
Wetlands						
Wetland A	III	Conversion	9,945	2:1	19,890	19,890 Wetland A
Wetland A	III	Permanent	397	4:1	1,588	1,588 Wetland A
Wetland B	III	Permanent	2,060	4:1	8,240	3,587 Wetland A 4,653 Wetland D
Wetland D	II	Conversion	100	3:1	300	300 Wetland D
Wetland D	II	Permanent	41	6:1	246	246 Wetland D
Wetland H	III	Conversion	73	2:1	146	146 Wetland D
Wetland H	III	Permanent	77	4:1	308	308 Wetland D
				TOTAL	**30,718**	**30,718**
Buffers						
Combined Buffers	N/A	Permanent	23,893	1:1	23,893	23,893 Combined Wetland A/Wetland D/Stream C buffer
Combined Buffers	N/A	Conversion	22,886	0.5:1	11,443	11,443 Combined Wetland A/Wetland D/Stream C buffer
Combined Buffers	N/A	Redevelopment[3]	47,512[3]	N/A[3]	0[3]	NA
				TOTAL	**35,336**	**35,336**
ADDITIONAL RESTORATION (not required to mitigate impacts)						
Critical Area Name	**Category**	**Type of Activity**	**Quantity (SF)**			**Description**
Stream C	N/A	Restoration (Realignment)[4]	3,557			New stream channel
Wetland A	III	Enhancement	6,215			Area between new and old stream channel, outside of grading boundaries
Wetland D	II	Enhancement	11,160			Area of Wetland D outside of stream project grading boundaries

1. Only activities resulting in a long-term change are included. Temporary impacts will be restored in place and are not shown in this table.
2. All wetland mitigation proposed is wetland enhancement.
3. This buffer area is already developed and is considered non-functioning; therefore, no mitigation is required.
4. Existing stream channel will be abandoned (not filled) with stream restoration/realignment activities.

MITIGATION FOR IMPACTS, PRESENTED IN THE TABLE ABOVE, IS PLANNED ON THE RICHARDS CREEK SUBSTATION SITE. AS DISCUSSED IN THE SOUTH BELLEVUE CAR, THIS LOCATION WAS SELECTED FOR MITIGATION ACTIVITIES BASED UPON THE LOCATION OF PROJECT IMPACTS, OPPORTUNITY PRESENT, PROPERTY OWNERSHIP, AND PROXIMITY TO OTHER REGULATED CRITICAL AREAS.

THIS FINAL MITIGATION PLAN PROPOSES TO COMPENSATE FOR PROJECT IMPACTS THROUGH WETLAND AND WETLAND BUFFER ENHANCEMENT IN AND ADJACENT TO WETLANDS A AND D AND A PROPOSED REALIGNED TRIBUTARY TO RICHARDS CREEK. THESE MITIGATION ACTIVITIES ARE INTENDED TO INCREASE NATIVE PLANT COVER, DECREASE INVASIVE SPECIES PREVALENCE, IMPROVE NATIVE SPECIES DIVERSITY, AND PROVIDE FOOD AND OTHER HABITAT RESOURCES FOR WILDLIFE. ADDITIONAL, NON-COMPENSATORY ENHANCEMENT IS ALSO PROPOSED IN WETLANDS A AND D, ABOVE WHAT IS REQUIRED TO MITIGATE PROJECT IMPACTS.

THE PLAN INCLUDES A COMPREHENSIVE FIVE-YEAR MAINTENANCE AND MONITORING PLAN, DETAILED BELOW. THESE SPECIFICATIONS AND STANDARDS WILL ENSURE THAT ENHANCEMENT PLANTINGS WILL BE MAINTAINED, MONITORED, AND SUCCESSFULLY ESTABLISHED WITHIN THE FIRST FIVE YEARS FOLLOWING IMPLEMENTATION.

GOALS

1. ENHANCE THE UNNAMED TRIBUTARY OF RICHARDS CREEK (STREAM C) BY ESTABLISHING A NEW CHANNEL WITH IMPROVED HABITAT FEATURES AND FUNCTIONAL RIPARIAN BUFFER.
2. ENHANCE APPROXIMATELY 30,718 SF OF WETLAND AREA ALONG THE NEW STREAM CHANNEL AND ELSEWHERE IN WETLANDS A AND D TO MITIGATE FOR PROJECT IMPACTS.
3. ENHANCE APPROXIMATELY 35,336 SF OF COMBINED WETLAND/STREAM BUFFER AREA TO MITIGATE FOR PROJECT IMPACTS.
4. ENHANCE AN ADDITIONAL 6,215 SQUARE FEET OF WETLAND A, OUTSIDE OF THE STREAM PROJECT AREA AND MAINTAIN WETLAND HYDROLOGIC FUNCTION IN THIS AREA.
5. ENHANCE AN ADDITIONAL 11,160 SQUARE FEET OF WETLAND D, OUTSIDE OF THE STREAM PROJECT AREA.
4. CREATE A DENSE, NATIVE, TREE AND SHRUB COMMUNITY THROUGHOUT RESTORED AREAS OF THE SITE WHICH ARE COMPATIBLE WITH THE POWERLINE INFRASTRUCTURE WHERE APPROPRIATE.

PERFORMANCE STANDARDS

THE FOLLOWING PERFORMANCE STANDARDS WILL BE USED TO GAUGE THE SUCCESS OF THE PROJECT OVER TIME. IF ALL PERFORMANCE STANDARDS HAVE BEEN SATISFIED BY THE END OF YEAR FIVE, THE PROJECT SHALL BE CONSIDERED COMPLETE.

1) SURVIVAL STANDARDS:
   A. 100% SURVIVAL OF INSTALLED PLANTINGS IN ALL AREAS AT THE END OF YEAR 1. THIS STANDARD MAY BE MET THROUGH ESTABLISHMENT OF INSTALLED PLANTS OR BY REPLANTING AS NECESSARY TO ACHIEVE THE REQUIRED NUMBERS.
   B. 80% SURVIVAL OF INSTALLED PLANTINGS IN ALL AREAS AT THE END OF YEAR 2. THIS STANDARD MAY BE MET THROUGH ESTABLISHMENT OF INSTALLED PLANTS OR BY REPLANTING AS NECESSARY TO ACHIEVE THE REQUIRED NUMBERS.
   C. SURVIVAL BEYOND YEAR 2 IS DIFFICULT TO TRACK. THEREFORE, A DIVERSITY STANDARD SHALL BE IMPLEMENTED.
      C.1. ESTABLISHMENT OF AT LEAST TWO NATIVE TREE SPECIES, FOUR NATIVE SHRUB SPECIES AND TWO NATIVE EMERGENT SPECIES IN PLANTING AREAS.
      C.2. ESTABLISHMENT OF A HYDRIC PLANT COMMUNITY IN ALL PLANTED WETLAND AREAS. THE COMBINATION OF INSTALLED AND VOLUNTEER PLANTS SHALL HAVE A WETLAND INDICATOR STATUS OF FAC OR WETTER.
2) NATIVE VEGETATION COVER STANDARDS:
   A. ACHIEVE 60% AERIAL COVER OF NATIVE WOODY VEGETATION BY THE END OF YEAR 3. NATIVE VOLUNTEERS MAY COUNT TOWARDS THIS STANDARD.
   B. ACHIEVE 80% AERIAL COVER OF NATIVE WOODY VEGETATION BY THE END OF YEAR 5. NATIVE VOLUNTEERS MAY COUNT TOWARDS THIS STANDARD.
3) INVASIVE SPECIES COVER STANDARD:
   A. NO MORE THAN 10% AERIAL COVER OF NON-NATIVE, INVASIVE SPECIES IN ANY PLANTING AREA IN ANY MONITORING YEAR.
4) WETLAND HYDROLOGY STANDARD (NON COMPENSATORY WETLAND A ENHANCEMENT AREA ONLY):
   A. EVIDENCE OF WETLAND HYDROLOGY IN WETLAND AREAS DURING THE GROWING SEASON OF EACH MONITORING YEAR. HYDROLOGY TO BE MEASURED BY SHALLOW GROUNDWATER WELLS AS DESCRIBED IN THE MONITORING METHODS SECTION OF THIS PLAN SET.
5) STREAM CHANNEL STANDARDS:
   A. STREAM BANK STABILITY: ANY BANK EROSION OR INSTABILITY FROM THE PREVIOUS WET SEASON IS TO BE SHALLOW AND LIMITED TO LESS THAN 5% OF RESTORED STREAM BANK LENGTH PER REACH AS DETERMINED BY FISHERIES BIOLOGIST VISUAL INSPECTION. THIS STANDARD MAY INCLUDE AN ADDITIONAL 5% IN STAGES OF RECOVERY AND PARTIALLY REVEGETATED FROM PREVIOUS YEARS.
   B. IN-STREAM LOG STRUCTURE STABILITY AND FUNCTION: IN-STREAM WOODY DEBRIS TO REMAIN ANCHORED DURING THE MONITORING PERIOD. AT LEAST ½ OF LOG STRUCTURES TO SHOW POSITIVE HYDRAULIC FUNCTION (MAINTENANCE OF POOLS, BANK TOE PROTECTION AND HABITAT COVER, TAIL OUT GRAVEL, ETC.) AS DETERMINED BY FISHERIES BIOLOGIST VISUAL INSPECTION.
   C. STREAM CHANNEL CAPACITY: CHANNEL CROSS SECTIONS TO REMAIN FREE OF SIGNIFICANT FLOOD OBSTRUCTIONS AS SCREENED BY FISHERIES BIOLOGIST VISUAL INSPECTION. QUESTIONABLE OBSTRUCTIONS MAY NEED ADDITIONAL CONSULTATION WITH A PROFESSIONAL ENGINEER AS NEEDED FOR ASSESSMENT.

MAINTENANCE

THE SITE SHALL BE MAINTAINED IN ACCORDANCE WITH THE FOLLOWING INSTRUCTIONS FOR FIVE YEARS FOLLOWING SUCCESSFUL COMPLETION OF THE CONSTRUCTION.

1. REPLACE EACH PLANT FOUND DEAD IN YEAR ONE.
2. FOLLOW THE RECOMMENDATIONS NOTED IN THE PREVIOUS MONITORING SITE VISIT'S REPORT.
3. GENERAL WEEDING FOR ALL PLANTED AREAS:
   A. AT LEAST TWICE ANNUALLY, REMOVE COMPETING GRASSES AND WEEDS FROM AROUND THE BASE OF EACH INSTALLED PLANT TO A RADIUS OF 12 INCHES. WEEDING SHOULD OCCUR AT LEAST ONCE IN THE SPRING AND ONCE IN THE SUMMER. THOROUGH WEEDING WILL RESULT IN LOWER PLANT MORTALITY AND ASSOCIATED PLANT REPLACEMENT COSTS.
   B. MORE FREQUENT WEEDING MAY BE NECESSARY DEPENDING ON WEED CONDITIONS THAT DEVELOP AFTER PLANT INSTALLATION.
   C. NOXIOUS WEEDS MUST BE REMOVED FROM THE ENTIRE MITIGATION AREA, AT LEAST TWICE ANNUALLY.
   D. DO NOT USE STRING TRIMMERS IN THE VICINITY OF INSTALLED PLANTS, AS THEY MAY DAMAGE OR KILL THE PLANTS.
4. MAINTAIN A FOUR-INCH-THICK LAYER OF WOODCHIP MULCH ACROSS THE ENTIRE PLANTING AREA OUTSIDE THE OHWM. MULCH SHOULD BE PULLED BACK TWO INCHES FROM THE PLANT STEMS.
5. INSPECT AND REPAIR THE IRRIGATION SYSTEM AS NECESSARY EACH SPRING. DURING AT LEAST THE FIRST TWO GROWING SEASONS, MAKE SURE THAT THE ENTIRE PLANTING AREA RECEIVES A MINIMUM OF ONE INCH OF WATER PER WEEK FROM JUNE 1ST THROUGH SEPTEMBER 30TH.
6. REMOVE TRASH AND DEBRIS FROM THE PLANTING AREAS.

MONITORING METHODS

THE MONITORING PROGRAM IS DESIGNED TO TRACK THE SUCCESS OF THE MITIGATION PLAN OVER TIME BY MEASURING THE DEGREE TO WHICH THE PLAN IS MEETING THE PERFORMANCE STANDARDS LISTED ABOVE. PRIOR TO THE COMMENCEMENT OF THE MONITORING PHASE, AN AS-BUILT PLAN DOCUMENTING THE SUCCESSFUL INSTALLATION OF THE PROJECT WILL BE SUBMITTED TO THE CITY OF BELLEVUE AND OTHER PERMITTING AGENCIES AS REQUESTED. IF NECESSARY, THE AS-BUILT REPORT MAY INCLUDE A MARK-UP OF THE ORIGINAL PLAN THAT NOTES ANY SIGNIFICANT CHANGES OR SUBSTITUTIONS THAT OCCURRED. DURING THE AS-BUILT INSPECTION, THE **RESTORATION SPECIALIST** WILL ESTABLISH AT LEAST FOUR PERMANENT PHOTO-POINTS, BASELINE PLANT INSTALLATION QUANTITIES, AND TRANSECTS AS DETAILED BELOW.

TRANSECTS:

DURING THE AS-BUILT INSPECTION, THE **RESTORATION SPECIALIST** SHALL INSTALL A SUFFICIENT NUMBER OF REPRESENTATIVELY LOCATED 100-FOOT TRANSECTS IN THE RESTORATION PLANTING AREAS TO ADEQUATELY MEASURE THE VEGETATION PERFORMANCE STANDARDS BELOW. PERCENT COVER DATA SHALL BE RECORDED ALONG ESTABLISHED TRANSECTS USING THE LINE INTERCEPT METHOD.

HYDROLOGY:

HYDROLOGY MONITORING WILL OCCUR IN THE SPRING OF EACH YEAR. HYDROLOGY SHALL BE MONITORED USING AT LEAST THREE SHALLOW GROUNDWATER WELLS IN THE NON COMPENSATORY WETLAND A ENHANCEMENT AREA. WELLS SHALL BE CONSTRUCTED OF 24-INCH LENGTHS OF 2-INCH DIAMETER PVC PIPE. THE LOWER 18 INCHES SHALL BE PERFORATED WITH A SERIES OF 1/4-INCH HOLES. WELLS WILL BE INSTALLED TO A DEPTH OF 18 INCHES. EACH WELL SHALL BE FITTED WITH A PIPE END FITTING CAP. HYDROLOGY WELLS SHALL BE MONITORED WEEKLY IN MARCH FOR THE FIRST TWO YEAR FOLLOWING AS-BUILT ACCEPTANCE.

YEARLY MONITORING:

THE SITE WILL BE MONITORED TWICE ANNUALLY FOR FIVE YEARS BEGINNING WITH APPROVAL OF THE AS-BUILT REPORT. DURING EACH YEAR THERE SHALL BE A SPRING VISIT AND A SUMMER OR EARLY FALL VISIT. THE SPRING MONITORING VISIT WILL ADDRESS MAINTENANCE NEEDS SUCH AS PLANT REPLACEMENT AND WEEDING. THE RESTORED STREAM CHANNEL AND IN-STREAM HABITAT FEATURES INCLUDING LOG STRUCTURES WILL ALSO BE INSPECTED IN THE SPRING VISIT TO IDENTIFY ANY MAINTENANCE OR REPAIRS THAT WOULD NEED TO BE DONE DURING THE UPCOMING LOW-FLOW SEASON, WHEN ANY NEEDED IN-STREAM WORK COULD BE AUTHORIZED. STREAM CHANNEL, STREAM BANK, AND LOG STRUCTURE FUNCTIONING WOULD BE ASSESSED. EXAMPLES OF NEEDED STREAM CHANNEL MAINTENANCE OR REPAIR MIGHT INCLUDING STABILIZING ANY ERODING STREAM BANKS OR SECURING ANY LOGS WHOSE ANCHORING MAY HAVE BECOME COMPROMISED.

FOLLOWING THE SPRING VISIT, THE **RESTORATION SPECIALIST** WILL NOTIFY THE RESPONSIBLE PARTY AND/OR MAINTENANCE CREWS OF NECESSARY MAINTENANCE. THE SECOND ANNUAL VISIT WILL OCCUR JULY 1ST TO SEPTEMBER 15TH AND WILL RECORD QUANTITATIVE ASSESSMENT OF THE SITE'S PROGRESS. A REPORT DETAILING THE FINDINGS OF SUMMER MONITORING WILL BE SUBMITTED ANNUAL TO THE CITY, US ARMY CORPS (NWS.COMPLIANCE@USACE.ARMY.MIL), AND WASHINGTON DEPARTMENT OF ECOLOGY AND WILL CONTAIN THE FOLLOWING:

1. GENERAL SUMMARY OF SITE CONDITIONS.
2. COUNTS OF LIVE PLANTINGS BY SPECIES (YEARS ONE AND TWO ONLY)
3. PERCENT COVER OF NATIVE WOODY SPECIES, DETERMINED USING THE LINE INTERCEPT METHOD ALONG ESTABLISHED TRANSECTS.
4. PERCENT COVER OF INVASIVE SPECIES USING THE LINE INTERCEPT METHOD ALONG ESTABLISHED TRANSECTS.
5. NOTES ON INVASIVE WEEDS OUTSIDE OF ESTABLISHED TRANSECTS.
6. PHOTOGRAPHS FROM FIXED PHOTO-POINTS ESTABLISHED DURING THE AS-BUILT INSPECTION.
7. ANY EVIDENCE OF WILDLIFE USAGE IN THE MITIGATION AREA.
8. REPORT ON CONDITION OF PLACED LARGE WOODY DEBRIS.
9. INTRUSIONS INTO THE PLANTING AREAS, VANDALISM OR OTHER ACTIONS THAT IMPAIR THE INTENDED FUNCTIONS OF THE MITIGATION AREAS.
10. RECOMMENDATIONS FOR MAINTENANCE OR REPAIRS.

CONTINGENCIES

UNFORESEEN PROJECT CONDITIONS MAY REQUIRE CHANGES IN VEGETATION LAYOUT, DENSITY/SPACING, AND SPECIES SUBSTITUTIONS. WEED CONDITIONS MAY REQUIRE ALTERATION OF INSTALLED VEGETATION TYPES, MULCH PLACEMENT, WEED REMOVAL AND USE OF HERBICIDES. MINOR HAND WORK TO IMPROVE OR RETARD DRAINAGE MAY BE NEEDED TO SUPPORT WETLAND HYDROLOGY. SUCH WORK WILL BE COORDINATED DIRECTLY WITH THE CITY OF BELLEVUE.

UNPREDICTABLE EVENTS SUCH AS OBSTRUCTIONS OR HIGH-FLOWS FROM LARGE STORMS MAY NECESSITATE EROSION AND HABITAT FEATURE REPAIRS. SMALL REPAIRS BY HAND WILL BE COORDINATED WITH THE CITY OF BELLEVUE. LARGER REPAIRS THAT REQUIRE EXTENSIVE MANIPULATION OR THE USE OF HEAVY MACHINERY WILL BE COORDINATED IN CONSULTATION WITH JURISDICTIONAL AGENCIES.

SHOULD THE ADDITIONAL, NON-COMPENSATORY ENHANCEMENT AREA IN WETLAND A NOT MEET WETLAND HYDROLOGY CRITERIA DURING THE FIRST TWO YEARS OF MONITORING, A PLAN TO CREATE ADDITIONAL WETLAND ONSITE WILL BE DEVELOPED TO OFFSET THE LOSS OF WETLAND FUNCTION.

SITE PROTECTION

THE MITIGATION AREA WILL BE PROTECTED BY RECORDING A NOTICE ON TITLE WITH KING COUNTY. FENCING AND SIGNS WILL BE INSTALLED ALONG THE EDGE OF THE MITIGATION AREA.

MATERIALS

1. **WOODCHIP MULCH**: "ARBORIST CHIPS" (CHIPPED WOODY MATERIAL) APPROXIMATELY ONE TO THREE INCHES IN MAXIMUM DIMENSION (NOT SAWDUST). THIS MATERIAL IS COMMONLY AVAILABLE IN LARGE QUANTITIES FROM ARBORISTS OR TREE-PRUNING COMPANIES. THIS MATERIAL IS SOLD AS "ANIMAL- FRIENDLY HOG FUEL" AT PACIFIC TOPSOILS [(800) 884-7645]. MULCH SHALL NOT CONTAIN APPRECIABLE QUANTITIES OF GARBAGE, PLASTIC, METAL, SOIL, AND DIMENSIONAL LUMBER OR CONSTRUCTION/DEMOLITION DEBRIS. APPROX. QUANTITY REQUIRED: 60 CUBIC YARDS.
2. **COMPOST**: CEDAR GROVE COMPOST OR EQUIVALENT "COMPOSTED MATERIAL" PER WASHINGTON ADMIN. CODE 173-350-220. QUANTITY REQUIRED: 35 CUBIC YARDS
3. **FERTILIZER**: SLOW-RELEASE, PHOSPHOROUS-FREE GRANULAR FERTILIZER. MOST COMMERCIAL NURSERIES CARRY THIS PRODUCT. FOLLOW MANUFACTURER'S INSTRUCTIONS FOR USE. KEEP FERTILIZER IN WEATHER-TIGHT CONTAINER WHILE ON-SITE. FERTILIZER IS ONLY TO BE APPLIED IN YEARS TWO AND THREE, NOT IN YEAR ONE.
4. **RESTORATION SPECIALIST**: QUALIFIED PROFESSIONAL ABLE TO EVALUATE AND MONITOR THE CONSTRUCTION OF ENVIRONMENTAL RESTORATION PROJECTS.
5. **FERTILIZER (FOR NEAR AQUATIC ENVIRONMENTS):** SLOW-RELEASE, PHOSPHOROUS-FREE GRANULAR FERTILIZER. LABEL MUST INDICATE THAT PRODUCT IS SAFE FOR AQUATIC ENVIRONMENTS. FOLLOW MANUFACTURER'S INSTRUCTIONS FOR USE. KEEP FERTILIZER IN WEATHER-TIGHT CONTAINER WHILE ON-SITE. FERTILIZER IS ONLY TO BE APPLIED IN YEARS TWO AND THREE, NOT IN YEAR ONE.

Know what's **below.** **Call** before you dig.

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THE WATERSHED COMPANY
750 Sixth Street South
Kirkland WA 98033
p 425.822.5242 f 425.827.8136
www.watershedco.com
Science & Design

PSE RICHARDS CREEK SUBSTATION
RICHARDS CREEK SUB-BASIN MITIGATION PLAN
PREPARED FOR: PUGET SOUND ENERGY
ENERGIZE EASTSIDE, SOUTH BELLEVUE SEGMENT
PARCELS #: 1024059130, 1024059083, 5453300150
BELLEVUE, WA

SUBMITTALS & REVISIONS

NO.	DATE	DESCRIPTION	BY
1	04-18-2018	MITIGATION PLAN	LM
2	12-03-2018	RESPONSE TO CITY COMMENTS	LM

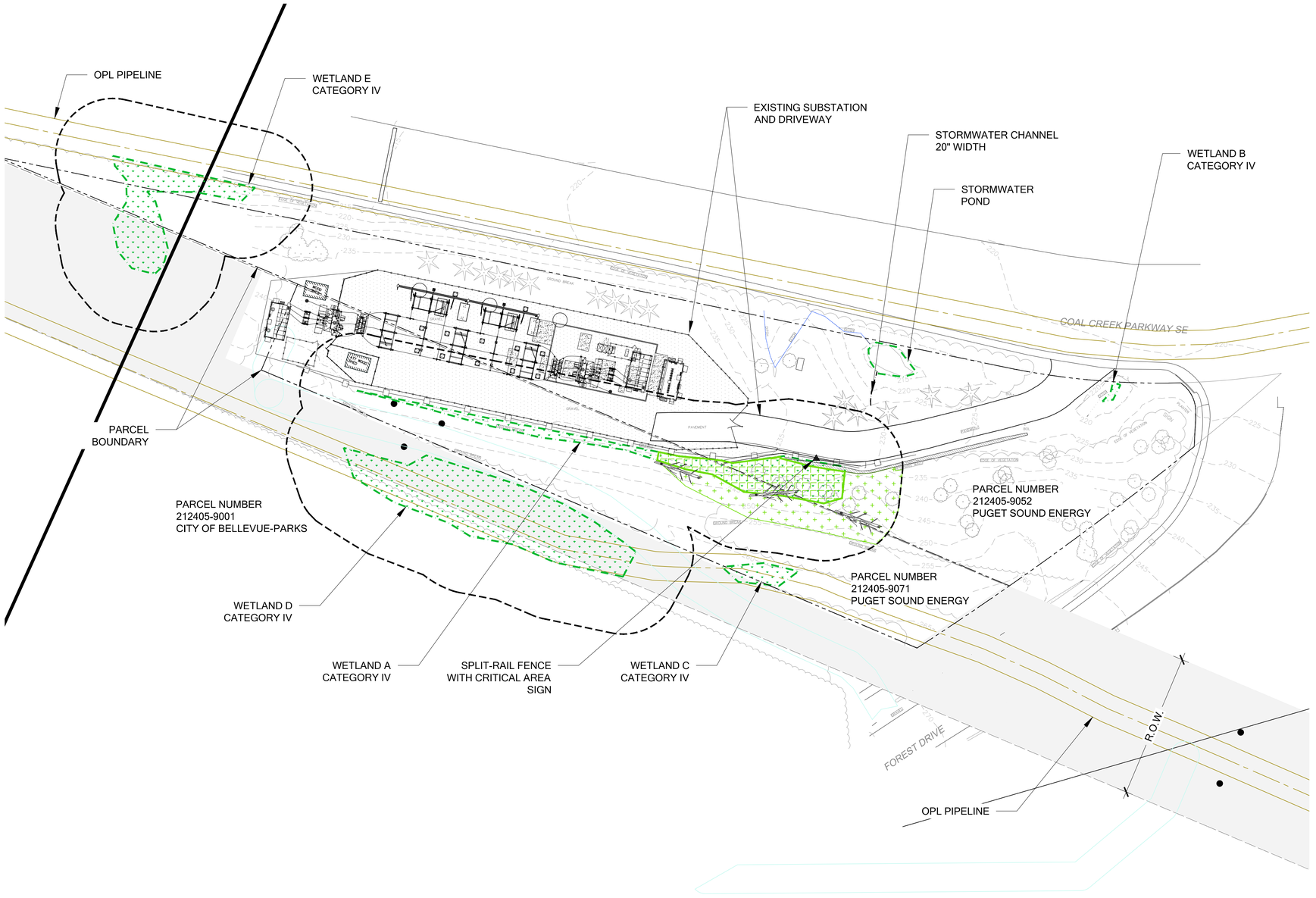
GENERAL NOTES:

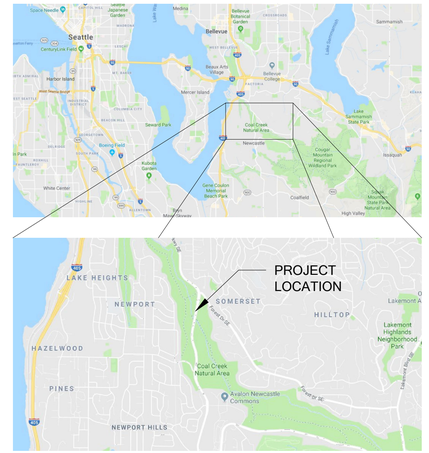
SHEET SIZE:
ORIGINAL PLAN IS 24" X 36".
SCALE ACCORDINGLY.

PROJECT MANAGER: JC
DESIGNED: LM
DRAFTED: LM
CHECKED: JC / AM
JOB NUMBER: 111103.11
SHEET NUMBER: W7 OF 7

FILENAME: MITIGATION_PLAN.DWG
PRINTED BY: LOGAN MCCLISH
DATE: 12/5/2018

MITIGATION NOTES





VICINITY MAPS

LEGEND

- WETLAND BOUNDARY
- WETLAND BUFFER
- PROPERTY BOUNDARY
- WETLAND MITIGATION (2,300 SF)
- WETLAND BUFFER MITIGATION (3,950 SF)
- PLACED WOODY DEBRIS (QTY: 3)
- CRITICAL AREA SPLIT-RAIL FENCE WITH SIGN (440 LF, QTY: 1)

SHEET INDEX

1. MITIGATION PLAN
2. PLANTING PLAN
3. SITE PREPARATION PLAN
4. PLANT INSTALLATION NOTES & DETAILS
4. MITIGATION NOTES

NOTES

1. PLEASE BE AWARE THAT CONSTRUCTION ACCESS, POLE TYPES, POLE HEIGHTS, AND POLE LOCATIONS ARE SUBJECT TO CHANGE PENDING FURTHER DESIGN, ENVIRONMENTAL REVIEW, PERMITTING AND IN-FIELD CONSTRUCTION NEEDS.
2. WETLANDS WERE DELINEATED BY THE WATERSHED COMPANY ON JANUARY 31, 2017 AND FEBRUARY 7, 2017.
3. SURVEY RECEIVED FROM APS SURVEY AND MAPPING, PERFORMED ON JANUARY 19, 2017 AND WETLAND LOCATES PERFORMED ON FEBRUARY 16, 2017.
4. THIS MITIGATION PLAN HAS BEEN DESIGNED TO APPROPRIATELY MITIGATE FOR PROJECT IMPACTS OCCURRING IN WETLANDS AND WETLAND AND STREAM BUFFERS IN THE COAL CREEK SUB-BASIN AND IS INTENDED TO REPRESENT THE FINAL MITIGATION PLAN REFERENCED IN THE SOUTH BELLEVUE CAR. SEE MITIGATION NOTES SHEET W5.

SOMERSET SUBSTATION

MITIGATION PLAN

0 20' 40' 80' 160'

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THE WATERSHED COMPANY

750 Sixth Street South
Kirkland WA 98033

p 425.822.5242
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Science & Design

SOMERSET SUBSTATION
ENERGIZE EASTSIDE MITIGATION PLAN
PREPARED FOR: PUGET SOUND ENERGY
PARCEL #2124059071, #2124059052
5200 SE COAL CREEK PKWY
BELLEVUE, WA 98006

SUBMITTALS & REVISIONS

NO.	DATE	DESCRIPTION	BY
1	05/03/2018	MITIGATION PLAN	AJ

SHEET SIZE:
ORIGINAL PLAN IS 22" x 34".
SCALE ACCORDINGLY.

PROJECT MANAGER: JC
DESIGNED: --
DRAFTED: AJ/LM
CHECKED: CM

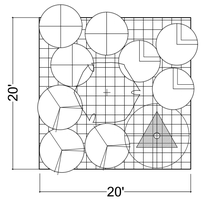
JOB NUMBER:
111103.11

SHEET NUMBER:
W1 OF 5

FILENAME
PRINTED BY
DATE

DSD 001072

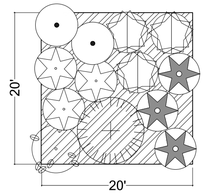
WETLAND ENHANCEMENT PLANTING TYPICAL
(WITH TREES)



TREES (18)	QTY	SPACING	SIZE
FRAXINUS LATIFOLIA / OREGON ASH	6	9' O.C.	2 GAL.
THUJA PLICATA / WESTERN REDCEDAR	6		2 GAL.
PICEA SITCHENSIS / SITKA SPRUCE	6		2 GAL.
SHRUBS (48)			
CORNUS SERICEA / RED-OSIER DOGWOOD	12	6' O.C.	1 GAL.
ROSA NUTKANA / NOOTKA ROSE	12		1 GAL.
RUBUS SPECTABILIS / SALMONBERRY	12		1 GAL.
PHYSOCARPUS CAPITATUS / PACIFIC NINEBARK	12		1 GAL.
GROUNDCOVER (367) **ALL SPECIES TO BE SPACED TRIANGULARLY*		24" O.C.	
ATHYRIUM FILIX-FEMINA/ LADY FERN	92		1 GAL
TOLMIEA MENZIESII /PIGGYBACK PLANT	92		1 GAL
SCIRPUS MICROCARPUS / SMALL FRUITED BULRUSH	92		1 GAL.
CAREX OBNUPTA/ SLOUGH SEDGE	92		1 GAL.

(PLANT BY SPECIES IN ODD NUMBER GROUPS OF 9-15)

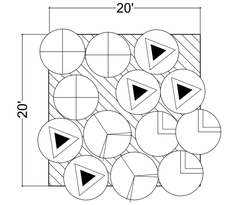
BUFFER ENHANCEMENT PLANTING TYPICAL
(WITH TREES)



TREES (19)	QTY	SPACING	SIZE
THUJA PLUCATA / WESTERN REDCEDAR	6	9' O.C.	2 GAL
ARBUTUS MENZIESII / PACIFIC MADRONE (PLANT NEXT TO EXISTING DOUGLAS-FIR)	6		2 GAL
PRUNUS EMARGINATA / BITTER CHERRY	7		2 GAL
SHRUBS (51)			
SYMPHORICARPUS ALBUS / SNOWBERRY	10	6' O.C.	1 GAL
OEMLERIA CERASIFORMIS / OSOBERRY	10		1 GAL
MAHONIA NERVOSA / LOW OREGON GRAPE	10		1 GAL
MAHONIA AQUIFOLIUM / TALL OREGON GRAPE	10		1 GAL
ACER CIRCINATUM / VINE MAPLE	11		1 GAL
GROUNDCOVER (392) **ALL SPECIES TO BE SPACED TRIANGULARLY*			
POLYSTICHUM MUNITUM / SWORD FERN	196	24" O.C.	1 GAL
BLECHNUM SPICANT / DEER FERN	196		1 GAL

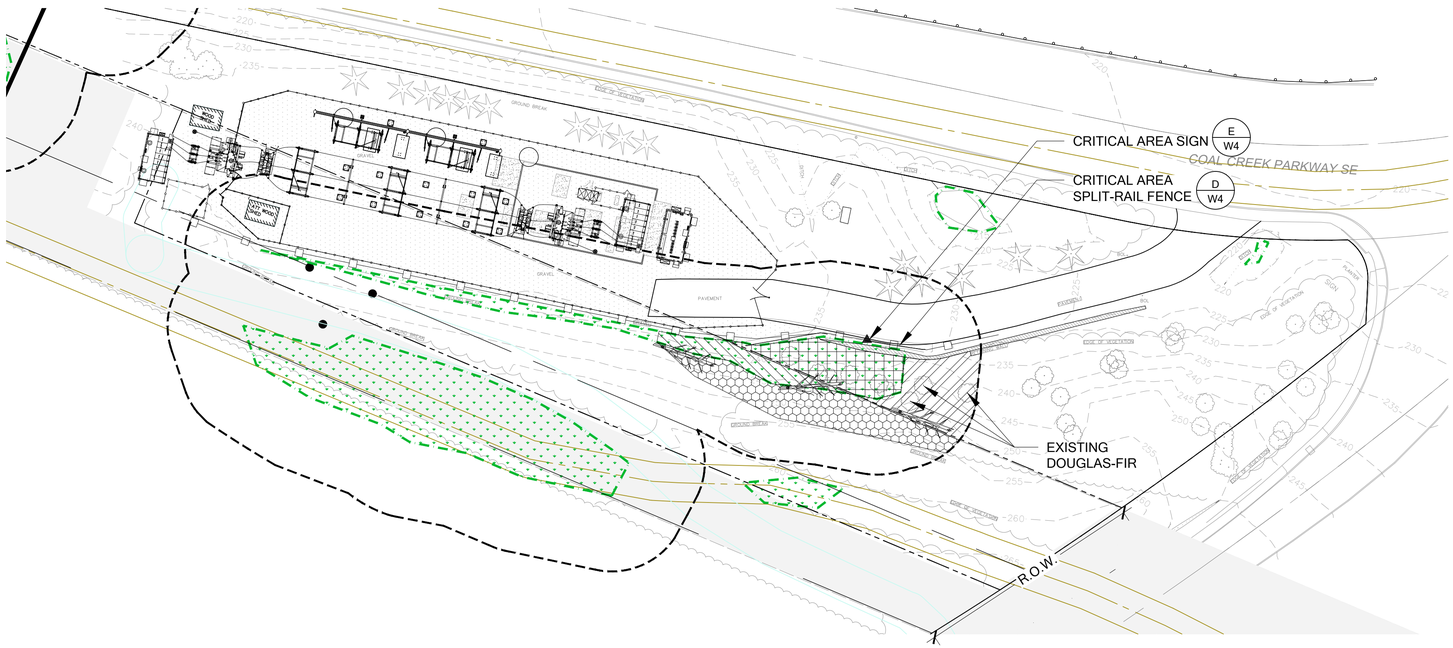
(PLANT BY SPECIES IN ODD NUMBER GROUPS OF 9-15)

WETLAND ROW ENHANCEMENT PLANTING TYPICAL
(NO TREES)

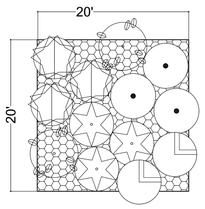


SHRUBS (12)	SIZE	SPACING	SIZE
CORNUS SERICEA / RED-OSIER DOGWOOD	3	6' O.C.	1 GAL.
ROSA NUTKANA / NOOTKA ROSE	3		1 GAL.
RUBUS SPECTABILIS / SALMONBERRY	3		1 GAL.
PHYSOCARPUS CAPITATUS/ PACIFIC NINEBARK	3		1 GAL.
GROUNDCOVER (102) **ALL SPECIES TO BE SPACED TRIANGULARLY*		24" O.C.	
ATHYRIUM FILIX-FEMINA/ LADY FERN (NO INUNDATION)	34		1 GAL
TOLMIEA MENZIESII /PIGGYBACK PLANT (NO INUNDATION)	34		1 GAL
SCIRPUS MICROCARPUS / SMALL FRUITED BULRUSH	34		1 GAL.

(PLANT BY SPECIES IN ODD NUMBER GROUPS OF 9-15)



BUFFER ROW ENHANCEMENT PLANTING TYPICAL
(NO TREES)



SHRUBS (75)	QTY	SPACING	SIZE
RUBUS SPECTABILIS / SALMONBERRY	15	6' O.C.	1 GAL
SYMPHORICARPUS ALBUS / SNOWBERRY	15		1 GAL
OEMLERIA CERASIFORMIS / OSOBERRY	15		1 GAL
MAHONIA AQUIFOLIUM / TALL OREGON GRAPE	15		1 GAL
ACER CIRCINATUM / VINE MAPLE	15		1 GAL
GROUNDCOVER (600) **ALL SPECIES TO BE SPACED TRIANGULARLY*		24" O.C.	
POLYSTICHUM MUNITUM / SWORD FERN	300		1 GAL
BLECHNUM SPICANT / DEER FERN	300		1 GAL

(PLANT BY SPECIES IN ODD NUMBER GROUPS OF 9-15)

SOMERSET SUBSTATION
PLANTING PLAN

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THE WATERSHED COMPANY
750 Sixth Street South
Kirkland WA 98033
p 425.822.5242
www.watershedco.com
Science & Design

SOMERSET SUBSTATION
ENERGIZE EASTSIDE MITIGATION PLAN
PREPARED FOR: PUGET SOUND ENERGY
PARCEL #2124059071, #2124059052
5200 SE COAL CREEK PKWY
BELLEVUE, WA 98006

SUBMITTALS & REVISIONS

NO.	DATE	DESCRIPTION	BY
1	05/03/2018	MITIGATION PLAN	AJ

SHEET SIZE:
ORIGINAL PLAN IS 22" x 34".
SCALE ACCORDINGLY.

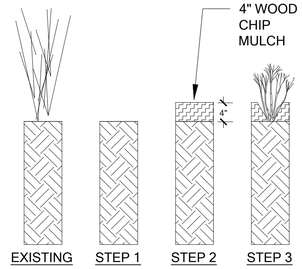
PROJECT MANAGER: JC
DESIGNED: --
DRAFTED: AJ/LM
CHECKED: CM

JOB NUMBER:
111103.11

SHEET NUMBER:
W2 OF 5

FILENAME
PRINTED BY
DATE

DSD 001073



PLANTING AREA PREPARATION

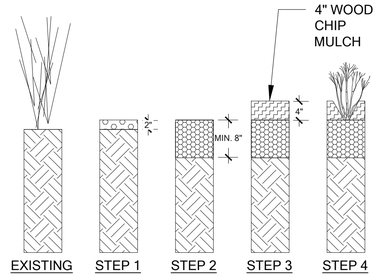
STEP 1
REMOVE INVASIVE SPECIES. WORK WITHIN ROOT ZONES OF EXISTING TREES AND SHRUBS SHALL BE DONE BY HAND.

STEP 2
INSTALL WOOD CHIP MULCH LAYER 4" DEEP.

STEP 3
INSTALL PLANTS. (SEE PLANTING DETAIL.)

A SOIL PREPARATION AREA 1

SEQUENCE OF WORK - NOT TO SCALE



PLANTING AREA PREPARATION

STEP 1
REMOVE INVASIVE SPECIES. WORK WITHIN ROOT ZONES OF EXISTING TREES AND SHRUBS SHALL BE DONE BY HAND. PLACE 2" INCHES OF COMPOST.

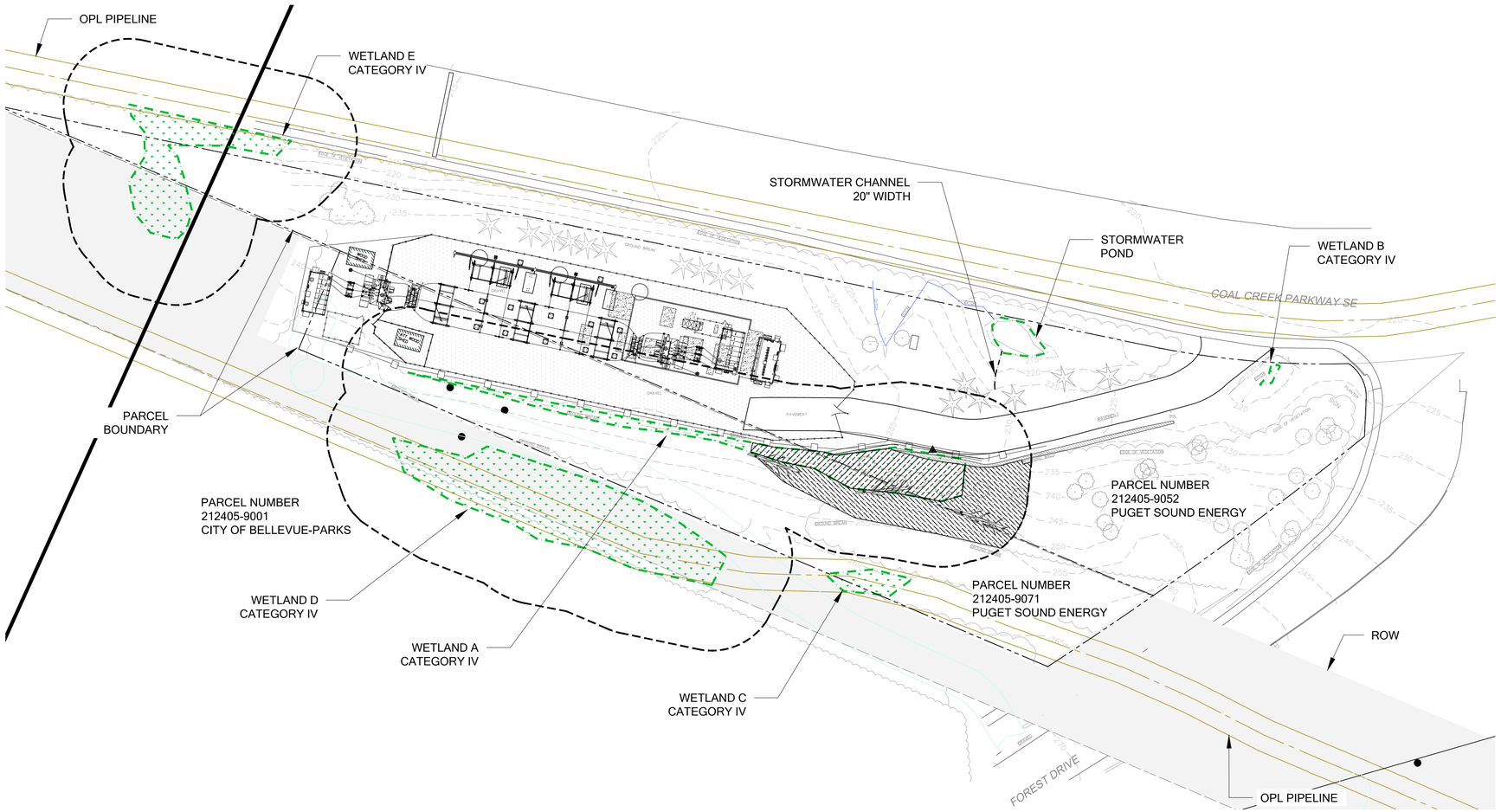
STEP 2
INCORPORATE COMPOST TO A DEPTH OF 8".

STEP 3
INSTALL WOOD CHIP MULCH LAYER 4" DEEP.

STEP 4
INSTALL PLANTS. (SEE PLANTING DETAIL.)

B SOIL PREPARATION AREA 2

SEQUENCE OF WORK - NOT TO SCALE



LEGEND

- WETLAND BOUNDARY
- WETLAND BUFFER
- PROPERTY BOUNDARY
- SOIL PREP 1 (2,300 SF)
- SOIL PREP 2 (3,950 SF)
- PLACED WOODY DEBRIS

SOMERSET SUBSTATION

SITE PREPARATION PLAN

0 20' 40' 80' 160'

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DATE

DSD 001074

PLANT INSTALLATION SPECIFICATIONS

GENERAL NOTES

QUALITY ASSURANCE
1. PLANTS SHALL MEET OR EXCEED THE SPECIFICATIONS OF FEDERAL, STATE, AND LOCAL LAWS REQUIRING INSPECTION FOR PLANT DISEASE AND INSECT CONTROL.
2. PLANTS SHALL BE HEALTHY, VIGOROUS, AND WELL-FORMED, WITH WELL DEVELOPED, FIBROUS ROOT SYSTEMS, FREE FROM DEAD BRANCHES OR ROOTS. PLANTS SHALL BE FREE FROM DAMAGE CAUSED BY TEMPERATURE EXTREMES, LACK OR EXCESS OF MOISTURE, INSECTS, DISEASE, AND MECHANICAL INJURY. PLANTS IN LEAF SHALL BE WELL FOLIATED AND OF GOOD COLOR. PLANTS SHALL BE HABITUATED TO THE OUTDOOR ENVIRONMENTAL CONDITIONS INTO WHICH THEY WILL BE PLANTED (HARDENED-OFF).
3. TREES WITH DAMAGED, CROOKED, MULTIPLE OR BROKEN LEADERS WILL BE REJECTED. WOODY PLANTS WITH ABRASIONS OF THE BARK OR SUN SCALD WILL BE REJECTED.
4. NOMENCLATURE: PLANT NAMES SHALL CONFORM TO FLORA OF THE PACIFIC NORTHWEST BY HITCHCOCK AND CRONQUIST, UNIVERSITY OF WASHINGTON PRESS, 1973 AND/OR TO A FIELD GUIDE TO THE COMMON WETLAND PLANTS OF WESTERN WASHINGTON & NORTHWESTERN OREGON, ED. SARAH SPEAR COOKE, SEATTLE AUDUBON SOCIETY, 1997.

DEFINITIONS
1. PLANTS/PLANT MATERIALS. PLANTS AND PLANT MATERIALS SHALL INCLUDE ANY LIVE PLANT MATERIAL USED ON THE PROJECT. THIS INCLUDES BUT IS NOT LIMITED TO CONTAINER GROWN, B&B OR BAREROOT PLANTS; LIVE STAKES AND FASCINES (WATTLES); TUBERS, CORMS, BULBS, ETC..; SPRIGS, PLUGS, AND LINERS.
2. CONTAINER GROWN. CONTAINER GROWN PLANTS ARE THOSE WHOSE ROOTBALLS ARE ENCLOSED IN A POT OR BAG IN WHICH THAT PLANT GREW.

SUBSTITUTIONS
1. IT IS THE CONTRACTOR'S RESPONSIBILITY TO OBTAIN SPECIFIED MATERIALS IN ADVANCE IF SPECIAL GROWING, MARKETING OR OTHER ARRANGEMENTS MUST BE MADE IN ORDER TO SUPPLY SPECIFIED MATERIALS.
2. SUBSTITUTION OF PLANT MATERIALS NOT ON THE PROJECT LIST WILL NOT BE PERMITTED UNLESS AUTHORIZED IN WRITING BY THE RESTORATION CONSULTANT.
3. IF PROOF IS SUBMITTED THAT ANY PLANT MATERIAL SPECIFIED IS NOT OBTAINABLE, A PROPOSAL WILL BE CONSIDERED FOR USE OF THE NEAREST EQUIVALENT SIZE OR ALTERNATIVE SPECIES, WITH CORRESPONDING ADJUSTMENT OF CONTRACT PRICE.
4. SUCH PROOF WILL BE SUBSTANTIATED AND SUBMITTED IN WRITING TO THE CONSULTANT AT LEAST 30 DAYS PRIOR TO START OF WORK UNDER THIS SECTION.

INSPECTION
1. PLANTS SHALL BE SUBJECT TO INSPECTION AND APPROVAL BY THE RESTORATION CONSULTANT FOR CONFORMANCE TO SPECIFICATIONS, EITHER AT TIME OF DELIVERY ON-SITE OR AT THE GROWER'S NURSERY. APPROVAL OF PLANT MATERIALS AT ANY TIME SHALL NOT IMPAIR THE SUBSEQUENT RIGHT OF INSPECTION AND REJECTION DURING PROGRESS OF THE WORK.
2. PLANTS INSPECTED ON SITE AND REJECTED FOR NOT MEETING SPECIFICATIONS MUST BE REMOVED IMMEDIATELY FROM SITE OR RED-TAGGED AND REMOVED AS SOON AS POSSIBLE.
3. THE RESTORATION CONSULTANT MAY ELECT TO INSPECT PLANT MATERIALS AT THE PLACE OF GROWTH. AFTER INSPECTION AND ACCEPTANCE, THE RESTORATION CONSULTANT MAY REQUIRE THE INSPECTED PLANTS BE LABELED AND RESERVED FOR PROJECT. SUBSTITUTION OF THESE PLANTS WITH OTHER INDIVIDUALS, EVEN OF THE SAME SPECIES AND SIZE, IS UNACCEPTABLE.

MEASUREMENT OF PLANTS
1. PLANTS SHALL CONFORM TO SIZES SPECIFIED UNLESS SUBSTITUTIONS ARE MADE AS OUTLINED IN THIS CONTRACT.
2. HEIGHT AND SPREAD DIMENSIONS SPECIFIED REFER TO MAIN BODY OF PLANT AND NOT BRANCH OR ROOT TIP TO TIP. PLANT DIMENSIONS SHALL BE MEASURED WHEN THEIR BRANCHES OR ROOTS ARE IN THEIR NORMAL POSITION.
3. WHERE A RANGE OF SIZE IS GIVEN, NO PLANT SHALL BE LESS THAN THE MINIMUM SIZE AND AT LEAST 50% OF THE PLANTS SHALL BE AS LARGE AS THE MEDIAN OF THE SIZE RANGE. (EXAMPLE: IF THE SIZE RANGE IS 12" TO 18", AT LEAST 50% OF PLANTS MUST BE 15" TALL.).

SUBMITTALS

PROPOSED PLANT SOURCES
1. WITHIN 45 DAYS AFTER AWARD OF THE CONTRACT, SUBMIT A COMPLETE LIST OF PLANT MATERIALS PROPOSED TO BE PROVIDED DEMONSTRATING CONFORMANCE WITH THE REQUIREMENTS SPECIFIED. INCLUDE THE NAMES AND ADDRESSES OF ALL GROWERS AND NURSERIES.

PRODUCT CERTIFICATES
1. PLANT MATERIALS LIST - SUBMIT DOCUMENTATION TO CONSULTANT AT LEAST 30 DAYS PRIOR TO START OF WORK UNDER THIS SECTION THAT PLANT MATERIALS HAVE BEEN ORDERED. ARRANGE PROCEDURE FOR INSPECTION OF PLANT MATERIAL WITH CONSULTANT AT TIME OF SUBMISSION.
2. HAVE COPIES OF VENDOR'S OR GROWERS' INVOICES OR PACKING SLIPS FOR ALL PLANTS ON SITE DURING INSTALLATION. INVOICE OR PACKING SLIP SHOULD LIST SPECIES BY SCIENTIFIC NAME, QUANTITY, AND DATE DELIVERED (AND GENETIC ORIGIN IF THAT INFORMATION WAS PREVIOUSLY REQUESTED).

DELIVERY, HANDLING, & STORAGE

NOTIFICATION
CONTRACTOR MUST NOTIFY CONSULTANT 48 HOURS OR MORE IN ADVANCE OF DELIVERIES SO THAT CONSULTANT MAY ARRANGE FOR INSPECTION.

PLANT MATERIALS
1. TRANSPORTATION - DURING SHIPPING, PLANTS SHALL BE PACKED TO PROVIDE PROTECTION AGAINST CLIMATE EXTREMES, BREAKAGE AND DRYING. PROPER VENTILATION AND PREVENTION OF DAMAGE TO BARK, BRANCHES, AND ROOT SYSTEMS MUST BE ENSURED.
2. SCHEDULING AND STORAGE - PLANTS SHALL BE DELIVERED AS CLOSE TO PLANTING AS POSSIBLE. PLANTS IN STORAGE MUST BE PROTECTED AGAINST ANY CONDITION THAT IS DETRIMENTAL TO THEIR CONTINUED HEALTH AND VIGOR.
3. HANDLING - PLANT MATERIALS SHALL NOT BE HANDLED BY THE TRUNK, LIMBS, OR FOLIAGE BUT ONLY BY THE CONTAINER, BALL, BOX, OR OTHER PROTECTIVE STRUCTURE, EXCEPT BAREROOT PLANTS SHALL BE KEPT IN BUNDLES UNTIL PLANTING AND THEN HANDLED CAREFULLY BY THE TRUNK OR STEM.
4. LABELS - PLANTS SHALL HAVE DURABLE, LEGIBLE LABELS STATING CORRECT SCIENTIFIC NAME AND SIZE. TEN PERCENT OF CONTAINER GROWN PLANTS IN INDIVIDUAL POTS SHALL BE LABELED. PLANTS SUPPLIED IN FLATS, RACKS, BOXES, BAGS, OR BUNDLES SHALL HAVE ONE LABEL PER GROUP.

WARRANTY

PLANT WARRANTY
PLANTS MUST BE GUARANTEED TO BE TRUE TO SCIENTIFIC NAME AND SPECIFIED SIZE, AND TO BE HEALTHY AND CAPABLE OF VIGOROUS GROWTH.

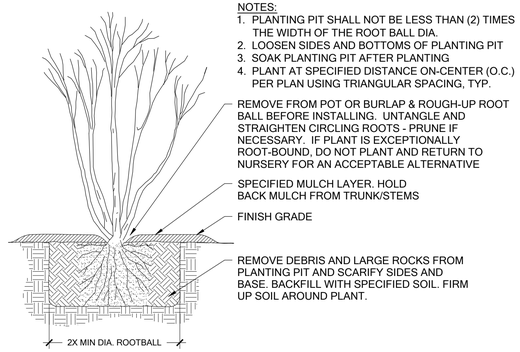
REPLACEMENT
1. PLANTS NOT FOUND MEETING ALL OF THE REQUIRED CONDITIONS AT THE CONSULTANT'S DISCRETION MUST BE REMOVED FROM SITE AND REPLACED IMMEDIATELY AT THE CONTRACTOR'S EXPENSE.
2. PLANTS NOT SURVIVING AFTER ONE YEAR TO BE REPLACED AT THE CONTRACTOR'S EXPENSE.

PLANT MATERIAL

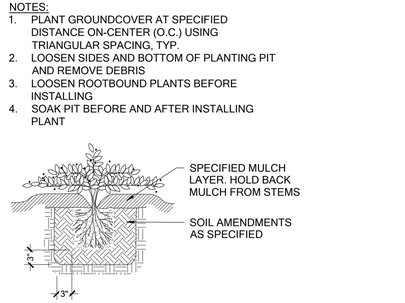
GENERAL
1. PLANTS SHALL BE NURSERY GROWN IN ACCORDANCE WITH GOOD HORTICULTURAL PRACTICES UNDER CLIMATIC CONDITIONS SIMILAR TO OR MORE SEVERE THAN THOSE OF THE PROJECT SITE.
2. PLANTS SHALL BE TRUE TO SPECIES AND VARIETY OR SUBSPECIES. NO CULTIVARS OR NAMED VARIETIES SHALL BE USED UNLESS SPECIFIED AS SUCH.

QUANTITIES
SEE PLANT LIST ON ACCOMPANYING PLANS AND PLANT SCHEDULES.

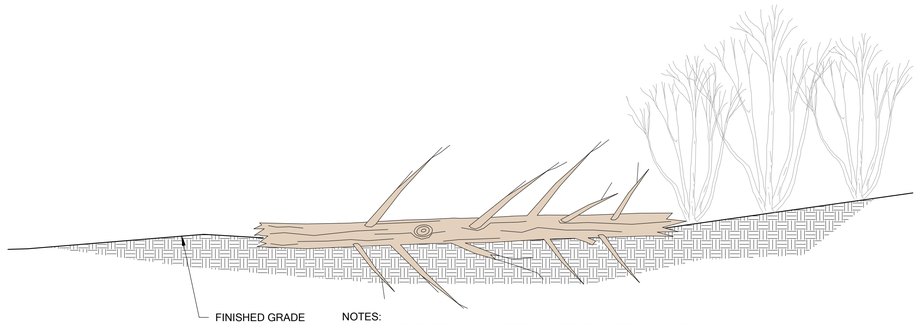
ROOT TREATMENT
1. CONTAINER GROWN PLANTS (INCLUDES PLUGS): PLANT ROOT BALLS MUST HOLD TOGETHER WHEN THE PLANT IS REMOVED FROM THE POT, EXCEPT THAT A SMALL AMOUNT OF LOOSE SOIL MAY BE ON THE TOP OF THE ROOTBALL.
2. PLANTS MUST NOT BE ROOT-BOUND; THERE MUST BE NO CIRCLING ROOTS PRESENT IN ANY PLANT INSPECTED.
3. ROOTBALLS THAT HAVE CRACKED OR BROKEN WHEN REMOVED FROM THE CONTAINER SHALL BE REJECTED.



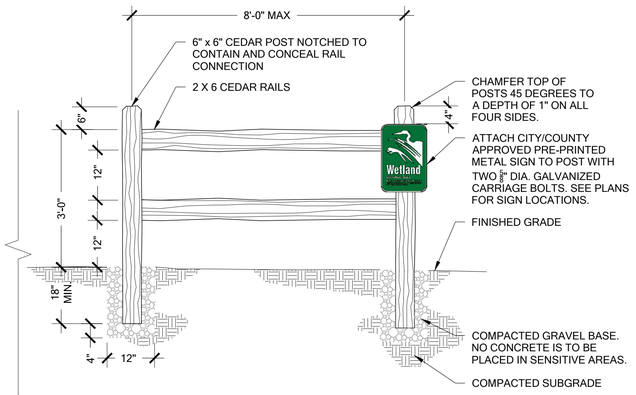
A TREE AND SHRUB PLANTING
Scale: NTS



B GROUNDCOVER PLANTING
Scale: NTS



C HABITAT LOG
Scale: NTS



D SPLIT RAIL FENCING AND NGPA SIGN
Scale: NTS

E NGPA SIGN
Scale: NTS

SOMERSET SUBSTATION

LANDSCAPE CONSTRUCTION DETAILS AND NOTES

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NO.	DATE	DESCRIPTION	BY
1	05/03/2018	MITIGATION PLAN	AJ

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ORIGINAL PLAN IS 22" x 34".
SCALE ACCORDINGLY.

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JOB NUMBER:
111103.11
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W4 OF 5

FILENAME
PRINTED BY
DATE

DSD 001075

MITIGATION NOTES

MITIGATION AND MONITORING NOTES

EXECUTIVE SUMMARY

PSE'S ENERGIZE EASTSIDE PROJECT (THE PROJECT) PROPOSES TO UPGRADE EXISTING TRANSMISSION LINES IN SOUTH BELLEVUE IN ORDER TO INCREASE TRANSMISSION SYSTEM CAPACITY TO 230KV POWER. PROJECT ELEMENTS, EXISTING CONDITIONS, MITIGATION SEQUENCING, AND PROJECT IMPACTS TO CRITICAL AREAS ARE DISCUSSED IN THE *CITY OF BELLEVUE CRITICAL AREAS REPORT: PUGET SOUND ENERGY-ENERGIZE EASTSIDE PROJECT SOUTH BELLEVUE SEGMENT* (SOUTH BELLEVUE CAR) PREPARED BY THE WATERSHED COMPANY, AUGUST 2017. THIS MITIGATION PLAN HAS BEEN DESIGNED TO APPROPRIATELY MITIGATE FOR PROJECT IMPACTS OCCURRING IN WETLANDS AND WETLAND AND STREAM BUFFERS IN THE COAL CREEK SUB-BASIN AND IS INTENDED TO REPRESENT THE FINAL MITIGATION PLAN REFERENCED IN THE SOUTH BELLEVUE CAR. A SEPARATE MITIGATION PLAN IS PROPOSED FOR PROJECT IMPACTS OCCURRING IN THE RICHARDS CREEK BASIN.

PROPOSED PROJECT ACTIVITIES IN THE COAL CREEK SUB-BASIN IMPACT WETLANDS AND BUFFERS IN ONE OF THREE WAYS: PERMANENT FILL RESULTING FROM TRANSMISSION POLE INSTALLATION/REPLACEMENT (PERMANENT), PERMANENT VEGETATION CONVERSION FROM A FORESTED VEGETATION TYPE DUE TO VEGETATION MANAGEMENT REQUIREMENTS (CONVERSION), AND TEMPORARY IMPACTS ASSOCIATED WITH CONSTRUCTION ACTIVITIES (TEMPORARY). PERMANENT AND CONVERSION BUFFER IMPACTS REQUIRE MITIGATION AS SUMMARIZED IN THE TABLE BELOW.

TABLE 2. COMPREHENSIVE TABLE OF ACTIVITIES AFFECTING CRITICAL AREAS IN SOUTH BELLEVUE- COAL CREEK BASIN[1].

IMPACTS					
Critical Area Name	**Category**	**Type of Activity**	**Quantity (SF)**	**Mitigation Ratio**	**Mitigation Required (SF)**
Wetland MB01	III	Conversion	1,146	2:1	2,292
Combined Buffers	na	Permanent	35	1:1	35
Combined Buffers	na	Conversion	7,734	0.5:1	3,867

RESTORATION			
Critical Area Name[2]	**Category**	**Type of Activity**	**Quantity (SF)**
Somerset Wetland A	IV	Enhancement	2,300
Somerset Buffers	NA	Enhancement	3,950

IMPACT & RESTORATION SUMMARY					
Critical Area Type	**Type of Activity**	**Quantity (SF)**	**Total Mitigation Required (SF)**	**Mitigation Proposed**	
				Type	**Qty (SF)**
Wetland	Conversion	1,146	2,292	Enhancement	2,300
	Permanent	0			
Buffer	Conversion	7,734	3,902	Enhancement	3,950
	Permanent	35			

1. Only activities resulting in a long-term change are included. Temporary impacts will be restored in place and are not shown in this table.

2. Critical Areas as identified in the Somerset Substation wetland delineation (The Watershed Company, February 2017) and delineation report, documented separately from the Energize Eastside delineation study.

MITIGATION FOR IMPACTS, PRESENTED IN THE TABLE ABOVE, IS PLANNED ON THE SOMERSET SUBSTATION PARCEL. AS DISCUSSED IN THE SOUTH BELLEVUE CAR, THIS LOCATION WAS SELECTED FOR MITIGATION ACTIVITIES BASED UPON THE LOCATION OF PROJECT IMPACTS, OPPORTUNITY PRESENT, PROPERTY OWNERSHIP, AND PROXIMITY TO OTHER REGULATED CRITICAL AREAS.

THIS FINAL MITIGATION PLAN PROPOSES TO COMPENSATE FOR PROJECT IMPACTS THROUGH WETLAND ENHANCEMENT AND BUFFER ENHANCEMENT AND IS INTENDED TO INCREASE NATIVE PLANT COVER, DECREASE INVASIVE SPECIES PREVALENCE, IMPROVE NATIVE SPECIES DIVERSITY, AND PROVIDE FOOD AND OTHER HABITAT RESOURCES FOR WILDLIFE IN THE COAL CREEK BASIN.THE MINIMUM MITIGATION AREA REQUIRED, AS PRESENTED IN THE SOUTH BELLEVUE CAR, IS 2,292 SF OF WETLAND ENHANCEMENT AND 3,902 SF OF BUFFER ENHANCEMENT. THE PROPOSED MITIGATION AREA DEPICTED HEREIN HAS BEEN DESIGNED TO ENSURE WETLAND AND BUFFER FUNCTIONS ARE MAINTAINED OR IMPROVED OVERALL.

THE PLAN INCLUDES A COMPREHENSIVE FIVE-YEAR MAINTENANCE AND MONITORING PLAN, DETAILED BELOW. THESE SPECIFICATIONS AND STANDARDS WILL ENSURE THAT ENHANCEMENT PLANTINGS WILL BE MAINTAINED, MONITORED, AND SUCCESSFULLY ESTABLISHED WITHIN THE FIRST FIVE YEARS FOLLOWING IMPLEMENTATION.

GOALS

1. REHABILITATE APPROXIMATELY 2,292 SF OF WETLAND AREA ON THE SOMERSET SUBSTATION PARCEL.
3. ENHANCE APPROXIMATELY 3,902 SF OF BUFFER AREA ON THE SOMERSET SUBSTATION PARCEL.
3. CREATE A DENSE, NATIVE, TREE AND SHRUB COMMUNITY THROUGHOUT RESTORED AREAS OF THE SITE WHICH ARE COMPATIBLE WITH THE EXISTING POWERLINE INFRASTRUCTURE AND PLANNED FUTURE DEVELOPMENT OF THE SITE.

PERFORMANCE STANDARDS

THE FOLLOWING PERFORMANCE STANDARDS WILL BE USED TO GAUGE THE SUCCESS OF THE PROJECT OVER TIME. IF ALL PERFORMANCE STANDARDS HAVE BEEN SATISFIED BY THE END OF YEAR FIVE, THE PROJECT SHALL BE CONSIDERED COMPLETE.

1. SURVIVAL STANDARDS:
   - 1.1. 100% SURVIVAL OF INSTALLED PLANTINGS IN ALL AREAS AT THE END OF YEAR 1. THIS STANDARD MAY BE MET THROUGH ESTABLISHMENT OF INSTALLED PLANTS OR BY REPLANTING AS NECESSARY TO ACHIEVE THE REQUIRED NUMBERS.
   - 1.2. 80% SURVIVAL OF INSTALLED PLANTINGS IN ALL AREAS AT THE END OF YEAR 2. THIS STANDARD MAY BE MET THROUGH ESTABLISHMENT OF INSTALLED PLANTS OR BY REPLANTING AS NECESSARY TO ACHIEVE THE REQUIRED NUMBERS.
   - 1.3. SURVIVAL BEYOND YEAR 2 IS DIFFICULT TO TRACK. THEREFORE, A DIVERSITY STANDARD SHALL BE IMPLEMENTED.
   - 1.4. ESTABLISHMENT OF AT LEAST TWO NATIVE TREE SPECIES, FOUR NATIVE SHRUB SPECIES AND TWO NATIVE EMERGENT SPECIES IN PLANTING AREAS.
2. NATIVE VEGETATION COVER STANDARDS:
   - 2.1. ACHIEVE 60% AERIAL COVER OF NATIVE WOODY VEGETATION BY THE END OF YEAR 3. NATIVE VOLUNTEERS MAY COUNT TOWARDS THIS STANDARD.
   - 2.2. ACHIEVE 80% AERIAL COVER OF NATIVE WOODY VEGETATION BY THE END OF YEAR 5. NATIVE VOLUNTEERS MAY COUNT TOWARDS THIS STANDARD.
3. INVASIVE SPECIES COVER STANDARD:
   - 3.1. NO MORE THAN 10% AERIAL COVER OF NON-NATIVE, INVASIVE SPECIES IN ANY PLANTING AREA IN ANY MONITORING YEAR.

MAINTENANCE

THE SITE SHALL BE MAINTAINED IN ACCORDANCE WITH THE FOLLOWING INSTRUCTIONS FOR FIVE YEARS FOLLOWING SUCCESSFUL COMPLETION OF THE CONSTRUCTION.

1. REPLACE EACH PLANT FOUND DEAD IN YEAR ONE.
2. FOLLOW THE RECOMMENDATIONS NOTED IN THE PREVIOUS MONITORING SITE VISIT'S REPORT.
3. GENERAL WEEDING FOR ALL PLANTED AREAS:
   - 3.1. AT LEAST TWICE ANNUALLY, REMOVE COMPETING GRASSES AND WEEDS FROM AROUND THE BASE OF EACH INSTALLED PLANT TO A RADIUS OF 12 INCHES. WEEDING SHOULD OCCUR AT LEAST ONCE IN THE SPRING AND ONCE IN THE SUMMER. THOROUGH WEEDING WILL RESULT IN LOWER PLANT MORTALITY AND ASSOCIATED PLANT REPLACEMENT COSTS.
   - 3.2. MORE FREQUENT WEEDING MAY BE NECESSARY DEPENDING ON WEED CONDITIONS THAT DEVELOP AFTER PLANT INSTALLATION.
   - 3.3. NOXIOUS WEEDS MUST BE REMOVED FROM THE ENTIRE MITIGATION AREA, AT LEAST TWICE ANNUALLY.
   - 3.4. DO NOT USE STRING TRIMMERS IN THE VICINITY OF INSTALLED PLANTS, AS THEY MAY DAMAGE OR KILL THE PLANTS.
4. MAINTAIN A FOUR-INCH-THICK LAYER OF WOOD CHIP MULCH ACROSS ALL PLANTING AREAS. MULCH SHOULD BE PULLED BACK TWO INCHES FROM THE PLANT STEMS.
5. DURING AT LEAST THE FIRST TWO GROWING SEASONS, MAKE SURE THAT THE ENTIRE PLANTING AREA RECEIVES A MINIMUM OF ONE INCH OF WATER PER WEEK FROM JUNE 1ST THROUGH SEPTEMBER 30TH.
6. REMOVE TRASH AND DEBRIS FROM THE PLANTING AREAS.

MONITORING METHODS

THE MONITORING PROGRAM IS DESIGNED TO TRACK THE SUCCESS OF THE MITIGATION PLAN OVER TIME BY MEASURING THE DEGREE TO WHICH THE PLAN IS MEETING THE PERFORMANCE STANDARDS LISTED ABOVE. PRIOR TO THE COMMENCEMENT OF THE MONITORING PHASE, AN AS-BUILT PLAN DOCUMENTING THE SUCCESSFUL INSTALLATION OF THE PROJECT WILL BE SUBMITTED TO THE CITY OF BELLEVUE AND OTHER PERMITTING AGENCIES AS REQUESTED. IF NECESSARY, THE AS-BUILT REPORT MAY INCLUDE A MARK-UP OF THE ORIGINAL PLAN THAT NOTES ANY SIGNIFICANT CHANGES OR SUBSTITUTIONS THAT OCCURRED. DURING THE AS-BUILT INSPECTION, THE RESTORATION SPECIALIST WILL ESTABLISH AT LEAST FOUR PERMANENT PHOTO-POINTS, BASELINE PLANT INSTALLATION QUANTITIES, AND TRANSECTS AS DETAILED BELOW.

TRANSECTS:

DURING THE AS-BUILT INSPECTION, THE RESTORATION SPECIALIST SHALL INSTALL A SUFFICIENT NUMBER OF REPRESENTATIVELY LOCATED 100-FOOT TRANSECTS IN THE RESTORATION PLANTING AREAS TO ADEQUATELY MEASURE THE VEGETATION PERFORMANCE STANDARDS BELOW. PERCENT COVER DATA SHALL BE RECORDED ALONG ESTABLISHED TRANSECTS USING THE LINE INTERCEPT METHOD.

YEARLY MONITORING:

THE SITE WILL BE MONITORED TWICE ANNUALLY FOR FIVE YEARS BEGINNING WITH APPROVAL OF THE AS-BUILT REPORT. DURING EACH YEAR THERE SHALL BE A SPRING VISIT AND A SUMMER OR EARLY FALL VISIT. THE SPRING MONITORING VISIT WILL ADDRESS MAINTENANCE NEEDS SUCH AS PLANT REPLACEMENT AND WEEDING.

FOLLOWING THE SPRING VISIT, THE RESTORATION SPECIALIST WILL NOTIFY THE RESPONSIBLE PARTY AND/OR MAINTENANCE CREWS OF NECESSARY MAINTENANCE. THE SECOND ANNUAL VISIT WILL OCCUR JULY 1ST TO SEPTEMBER 15TH AND WILL RECORD QUANTITATIVE ASSESSMENT OF THE SITE'S PROGRESS. A REPORT DETAILING THE FINDINGS OF SUMMER MONITORING WILL BE SUBMITTED ANNUALLY TO THE CITY, AND WILL CONTAIN THE FOLLOWING:

1. GENERAL SUMMARY OF SITE CONDITIONS.
2. COUNTS OF LIVE PLANTINGS BY SPECIES (YEARS ONE AND TWO ONLY)
3. PERCENT COVER OF NATIVE WOODY SPECIES, DETERMINED USING THE LINE INTERCEPT METHOD ALONG ESTABLISHED TRANSECTS.
4. PERCENT COVER OF INVASIVE SPECIES USING THE LINE INTERCEPT METHOD ALONG ESTABLISHED TRANSECTS.
5. NOTES ON INVASIVE WEEDS OUTSIDE OF ESTABLISHED TRANSECTS.
6. PHOTOGRAPHS FROM FIXED PHOTO-POINTS ESTABLISHED DURING THE AS-BUILT INSPECTION.
8. ANY EVIDENCE OF WILDLIFE USAGE IN THE MITIGATION AREA.
9. REPORT ON CONDITION OF PLACED LARGE WOODY DEBRIS.
10. INTRUSIONS INTO THE PLANTING AREAS, VANDALISM OR OTHER ACTIONS THAT IMPAIR THE INTENDED FUNCTIONS OF THE MITIGATION AREAS.
11. RECOMMENDATIONS FOR MAINTENANCE OR REPAIRS.

CONTINGENCIES

UNFORESEEN PROJECT CONDITIONS MAY REQUIRE CHANGES IN VEGETATION LAYOUT, DENSITY/SPACING, AND SPECIES SUBSTITUTIONS. WEED CONDITIONS MAY REQUIRE ALTERATION OF INSTALLED VEGETATION TYPES, MULCH PLACEMENT, WEED REMOVAL AND USE OF HERBICIDES. MINOR HAND WORK TO IMPROVE OR RETARD DRAINAGE MAY BE NEEDED TO SUPPORT WETLAND HYDROLOGY. SUCH WORK WILL BE COORDINATED DIRECTLY WITH THE CITY OF BELLEVUE.

UNPREDICTABLE EVENTS SUCH AS OBSTRUCTIONS OR HIGH-FLOWS FROM LARGE STORMS MAY NECESSITATE EROSION AND HABITAT FEATURE REPAIRS. SMALL REPAIRS BY HAND WILL BE COORDINATED WITH THE CITY OF BELLEVUE. LARGER REPAIRS THAT REQUIRE EXTENSIVE MANIPULATION OR THE USE OF HEAVY MACHINERY WILL BE COORDINATED IN CONSULTATION WITH JURISDICTIONAL AGENCIES.

SITE PROTECTION

THE MITIGATION AREA WILL BE PROTECTED BY RECORDING A NOTICE ON TITLE WITH KING COUNTY. FENCING AND SIGNS WILL BE INSTALLED ALONG THE EDGE OF THE MITIGATION AREA.

MATERIALS

1. WOOD CHIP MULCH: "ARBORIST CHIPS" (CHIPPED WOODY MATERIAL) BARK OR WOOD CHIP MULCH SHALL BE DERIVED FROM DOUGLAS FIR, PINE, OR HEMLOCK SPECIES. IT SHALL NOT CONTAIN RESIN, TANNIN, OR OTHER COMPOUNDS IN QUANTITIES THAT WOULD BE DETRIMENTAL TO PLANT LIFE. SAWDUST SHALL NOT BE USED AS MULCH.

   BARK OR WOOD CHIPS WHEN TESTED SHALL BE ACCORDING TO WSDOT TEST METHOD T 123 PRIOR TO PLACEMENT AND SHALL MEET THE FOLLOWING LOOSE VOLUME GRADATION:

SIEVE SIZE	PERCENT PASSING MINIMUM	MAXIMUM
2"	95	100
NO. 4	0	30

   APPROX. QUANTITY REQUIRED: 60 CUBIC YARDS.
2. COMPOST: CEDAR GROVE COMPOST OR EQUIVALENT "COMPOSTED MATERIAL" PER WASHINGTON ADMIN. CODE 173-350-220. QUANTITY REQUIRED: 35 CUBIC YARDS
3. FERTILIZER: SLOW-RELEASE, PHOSPHOROUS-FREE GRANULAR FERTILIZER. MOST COMMERCIAL NURSERIES CARRY THIS PRODUCT. FOLLOW MANUFACTURER'S INSTRUCTIONS FOR USE. KEEP FERTILIZER IN WEATHER-TIGHT CONTAINER WHILE ON-SITE. FERTILIZER IS ONLY TO BE APPLIED IN YEARS TWO AND THREE, NOT IN YEAR ONE.
4. FERTILIZER (FOR NEAR AQUATIC ENVIRONMENTS): SLOW-RELEASE, PHOSPHOROUS-FREE GRANULAR FERTILIZER. LABEL MUST INDICATE THAT PRODUCT IS SAFE FOR AQUATIC ENVIRONMENTS. FOLLOW MANUFACTURER'S INSTRUCTIONS FOR USE. KEEP FERTILIZER IN WEATHER-TIGHT CONTAINER WHILE ON-SITE. FERTILIZER IS ONLY TO BE APPLIED IN YEARS TWO AND THREE, NOT IN YEAR ONE.
5. RESTORATION SPECIALIST: QUALIFIED PROFESSIONAL ABLE TO EVALUATE AND MONITOR THE CONSTRUCTION OF ENVIRONMENTAL RESTORATION PROJECTS.

THE WATERSHED COMPANY
750 Sixth Street South
Kirkland WA 98033
p 425.822.5242
www.watershedco.com
Science & Design

SOMERSET SUBSTATION
ENERGIZE EASTSIDE MITIGATION PLAN
PREPARED FOR: PUGET SOUND ENERGY
PARCEL #2124059071, #2124059052
5200 SE COAL CREEK PKWY
BELLEVUE, WA 98006

SUBMITTALS & REVISIONS

NO.	DATE	DESCRIPTION	BY
1	05/03/2018	MITIGATION PLAN	AJ

SHEET SIZE:
ORIGINAL PLAN IS 22" x 34".
SCALE ACCORDINGLY.

PROJECT MANAGER: JC
DESIGNED: --
DRAFTED: AJ/LM
CHECKED: CM
JOB NUMBER:
111103.11
SHEET NUMBER:
W5 OF 5

FILENAME
PRINTED BY
DATE

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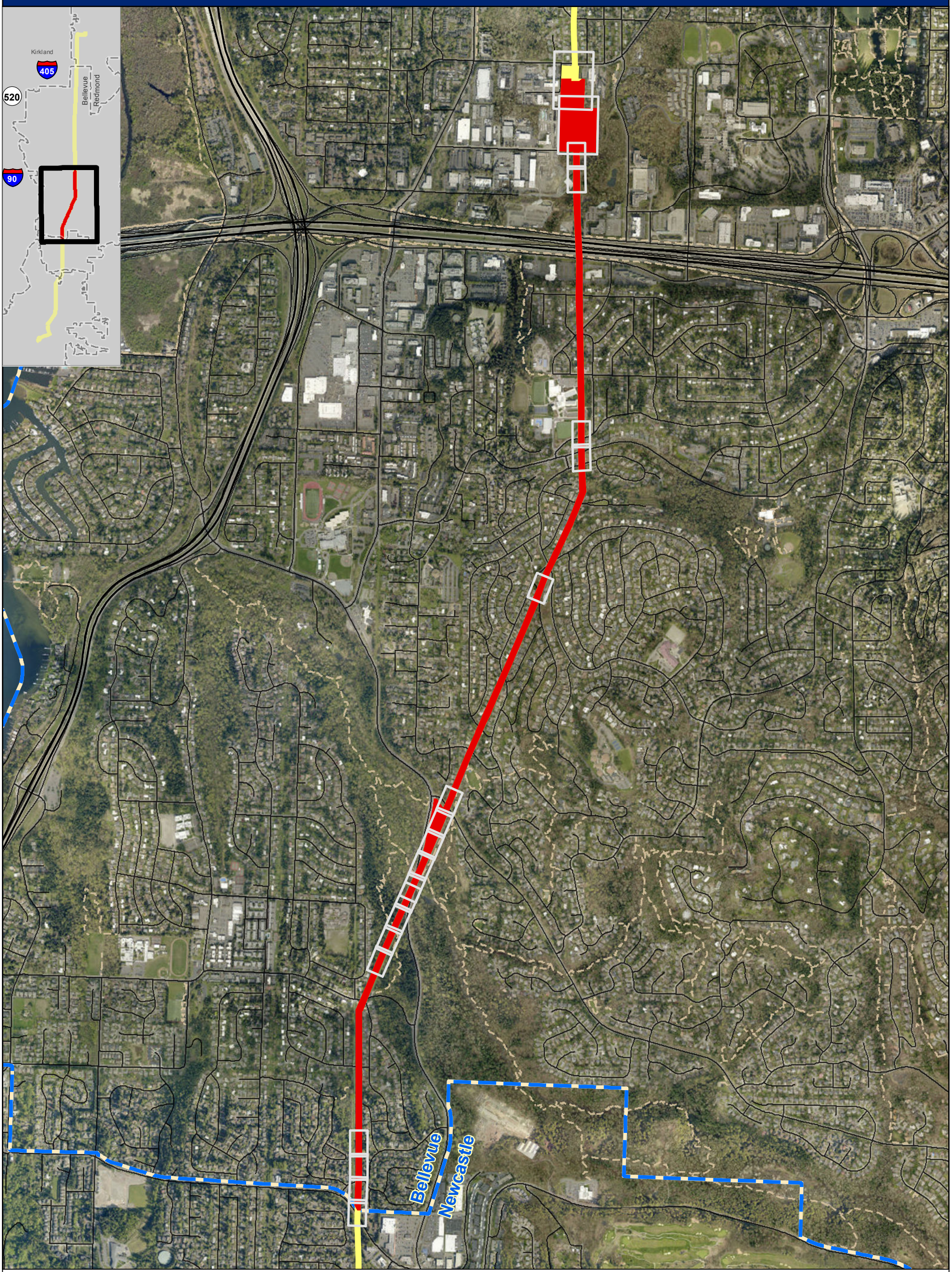
APPENDIX B

Critical Area Assessment Maps

PSE EE230 - SOUTH BELLEVUE CRITICAL AREA ASSESSMENT MAP - COVER PAGE



South Bellevue Segment of PSE Route and Critical Area Study Limits[1 PSE, TWC]

PSE Route and Critical Area Study Limits outside of South Bellevue Segment[PSE]

Report Map Page Extents[2 TWC]

Road Centerlines[COB]

Trails[COB]

City Limit[KC]

Notes:
1. Critical areas were defined within a 100' corridor along the existing powerline corridor and the entirety of the Lakeside and Richards Creek substation parcels.
2. Map pages highlighted are where critical areas, as designated in Bellevue Municipal Code, are mapped within the South Bellevue portion of the corridor. All other map pages were omitted.
3. Only those steep slopes designated as priority through geotechnical field investigation are mapped within the corridor. Please refer to discussion in Critical Areas Report.

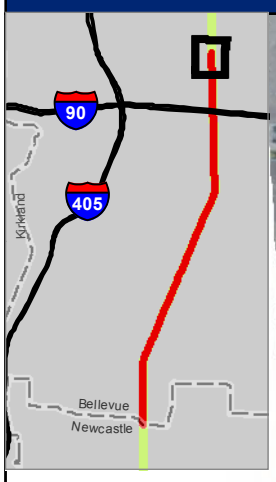
DSD 001078

N

0 720 1,440

Feet

PSE EE230 - SOUTH BELLEVUE CRITICAL AREA ASSESSMENT MAP



SE 26TH ST

137TH AVE SE

WETLAND I
(Lakeside)
(Category III)

Northern extent of South Bellevue project area

136TH AVE SE

WETLAND EE
(Lakeside)
(Category III)

7/5

7/5

LAKESIDE
SUBSTATION

SE 27TH PL

115-X

7/6

7/6

115-5

STREAM D
(Lakeside)
(Type F)

WETLAND A
(Richards)
(Category III)

STREAM B
(Lakeside)
(Type F)

WETLAND D (Lakeside)
(Category III)

115-2

STREAM C (Richards) -
Richards Creek
(Type F)

115-X

STREAM F
(Lakeside)
(Type F)

STREAM A
(Richards)
(Type N)

- Critical Area Study Limits[1] TWC
- City Limit
- Maintained Legal ROW[PSE] - *pale yellow shading*
- Managed Right-of-Way
- Wires
- Wire Zone
- Proposed Stringing Sites HDR
- Existing Pole to Remain PSE
- Existing Pole to be Removed[PSE]
- Proposed Pole Footprints PSE
- Proposed Access Routes[3] PSE
- Richards Creek Work Limits[PSE]
- Substation Improvement Area[PSE]
- Trees to Remove[6]
- Canopy to be Removed[6] TWC
- Canopy to Remain[6]
- Delineated Stream Boundary[TWC]
- Delineated Wetland Boundary[TWC]
- Limit of Combined Functioning Wetland/Stream Buffer[2] TWC
- Stream
- Wetland
- Combined Functioning Wetland/Stream Buffer Area[2 TWC] - *white shading*
- Priority Steep Slopes[4 COB]
- Limit of Priority Steep Slope Buffer[5 TWC]
- Landslide Hazard Areas
- Landslide Hazard Area Buffer[TWC]
- Flood Hazard (100-yr Floodplain)[COB]

Notes:
1. Critical areas were defined within a 100' corridor along the existing powerline corridor and the entirety of the Lakeside and Richards Creek substation parcels.
2. Shapes representing functioning buffers are truncated 25 feet outside of the study limits.
3. Access roads shown at typical width of 20 feet.
4. Determined in the field by geotechnical consultant. See discussion in Critical Areas Report.
5. Required from top of slope only, per BMC 20.25H.035(A).
6. Canopy shown only in Richards Creek and Lakeside substation parcels. Canopy not shown for dead/dying trees.

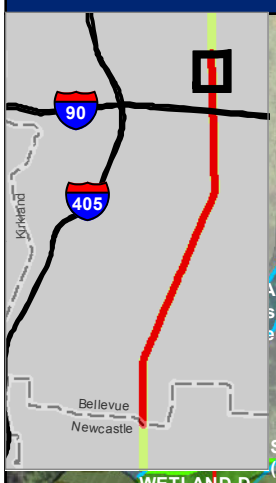
DSD 001079

1

0 25 50
Feet

Data sources: Puget Sound Energy (PSE), The Watershed Company (TWC), City of Bellevue (COB), King County (KC), and HDR. Aerial imagery from PSE, 2011.

PSE EE230 - SOUTH BELLEVUE CRITICAL AREA ASSESSMENT MAP



115-X
115-5
7/6
7/6
115-2
115-X
115-X
7/7
115-1
115-X
7/7
115-X
7/8
115-X
7/9
115-X
9/1
9/2
115-X
9/1
9/2
STREAM B (Lakeside) (Type F)
WETLAND D (Lakeside) (Category III)
STREAM F (Lakeside) (Type F)
STREAM A (Richards) (Type N)
WETLAND C (Richards) (Category III)
WETLAND A (Richards) (Category III)
WETLAND B (Richards) (Category III)
STREAM C (Richards) - Richards Creek (Type F)
RICHARDS CREEK SUBSTATION
SE 30TH ST
WETLAND D (Richards) (Category II)
WETLAND H (Richards) (Category III)

- Critical Area Study Limits[1] TWC
- City Limit
- Maintained Legal ROW[PSE] - *pale yellow shading*
- Managed Right-of-Way
- Wires
- Wire Zone
- Proposed Stringing Sites HDR
- Existing Pole to Remain PSE
- Existing Pole to be Removed[PSE]
- Proposed Pole Footprints PSE
- Proposed Access Routes[3] PSE
- Richards Creek Work Limits[PSE]
- Substation Improvement Area[PSE]
- Trees to Remove[6]
- Canopy to be Removed[6] TWC
- Canopy to Remain[6]
- Delineated Stream Boundary[TWC]
- Delineated Wetland Boundary[TWC]
- Limit of Combined Functioning Wetland/Stream Buffer[2] TWC
- Stream
- Wetland
- Combined Functioning Wetland/Stream Buffer Area[2 TWC] - *white shading*
- Priority Steep Slopes[4 COB]
- Limit of Priority Steep Slope Buffer[5 TWC]
- Landslide Hazard Areas
- Landslide Hazard Area Buffer[TWC]
- Flood Hazard (100-yr Floodplain)[COB]

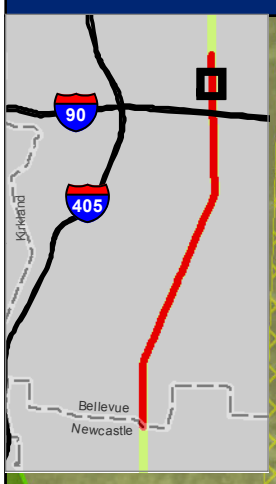
Notes:
1. Critical areas were defined within a 100' corridor along the existing powerline corridor and the entirety of the Lakeside and Richards Creek substation parcels.
2. Shapes representing functioning buffers are truncated 25 feet outside of the study limits.
3. Access roads shown at typical width of 20 feet.
4. Determined in the field by geotechnical consultant. See discussion in Critical Areas Report.
5. Required from top of slope only, per BMC 20.25H.035(A).
6. Canopy shown only in Richards Creek and Lakeside substation parcels. Canopy not shown for dead/dying trees.

DSD 001080
2

0 25 50
Feet

Data sources: Puget Sound Energy (PSE), The Watershed Company (TWC), City of Bellevue (COB), King County (KC), and HDR. Aerial imagery from PSE, 2011.

PSE EE230 - SOUTH BELLEVUE CRITICAL AREA ASSESSMENT MAP



7/8
115-X
7/9
115-X
9/2
9/1
115-X
9/1
WETLAND D
(Richards)
(Category II)
STREAM C (Richards)
- Richards Creek
(Type F)
STREAM JB02
(Type F)
WETLAND H
(Richards)
(Category III)
King County
Mitigation Area

- Critical Area Study Limits[1] TWC
- City Limit
- Maintained Legal ROW[PSE] - *pale yellow shading*
- Managed Right-of-Way
- Wires
- Wire Zone
- Proposed Stringing Sites HDR
- Existing Pole to Remain PSE
- Existing Pole to be Removed[PSE]
- Proposed Pole Footprints PSE
- Proposed Access Routes[3] PSE
- Richards Creek Work Limits[PSE]
- Substation Improvement Area[PSE]
- Trees to Remove[6]
- Canopy to be Removed[6] TWC
- Canopy to Remain[6]
- Delineated Stream Boundary[TWC]
- Delineated Wetland Boundary[TWC]
- Limit of Combined Functioning Wetland/Stream Buffer[2] TWC
- Stream
- Wetland
- Combined Functioning Wetland/Stream Buffer Area[2 TWC] - *white shading*
- Priority Steep Slopes[4 COB]
- Limit of Priority Steep Slope Buffer[5 TWC]
- Landslide Hazard Areas
- Landslide Hazard Area Buffer[TWC]
- Flood Hazard (100-yr Floodplain)[COB]

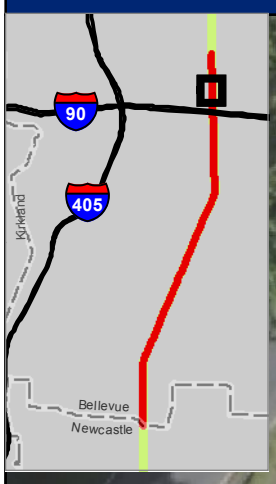
Notes:
1. Critical areas were defined within a 100' corridor along the existing powerline corridor and the entirety of the Lakeside and Richards Creek substation parcels.
2. Shapes representing functioning buffers are truncated 25 feet outside of the study limits.
3. Access roads shown at typical width of 20 feet.
4. Determined in the field by geotechnical consultant. See discussion in Critical Areas Report.
5. Required from top of slope only, per BMC 20.25H.035(A).
6. Canopy shown only in Richards Creek and Lakeside substation parcels. Canopy not shown for dead/dying trees.

DSD 001081
3

0 10 20
Feet

Data sources: Puget Sound Energy (PSE), The Watershed Company (TWC), City of Bellevue (COB), King County (KC), and HDR. Aerial imagery from PSE, 2011.

PSE EE230 - SOUTH BELLEVUE CRITICAL AREA ASSESSMENT MAP



King County Mitigation Area

STREAM C (Richards) - Richards Creek (Type F)

WETLAND H (Richards) (Category III)

- Critical Area Study Limits[1] TWC
- City Limit
- Maintained Legal ROW[PSE] - *pale yellow shading*
- Managed Right-of-Way
- Wires
- Wire Zone
- Proposed Stringing Sites HDR
- Existing Pole to Remain PSE
- Existing Pole to be Removed[PSE]
- Proposed Pole Footprints PSE
- Proposed Access Routes[3] PSE
- Richards Creek Work Limits[PSE]
- Substation Improvement Area[PSE]
- Trees to Remove[6]
- Canopy to be Removed[6] TWC
- Canopy to Remain[6]
- Delineated Stream Boundary[TWC]
- Delineated Wetland Boundary[TWC]
- Limit of Combined Functioning Wetland/Stream Buffer[2] TWC
- Stream
- Wetland
- Combined Functioning Wetland/Stream Buffer Area[2 TWC] - *white shading*
- Priority Steep Slopes[4 COB]
- Limit of Priority Steep Slope Buffer[5 TWC]
- Landslide Hazard Areas
- Landslide Hazard Area Buffer[TWC]
- Flood Hazard (100-yr Floodplain)[COB]

Notes:
1. Critical areas were defined within a 100' corridor along the existing powerline corridor and the entirety of the Lakeside and Richards Creek substation parcels.
2. Shapes representing functioning buffers are truncated 25 feet outside of the study limits.
3. Access roads shown at typical width of 20 feet.
4. Determined in the field by geotechnical consultant. See discussion in Critical Areas Report.
5. Required from top of slope only, per BMC 20.25H.035(A).
6. Canopy shown only in Richards Creek and Lakeside substation parcels. Canopy not shown for dead/dying trees.

DSD 001082

4

0 10 20

Feet

Data sources: Puget Sound Energy (PSE), The Watershed Company (TWC), City of Bellevue (COB), King County (KC), and HDR. Aerial imagery from PSE, 2011.

PSE EE230 - SOUTH BELLEVUE CRITICAL AREA ASSESSMENT MAP

SUNSET CREEK FLOODPLAIN

SE ALLEN RD

8/3

8/3

Critical Area Study Limits[1] TWC
City Limit
Maintained Legal ROW[PSE] - *pale yellow shading*
Managed Right-of-Way
Wires
Wire Zone

Proposed Stringing Sites HDR
Existing Pole to Remain PSE
Existing Pole to be Removed[PSE]
Proposed Pole Footprints PSE
Proposed Access Routes[3] PSE

Richards Creek Work Limits[PSE]
Substation Improvement Area[PSE]
Trees to Remove[6]
Canopy to be Removed[6] TWC
Canopy to Remain[6]

Delineated Stream Boundary[TWC]
Delineated Wetland Boundary[TWC]
Limit of Combined Functioning Wetland/Stream Buffer[2] TWC

Stream
Wetland
Combined Functioning Wetland/Stream Buffer Area[2 TWC] - *white shading*

Priority Steep Slopes[4 COB]
Limit of Priority Steep Slope Buffer[5 TWC]
Landslide Hazard Areas
Landslide Hazard Area Buffer[TWC]
Flood Hazard (100-yr Floodplain)[COB]

Notes:
1. Critical areas were defined within a 100' corridor along the existing powerline corridor and the entirety of the Lakeside and Richards Creek substation parcels.
2. Shapes representing functioning buffers are truncated 25 feet outside of the study limits.
3. Access roads shown at typical width of 20 feet.
4. Determined in the field by geotechnical consultant. See discussion in Critical Areas Report.
5. Required from top of slope only, per BMC 20.25H.035(A).
6. Canopy shown only in Richards Creek and Lakeside substation parcels. Canopy not shown for dead/dying trees.

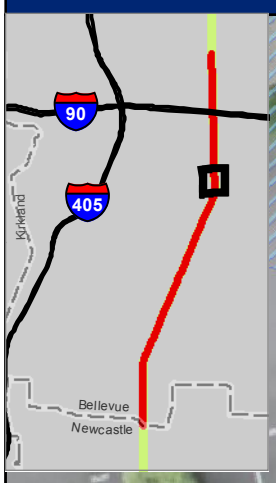
DSD 001083

5

0 10 20
Feet

Data sources: Puget Sound Energy (PSE), The Watershed Company (TWC), City of Bellevue (COB), King County (KC), and HDR. Aerial imagery from PSE, 2011.

PSE EE230 - SOUTH BELLEVUE CRITICAL AREA ASSESSMENT MAP



SUNSET CREEK FLOODPLAIN

SE NEWPORT WAY

SE 42ND ST

- Critical Area Study Limits[1] TWC
- City Limit
- Maintained Legal ROW[PSE] - *pale yellow shading*
- Managed Right-of-Way
- Wires
- Wire Zone
- Proposed Stringing Sites HDR
- Existing Pole to Remain PSE
- Existing Pole to be Removed[PSE]
- Proposed Pole Footprints PSE
- Proposed Access Routes[3] PSE
- Richards Creek Work Limits[PSE]
- Substation Improvement Area[PSE]
- Trees to Remove[6]
- Canopy to be Removed[6] TWC
- Canopy to Remain[6]
- Delineated Stream Boundary[TWC]
- Delineated Wetland Boundary[TWC]
- Limit of Combined Functioning Wetland/Stream Buffer[2] TWC
- Stream
- Wetland
- Combined Functioning Wetland/Stream Buffer Area[2 TWC] - *white shading*
- Priority Steep Slopes[4 COB]
- Limit of Priority Steep Slope Buffer[5 TWC]
- Landslide Hazard Areas
- Landslide Hazard Area Buffer[TWC]
- Flood Hazard (100-yr Floodplain)[COB]

Notes:
1. Critical areas were defined within a 100' corridor along the existing powerline corridor and the entirety of the Lakeside and Richards Creek substation parcels.
2. Shapes representing functioning buffers are truncated 25 feet outside of the study limits.
3. Access roads shown at typical width of 20 feet.
4. Determined in the field by geotechnical consultant. See discussion in Critical Areas Report.
5. Required from top of slope only, per BMC 20.25H.035(A).
6. Canopy shown only in Richards Creek and Lakeside substation parcels. Canopy not shown for dead/dying trees.

DSD 001084

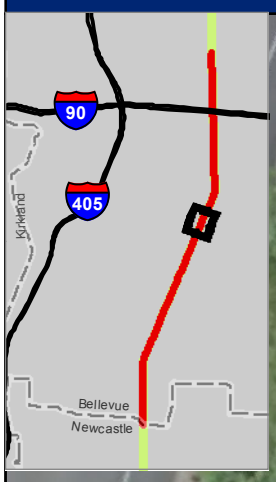
6

0 10 20

Feet

Data sources: Puget Sound Energy (PSE), The Watershed Company (TWC), City of Bellevue (COB), King County (KC), and HDR. Aerial imagery from PSE, 2011.

PSE EE230 - SOUTH BELLEVUE CRITICAL AREA ASSESSMENT MAP



SOMERSET BLVD SE

7/7

7/7

WETLAND JB03
(Category IV)

SOMERSET PL SE

WETLAND JB02
(Category IV)

- Critical Area Study Limits[1] (TWC)
- City Limit
- Maintained Legal ROW[PSE] - *pale yellow shading*
- Managed Right-of-Way
- Wires
- Wire Zone
- Proposed Stringing Sites (HDR)
- Existing Pole to Remain (PSE)
- Existing Pole to be Removed[PSE]
- Proposed Pole Footprints (PSE)
- Proposed Access Routes[3] (PSE)
- Richards Creek Work Limits[PSE]
- Substation Improvement Area[PSE]
- Trees to Remove[6]
- Canopy to be Removed[6] (TWC)
- Canopy to Remain[6]
- Delineated Stream Boundary[TWC]
- Delineated Wetland Boundary[TWC]
- Limit of Combined Functioning Wetland/Stream Buffer[2] (TWC)
- Stream
- Wetland
- Combined Functioning Wetland/Stream Buffer Area[2 TWC] - *white shading*
- Priority Steep Slopes[4 COB]
- Limit of Priority Steep Slope Buffer[5 TWC]
- Landslide Hazard Areas
- Landslide Hazard Area Buffer[TWC]
- Flood Hazard (100-yr Floodplain)[COB]

Notes:
1. Critical areas were defined within a 100' corridor along the existing powerline corridor and the entirety of the Lakeside and Richards Creek substation parcels.
2. Shapes representing functioning buffers are truncated 25 feet outside of the study limits.
3. Access roads shown at typical width of 20 feet.
4. Determined in the field by geotechnical consultant. See discussion in Critical Areas Report.
5. Required from top of slope only, per BMC 20.25H.035(A).
6. Canopy shown only in Richards Creek and Lakeside substation parcels. Canopy not shown for dead/dying trees.

DSD 001085

7

0 10 20

Feet

Data sources: Puget Sound Energy (PSE), The Watershed Company (TWC), City of Bellevue (COB), King County (KC), and HDR. Aerial imagery from PSE, 2011.

PSE EE230 - SOUTH BELLEVUE CRITICAL AREA ASSESSMENT MAP

7/1

7/1

Foresthill Neighborhood Trail

WETLAND JB04
(Category IV)

FOREST DR SE

Critical Area Study Limits[1] TWC
City Limit
Maintained Legal ROW[PSE] - *pale yellow shading*
Managed Right-of-Way
Wires
Wire Zone

Proposed Stringing Sites HDR
Existing Pole to Remain PSE
Existing Pole to be Removed[PSE]
Proposed Pole Footprints PSE
Proposed Access Routes[3] PSE

Richards Creek Work Limits[PSE]
Substation Improvement Area[PSE]
Trees to Remove[6]
Canopy to be Removed[6] TWC
Canopy to Remain[6]

Delineated Stream Boundary[TWC]
Delineated Wetland Boundary[TWC]
Limit of Combined Functioning Wetland/Stream Buffer[2] TWC

Stream
Wetland
Combined Functioning Wetland/Stream Buffer Area[2 TWC] - *white shading*

Priority Steep Slopes[4 COB]
Limit of Priority Steep Slope Buffer[5 TWC]
Landslide Hazard Areas
Landslide Hazard Area Buffer[TWC]
Flood Hazard (100-yr Floodplain)[COB]

Notes:
1. Critical areas were defined within a 100' corridor along the existing powerline corridor and the entirety of the Lakeside and Richards Creek substation parcels.
2. Shapes representing functioning buffers are truncated 25 feet outside of the study limits.
3. Access roads shown at typical width of 20 feet.
4. Determined in the field by geotechnical consultant. See discussion in Critical Areas Report.
5. Required from top of slope only, per BMC 20.25H.035(A).
6. Canopy shown only in Richards Creek and Lakeside substation parcels. Canopy not shown for dead/dying trees.

DSD 001086

8

0 10 20
Feet

Data sources: Puget Sound Energy (PSE), The Watershed Company (TWC), City of Bellevue (COB), King County (KC), and HDR. Aerial imagery from PSE, 2011.

PSE EE230 - SOUTH BELLEVUE CRITICAL AREA ASSESSMENT MAP

FOREST DR SE

WETLAND C
(Somerset)
(Category IV)

WETLAND A
(Somerset)
(Category IV)

WETLAND D
(Somerset)
(Category IV)

Foresthill Neighborhood Trail

6/7

6/7

SOMERSET
SUBSTATION

- Critical Area Study Limits[1] TWC
- City Limit
- Maintained Legal ROW[PSE] - *pale yellow shading*
- Managed Right-of-Way
- Wires
- Wire Zone
- Proposed Stringing Sites HDR
- Existing Pole to Remain PSE
- Existing Pole to be Removed[PSE]
- Proposed Pole Footprints PSE
- Proposed Access Routes[3] PSE
- Richards Creek Work Limits[PSE]
- Substation Improvement Area[PSE]
- Trees to Remove[6]
- Canopy to be Removed[6] TWC
- Canopy to Remain[6]
- Delineated Stream Boundary[TWC]
- Delineated Wetland Boundary[TWC]
- Limit of Combined Functioning Wetland/Stream Buffer[2] TWC
- Stream
- Wetland
- Combined Functioning Wetland/Stream Buffer Area[2 TWC] - *white shading*
- Priority Steep Slopes[4 COB]
- Limit of Priority Steep Slope Buffer[5 TWC]
- Landslide Hazard Areas
- Landslide Hazard Area Buffer[TWC]
- Flood Hazard (100-yr Floodplain)[COB]

Notes:
1. Critical areas were defined within a 100' corridor along the existing powerline corridor and the entirety of the Lakeside and Richards Creek substation parcels.
2. Shapes representing functioning buffers are truncated 25 feet outside of the study limits.
3. Access roads shown at typical width of 20 feet.
4. Determined in the field by geotechnical consultant. See discussion in Critical Areas Report.
5. Required from top of slope only, per BMC 20.25H.035(A).
6. Canopy shown only in Richards Creek and Lakeside substation parcels. Canopy not shown for dead/dying trees.

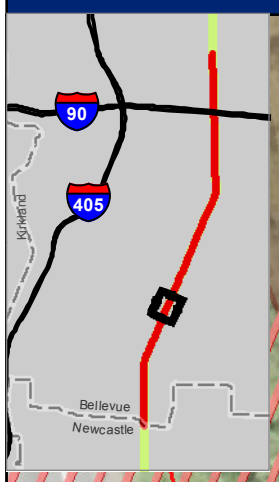
DSD 001087

9

0 10 20
Feet

Data sources: Puget Sound Energy (PSE), The Watershed Company (TWC), City of Bellevue (COB), King County (KC), and HDR. Aerial imagery from PSE, 2011.

PSE EE230 - SOUTH BELLEVUE CRITICAL AREA ASSESSMENT MAP



SOMERSET SUBSTATION

WETLAND A (Somerset) (Category IV)

WETLAND D (Somerset) (Category IV)

6/7

6/7

6/7

Foresthill Neighborhood Trail

COAL CREEK PKWY SE

WETLAND E (Somerset) (Category IV)

WETLAND JB05 (Category IV)

- Critical Area Study Limits[1] TWC
- City Limit
- Maintained Legal ROW[PSE] - *pale yellow shading*
- Managed Right-of-Way
- Wires
- Wire Zone
- Proposed Stringing Sites HDR
- Existing Pole to Remain PSE
- Existing Pole to be Removed[PSE]
- Proposed Pole Footprints PSE
- Proposed Access Routes[3] PSE
- Richards Creek Work Limits[PSE]
- Substation Improvement Area[PSE]
- Trees to Remove[6]
- Canopy to be Removed[6] TWC
- Canopy to Remain[6]
- Delineated Stream Boundary[TWC]
- Delineated Wetland Boundary[TWC]
- Limit of Combined Functioning Wetland/Stream Buffer[2] TWC
- Stream
- Wetland
- Combined Functioning Wetland/Stream Buffer Area[2 TWC] - *white shading*
- Priority Steep Slopes[4 COB]
- Limit of Priority Steep Slope Buffer[5 TWC]
- Landslide Hazard Areas
- Landslide Hazard Area Buffer[TWC]
- Flood Hazard (100-yr Floodplain)[COB]

Notes:
1. Critical areas were defined within a 100' corridor along the existing powerline corridor and the entirety of the Lakeside and Richards Creek substation parcels.
2. Shapes representing functioning buffers are truncated 25 feet outside of the study limits.
3. Access roads shown at typical width of 20 feet.
4. Determined in the field by geotechnical consultant. See discussion in Critical Areas Report.
5. Required from top of slope only, per BMC 20.25H.035(A).
6. Canopy shown only in Richards Creek and Lakeside substation parcels. Canopy not shown for dead/dying trees.

DSD 001088

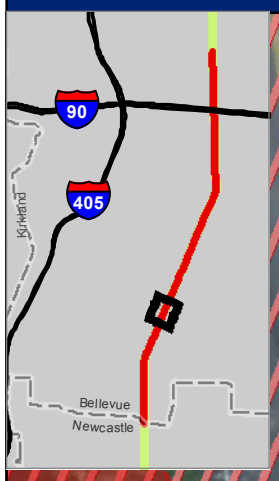
10

0 10 20

Feet

Data sources: Puget Sound Energy (PSE), The Watershed Company (TWC), City of Bellevue (COB), King County (KC), and HDR. Aerial imagery from PSE, 2011.

PSE EE230 - SOUTH BELLEVUE CRITICAL AREA ASSESSMENT MAP



WETLAND JB05
(Category IV)

Foresthill
Neighborhood
Trail

COAL CREEK PKWY SE

WETLAND JB08
(Category III)

STREAM JB04
(Type N)

STREAM JB05
(Coal Creek)
(Type F)

COAL CREEK
FLOODPLAIN

- Critical Area Study Limits[1] TWC
- City Limit
- Maintained Legal ROW[PSE] - *pale yellow shading*
- Managed Right-of-Way
- Wires
- Wire Zone
- Proposed Stringing Sites HDR
- Existing Pole to Remain PSE
- Existing Pole to be Removed[PSE]
- Proposed Pole Footprints PSE
- Proposed Access Routes[3] PSE
- Richards Creek Work Limits[PSE]
- Substation Improvement Area[PSE]
- Trees to Remove[6]
- Canopy to be Removed[6] TWC
- Canopy to Remain[6]
- Delineated Stream Boundary[TWC]
- Delineated Wetland Boundary[TWC]
- Limit of Combined Functioning Wetland/Stream Buffer[2] TWC
- Stream
- Wetland
- Combined Functioning Wetland/Stream Buffer Area[2 TWC] - *white shading*
- Priority Steep Slopes[4 COB]
- Limit of Priority Steep Slope Buffer[5 TWC]
- Landslide Hazard Areas
- Landslide Hazard Area Buffer[TWC]
- Flood Hazard (100-yr Floodplain)[COB]

Notes:
1. Critical areas were defined within a 100' corridor along the existing powerline corridor and the entirety of the Lakeside and Richards Creek substation parcels.
2. Shapes representing functioning buffers are truncated 25 feet outside of the study limits.
3. Access roads shown at typical width of 20 feet.
4. Determined in the field by geotechnical consultant. See discussion in Critical Areas Report.
5. Required from top of slope only, per BMC 20.25H.035(A).
6. Canopy shown only in Richards Creek and Lakeside substation parcels. Canopy not shown for dead/dying trees.

DSD 001089

11

0 10 20
Feet

Data sources: Puget Sound Energy (PSE), The Watershed Company (TWC), City of Bellevue (COB), King County (KC), and HDR. Aerial imagery from PSE, 2011.

PSE EE230 - SOUTH BELLEVUE CRITICAL AREA ASSESSMENT MAP

COAL CREEK FLOODPLAIN

COAL CREEK PKWY SE

STREAM MB02
(Type F)

WETLAND MB04
(Category IV)

STREAM MB01
(Type N)

STREAM JB05
(Coal Creek)
(Type F)

- Critical Area Study Limits[1] TWC
- City Limit
- Maintained Legal ROW[PSE] - *pale yellow shading*
- Managed Right-of-Way
- Wires
- Wire Zone
- Proposed Stringing Sites HDR
- Existing Pole to Remain PSE
- Existing Pole to be Removed[PSE]
- Proposed Pole Footprints PSE
- Proposed Access Routes[3] PSE
- Richards Creek Work Limits[PSE]
- Substation Improvement Area[PSE]
- Trees to Remove[6]
- Canopy to be Removed[6] TWC
- Canopy to Remain[6]
- Delineated Stream Boundary[TWC]
- Delineated Wetland Boundary[TWC]
- Limit of Combined Functioning Wetland/Stream Buffer[2] TWC
- Stream
- Wetland
- Combined Functioning Wetland/Stream Buffer Area[2 TWC] - *white shading*
- Priority Steep Slopes[4 COB]
- Limit of Priority Steep Slope Buffer[5 TWC]
- Landslide Hazard Areas
- Landslide Hazard Area Buffer[TWC]
- Flood Hazard (100-yr Floodplain)[COB]

Notes:
1. Critical areas were defined within a 100' corridor along the existing powerline corridor and the entirety of the Lakeside and Richards Creek substation parcels.
2. Shapes representing functioning buffers are truncated 25 feet outside of the study limits.
3. Access roads shown at typical width of 20 feet.
4. Determined in the field by geotechnical consultant. See discussion in Critical Areas Report.
5. Required from top of slope only, per BMC 20.25H.035(A).
6. Canopy shown only in Richards Creek and Lakeside substation parcels. Canopy not shown for dead/dying trees.

DSD 001090

12

0 10 20
Feet

Data sources: Puget Sound Energy (PSE), The Watershed Company (TWC), City of Bellevue (COB), King County (KC), and HDR. Aerial imagery from PSE, 2011.

PSE EE230 - SOUTH BELLEVUE CRITICAL AREA ASSESSMENT MAP

STREAM MB02
(Type F)

COAL CREEK
FLOODPLAIN

STREAM
MB01
(Type N)

WETLAND MB04
(Category IV)

COAL CREEK PKWY SE

STREAM JB05
(Coal Creek)
(Type F)

- Critical Area Study Limits[1] TWC
- City Limit
- Maintained Legal ROW[PSE] - *pale yellow shading*
- Managed Right-of-Way
- Wires
- Wire Zone
- Proposed Stringing Sites HDR
- Existing Pole to Remain PSE
- Existing Pole to be Removed[PSE]
- Proposed Pole Footprints PSE
- Proposed Access Routes[3] PSE
- Richards Creek Work Limits[PSE]
- Substation Improvement Area[PSE]
- Trees to Remove[6]
- Canopy to be Removed[6] TWC
- Canopy to Remain[6]
- Delineated Stream Boundary[TWC]
- Delineated Wetland Boundary[TWC]
- Limit of Combined Functioning Wetland/Stream Buffer[2] TWC
- Stream
- Wetland
- Combined Functioning Wetland/Stream Buffer Area[2 TWC] - *white shading*
- Priority Steep Slopes[4 COB]
- Limit of Priority Steep Slope Buffer[5 TWC]
- Landslide Hazard Areas
- Landslide Hazard Area Buffer[TWC]
- Flood Hazard (100-yr Floodplain)[COB]

Notes:
1. Critical areas were defined within a 100' corridor along the existing powerline corridor and the entirety of the Lakeside and Richards Creek substation parcels.
2. Shapes representing functioning buffers are truncated 25 feet outside of the study limits.
3. Access roads shown at typical width of 20 feet.
4. Determined in the field by geotechnical consultant. See discussion in Critical Areas Report.
5. Required from top of slope only, per BMC 20.25H.035(A).
6. Canopy shown only in Richards Creek and Lakeside substation parcels. Canopy not shown for dead/dying trees.

DSD 001091
13

0 10 20
Feet

Data sources: Puget Sound Energy (PSE), The Watershed Company (TWC), City of Bellevue (COB), King County (KC), and HDR. Aerial imagery from PSE, 2011.

PSE EE230 - SOUTH BELLEVUE CRITICAL AREA ASSESSMENT MAP

COAL CREEK PKWY SE

6/6

Lower Coal Creek Trail

- Critical Area Study Limits[1] TWC
- City Limit
- Maintained Legal ROW[PSE] - *pale yellow shading*
- Managed Right-of-Way
- Wires
- Wire Zone
- Proposed Stringing Sites HDR
- Existing Pole to Remain PSE
- Existing Pole to be Removed[PSE]
- Proposed Pole Footprints PSE
- Proposed Access Routes[3] PSE
- Richards Creek Work Limits[PSE]
- Substation Improvement Area[PSE]
- Trees to Remove[6]
- Canopy to be Removed[6] TWC
- Canopy to Remain[6]
- Delineated Stream Boundary[TWC]
- Delineated Wetland Boundary[TWC]
- Limit of Combined Functioning Wetland/Stream Buffer[2] TWC
- Stream
- Wetland
- Combined Functioning Wetland/Stream Buffer Area[2 TWC] - *white shading*
- Priority Steep Slopes[4 COB]
- Limit of Priority Steep Slope Buffer[5 TWC]
- Landslide Hazard Areas
- Landslide Hazard Area Buffer[TWC]
- Flood Hazard (100-yr Floodplain)[COB]

Notes:
1. Critical areas were defined within a 100' corridor along the existing powerline corridor and the entirety of the Lakeside and Richards Creek substation parcels.
2. Shapes representing functioning buffers are truncated 25 feet outside of the study limits.
3. Access roads shown at typical width of 20 feet.
4. Determined in the field by geotechnical consultant. See discussion in Critical Areas Report.
5. Required from top of slope only, per BMC 20.25H.035(A).
6. Canopy shown only in Richards Creek and Lakeside substation parcels. Canopy not shown for dead/dying trees.

DSD 001092

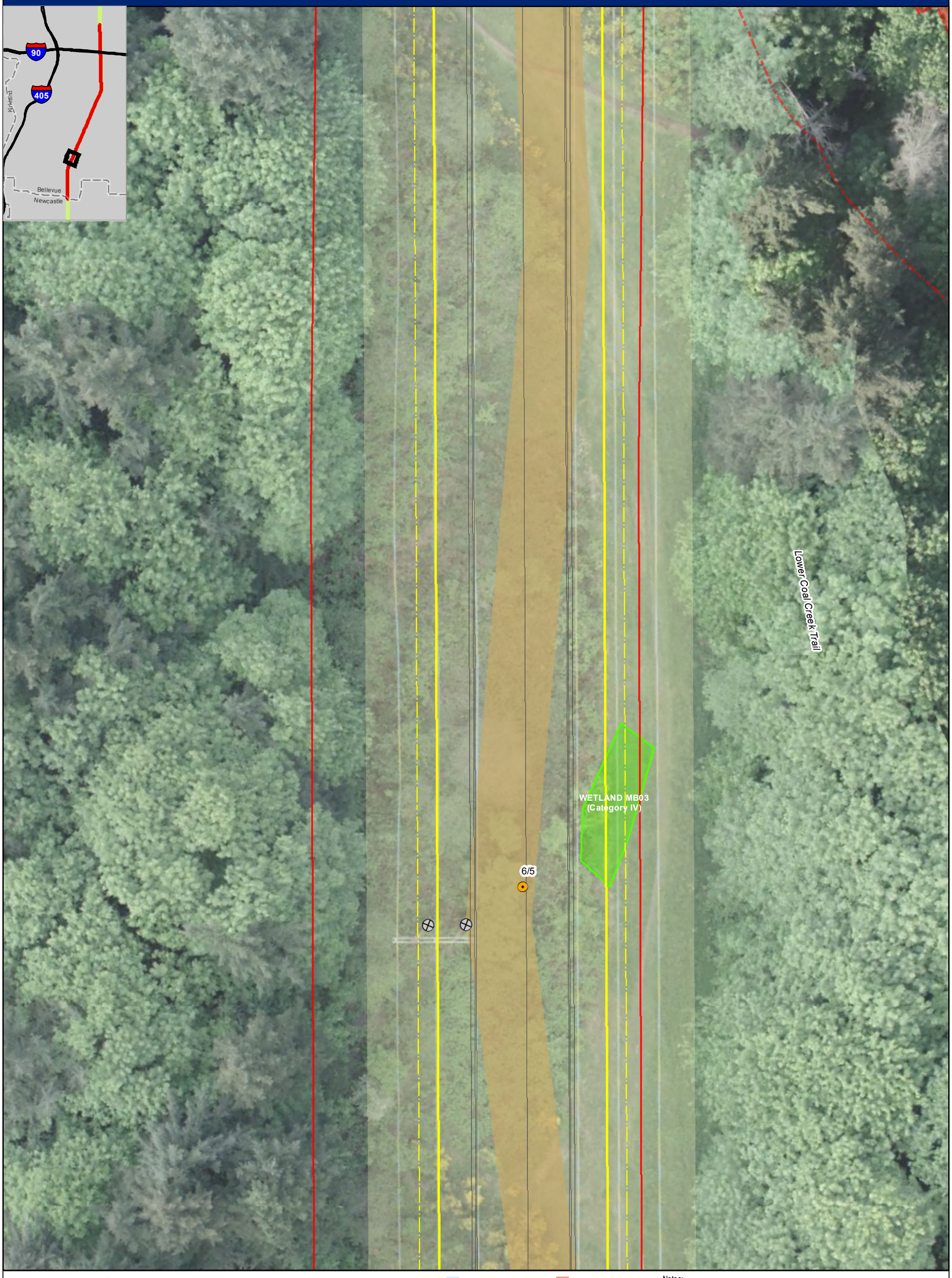
14

0 10 20

Feet

Data sources: Puget Sound Energy (PSE), The Watershed Company (TWC), City of Bellevue (COB), King County (KC), and HDR. Aerial imagery from PSE, 2011.

PSE EE230 - SOUTH BELLEVUE CRITICAL AREA ASSESSMENT MAP



Critical Area Study Limits[1] TWC
City Limit
Maintained Legal ROW[PSE] - *pale yellow shading*
Managed Right-of-Way
Wires
Wire Zone

Proposed Stringing Sites HDR
Existing Pole to Remain PSE
Existing Pole to be Removed[PSE]
Proposed Pole Footprints PSE
Proposed Access Routes[3] PSE

Richards Creek Work Limits[PSE]
Substation Improvement Area[PSE]
Trees to Remove[6]
Canopy to be Removed[6] TWC
Canopy to Remain[6]

Delineated Stream Boundary[TWC]
Delineated Wetland Boundary[TWC]
Limit of Combined Functioning Wetland/Stream Buffer[2] TWC

Stream
Wetland
Combined Functioning Wetland/Stream Buffer Area[2 TWC] - *white shading*

Priority Steep Slopes[4 COB]
Limit of Priority Steep Slope Buffer[5 TWC]
Landslide Hazard Areas
Landslide Hazard Area Buffer[TWC]
Flood Hazard (100-yr Floodplain)[COB]

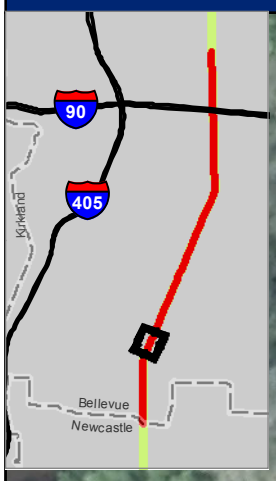
Notes:
1. Critical areas were defined within a 100' corridor along the existing powerline corridor and the entirety of the Lakeside and Richards Creek substation parcels.
2. Shapes representing functioning buffers are truncated 25 feet outside of the study limits.
3. Access roads shown at typical width of 20 feet.
4. Determined in the field by geotechnical consultant. See discussion in Critical Areas Report.
5. Required from top of slope only, per BMC 20.25H.035(A).
6. Canopy shown only in Richards Creek and Lakeside substation parcels. Canopy not shown for dead/dying trees.

DSD 001093
15

0 10 20
Feet

Data sources: Puget Sound Energy (PSE), The Watershed Company (TWC), City of Bellevue (COB), King County (KC), and HDR. Aerial imagery from PSE, 2011.

PSE EE230 - SOUTH BELLEVUE CRITICAL AREA ASSESSMENT MAP



WETLAND MB02
(Category IV)

- Critical Area Study Limits[1] TWC
- City Limit
- Maintained Legal ROW[PSE] - *pale yellow shading*
- Managed Right-of-Way
- Wires
- Wire Zone
- Proposed Stringing Sites HDR
- Existing Pole to Remain PSE
- Existing Pole to be Removed[PSE]
- Proposed Pole Footprints PSE
- Proposed Access Routes[3] PSE
- Richards Creek Work Limits[PSE]
- Substation Improvement Area[PSE]
- Trees to Remove[6]
- Canopy to be Removed[6] TWC
- Canopy to Remain[6]
- Delineated Stream Boundary[TWC]
- Delineated Wetland Boundary[TWC]
- Limit of Combined Functioning Wetland/Stream Buffer[2] TWC
- Stream
- Wetland
- Combined Functioning Wetland/Stream Buffer Area[2 TWC] - *white shading*
- Priority Steep Slopes[4 COB]
- Limit of Priority Steep Slope Buffer[5 TWC]
- Landslide Hazard Areas
- Landslide Hazard Area Buffer[TWC]
- Flood Hazard (100-yr Floodplain)[COB]

Notes:
1. Critical areas were defined within a 100' corridor along the existing powerline corridor and the entirety of the Lakeside and Richards Creek substation parcels.
2. Shapes representing functioning buffers are truncated 25 feet outside of the study limits.
3. Access roads shown at typical width of 20 feet.
4. Determined in the field by geotechnical consultant. See discussion in Critical Areas Report.
5. Required from top of slope only, per BMC 20.25H.035(A).
6. Canopy shown only in Richards Creek and Lakeside substation parcels. Canopy not shown for dead/dying trees.

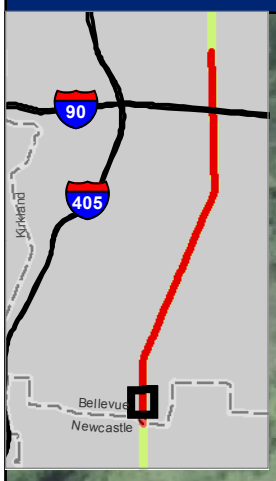
DSD 001094

16

0 10 20
Feet

Data sources: Puget Sound Energy (PSE), The Watershed Company (TWC), City of Bellevue (COB), King County (KC), and HDR. Aerial imagery from PSE, 2011.

PSE EE230 - SOUTH BELLEVUE CRITICAL AREA ASSESSMENT MAP



Regional Trail

5/9

5/9

WETLAND MB01 (Category III)

- Critical Area Study Limits[1] TWC
- City Limit
- Maintained Legal ROW[PSE] - *pale yellow shading*
- Managed Right-of-Way
- Wires
- Wire Zone
- Proposed Stringing Sites HDR
- Existing Pole to Remain PSE
- Existing Pole to be Removed[PSE]
- Proposed Pole Footprints PSE
- Proposed Access Routes[3] PSE
- Richards Creek Work Limits[PSE]
- Substation Improvement Area[PSE]
- Trees to Remove[6]
- Canopy to be Removed[6] TWC
- Canopy to Remain[6]
- Delineated Stream Boundary[TWC]
- Delineated Wetland Boundary[TWC]
- Limit of Combined Functioning Wetland/Stream Buffer[2] TWC
- Stream
- Wetland
- Combined Functioning Wetland/Stream Buffer Area[2 TWC] - *white shading*
- Priority Steep Slopes[4 COB]
- Limit of Priority Steep Slope Buffer[5 TWC]
- Landslide Hazard Areas
- Landslide Hazard Area Buffer[TWC]
- Flood Hazard (100-yr Floodplain)[COB]

Notes:
1. Critical areas were defined within a 100' corridor along the existing powerline corridor and the entirety of the Lakeside and Richards Creek substation parcels.
2. Shapes representing functioning buffers are truncated 25 feet outside of the study limits.
3. Access roads shown at typical width of 20 feet.
4. Determined in the field by geotechnical consultant. See discussion in Critical Areas Report.
5. Required from top of slope only, per BMC 20.25H.035(A).
6. Canopy shown only in Richards Creek and Lakeside substation parcels. Canopy not shown for dead/dying trees.

DSD 001095

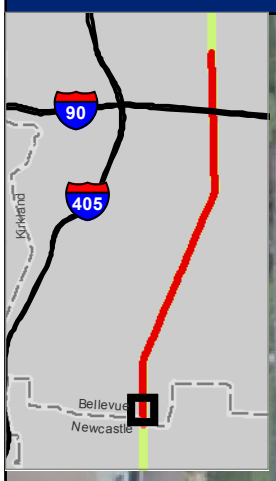
17

0 10 20

Feet

Data sources: Puget Sound Energy (PSE), The Watershed Company (TWC), City of Bellevue (COB), King County (KC), and HDR. Aerial imagery from PSE, 2011.

PSE EE230 - SOUTH BELLEVUE CRITICAL AREA ASSESSMENT MAP



WETLAND
MB01
(Category III)

Regional Trail

5/8

5/8

128TH AVE SE

- Critical Area Study Limits[1] TWC
- City Limit
- Maintained Legal ROW[PSE] - *pale yellow shading*
- Managed Right-of-Way
- Wires
- Wire Zone
- Proposed Stringing Sites HDR
- Existing Pole to Remain PSE
- Existing Pole to be Removed[PSE]
- Proposed Pole Footprints PSE
- Proposed Access Routes[3] PSE
- Richards Creek Work Limits[PSE]
- Substation Improvement Area[PSE]
- Trees to Remove[6]
- Canopy to be Removed[6] TWC
- Canopy to Remain[6]
- Delineated Stream Boundary[TWC]
- Delineated Wetland Boundary[TWC]
- Limit of Combined Functioning Wetland/Stream Buffer[2] TWC
- Stream
- Wetland
- Combined Functioning Wetland/Stream Buffer Area[2 TWC] - *white shading*
- Priority Steep Slopes[4 COB]
- Limit of Priority Steep Slope Buffer[5 TWC]
- Landslide Hazard Areas
- Landslide Hazard Area Buffer[TWC]
- Flood Hazard (100-yr Floodplain)[COB]

Notes:
1. Critical areas were defined within a 100' corridor along the existing powerline corridor and the entirety of the Lakeside and Richards Creek substation parcels.
2. Shapes representing functioning buffers are truncated 25 feet outside of the study limits.
3. Access roads shown at typical width of 20 feet.
4. Determined in the field by geotechnical consultant. See discussion in Critical Areas Report.
5. Required from top of slope only, per BMC 20.25H.035(A).
6. Canopy shown only in Richards Creek and Lakeside substation parcels. Canopy not shown for dead/dying trees.

DSD 001096

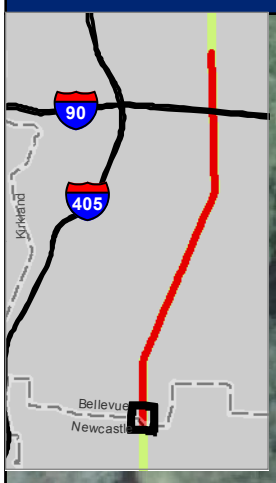
18

0 10 20

Feet

Data sources: Puget Sound Energy (PSE), The Watershed Company (TWC), City of Bellevue (COB), King County (KC), and HDR. Aerial imagery from PSE, 2011.

PSE EE230 - SOUTH BELLEVUE CRITICAL AREA ASSESSMENT MAP



128TH AVE SE

128TH PL SE

5/8

5/8

Regional Trail

STREAM MB01
(Type N)

NEWCASTLE WAY

- Critical Area Study Limits[1] TWC
- City Limit
- Maintained Legal ROW[PSE] - *pale yellow shading*
- Managed Right-of-Way
- Wires
- Wire Zone
- Proposed Stringing Sites HDR
- Existing Pole to Remain PSE
- Existing Pole to be Removed PSE
- Proposed Pole Footprints PSE
- Proposed Access Routes[3] PSE
- Richards Creek Work Limits PSE
- Substation Improvement Area PSE
- Trees to Remove[6]
- Canopy to be Removed[6] TWC
- Canopy to Remain[6]
- Delineated Stream Boundary TWC
- Delineated Wetland Boundary TWC
- Limit of Combined Functioning Wetland/Stream Buffer[2] TWC
- Stream
- Wetland
- Combined Functioning Wetland/Stream Buffer Area[2] TWC - *white shading*
- Priority Steep Slopes[4] COB
- Limit of Priority Steep Slope Buffer[5] TWC
- Landslide Hazard Areas
- Landslide Hazard Area Buffer TWC
- Flood Hazard (100-yr Floodplain) COB

Notes:
1. Critical areas were defined within a 100' corridor along the existing powerline corridor and the entirety of the Lakeside and Richards Creek substation parcels.
2. Shapes representing functioning buffers are truncated 25 feet outside of the study limits.
3. Access roads shown at typical width of 20 feet.
4. Determined in the field by geotechnical consultant. See discussion in Critical Areas Report.
5. Required from top of slope only, per BMC 20.25H.035(A).
6. Canopy shown only in Richards Creek and Lakeside substation parcels. Canopy not shown for dead/dying trees.

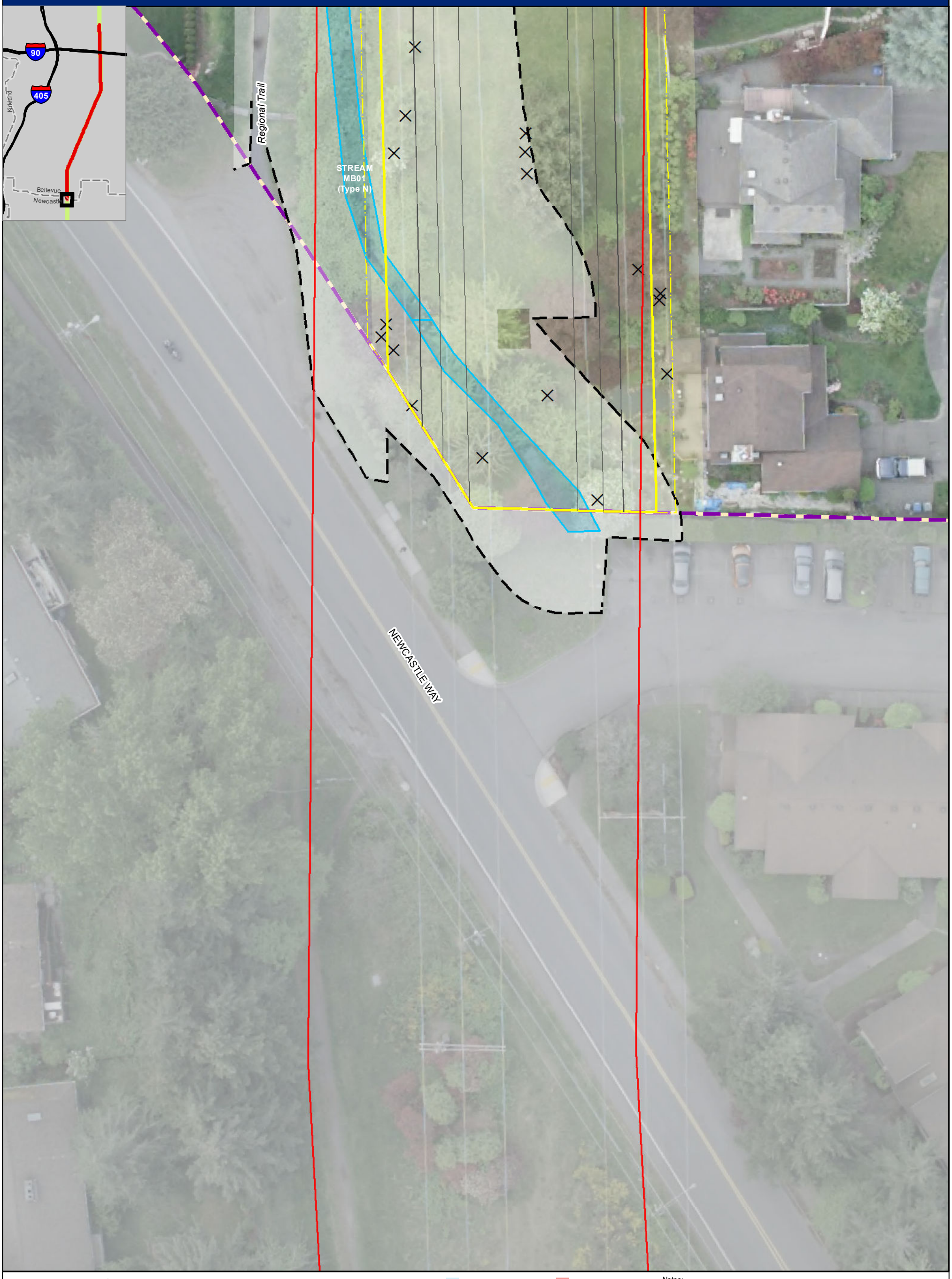
DSD 001097

19

0 10 20
Feet

Data sources: Puget Sound Energy (PSE), The Watershed Company (TWC), City of Bellevue (COB), King County (KC), and HDR. Aerial imagery from PSE, 2011.

PSE EE230 - SOUTH BELLEVUE CRITICAL AREA ASSESSMENT MAP



Critical Area Study Limits[1] TWC
City Limit
Maintained Legal ROW[PSE] - *pale yellow shading*
Managed Right-of-Way
Wires
Wire Zone

Proposed Stringing Sites HDR
Existing Pole to Remain PSE
Existing Pole to be Removed[PSE]
Proposed Pole Footprints PSE
Proposed Access Routes[3] PSE

Richards Creek Work Limits[PSE]
Substation Improvement Area[PSE]
Trees to Remove[6]
Canopy to be Removed[6] TWC
Canopy to Remain[6]

Delineated Stream Boundary[TWC]
Delineated Wetland Boundary[TWC]
Limit of Combined Functioning Wetland/Stream Buffer[2] TWC

Stream
Wetland
Combined Functioning Wetland/Stream Buffer Area[2 TWC] - *white shading*

Priority Steep Slopes[4 COB]
Limit of Priority Steep Slope Buffer[5 TWC]
Landslide Hazard Areas
Landslide Hazard Area Buffer[TWC]
Flood Hazard (100-yr Floodplain)[COB]

Notes:
1. Critical areas were defined within a 100' corridor along the existing powerline corridor and the entirety of the Lakeside and Richards Creek substation parcels.
2. Shapes representing functioning buffers are truncated 25 feet outside of the study limits.
3. Access roads shown at typical width of 20 feet.
4. Determined in the field by geotechnical consultant. See discussion in Critical Areas Report.
5. Required from top of slope only, per BMC 20.25H.035(A).
6. Canopy shown only in Richards Creek and Lakeside substation parcels. Canopy not shown for dead/dying trees.

DSD 001098

20

0 10 20
Feet

Data sources: Puget Sound Energy (PSE), The Watershed Company (TWC), City of Bellevue (COB), King County (KC), and HDR. Aerial imagery from PSE, 2011.

APPENDIX C

Geotechnical Report and Memo

Revised Targeted Critical Areas Geologic Hazard Evaluation

Energize Eastside Project
Bellevue, Washington

for
Puget Sound Energy

July 11, 2017

GeoEngineers
Earth Science + Technology

DSD 001100

Revised Targeted Critical Areas Geologic Hazard Evaluation

Energize Eastside Project
Bellevue, Washington

for
Puget Sound Energy

July 11, 2017

GeoEngineers

8410 154th Avenue NE
Redmond, Washington 98052
425.861.6000

Revised Targeted Critical Areas Geologic Hazard Evaluation

Energize Eastside Project
Bellevue, Washington

File No. 0186-871-06

July 11, 2017

Prepared for:

Puget Sound Energy
P.O. Box 97034, EST-04W
Bellevue, Washington 98009-9734

Attention: Kelly Purnell

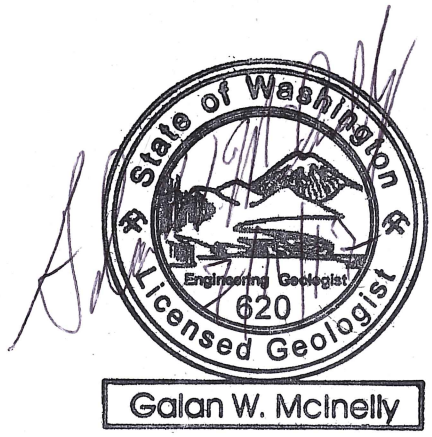
Prepared by:

GeoEngineers, Inc.
8410 154th Avenue NE
Redmond, Washington 98052
425.861.6000

Rachel M. Hunt
Staff Geologist

Elson T. Barnett, LG, LEG
Senior Engineering Geologist

Galan W. McInelly, LG, LHG, LEG
Principal



RMH:ETB:GWM:cam

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DSD 001103

INTRODUCTION

GeoEngineers, Inc. (GeoEngineers) is pleased to present the revised results for targeted critical areas evaluation of specific geologic hazards identified by Puget Sound Energy (PSE) for the Energize Eastside Project. Our services have been provided in general accordance with the proposal between GeoEngineers and PSE dated June 21, 2017. These services were authorized by Kelly Purnell with PSE on June 15, 2017, and formal authorization was received on June 26, 2017.

The project area is located along existing PSE rights-of-way and includes areas within the city of Bellevue. We previously provided a geologic hazard evaluation for various routes under consideration, including the route evaluated within this document, in a separate report submitted to PSE on December 19, 2014. The geologic hazards evaluation included in this report focuses on a desktop review for steep slope and landslide hazard areas (geologic hazard areas), as assigned by PSE, relative to proposed vegetation management activities, including tree-removal required for construction access and pole replacement. PSE has provided specific locations for evaluation and also provided a map developed by others which shows proposed pole replacement activities including proposed tree removal, vegetation management zones and access roads.

LOCAL REGULATIONS

GeoEngineers assessed local regulations in the Bellevue Land Use Code, Critical Areas Overlay District for Geologic Hazard Areas (20.25H.120) for the project areas identified by PSE that coincide with regulated geologic hazard areas.

General Geologic Hazard Area Buffers

The City of Bellevue Land Use Code, 20.25H.120, criteria for defining geologic hazards and geologic hazard buffers is described below.

- *Landslide Hazards: Areas of slopes of 15 percent of more with more than 10 feet of rise, which also displace areas of historic failures, including those areas designated as quaternary slumps, earthflows, mudflows, or landslides, areas that have shown movement during the past 13,500 years or that are underlain by landslide deposits, slopes that are parallel or subparallel to planes of weakness in subsurface materials, slopes exhibiting geomorphological features indicative of past failures such as hummocky ground and back-rotated benches on slopes, areas with seeps indicating a shallow ground water table on or adjacent to the slope face, or areas of potentially instability because of rapid stream incision, stream bank erosion, and undercutting by wave action.*

  According to the Bellevue Land Use Code, the established critical area buffer in geologic hazard critical areas for landslide hazards is 50 feet from the top of the slope.

- *Steep Slopes: Slope of 40 percent or more that have a rise of at least 10 feet and exceed 1,000 square feet in area.*

  According to the Bellevue Land Use Code, the established critical area buffer in general geologic hazard critical areas for steep slopes is 50 feet from the top of the slope.

EXISTING CONDITIONS

GeoEngineers reviewed a previous report, titled Geologic Hazards Evaluation and Preliminary Geotechnical Engineering Services report, submitted to PSE on December 2014, to assess existing conditions in the project area within City of Bellevue (GeoEngineers 2014). Existing geology in the identified areas mainly consists of glacial drift, recessional outwash, glacially consolidated till and advance outwash deposits, with the exception of a small areas of peat, fill, alluvium and Eocene age sedimentary rocks. Soil types anticipated in the project area include mainly silty gravel, silty sand and silt.

Steep slopes with slopes 40 percent or greater are observed locally within the project area, however the steep slope areas where selected tree removal is proposed are generally developed and include rockeries, landscaped residential slopes and managed right-of-way areas that are unlikely to be adversely impacted. Some undeveloped/natural areas of steep slopes along the project area include the Coal Creek drainage east and west locally along Coal Creek Parkway. These Coal Creek drainage areas also include localized mapped landslide hazards. We observed no active areas of slope movement or instability for project areas that include mapped steep slope areas or steep slope and landslide areas within the Coal Creek drainage area.

IMPACT ASSESSMENT

Tree Removal

There are two primary ways in which tree removal activities may impact slope stability on steep slopes or landslide hazard areas. After tree removal, root decay causes both the numbers of roots and the tensile strength of the remaining individual roots to decrease with time (Burroughs and Thomas 1977). Studies show that the period of minimum root strength is typically from 3 to 5 years after harvest (Ziemer 1981a; 1981b), but can extend up to 10 to 20 years depending on the tree species. For example, minimum root strength in evergreens is typically 10 years after harvest, alders have a minimum root strength of 5 to 10 years after harvest, and maples typically maintain full root strength after harvest (because they regrow from the existing stump). The reductions in root strength result in a net decrease in the cohesive strength of the near-surface soil mass.

Tree removal likely will modify surface and subsurface hydrology. Tree removal may increase soil moisture by reducing canopy interception and evapotranspiration. Ground-based yarding equipment can compact soil, which may alter hydrologic processes in certain soil types.

Elevated groundwater levels decreases the stability of slopes by reducing the shear strength of the soil and by adding additional weight. The probability of landsliding from increased groundwater levels depends on the magnitude of the increase and the existing stability of the slope. The magnitude of potential changes in groundwater levels from tree removal is highly variable and depends on several factors, including the tree size, silviculture, subsurface conditions and topography.

In general, tree removal will increase the impact on slope stability for steep slopes or landslide hazard areas. However, fewer impacts are expected in areas where tree removal is isolated to one or two trees and the steep slope or landslide hazard area is otherwise stable and well vegetated. Additionally, fewer impacts are expected at the toe of the slope, compared to tree removal within the body or at the top of the slope.

Much of the tree removal near/on steep slope areas north of I-90 are situated in the PSE parcel that will be developed for the Richards Creek Substation. GeoEngineers completed a geotechnical engineering report for this substation in a report dated September 23, 2016 and an addendum report dated April 4, 2017. The new substation will require some retaining walls along the south side of the parcel where existing steep slopes are mapped, and a soldier pile wall on the east side of the site. The soldier pile wall (and eastern limits of the new substation) will be located east of the existing eastern steep slope area. Thus, construction of the substation and soldier wall will result in removal of this small steep slope area and the hillside will be stabilized by the wall. As such, the proposed tree removal located within the steep slopes of the substation limits will not affect the stability of the hillside.

Access Construction

Temporary access routes will generally follow previously established access trails and routes, and in some cases, will cross existing developed landscape. Therefore, little cutting or filling will be required. Small amounts of quarry spalls might be necessary to stabilize portions of existing routes. Many of the existing routes are overgrown with vegetation and, thus, will need to be cleared. Standard erosion control best management practices (BMPs) should be followed during clearing and use of the temporary access routes. Following completion of construction activities, restoration BMPs such as mulching and/or placing jute matting, should be implemented.

Pole Installation

Where new poles are located in steep slope or landslide hazard areas, a temporary working bench might be necessary to install the pole. We anticipate that these benches might vary from about 10 feet by 10 feet to 30 feet by 30 feet in dimension. The same considerations discussed above for access routes also apply to benches needed for pole installation. We recommend that clearing activities be restricted to that necessary to auger the hole for the pole.

Recommendations for the design and construction of poles are presented in our Geotechnical Engineering Services report dated June 8, 2016. In general, most of the site soils along the proposed route consist of recessional deposits or glacially consolidated deposits, and in some limited locations, bedrock. These soils should provide adequate support for the new poles, and it is our opinion that once the pole is installed, the pole will not adversely impact slope stability since the pole should actually provide additional resisting force against slope failure, provided the pole is embedded to a sufficient depth.

Conclusions

Mapped steep slopes in Bellevue that include slopes 40 percent or greater are observed locally within the project area, however many of these areas are developed and include rockeries, landscaped residential or commercial development slopes and cut slopes associated with paved roadways and include the following:

- Two trees removed from just north of 132nd Avenue SE.
- Multiple trees removed and access just east of the intersection of Somerset Drive SE and 134th Place SE, north to Somerset Place SE.
- Multiple trees removed just east of the intersection of Somerset Drive SE and Somerset Boulevard SE.

- Multiple trees removed just east of 136th Place SE between SE 43rd Place and SE 43rd Street; and two trees between this area and the intersection of Somerset Drive SE and Somerset Boulevard SE.
- Two trees removed and access north of the intersection of SE 43rd St. and the PSE right-of-way.
- Multiple trees removed south of SE 42nd Street.
- Multiple trees removed between SE 37th Street and SE 36th Street.
- Access east of SE 32nd Street.
- Multiple trees removed in the Richards Creek Substation and Lakeside Substation area.
- Multiple trees removed and access south of SE 26th Street.

A localized natural area of steep slopes in the project area includes the Coal Creek drainage east and west locally along Coal Creek Parkway; this area also has localized mapped landslide hazards. The project area is within an existing right-of-way that is maintained for vegetation by PSE and includes a narrower right-of-way managed by a private petroleum pipeline company. The right-of-way for the buried petroleum pipeline includes areas with no trees and grass that is mowed regularly for vegetation management. We observed no indication of slope movement in the pipeline right-of-way that is included within the PSE right-of-way. The proposed removal of 11 selected trees in this area is consistent with the management activities of the existing pipeline right-of-way and is not anticipated to impact the mapped geologic hazard areas within the Coal Creek drainage, in our opinion, provided that no tracked or rubber-tired equipment is used to remove the trees.

Conceptual Impact Mitigation Strategy

Vegetation Management and Tree Removal

For vegetation management and tree removal in the City of Bellevue within the mapped geohazard areas outlined in the proposed PSE project segment, GeoEngineers suggests the following options for mitigating impacts after tree removal.

In general, to limit impacts on slope stability from vegetation management and tree removal within steep slope and landslide hazard areas, the sites should be accessed by foot to reduce equipment impacts. Hand cutting with chainsaws should be implemented to trim branches and remove trees. Stumps should remain in place, but can be cut to ground level. Branches, limbs, trunks and other tree debris should be chipped and scattered around the removal site within the right-of-way. Where chipping is not feasible, unchipped tree debris can be scattered.

In areas where tree removal is widely spaced within steep slope and landslide buffer areas, the trees should be cut, stumps left in place, and trimmed branches and trunks can be scattered within the right-of-way.

In areas where tree removal is clustered, erosion control BMPs, such as grass seeding, leaving stumps, scattering straw and/or replacement planting of native shrubs or small trees, should be implemented to reduce concentrated flows and minimize disturbance.

In areas where houses are located within 25 to 50 feet of vegetation management and tree removal, all tree debris should be removed from the owner's property and communication with the property owner is

suggested to identify possible reseeding, replacement tree or shrub, or landscaping options. If agreeable to the property owner, it is possible that the tree trunk can be cut and left below ground surface to maintain root strength (up to 5 to 10 years, depending on tree type), and a replacement tree or shrub may be planted near the trimmed trunk.

Reestablish Access Routes

Where vegetation clearing is required to reestablish the access on existing trails and access routes, BMPs should be implemented; these BMPs can include, but are not limited to: outsloping road surfaces, crowning road surfaces (where appropriate, such as at ridge tops and where roads climb gently inclined surfaces) and installing water bars or rolling dips at regularly spaced intervals to avoid concentrating surface water flow along the road surface. The spacing depends on the grade of the route, the soil type present, proximity to streams and the intended use of the road (e.g., temporary or permanent).

Most, if not all, access routes will be temporary and will be abandoned following construction of the transmission line. In the transmission corridor, no temporary access roads will cross any drainages situated in geologic hazard areas (i.e. Coal Creek).

It is the contractor's responsibility to complete construction work safely and in accordance with applicable local, state and federal laws. After access use is complete, where it is deemed necessary, limited regrading of the access route is recommended to avoid concentrating surface runoff along tracks, ruts or other potential flowpaths. Following completion of construction activities, the construction access routes will be graded to a stable free-draining configuration, treated with appropriate erosion control measures, such as mulching and/or placing jute matting and installation of water bars as needed to control runoff, and seeded. If jute mat is determined a necessary BMP, the jute mat should be anchored at the upslope and downslope ends and secured with staples per the manufacturer's recommendations.

Pole Installation

Where a bench is required to install a pole on a steep slope or landslide hazard area, the recommendations presented above for temporary access routes also apply for pole installation. Appropriate erosion control BMPs should be implemented during construction, and the disturbed area should be restored after pole installation by seeding or revegetating and covering the disturbed area with appropriate BMPs. Soil removed from the new pole excavations should be scattered into vegetation away from the any landscaped areas. Any areas of exposed soil must be seeded and mulched (or covered with hog fuel) to prevent transport of sediment down the steep slopes or into the seepage area during rain events. If the work area is wet or has standing water, driving mats should be used under all equipment and all soils should be removed from the site for off-site disposal.

For poles located in geologic hazards areas, the old poles should be cut off approximately 1 to 2 feet below the ground surface and the remaining portion of each pole left in place. If poles are installed on slopes steeper than 2H:1V (horizontal:vertical), they should be embedded at least 3 feet deeper than the typical design embedment.

CODE COMPLIANCE

20.25H.125 Performance standards – Landslide hazards and steep slopes

In addition to generally applicable performance standards set forth in LUC 20.25H.055 and 20.25H.065, development within a landslide hazard or steep slope critical area or the critical area buffers of such hazards shall incorporate the following additional performance standards in design of the development, as applicable. The requirement for long-term slope stability shall exclude designs that require regular and periodic maintenance to maintain their level of function.

A. Structures and improvements shall minimize alterations to the natural contour of the slope, and foundations shall be tiered where possible to conform to existing topography.

   Response to Code Requirement: No structures will be constructed as part of the proposed project. Site improvements (pole removal, pole replacement, access roads, and vegetation management) are not anticipated to adversely impact the natural contour of the slope. The proposed site activities that include vegetation management, tree removal, and temporary access roads (associated with the proposed pole replacement activities) will maintain overall existing site topography.

B. Structures and improvements shall be located to preserve the most critical portion of the site and its natural landforms and vegetation.

   Response to Code Requirement: No structures will be constructed as part of the proposed project. Site improvements include localized vegetation management, including tree removal, and use of existing access routes (associated with the proposed pole replacement activities). The proposed tree removal and surface disturbance will be limited to reduce potential impacts to natural landforms and vegetation.

C. The proposed development shall not result in greater risk or a need for increased buffers on neighboring properties.

   Response to Code Requirement: The proposed development includes vegetation management, including tree removal and use of existing access routes (associated with the proposed pole replacement activities) that will be followed by mitigation measures to reduce potential impacts to geologic hazards that include landslide and steep slope hazards. Mitigation measures include a variety of BMPs to reduce potential impacts to geologic hazards in the vicinity of neighboring properties. BMPs include plant replacement, scattering trimmed or removed tree debris, and chipping wood to reduce potential impacts to work areas as appropriate. Removal of vegetation by hand and/or using limited access machinery will reduce potential impacts to landslide and steep slope hazard areas. It is our opinion that the proposed project will not require additional buffers.

D. The use of retaining walls that allow the maintenance of existing natural slope area is preferred over graded artificial slopes where graded slopes would result in increased disturbance as compared to use of retaining wall.

   Response to Code Requirement: In the transmission corridor, no retaining walls or grading activities are proposed relative to the proposed vegetation management, tree removal and access route activities (associated with the proposed pole replacement activities). The development of soldier pile walls and retaining walls for the Richards Creek Substation is discussed in detail in the substation-specific geotechnical engineering report dated September 23, 2016, and in an addendum report dated April 4, 2017. The use of retaining walls for the new substation will reduce disturbance

and grading of the existing natural slopes, which would be otherwise necessary without construction of the walls.

E. Development shall be designed to minimize impervious surfaces within the critical area and critical area buffer.

Response to Code Requirement: No new impervious surfaces are proposed relative to the proposed vegetation management, tree removal and access route activities (associated with the proposed pole replacement activities) within mapped critical area and mapped critical area buffers of the transmission corridor. Five narrow, and relatively small (low square footage), steep slopes are located on the future Richards Creek Substation property (comprising 8.46 acres), which is partially developed with an existing pole yard (existing hard surface/impervious surface of 1.58 acres). Only two mapped steep slopes are located within the limits of the new substation (one of which is mapped in the graded/compacted gravel pole yard). Based on the design of the future Richards Creek Substation, site development will be limited to that area necessary for the substation, leaving the surrounding vegetation and grade intact. As such, only one of the mapped steep slopes in the future Richards Creek Substation property will experience an increase in impervious surface.

F. Where change in grade outside the building footprint is necessary, the site retention system should be stepped and regrading should be designed to minimize topographic modification. On slopes in excess of 40 percent, grading for yard area may be disallowed where inconsistent with these criteria.

Response to Code Requirement: No change in grade is proposed relative to the proposed vegetation management, tree removal and access route activities (associated with the proposed pole replacement activities) within the transmission corridor. Within the new substation, grade transitions along the east side (up to 24 feet in height) will be supported with a soldier pile wall (cantilever and with tiebacks). Grade transitions along the west side (up to 6 feet in height) will be supported by fill slopes and a cast-in-place retaining wall.

G. Building foundation walls shall be utilized as retaining walls rather than rockeries or retaining structures built separately and away from the building wherever feasible. Freestanding retaining devices are only permitted when they cannot be designed as structural elements of the building foundation.

Response to Code Requirement: No building foundations are proposed relative to the proposed vegetation management and tree removal activities associated with the proposed pole replacement activities within the transmission corridor. However, for stability purposes, drilled pier foundations will be utilized on select poles in the corridor where appropriate. The new substation is not a building and, thus, does not have typical foundation walls; as such, soldier pile and retaining walls will be necessary to retain the required grade changes.

H. On slopes in excess of 40 percent, use of pole-type construction which conforms to the existing topography is required where feasible. If pole-type construction is not technically feasible, the structure must be tiered to conform to the existing topography and to minimize topographic modification.

Response to Code Requirement: No pole-type structures are proposed relative to the proposed vegetation management and tree removal activities. The new poles will meet the preferred construction type (which is pole-type construction). The new substation cannot be tiered and was situated east of the existing Olympic pipeline. This requires construction of a soldier pile wall east of

the existing steep slope area. While this results in grading in the steep slope area, the area of disturbance is minimized by construction of a vertical wall.

I. On slopes in excess of 40 percent, piled deck support structures are required where technically feasible for parking or garages over fill-based construction types.

Response to Code Requirement: No structures requiring pile deck support are proposed relative to the proposed vegetation management and tree removal activities. The new poles will meet the preferred construction type (which is pole-type construction).

No parking or garage structures are planned for the new substation. Pile-supported deck structures are not feasible for a substation. The substation grades will require cutting into the steep slope on the east side, which will then be retained with a soldier pile wall.

J. Areas of new permanent disturbance and all areas of temporary disturbance shall be mitigated and/or restored pursuant to a mitigation and restoration plan meeting the requirements of LUC 20.25H.210. (Ord. 5680, 6-26-06, § 3).

Response to Code Requirement: Temporary disturbance for the proposed vegetation management and tree removal activities and access routes (associated with the proposed pole replacement activities) within the existing transmission corridor will be mitigated by scattering and/or chipping trimmed limbs and logs, replanting vegetation, and using limited access equipment or accessing only by foot as appropriate. For steep slope areas in the vicinity of the new substation that will be disturbed during construction, the disturbed areas should be restored by seeding/revegetating and covering the planted area with mulch or other appropriate BMPs.

LIMITATIONS

We have prepared this report for the exclusive use of PSE and their authorized agents for the Energize Eastside project located in Bellevue, Washington.

The purpose of our services was to review slope stability and landslide hazard impacts in relation to vegetation management and tree removal and temporary access routes (associated with the proposed pole replacement activities) in steep slope and landslide critical hazard areas along the transmission line corridor within the City of Bellevue. Within the limitations of scope, schedule and budget, our services have been executed in accordance with generally accepted practices in the field of geotechnical engineering in this area at the time this report was prepared. No warranty or other conditions, express or implied, should be understood.

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Memorandum

To: Kelly Purnell, Puget Sound Energy

From: Elson T. "Chip" Barnett, LG, LEG;
Galan W. McInelly, LG, LHG, LEG

Date: August 21, 2017

File: 0186-871-06

Subject: Critical Area Supplement for Energize Eastside Bellevue
Geologic Hazard Report dated July 11, 2017

DRAFT

GeoEngineers, Inc. (GeoEngineers) is providing this memorandum as a supplement to our City of Bellevue (City) Critical Areas report for the Energize Eastside Project dated July 11, 2017. Puget Sound Energy (PSE) requested this memorandum to address additional permitting related services during a phone conversation with Chip Barnett and Kelly Purnell of PSE on August 10, 2017. PSE has proposed modification of the number of trees for removal associated with the project.

A follow up conversation on August 15, 2017 with Chip Barnett and Galan McInelly of GeoEngineers and Kerry Kriner, Toni Hartje, and Kelly Purnell of PSE included an additional request to provide some details regarding the methodology for evaluating geologic hazards and to further clarify the City code as it related to geologic hazard area buffers, their value and need for mitigation relative to the Eastside Energize project.

We provide discussion below related to our geologic hazard evaluation methodology, the modification of the number of trees for removal and City code relative to geologic hazard buffers.

Methodology

Our methodology to evaluate geologic hazards primarily relied on the following:

- Review of published geologic maps and geologic hazard maps
- Review of digital imagery (King County and Google Earth)
- Previous site visits for the Geotechnical and Geologic Hazard Evaluation (December 19, 2014).
- Evaluate the potential for impacts to the following geologic hazards:
  - Landslide Areas and buffers
  - Steep Slopes (Greater than 40 percent) and buffers
- Develop a response to specific critical area code requirements

Review of published geologic maps and geologic hazard maps

We reviewed geologic and geologic hazard maps from published King County 1:100,000 scale maps as well as digital geologic hazard data from City of Bellevue as provided by Watershed Associates. The goal of this task was to better understand mapped geologic conditions and geologic hazards at the site relative to planned poles

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and areas for proposed tree removal. We also reviewed previous geologic and geotechnical reports completed in the vicinity of the project area.

Review of digital area photographs

Aerial photographs were reviewed using both King County iMap (http://kingcounty.gov/services/gis/Maps/imap.aspx) as well as Google Earth images. King County data available for review of surface conditions includes Light Detection and Ranging (LiDAR) bare earth hillshade surface relief and aerial photograph images from 1936, 1998, 2000, 2002, 2005, 2007, 2009, 2012, 2013 and 2015. Google Earth aerial photograph images include 1990, 2002, 2005, 2006, 2007, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016 and 2017. Google Earth data includes multiple images for the same year to observe more subtle changes over the course of a shorter period of time. This task was focused on observing changes in development and vegetation and if geologic hazard areas show some activity during the aerial photograph record. Also, LiDAR bare earth hillshade data provides a tool to observe surface relief without a vegetated canopy that is key to evaluating geologic hazards physical characteristics (scarps, flanks, toe of slide, hummocky topography) of the hazard area, if any.

Previous site visits for the Geotechnical and Geologic Hazard Evaluation

We also verified with GeoEngineers staff that had already completed surface reconnaissance for the proposed site relative to our December 19, 2014 report. The goal of this task was to compare our site-specific reconnaissance information relative to mapped geologic hazards in the project vicinity.

Evaluate the potential for impacts to geologic hazards

GeoEngineers compiled the information to evaluate the potential impacts to the geologic hazard areas relative to the proposed construction of poles and removal of trees. Per City code (20.25H.120). We considered whether mapped landslide areas have:

- Areas that have shown movement during the Holocene Epoch (past 13,500 years) or that are underlain by landslide deposits.
- Slopes that are parallel or subparallel to planes of weakness in subsurface materials.
- Slopes exhibiting geomorphological features indicative of past failures, such as hummocky ground and back-rotated benches on slopes.
- Areas with seeps indicating a shallow ground water table on or adjacent to the slope face.
- Areas of potential instability because of rapid stream incision, stream bank erosion, and undercutting by wave action.

We also consider steep slopes of 40 percent or more that have a rise of at least 10 feet and exceed 1,000 square feet in area.

We reviewed the performance of these steep slopes and mapped landslide areas relative to decades of residential development as well as engineered City streets.

DRAFT

Develop a response to specific critical area code requirements

GeoEngineers lastly addressed each of the following code performance standards (20.25H.125) for landslide hazards and steep slopes relative to the proposed development for the proposed project.

A. *Structures and improvements shall minimize alterations to the natural contour of the slope, and foundations shall be tiered where possible to conform to existing topography.*

B. *Structures and improvements shall be located to preserve the most critical portion of the site and its natural landforms and vegetation.*

C. *The proposed development shall not result in greater risk or a need for increased buffers on neighboring properties.*

D. *The use of retaining walls that allow the maintenance of existing natural slope area is preferred over graded artificial slopes where graded slopes would result in increased disturbance as compared to use of retaining wall.*

E. *Development shall be designed to minimize impervious surfaces within the critical area and critical area buffer.*

F. *Where change in grade outside the building footprint is necessary, the site retention system should be stepped and regrading should be designed to minimize topographic modification. On slopes in excess of 40 percent, grading for yard area may be disallowed where inconsistent with these criteria.*

G. *Building foundation walls shall be utilized as retaining walls rather than rockeries or retaining structures built separately and away from the building wherever feasible. Freestanding retaining devices are only permitted when they cannot be designed as structural elements of the building foundation.*

H. *On slopes in excess of 40 percent, use of pole-type construction which conforms to the existing topography is required where feasible. If pole-type construction is not technically feasible, the structure must be tiered to conform to the existing topography and to minimize topographic modification.*

I. *On slopes in excess of 40 percent, piled deck support structures are required where technically feasible for parking or garages over fill-based construction types.*

J. *Areas of new permanent disturbance and all areas of temporary disturbance shall be mitigated and/or restored pursuant to a mitigation and restoration plan meeting the requirements of LUC 20.25H.210. (Ord. 5680, 6-26-06, § 3).*

Modified Tree Removal

PSE has increased areas of proposed tree removal and in some cases, has reduced the number of trees previously proposed for removal. GeoEngineers reviewed the locations of the trees that PSE has reduced or added to those previously identified. We reviewed the online mapping provided by Watershed Associates on August 14, 2017 for updated proposed retained and removed trees within the project area.

In general, we noted that a proportion of the added trees proposed for removal are located on areas that include cut- and fill slopes that are locally greater than 40 percent. These slopes have been engineered in many cases associated with roadways that include Coal Creek Parkway SE, Somerset Place SE, Somerset Boulevard SE, SE Newport Way, SE 37th Street, and SE 26th Street. Elsewhere proposed tree removal is located within residential

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areas of the right-of-way that include landscaped slopes and rockeries. Also, we reviewed the area that include south of the Richards Creek Substation near previous earthwork activities within the PSE right-of-way observed from the May 2005 aerial photographs that did not destabilize the right of way. It is our opinion that the limited additional few dozen trees proposed for removal will not adversely impact existing mapped geologic hazard areas or their buffers.

Geologic Hazard Buffers and Value

PSE requested additional discussion and comment relative to geologic hazard buffers (landslide and steep slopes), their value and protection. Several areas within the project include buffers (50 feet from mapped hazard) that extend across residential areas and existing roadways where cut and fill areas are steeper than 40 percent.

The City code (20.25H.120) sections provides context:

- Existing Development. Where a primary structure legally established on a site prior to August 1, 2006, encroaches into the critical area buffer established in subsection B.1 of this section, the critical area buffer and structure setback shall be modified to exclude the footprint of the existing structure. Expansion of an existing structure into the critical area buffer shall be allowed only pursuant to the provisions of LUC 20.25H.065.
- Buffer Modification. Modifications to the geologic hazard critical area buffer may be considered through a critical areas report, LUC 20.25H.230.

The value these natural buffers provide is likely some measure of reduced concentration of runoff onto steep slopes and landslide hazards. However, it is important to consider that some areas of existing roadways that have a mapped “steep slope” downslope include a fill slope or rockery that is not a natural slope, rather it is a constructed and likely an engineered slope that does not represent a geologic hazard and therefore it should have no buffer. In that regard modification of buffers is entirely appropriate as is the case in most of the project area.

It is our opinion that buffers that need protection or mitigation are those where the geologic hazard downslope shows some indication of activity in the form of slope movement or active erosion. We observed no buffer areas associated with active or historically active landslides or steep slopes as related to the proposed development. The proposed replanting and other BMP measures as previously discussed in our July 11, 2017 report for buffer and mapped geologic hazards are intended to address the potential risk for instability and maintain value of the critical area.

We appreciate the opportunity to provide services to you. Please contact us if you have any questions concerning this memorandum or our services.

ETB:GWM:cam

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APPENDIX D

Detailed CAIA Methodology

This detailed Critical Area Impact Analysis (CAIA) is intended to further describe the methods used to generate critical area features and existing land cover classes used in conjunction with PSE site plans in order to quantify impacts resulting from implementation of the Energize Eastside Project. This Appendix is meant to complement and expand upon the methods described in the body of the report.

Methodology Outline:

- Critical Area Delineation and Mapping Methods
  - Wetlands
  - Streams
  - Functioning Wetland and Stream Buffers
  - Geologic Hazard Area Buffers
- Existing Land Cover Mapping
  - Vegetation Assessment Methods
- Impact Characterization
- Critical Areas Impact Assessment
- Quality Assurance Review of Analysis Steps and Results
- Limitations
- Data Sources Table

Critical Area Delineation and Mapping Methods

Wetland and stream critical areas were delineated and classified by The Watershed Company between March and October 2015 coincident with the field work for vegetation inventory analysis. These delineated features were GPS-located.

Supplemental studies were conducted at specific locations along the Project corridor as indicated in the body of the report (Section 3.2). Wetland and stream boundaries delineated during supplemental studies were typically survey-located.

Critical area features not delineated in the field were mapped using publicly-available GIS data. Priority was given to data produced and/or provided by the City of Bellevue. Where such data were not available for a designated critical area, data were obtained from other agency sources. A table provided at the end of this document lists data sources for each mapped critical area.

WETLAND DELINEATION

The study area was evaluated for wetlands using methodology from the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region Version 2.0* (Regional Supplement) (US Army Corps of Engineers [Corps] May 2010). Wetland boundaries were determined on the basis of an examination of vegetation, soils, and hydrology. Areas meeting the criteria set forth in the Regional Supplement were determined to be wetland. Soil, vegetation, and hydrologic parameters were sampled at several locations along the wetland boundary to make the determination.

Identified wetlands have been classified using the *Washington State Wetland Rating System for Western Washington, Version 2* (Ecology publication #04-06-025), per Bellevue's current Critical Areas Ordinance.

STREAM DELINEATION

The study area was also evaluated for streams based on the presence or absence of an ordinary high water mark (OHWM) as defined by the Revised Code of Washington (RCW) 90.58.030 and the Washington Administrative Code (WAC) 220-660-030. The OHWM edge was located by examining the bed and bank physical characteristics and vegetation.

The centerlines of streams in the study area were recorded in the field, with stream widths either visually approximated in the field or later approximated based on aerial photometry and elevation contours. Streams were classified according to the City of Bellevue Land Use Code.

Stream OHWM edges were delineated on the Richards Creek and Lakeside Substation parcels.

Functioning Wetland and Stream Buffers Mapping

Standard buffers were applied to delineated wetland and stream edges in GIS according to regulatory buffer widths in Bellevue Land Use Code. It was observed that in many cases, developed areas intruded into these mapped standard buffers. To remove these non-functioning buffer areas from the assessment of Project impacts, developed areas (see land cover mapping section) were manually removed from the standard buffer polygons in GIS (based on observed field conditions and recent aerial photography). Where development, such as a roadway, intruded into the buffer, impeding hydrologic connection, the disconnected outer portion of the buffer was removed. The resulting functioning buffers were used to determine buffer impacts and mitigation needs.

Geologic Hazard Areas and Buffers Mapping

According to Bellevue Land Use Code, landslide hazard areas and steep slopes require 50-foot buffers from the top-of-slope. In order to map top-of-slope buffers, steep slopes and landslide hazard areas were visually evaluated relative to 10-foot contour data provided by the City of Bellevue, and buffers were clipped to top-of-slope.

Steep slope and steep slope buffer data were further refined to include only priority features, as described by GeoEngineers in their July 2017 report and subsequent memo. GeoEngineers evaluated proposed tree removal associated with the Energize Eastside Project on Bellevue's mapped steep slopes for impact risks, including review against a current aerial photograph and field conditions following a site visit. According to communication with PSE, based on the observed developed conditions of the majority of the corridor (residential rockeries, landscaped residential or commercial development slopes, and engineered cut slopes associated with paved roadways) and the proposed work at those locations, the GeoEngineers Report considered these mapped areas as having a low impact risk, offering generalized impact minimization measures. As such, steep slope areas depicted on the Critical Areas Assessment Maps (Appendix B) were limited to show priority areas, while features with low impact risk, including residential rockeries and other marginal mapped slopes, were omitted.

Existing Land Cover Mapping

In order to quantify land cover changes from Project-related activities, a layer showing existing land use was created to describe the current land cover conditions. The land cover base map was developed from the following existing data sources:

- 2009 Impervious and Impacted Surface raster data set, King County GIS
- Energize Eastside Corridor digital survey, APS Surveying
- Energize Eastside Corridor Tree Inventory data, The Watershed Company
- Energize Eastside Corridor Vegetation Polygon data, The Watershed Company
- Energize Eastside Corridor Wetland and Stream Inventory, The Watershed Company
- High-resolution aerial photography, PSE, captured in 2011
- 2015-2016 aerial photography, King County GIS

Using the King County impervious surface raster, GIS analysts supplemented the mapped features using digital survey data. These data were further refined by manually reviewing mapped features against high-resolution aerial photography and field-verified conditions. After developed and non-developed areas were mapped, vegetation and tree canopy coverage information were integrated (described in following subsection), as well as mapped open water areas (streams). This effort yielded a base map with six general land cover types:

- Forested with understory vegetation
- Forested without understory vegetation
- Understory vegetation, unforested
- Other (generally lawn)
- Developed
- Water

VEGETATION ASSESSMENT METHODS

A full description of the vegetation analysis methods, the results of which have been incorporated into the CAIA, is presented in the *City of Bellevue Tree Inventory Report: Puget Sound Energy – Energize Eastside Project* (The Watershed Company 2016b). The ways in which the results were used to generate the mapped features presented in the CAIA are summarized below.

The Watershed Company certified arborists conducted a field-based vegetation inventory from March 23, 2015, to November 9, 2015 associated with potential routes for the Energize Eastside Project. The methodology utilized during the inventory was developed to comprehensively identify, describe, and mark all vegetation greater than 15 feet tall, or that had the potential to reach a mature height of 15 feet or taller.

Inventoried vegetation was mapped as points and/or polygons. Any tree with a diameter of six inches at four-and-a-half feet above the ground surface (DBH) was mapped as a point and tagged with a unique number and its attributes were recorded. Landscaped vegetation with the potential to reach 15 feet or greater

was also inventoried in this manner regardless of size. Finally, weedy vegetation (i.e. from seed [not planted] and not maintained) with a DBH of three to six inches was also inventoried in this way. This type of inventoried vegetation was typically survey-located.

Hedges and small weedy vegetation (less than three inches DBH) were mapped as polygons, not points. Polygons were sketched in the field based on observations then digitized in GIS using high-resolution imagery. Vegetation attributes within polygons were averaged. No significant (regulated) trees were inventoried using this method.

Resulting mapped features included in land cover mapping of the CAIA are vegetation points with the recorded canopy (or radius) applied creating circular "tree footprints" and polygons representing varying densities of smaller weedy vegetation with the potential to reach a height of 15 feet or more.

Using inventoried tree point data and incorporation of 3D design data depicting proposed pole heights and vertical wire alignment, tree impacts related to the construction of the Energize Eastside Project were quantified. Canopy cover for the anticipated trees to remain and trees to be removed or maintained was then mapped and overlayed, resulting in a coverage layer depicting the extent of anticipated canopy preservation and canopy loss. This data was incorporated into the land cover data, further refining existing land cover into eight general land cover types:

- Forested to be removed (canopy loss) with understory
- Forested to be removed, no understory
- Forested to remain (canopy preservation) with understory
- Forested to remain, no understory
- Understory vegetation, unforested
- Other (generally lawn)
- Developed
- Water

Impact Characterization

Proposed development areas associated with the Energize Eastside Project were mapped using geometry from design files and data provided by PSE. As described by PSE, work proposed could be classified into ten types and maintained in the long term as described in the following table.

Proposed Work	Long term Condition
Pole footprint	Developed
Permanent development of the Richards Creek Substation, including structures and impervious areas	Developed
Clearing limits for the Richards Creek Substation construction, includes temporary disturbance related to construction activities	Mixed Vegetation (Height may be maintained depending upon location relative to wire alignment)
Pole buffer, describes an approximate 6-foot buffer around the proposed poles that will be disturbed during construction and tree growth will be managed long-term	Mixed Vegetation (Height maintained at 15 feet or where 20 feet of vertical clearance is provided beneath the vertical curvature of the lowest wire)
Access route, describes approximate path used during construction activities	Mixed Vegetation (Height may be maintained depending upon location relative to wire alignment)
Stringing sites*	Mixed Vegetation (Height may be maintained depending upon location relative to wire alignment)
Wire zone (WZ)	Mixed Vegetation (Height maintained at 15 feet or where 20 feet of vertical clearance is provided beneath the vertical curvature of the lowest wire)
Managed right-of-way (MROW)	Mixed Vegetation (Height maintained at 15 feet or where 20 feet of vertical clearance is provided beneath the vertical curvature of the lowest wire)
Pole work area, approximate temporary disturbance related to pole construction	Mixed Vegetation (Height may be maintained depending upon location relative to wire alignment)
Limit of other vegetation management associated with construction and operations at the Richards Creek Substation	Mixed Vegetation (Height may be maintained depending upon location relative to wire alignment)
Maintained legal right-of-way (LROW), encompasses the areas of LROW where PSE intends to exercise long-term vegetation management	**Mixed Vegetation (Height maintained at 70 feet)**
* Note: Impacts from stringing sites are captured within the footprints of other proposed work activities. During construction work associated with stringing sites, adjustments may be made in the field to avoid, minimize, or mitigate impacts should they occur.	

These proposed work areas were then intersected with the land cover data set described above. The result was a set of polygons defining pre-Project conditions (land cover data set values) and post-Project conditions (proposed work and long-term condition values). Differences between post-Project conditions and pre-Project conditions, or impacts, were then characterized as one of four types – permanent, conversion, temporary, or no change – based on the nature of the change on the ground. These characterization types are defined in the matrix below.

			Existing Land Cover Types							
	Impact Description	**Long-term Condition[1]**	Forested to be removed with understory	Forested to be removed, no understory	Forested to remain with understory	Forested to remain, no understory	Understory	Other (mostly lawn)	Developed	Water
Proposed Activities	Pole footprint	Developed	P	P	P	P	P	P	NC	N/A
	Permanent development of Richards Creek Substation	Developed	P	P	P	P	P	P	NC	N/A
	Clearing limits for the Richards Creek Substation construction	Mixed vegetation[2]	C	C	T	T	T	T	NC	N/A
	Pole buffer	Mixed vegetation[2]	C	C	T	T	T	T	NC	N/A
	Access route	Mixed vegetation[2]	C	C	T	T	T	T	NC	N/A
	Wire zone (WZ)	Mixed vegetation[2]	C	C	NC	NC	NC	NC	NC	N/A
	Managed right-of-way (MROW)	Mixed vegetation[2]	C	C	NC	NC	NC	NC	NC	N/A
	Pole work area	Mixed vegetation[2]	C	C	T	T	T	T	NC	N/A
	Limit of other vegetation management at Richards Creek Substation	Mixed vegetation[2]	C	C	NC	NC	NC	NC	NC	N/A

Type of Impact based on proposed activity, long term condition, and existing land cover type:

P = Permanent to developed C = Vegetation conversion (not developed)

T = Temporary impact, can be restored to existing land cover

NC = No Change N/A = Not applicable/does not occur

[1] Long term condition determined in coordination with PSE.

[2] Subject to varying height restrictions described in Section 2.3.5.

Critical Areas Impact Assessment

Application of the matrix, yielded a map showing a full characterization of permanent, conversion, and temporary impacts associated with the Energize Eastside Project. This impact characterization layer was then intersected with each individual mapped critical area in order to locate, characterize, and quantify impacts to that critical area. The results were summarized by critical area and drainage sub-basin.

The ending table summarizes the data sources used for the critical areas analysis.

Quality Assurance Review of Analysis Steps and Results

Internal review of CAIA steps and results has occurred throughout the process described above and will be ongoing as the analysis is refined.

Ecologists, arborists, GIS analysts, and planners worked collaboratively to ensure all appropriate critical areas were incorporated into the maps and where appropriate, classified and buffered according the local jurisdiction regulations.

GIS analysts created the land cover base map, compiled from a variety of sources. Land cover classifications were reviewed for quality assurance first through the GIS department by comparing mapped data to high resolution aerial imagery. Following review by the GIS analysts, the land cover map was reviewed by an ecologist against delineation field notes and recollections from field work activities.

Project elements and site plans have been provided by, and reviewed with, PSE Project staff. The mapped location and long term condition of Project elements is based upon discussions with PSE regarding BMPs and standard PSE programs and policies.

All components of the CAIA have been generated/authored by reputable sources and have been cross-checked internally for consistency. Quantified and depicted impacts resulting from the CAIA have been reviewed by ecologists for quality assurance to the extent feasible. Impact results will continue to be reviewed for accuracy as the Project plans and impact areas are refined and finalized.

Limitations

This analysis relies on a series of data products produced using different scales and methods; therefore, mapped features may not align with the planned real-world layout of proposed corridor facilities. Ground-truthing of these results may reveal inaccuracies. Furthermore, as some features and design geometries were translated from AutoCAD into ArcGIS, some geometric refinements were necessary to address gaps and other issues, which could affect the accuracy of the analysis results.

Data Inventory Elements and Information Sources:

Inventory Element	Information Gathered	Data Source(s)	Assumptions/Limitations
Proposed Development			
Topographic surface data	• Point map of surface elevations	Puget Sound Energy (PSE) tabular data (via email R. Weider); date received 4/19/2017 The Watershed Company (TWC)	• Point elevations generated from lidar flight by consultant to PSE; flight date unknown • Data was post-processed to generate a 3D surface map using ArcGIS software
Proposed Energize Eastside Project Improvements	• Pole structures • Wire alignments • Pole construction work areas • Proposed temporary construction access routes • Stringing sites • Richards Creek substation improvements	PSE (via email R. Weider, K. Purnell), design drawings in AutoCAD; date received: 7/20/2017-8/2/2017 HDR (via email K. Purnell), geospatial data; date received 8/2/2017 TWC	• Reflects pole and wire design configuration from June 30, 2017, with updates through Aug 18, 2017 • Design may be subject to revision or update based on regulatory comments, field conditions, or other factors
Cadastral Datasets & Features			
Land Cover	• Development and impervious areas • Other • Tree canopy • Understory vegetation	King County 2009 impervious dataset and 2015-2016 aerial data PSE high-resolution aerial photography; flight date 2011 APS Surveying, digital survey TWC	• Impervious dataset from King County, last updated 2009 • Vegetation survey by TWC between 2015 and 2017 • "Developed" category includes roads, structures, and heavily disturbed areas, such as compacted unimproved roadways • "Other" category observed to be mostly lawn based on visual observation of aerial photographs, but could include other conditions • Survey data was post-processed to isolate and generate geospatial feature classes using ArcGIS software

Inventory Element	Information Gathered	Data Source(s)	Assumptions/Limitations
Parks	• Park locations	City of Bellevue (downloaded 4/6/2017) King County	• Bellevue last updated on 02-06-2017 • King Co last updated 07-19-2016
City limits	• Incorporated city limit boundary	City of Bellevue (downloaded 4/14/2017)	• Bellevue updated 02-06-2017
Parcels	• Parcel lines	City of Bellevue (downloaded 4/14/2017)	• Bellevue updated 02-06-2017
Regulated Critical Areas			
Streams and Riparian Areas (LUC 20.25H.075)	• Streams with study corridor • Stream buffers	TWC	• Streams delineated by TWC between 2015 and 2017 • Feature buffers assigned according to City of Bellevue 2006 Critical Areas Ordinance (CAO)
	• Floodplains	*See Flood Hazard Areas*	
Wetlands (LUC 20.25H.095)	• Delineated wetlands within study corridor • Wetland buffers • Approximate wetlands	TWC	• Wetlands delineated by TWC between 2015 and 2017 • Wetland feature ratings based on 2004 rating system • Feature buffers assigned according to City of Bellevue 2006 Critical Areas Ordinance (CAO)
Habitats for Species of Local Importance (LUC 20.25H.150)	• Priority habitat and species data (PHS)	WDFW (received 6/27/2017)	• Scale may not be sufficient to capture individual occurrences or observations along the corridor. • Accuracy does not supersede observation by PSE staff.
Geological Hazard Areas (LUC 20.25H.120)	• Landslide hazard areas • Landslide hazard buffers	King County (downloaded 6/15/2017) TWC	• Data describes landslide hazards defined by King County SAO • Feature buffers assigned according to City of Bellevue 2006 Critical Areas Ordinance (CAO); mapped buffers extend around full feature area; however, only top-of-slope buffers are prescribed by code.
	• Priority steep slopes • Priority steep slope buffers	City of Bellevue Mapping Services (downloaded 4/6/2017) TWC GeoEngineers	• Bellevue data last updated 04-06-2016 • Feature buffers assigned according to City of Bellevue 2006 Critical Areas Ordinance (CAO); mapped buffers extend around full feature area;

Inventory Element	Information Gathered	Data Source(s)	Assumptions/Limitations
			however, only top-of-slope buffers are prescribed by code. • Based on site-specific geotechnical analysis by GeoEngineers, datasets were refined to show only priority geohazard features
	• Coal mine hazard areas	City of Bellevue Mapping Services (downloaded 4/6/2017)	• COALZONE – last updated 04-05-2016; no features occur within Project area
Flood Hazard Areas (LUC 20.25H.175)	• Flood hazard areas	City of Bellevue Mapping Services (downloaded 4/6/2017) FEMA	• Bellevue FLOODPLAIN last updated 04-05-2016
Shorelines (LUC 20.25E.017)	• Shoreline jurisdiction areas	City of Bellevue Mapping Services (downloaded 4/6/2017)	• SHORELINES not provided on Bellevue site; no features occur within Project area

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Puget Sound Energy
P.O. Box 97034
Bellevue, WA 98009-9734

PSE.com

November 5, 2018

Heidi Bedwell, Environmental Planning Manager
City of Bellevue
450 110th Avenue NE
Bellevue, WA 98004

RE: South Bellevue Segment Energize Eastside – Response to Technical Review Letter, Part #4
Conditional Use Permit (File #17-120556-LB)
Critical Areas Land Use Permit (File #17-120557-LO)

Dear Ms. Bedwell:

Puget Sound Energy, Inc. (PSE) provides the following information regarding routing and substation location review in response to the City of Bellevue's (City's) request for additional information on the above referenced permit applications.

Routing and Substation Options – Summary

In order to develop route options, PSE identified potential route segments between Renton and Redmond. To help identify these route segments, PSE took into account not only electrical feasibility, but dozens of non-electrical factors, like geographic barriers, land uses and impacts on the environment.

In 2014, PSE engaged the community in a public routing discussion for Energize Eastside. Through the Community Advisory Group process, open houses, neighborhood meetings, briefings and comments, we learned about community values and concerns about the project.

Through the public route discussion process, the Community Advisory Group selected the *Oak* and *Willow* routes as their final recommendation for PSE's consideration. The final route selected (subject of the CUP application) is one of the two routes recommended by the Community Advisory Group.

Sycamore and Willow Routes

The Community Advisory Group reviewed the 18 potential route options for the Project. Two of the routes, *Sycamore* and *Willow*, included new substation options: the Vernell Substation site (located along the *Sycamore* route), and the Richards Creek and Westminster substation sites (located along the *Willow* route).

The Community Advisory Group completed their work on Dec. 10, 2014 and selected the *Oak* (not analyzed in this document) and *Willow* routes as their final recommendation for PSE's consideration.

More information related to the *Sycamore* (shown as Segment B on Figure 1) and *Willow* routes are provided below.

Figure 1: Final Route Recommendation (*Willow*) and Potential Route Segments

Substations

Three substation sites were identified and evaluated by both PSE and the Community Advisory Group: Richards Creek, Westminster, and Vernell. These sites were chosen because they are all owned by PSE with the intent of using them for future substations sites (as shown on Bellevue Comprehensive Plan Map UT-7). As part of the 2014 evaluation, critical areas on each site were reviewed, specifically wetlands, stream crossings, and steep slopes. Both the Richards Creek and Westminster sites are located along the existing SAM-LAK-TAL corridor (the *Willow* route); however, the Vernell site would require the new 230 kV transmission lines to follow a different corridor (the *Sycamore* route) between the existing PSE Sammamish (Redmond) and Lakeside (Bellevue) substations, as well as the installation of additional 115 kV lines to the existing Clyde Hill and Ardmore substations. As the Vernell Substation site was removed from further consideration in 2014, specific critical areas information related to the Vernell site was not collected; however, a summary of critical areas on this site are provided in this document.

Critical Areas Review

The City of Bellevue's Land Use Code (LUC) Section 20.25H.055.A provides the following hierarchy of alterations:

> "*Where a use or development is proposed on a site with more than one type of critical area, preference shall be given to disturbing those critical areas with the least sensitivity to human disturbance, based on a consideration of both existing functions and values, and future functions and values if left undisturbed.*"

Critical areas associated with the Richards Creek Substation site are included in the CUP and LO permit applications. The Westminster and Vernell substation sites are summarized in this memorandum, as well as responses to the General Performance Standards associated with new and expanded uses or development in LUC 20.25H.055.C.2.

Sycamore and Willow Routes

As part of the 2014 Community Advisory Group, GIS data was reviewed for each of the routes under consideration. The GIS data reviewed can be used to make a relative comparison between the *Sycamore* and *Willow* routes, see Table 1 for a summary of information for each route associated with critical areas and other sensitive uses.

Table 1: Critical Areas Summary for *Sycamore* and *Willow* Routes

Data (2014)	*Sycamore* Route (Vernell)	*Willow* Route (Richards Creek and Westminster)
Wetlands identified within 50' of both sides of the corridor centerline[1]	34 wetlands	25 wetlands
Potential stream crossings[1]	18 stream crossings	22 stream crossings
State-documented wildlife species present[2]	22 species	21 species

Data (2014)	*Sycamore* Route (Vernell)	*Willow* Route (Richards Creek and Westminster)
High Slope Instability within 25' of the corridor[3]	4.05% of the corridor	4.94% of the corridor
Medium Slope Instability within 25' of the corridor[3]	4.90% of the corridor	6.67% of the corridor
Low Slope Instability within 25' of the corridor[3]	1.68% of the corridor	2.89% of the corridor
Steep slopes within 25' of the corridor (>40% slopes)[4]	10.13% of the corridor	9.91% of the corridor
Moderately steep slopes within 25' of the corridor (>20% and less than 40% slopes)[4]	18.26% of the corridor	21.25% of the corridor
Fault lines within 25' of the corridor[5]	11 faults	7 faults
Tree removal (total number of trees >4" DBH requiring removal or trimming)[6]	9,175 trees	7,879 trees
Residential use within 600' of the corridor[7]	4,114 parcels	3,970 parcels
(Residential use within 600' of the corridor that has not existing transmission lines)[7]	(405 parcels)	(7 parcels)
Park uses within 25' of the corridor[7]	14 parcels in park use	13 parcels in park use
Recreational uses within 25' of the corridor[7]	8 parcels in recreational use	7 parcels in recreational use
School use within 600' of the corridor[7]	13 schools	7 schools
Registered Historic Sites within 0.5-mile of the corridor	5 sites	6 sites
Percent of route on existing corridor	50%	100%
Cost (total cost, in USD millions)	$277	$154

1: Based on GIS data or field reconnaissance.
2: Based on State Priority Habitat and Species Data (includes known salmonids species).
3: Based on Washington State Department of Natural Resources (DNR) Slope Stability Rating Area.
4: Derived from King County LiDAR elevation.
5: Derived from Washington State DNR fault data.
6: Developed using LiDAR, Google Earth, and/or field reconnaissance.
7: Based on King County Assessor Data.

In general, the *Sycamore* route would cross approximately nine more wetlands, four fewer streams, and four more geologic faults than the *Willow* route. It was estimated that approximately 1,300 more trees would be subject to removal with the *Sycamore* route; most of these trees would be along the western extent of Bridle Trails State Park and 116th Avenue NE, where a number of streams (including known salmonids locations) and wetlands have been identified on Kirkland's Sensitive Areas map (2018).

Richards Creek Substation Site

The Richards Creek Substation site is described in detail in the CUP and LO permit applications submitted to the City of Bellevue.

Westminster Substation Site

Site Summary: The Westminster Substation site is located at 13649 NE 24th Street in Bellevue, WA on Parcel 2725059116, and is bounded by NE 24th Street on the north, 136th Place NE on the east, State Route (SR) 520 on the south, and Viewpoint Park on the west. The site is owned by PSE and is zoned O Office and PO Professional Office. It is approximately 267,820 square feet, or 6.15 acres and is undeveloped and forested.

Critical Areas: Critical areas on the Westminster Substation site include:

- An erosion hazard area mapped by King County in the northwest portion of the site;
- Known wetlands along the eastern portion of the site (estimated at 0.69 acre);
- A stream near the southern portion of the site mapped by the Washington State Department of Natural Resources (DNR) as fish-bearing; and
- Areas of steep slopes >40% as mapped by the City of Bellevue Critical Hazards Maps.

A proposed site plan of the Westminster Substation has been prepared (see attached Figure 2), and development of a 3.44 acre (or 149,718 square foot) substation would result in impacts to approximately 0.69 acres (or 30,037 square feet) of wetlands - all of the approximated wetlands on the site. The smaller size of the site and configuration of the property would not allow for the same enhancement and/or mitigation activities as on the Richards Creek Substation site. Critical areas mitigation would likely need to be off-site.

Vernell Substation Site

Site Summary: The Vernell Substation site is located at 2380 116th Avenue NE in Bellevue, WA on Parcels 2825059141 and 2825059101, and is bounded by 116th Avenue NE on the west, SR 520 on the north, the Cross Kirkland Corridor on the east, and NE 22nd Place on the south. Both parcels are owned by PSE and are zoned as BR-MO Bel-Red Medical Office. Together, the parcels are 124,951 square feet, or 2.87 acres, and are developed with light industrial and commercial uses.

Critical Areas: Critical areas on the Vernell Substation site include:

- An erosion hazard area mapped by King County in the southeast portion of the site;
- A stream along the east side of the site mapped by Washington Department of Natural Resources (DNR) as fish-bearing; and
- Low to moderate liquefaction hazard, steep slopes >40%, and very severe soil erosion hazards in the south/southeast portion of the site as mapped by the City of Bellevue Critical Hazards Maps.

As the Vernell Substation site was removed from consideration by the Community Advisory Group, more detailed information (such as a preliminary site plan) has not been prepared.

Review of LUC 20.25H.055.C.2

New or expanded facilities and systems are allowed within critical areas or their buffers only where no technically feasible alternative with less impact on the critical area or buffer exists (LUC 20.25H.055.C.2).

Criteria and responses for technical feasibility of the Westminster and Vernell substation sites are presented in Table 2.

Table 2: LUC Review for Westminster and Vernell Substation Sites

LUC 20.25H.055.C.2.a. Code Sections	PSE Response
i. The location of existing infrastructure;	Westminster Substation is located along the existing SAM-LAK-TAL 115 kV transmission line corridor, same as the Richards Creek Substation site. However, Westminster is undeveloped, sloped, and forested; therefore, it would require extensive clearing and grading. The Vernell Substation site would require a new 230 kV transmission line route (*Sycamore* route) to make the connection between the Vernell and the Sammamish substation (Redmond). Also, in order to use the Vernell site, approx. 2.3 miles of new 115 kV transmission line would be needed to connect the site with the Ardmore Substation in Redmond, and 1 mile of new 115 kV transmission line to connect the site to the Clyde Hill Substation in Bellevue.
ii. The function or objective of the proposed new or expanded facility or system;	As the Westminster Substation site is within the same 230 kV transmission line corridor as the Richards Creek Substation, it would provide the same system functions. The Vernell Substation site would require use of a new 230 kV transmission corridor as well as multiple additional 115 kV lines between the Clyde Hill and Ardmore Substations. The *Sycamore* route was one of the most expensive alternatives reviewed, and considered to have more difficult constructability than other routes.
iii. Demonstration that no alternative location or configuration outside of the critical area or critical area buffer achieves the stated function or objective, including construction of new or expanded facilities or systems outside of the critical area;	Both the Westminster Substation site and Richards Creek Substation site would include impacts to wetlands, streams, and vegetation; however, as the Westminster site is forested and undeveloped it would result in more tree and vegetation removals than the Richards Creek site. It is likely that the entirety of the wetland at Westminster would be affected by project construction (estimated at 0.69 acre). The Vernell Substation site does not have wetlands, but contains a

LUC 20.25H.055.C.2.a. Code Sections	PSE Response
	small stream on the eastern edge of the site. All three sites have erosion and slope hazards present, and the Vernell site contains more extensive geologic hazards as mapped by the City of Bellevue.
iv. Whether the cost of avoiding disturbance is substantially disproportionate as compared to the environmental impact of proposed disturbance; and	All three identified substation sites contain critical areas; therefore, avoidance is not feasible no matter the cost. The Westminster Substation preliminary site plan (attached as Figure 2) has been laid out to minimize impacts on wetlands as possible, but likely would still impact the entirety of the wetland (estimated at 0.69 acre). This would result in greater wetland impacts than at Richards Creek, which includes approximately 0.29 acre of wetland impact (permanent and conversion).
v. The ability of both permanent and temporary disturbance to be mitigated.	Due to the small size of the Westminster site, it does not provide the same opportunity to mitigate for temporary and permanent impacts on wetlands (and streams, if present) on-site like the Richards Creek Substation site. It would likely require off-site mitigation which is not preferred by the City of Bellevue. The Vernell Substation site could likely be constructed and designed to mitigate for on-site geologic hazards.

This memorandum concludes that there is no technically feasible alternative substation site that has less impact than the Richards Creek substation site; therefore, the CUP and LO permit documentation submitted for the Richards Creek Substation provides information in compliance with LUC 20.25H.055.C.2.b.i through viii.

LUC 20.25H.055.C.3 Performance Standards for Specific Uses or Development does not contain provisions applicable to this Project.

Please let us know if additional information or clarifications are needed.

Sincerely,

Brad Strauch
Senior Land Planner

Attachment

EAST-WEST BASELINE
N 88°33'37" W

NORTH-SOUTH BASELINE
N 00°00'00" E

N

40 0 40 80 160

GRAPHIC SCALE
(IN FEET)

LEGAL DESCRIPTION

THE NORTH 297 FEET OF THE NORTH HALF OF THE NORTHEAST QUARTER OF THE NORTHWEST QUARTER OF SECTION 27, TOWNSHIP 25 NORTH, RANGE 5 EAST, W.M., IN KING COUNTY, WASHINGTON, LYING WEST OF C.B. HOWARD ROAD; EXCEPT THE NORTH 30 FEET OF NORTHEAST 24th STREET;
AND EXCEPT ANY PORTION LYING WITH C.B. HOWARD ROAD.

NOTES

WETLANDS BOUNDARY MARKED IN FIELD BY BEAK CONSULTANTS. MARKERS MISSING OR OMITTED @ TIME OF SURVEY (7-31-91) ARE SHOWN HERE APPROXIMATE.

AREA: 3.44 ACRES (149,718 SQ. FT.)
WETLANDS: 0.69 ACRES (30,037 SQ. FT.)

DSD 001137

REVISION DESCRIPTION:	WO NUMBER: ?		
ORIGINAL ISSUE			
		DATE (M/D/Y)	
CAD	?	? / ? / ?	
ENGINEER		/ /	
REVIEWED		/ /	
APPROVED		/ /	

FIGURE 2
PROPOSED SITE PLAN
WESTMINSTER SUBSTATION

PSE PUGET SOUND ENERGY
SUBSTATION ENGINEERING DEPARTMENT

DRAWING NO D-20114
REV NO 0
SHEET: 1 OF 1
FILE NO:
CODE: WES

SCALE: 1"= 40'-0"
CLASS: SITE
CADD NO: $$DGN$$

$USER$
$DATE$
$FILE$

TECHNICAL MEMORANDUM

Date:	October 11, 2018
To:	Kelly Purnell, PSE
From:	Watershed team
TWC Project Number:	111103
Project Name:	Energize Eastside Critical Areas Impact Analysis – South Bellevue

Subject: South Bellevue Review Comments

Overview

This memorandum responds to select land use review comments in the City of Bellevue's August 14, 2018, comment letter regarding the Energize Eastside Project, and additional information requested by Environmental Science Associates (ESA). Information intended to address ESA's request is provided at the end of this memo.

COB Comments and Responses

The City of Bellevue (COB) comments are summarized below, followed by The Watershed Company's (Watershed's) response.

Critical Areas:

Functional Buffer

The code recognizes degraded conditions and does not use the term "Functioning Buffer." It is recognized that many buffers may be degraded (i.e., have little to no vegetation or contain structures). The Critical Areas Report (see page 27) appropriately recognizes the lack of function provided by existing impervious surfaces. It is unclear however what is meant by the term development as used in this report. As noted above in comments associated with geologic hazard areas, commercial and residential landscaping may provide some critical area function and should not be disregarded in the report. When these areas are within the prescribed buffers their function should be considered and mitigation should take into account impacts to these functions.

Watershed Response: Portions of critical area buffers that contained "development" were removed from standard buffers. Areas removed included primary structures and other areas which did not contribute to buffer function such as pavement, secondary structures, and compact gravel. Specific examples occur on the Richards Creek Substation parcel, Somerset

Substation, Coal Creek Parkway, and on some residential parcels (Figure 1). Areas characterized as commercial or residential landscaping have not been removed from functioning buffers.

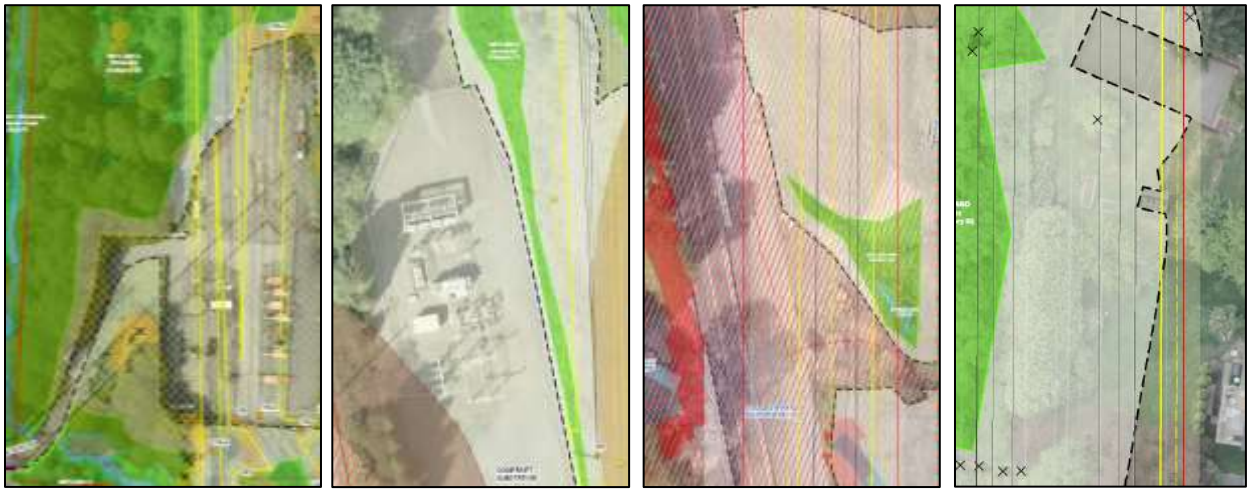


Figure 1. Examples of development removed from functional buffers from CAIA maps submitted with the South Bellevue CAR. From left to right: 1) access road and gravel pad removed from buffer at Richards Creek; 2) Somerset substation removed from Wetland A (Somerset) buffer; 3) Coal Creek Parkway and associated parking area removed nearby critical area buffers; and 4) private sport court and shed removed from Wetland MN01 buffer.

As described in the South Bellevue CAR, developed areas within the buffer that are not providing functions were excluded from the CAIA since the primary purpose of the analysis was to determine project impacts to critical area functions and the amount of mitigation that would be required based on those impacts. However, some non-functional buffers are viewed as "standard buffer" by the City, including the existing paved driveway and gravel pad located on the Richards Creek substation parcel, ancillary residential structures, and some roadways and parking areas. The majority of excluded non-functioning buffer areas will not experience any type of new impact as a result of the proposed project (largely due to the fact that these areas have already been developed to some degree – *i.e.,* no trees – and transmission lines will span large areas). The only exception is the existing development at the Richards Creek substation parcel. Here, the roadway, gravel pad, and detention pond will be redeveloped during construction of the Richards Creek Substation.

The total buffer area being impacted (conversion and permanent) in the Richards Creek sub-basin reported in the CAR is 35,336 square feet (SF). This number did not include the roadway, gravel pad, and detention pond on the Richards Creek substation parcel (they were considered

"non-functioning") that will also be impacted by the project; these buffer areas total 47,512 SF. Therefore, the total buffer area to be impacted (including non-functional areas) is 82,848 SF. However, the proposal provides mitigation for 35,336 SF of functional buffer impact. This is because the driveway and gravel pad on the Richards Creek substation parcel were determined to provide little water quality/hydrology/habitat function to nearby areas as they are paved or consist of compact, crushed gravel. The detention pond was also removed from the buffer based on its association with the impacted/developed condition of the substation parcel. Additionally, PSE stated that at other developed substation sites within the City, detention ponds were not considered buffer.

Stream Realignment Mitigation

The project proposes to mitigate for wetland, and stream and wetland buffer impacts through both wetland enhancement and stream restoration. The applicable provision is as follows:

> ***Wetlands Enhancement as Mitigation**. Impacts to wetland critical area functions may be mitigated by enhancement of existing significantly degraded wetlands. Applicants proposing to enhance wetlands must produce a critical areas report meeting the requirements of LUC 20.25H.110 and 20.25H.230 that identifies how enhancement will increase the functions of the degraded wetland and how this increase will adequately mitigate for the loss of wetland area and function at the impact site. An enhancement proposal must also show whether existing wetland functions will be reduced by the enhancement actions.*

The Critical Areas Report does not address whether existing wetland functions will be reduced by the enhancement actions. As shown on figure 2 of the report, wetlands are located within the proposed stream realignment area. Address how the functions in these areas will be maintained as part of the proposed mitigation. Prepare a written response to all applicable standards in LUC 20.25H.105 and 110.

Watershed Response: The stream realignment proposal will not result in impacts to wetland function except over the very short term – during the year or season of construction. It's important to note that the stream and wetland features at this site are part of an interrelated and interdependent system.

The re-aligned stream channel will improve habitat complexity and interspersion of the wetland and stream functions. The stream channel and its habitat functions will be improved by moving the channel away from the top edge of a concrete ecology block wall bordering an industrial storage yard located to the west. As a result of the increased area between the stream and the wall, the new condition will have vegetated buffers on both sides of the stream rather than just one. This will provide the additional space necessary to allow for channel meanders, new gravel substrate, and pools with log structure cover as fish habitat features, as well as the wildlife

habitat and water quality functions of a vegetated buffer. Buffers will also be wider and the prevalence of invasive plant cover will be reduced. Native trees, shrubs, and groundcover will be added to the existing and expanded wetland, stream and buffer areas.

The plan will provide equivalent or greater critical area functions when compared to existing conditions. Following are specific increases in wetland functions expected as a result of the restoration project (see additional discussion in Table 15 of the CAR).

Water quality

- Wider and more fully vegetated buffers along both sides of the stream will increase biofiltration function, helping to improve water quality from stormwater originating off-site upstream, as well as helping to filter storm water originating onsite prior to it reaching the stream onsite.
- Preventing flows from spilling out onto a lower, paved industrial area adjoining to the west during high-flow events (and even from pervasive seepage) will reduce the entrainment of pollutants from this potentially pollution-generating surface.

Hydrologic

- Invasive, channel-clogging vegetation will be removed and replaced with bare root or container native trees and shrubs, as well as live stakes.
- New native plantings will provide increased soil stability and native vegetation that will reduce velocity of peak flows; improving wetland and stream buffer functions, along with increased channel dimensions and flow-carrying capacity.

Habitat

- New native plantings will provide a net increase in species and structural diversity.
- The function of the 35 trees proposed for removal in the stream restoration project area will be replaced by planting approximately 260 trees.
- New plantings will provide organic matter, as well as foraging and nesting opportunities for terrestrial wildlife, including songbirds and small mammals.
- Culvert replacement and stream restoration will improve fish passage, and improve in-stream and riparian habitat conditions.

Sediment transport

- Culvert replacement and stream realignment will help remove flood-flow-deposited gravel from the existing wetland and prevent future deposition of streambed gravel into the wetland.

It is anticipated that once the stream is relocated to the east, wetland functions will further develop in the location of the old stream channel. The former stream channel will transition into a low-flow, low-energy backwater channel. This feature, within the overall habitat context, will provide diversity and additional habitat opportunities for wildlife. The backwater channel will continue to intercept shallow groundwater seepage and will support emergent and other obligate wetland vegetation. This combination of hydrology and vegetation is anticipated to function well and provide improved amphibian habitat. Fish would also have access to the old channel volitionally – smaller fish could move in and out seasonally or as flows otherwise allow.

A low "berm" is proposed along the entire length of the west side of the stream (left bank facing downstream) within the project area in order to form a better-defined stream bank along that downslope side where channel definition is currently lacking. This "berm" area totals approximately 2,169 SF. Channel definition and a streambank of sufficient height is needed along that side of the stream to contain anticipated high flows in this flashy stream fed by upstream impervious surfaces in this urban setting. Downstream of the access road crossing, the existing, poorly-defined channel sits atop a concrete block wall and it readily overtops and spills into the H. D. Fowler paved storage yard when flows are elevated. Seepage onto the paved storage yard continues to occur even at base flows. Setting the channel back (east) from atop this wall and providing a defined west channel bank of sufficient height is necessary to solve or greatly alleviate this problem. As noted above, the existing channel (approximately 2,110 SF) will not be filled and will remain as a means of collecting seepage before it reaches the storage yard, and returning it back to the stream channel.

In addition to preventing overbank flows from spilling into the adjoining paved storage yard, the proposed elevated west streambank extending downstream of the access road crossing is intended to function similarly to or the same as hummocks do in a forested wetland setting. Such hummocks provide limited areas of upland-type soils, allowing additional plant species, particularly trees, to grow, thereby enabling the desired forested wetland effect and function to develop over time. With a few exceptions (such as willow species, cottonwood, and Oregon ash), most or many tree species (including bigleaf maple, red alder, western red cedar, Douglas-fir, hemlock, birch) will not grow or flourish in overtly wetland soils, even though they are often considered to be integral components of forested wetlands. Most trees associated with forested wetlands actually tend to grow in areas of upland soils along a wetland boundary or fringe, or in the localized areas of upland soils associated with hummock "islands "contained within the overall wetland boundaries. Though not technically rooted in wetland soils, many or

most of these canopy trees do grow over, shade, provide wildlife habitat to, and otherwise contribute to the overall function of forested wetlands. The area encompassed by such relatively small, upland hummock areas contained within forested wetlands is not typically subtracted from the overall wetland area, in part because they contribute so importantly to highly-valued forested wetland function. While we have not counted the stream bank as part of the wetland rehabilitation area proposed around the new stream channel, we have also not explicitly counted it as impact to existing wetland. This is partly because it is difficult to precisely quantify how much of it will actually become non-wetland, but also because of its expected significant contribution to overall forested wetland function.

Upstream of the access road, a higher and better-defined west side streambank is also needed to keep peak flows within the channel and prevent them from spilling downslope, as they do now. These overbank flows are eventually collected in the SE 30th Street stormwater system as opposed to contributing to stream function by staying within the stream channel. The concern has been raised that retaining surface flows within a defined channel will impact wetland hydrology in Wetland D on the downslope (west) side of the stream. We do not believe this will occur because, even though surface flows will be contained within the channel, subsurface flows will continue to seep downslope along the path of least resistance to keep the defined wetland areas adequately supplied with hydrology. Our interpretation and analysis of the existing stream channel and flow patterns in that vicinity indicate that a high-flow event several years ago resulted in a large amount of cobbly deposition in that area which caused the channel to lose definition and its flows to disperse. Some of this dispersed flow finds its way back into the channel, but some of it also seeps directly downslope. We believe this to be an alteration from the previous situation, prior to the high-flow event. Our design is intended to restore the more normal and historic situation while still maintaining downslope wetland hydrology.

Bellevue's LUC 20.25H.105 includes specific mitigation and monitoring provisions for mitigation plans designed to mitigate impacts to wetlands and wetland critical area buffers. These provisions have been addressed in the Critical Areas Report in the context of the overall Project's proposed approach to mitigation for wetland impact (wetland conversion, poles in wetlands etc.). The stream realignment project is part of this proposed mitigation strategy for Energize Eastside and is itself considered self-mitigating in terms of wetland impact. As discussed above, the stream realignment proposal will not result in impacts to wetland function, and therefore additional mitigation is not necessary.

While the overall Energize Eastside project is an allowed use in critical areas (new or expanded utility facility), per LUC 20.25H.080.B, modification of a stream channel may be approved only through a Critical Areas Report. Therefore, the submitted Critical Areas Report includes discussion of Critical Areas Report submittal requirements (LUC 20.25H.250) and decision criteria (LUC 20.25H.255). LUC 20.25H.110 consists of additional critical areas report provisions for projects which propose wetland impact through a critical areas report. While the stream realignment proposal will not result in net impacts to wetland function, some wetland modifications are proposed. Therefore, the criteria of LUC 20.25.H.110 are addressed below, as they relate to the stream realignment project.

A. Limitation on Modification.

A critical areas report may not be used to fill a wetland critical area, except where filling is required to allow a use set forth in LUC 20.25H.055.

Response: Existing wetland area will be converted to stream channel, and a comparable area of existing stream channel will transition to wetland. This will be accomplished in a manner that will result in materially improved habitat function for both the stream and wetland. The project is proposed both as a flood protection project and habitat restoration project. Per LUC 20.25H.055 Public flood protection measures and habitat improvement projects are both allowed uses, subject to certain performance standards.

Listed performance standards which must be met for habitat improvement projects include LUC 25.25H.055.C.3.j and LUC 20.25H.100:

> *25.25H.055.C.3.j Habitat Improvement Projects.*
>
> *Disturbance, clearing and grading are allowed in the critical area or critical area buffer for habitat improvement projects demonstrating an improvement to functions and values of a critical area or critical area buffer. Habitat improvement projects shall be:*
>
> *i. Sponsored or cosponsored by a public agency or federally recognized tribe and whose primary function is habitat restoration; or*
>
> *ii. Approved by the Director pursuant to LUC 20.25H.230*

Public agencies, including the City of Bellevue, WDFW and the Muckleshoot and Snoqualmie Tribes have been involved in early coordination on the stream restoration project and have been generally supportive of it. Approval is sought by the Director pursuant to LUC 20.25H.230.

20.25H.100 Performance standards

Development on sites with a wetland or wetland critical area buffer shall incorporate the following performance standards in design of the development, as applicable:

A. Lights shall be directed away from the wetland.

B. Activity that generates noise such as parking lots, generators, and residential uses, shall be located away from the wetland, or any noise shall be minimized through use of design and insulation techniques.

C. Toxic runoff from new impervious area shall be routed away from the wetlands.

D. Treated water may be allowed to enter the wetland critical area buffer.

E. The outer edge of the wetland critical area buffer shall be planted with dense vegetation to limit pet or human use.

F. Use of pesticides, insecticides and fertilizers within 150 feet of the edge of the stream buffer shall be in accordance with the City of Bellevue's "Environmental Best Management Practices," now or as hereafter amended.

All performance standards will be met. See Critical Areas Report Section 9.3 for a discussion of 20.25H.100.

B. Additional Content.

In addition to the general requirements of LUC 20.25H.230, a critical areas report for wetlands shall include a written assessment and accompanying maps of the wetlands and buffers within 300 feet of the project area, including the following information at a minimum:

1. A discussion of measures, including avoidance, minimization, and mitigation, proposed to preserve existing wetlands and restore any wetlands that were degraded prior to the current proposed land use activity.

2. A habitat and native vegetation conservation strategy that addresses methods to protect and enhance on-site habitat and wetland functions.

3. Functional evaluation for the wetland and adjacent buffer using a local or state agency staff-recognized method and including the reference of the method and all data sheets.

Response: As discussed above, the stream realignment project is designed to enhance functions for both the stream and wetland areas present. Some existing wetland area will be converted to stream channel, and a comparable area of existing stream channel will transition to wetland. Additional existing wetland area will be enhanced through invasive species removal and native vegetation planting. Wetlands A and D have been delineated and rated using City-approved methodology (Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Washington Mountains, Valleys, and Coast Region, Version 2.0; and the 2004 Washington State wetland rating system for western Washington –Revised), as documented in the City of Bellevue Critical Areas Delineation Report: Puget Sound Energy – Energize Eastside Project (The Watershed Company 2016) and the CAR.

Proposed plans show disturbance and mitigation offsite and outside of PSE property and easement. Confirm PSE has an easement right or is in conversation with adjacent property owner to establish the proposed mitigation.

Watershed Response: PSE is currently in the process of obtaining an easement from King County to establish the proposed off-site mitigation.

ESA Information Request

We are reviewing the functional lift analysis in the Critical Areas Report to assist the City of Bellevue with their staff report. Would you please fill out the attached spreadsheet to aid our biologists in better understanding the specific impact areas and how net impacts have been derived (see the first tab in the attached spreadsheet), as well as how some of the mitigation elements result in a trade-off between stream and wetland functions (see the second tab in the spreadsheet)?

Watershed Response: See previous comment responses. Two additional tables (Table 1 and Table 2, below) are provided to detail overall project impacts on wetland, stream, and associated buffer critical areas, and proposed restoration activities by sub-basin in South Bellevue, based on the 2017 CAIA. The activities which generate the impact numbers provided in the tables are discussed in Table 14 of the CAR (Functional Lift Analysis).

Table 1. Comprehensive table of activities affecting wetland and stream critical areas in South Bellevue - Richards Creek Basin[1].

IMPACTS					
Critical Area Name	**Category**	**Type of Activity**	**Quantity (SF)**	**Mitigation Ratio**	**Mitigation Required (SF)**
Wetland A (Richards)	III	Conversion	9,945	2:1	19,890
Wetland A (Richards)	III	Permanent	397	4:1	1,588
Wetland B (Richards)	III	Permanent	2,060	4:1	8,240
Wetland D (Richards)	II	Conversion	100	3:1	300
Wetland D (Richards)	II	Permanent	41	6:1	246
Wetland H (Richards)	III	Conversion	73	2:1	146
Wetland H (Richards)	III	Permanent	77	4:1	308
Combined Buffers	N/A	Permanent	23,893	1:1	23,893
Combined Buffers	N/A	Conversion	22,886	0.5:1	11,443
Combined Buffers	N/A	Redevelopment[2]	47,512[2]	N/A[2]	0[2]

RESTORATION			
Critical Area Name	**Category**	**Type of Activity**	**Quantity (SF)**
Stream C	N/A	Restoration (Realignment)[3]	3,557
Wetland A	III	Rehabilitation	30,718
Combined Buffers	N/A	Restoration	35,336

IMPACT & RESTORATION SUMMARY					
				Mitigation Proposed	
Critical Area Type	**Type of Activity**	**Quantity (SF)**	**Total Mitigation Required (SF)**	**Type**	**Quantity (SF)**
Wetland	Conversion	10,118	30,718	Wetland rehabilitation	30,718
	Permanent	2,575		Stream enhancement	3,557
Buffer	Conversion	22,886	35,336	Buffer enhancement	35,336
	Permanent	23,893			
	Redevelopment[2]	47,512[2]			

1. Only activities resulting in a long-term change are included. Temporary impacts will be restored in place and are not shown in this table.
2. This buffer area is already developed and is considered non-functioning; therefore, no mitigation is required.
3. Existing stream channel will be abandoned (not filled) with stream restoration/realignment activities.

Table 2. Comprehensive table of activities affecting wetland and stream critical areas in South Bellevue - Coal Creek Basin[1].

IMPACTS					
Critical Area Name	**Category**	**Type of Activity**	**Quantity (SF)**	**Mitigation Ratio**	**Mitigation Required (SF)**
Wetland MB01	III	Conversion	1,146	2:1	2,292
Combined Buffers	N/A	Permanent	35	1:1	35
Combined Buffers	N/A	Conversion	7,734	0.5:1	3,867

IMPACT SUMMARY					
Critical Area Type	**Type of Activity**	**Quantity (SF)**	**Total Mitigation Required (SF)**	**Mitigation Proposed**	
				Type	**Quantity (SF)**
Wetland	Conversion	1,146	2,292	Wetland rehabilitation	2,300
	Permanent	0			
Buffer	Conversion	7,734	3,902	Buffer enhancement	3,950
	Permanent	35			

1. Only activities resulting in a long-term change are included. Temporary impacts will be restored in place and are not shown in this table.

PUGET SOUND ENERGY
The Energy To Do Great Things

Puget Sound Energy
P.O. Box 97034
Bellevue, WA 98009-9734

PSE.com

September 21, 2018

Heidi Bedwell, Environmental Planning Manager
City of Bellevue
450 110th Avenue NE
Bellevue, WA 98004

RE: South Bellevue Segment Energize Eastside – Response to Technical Review Letter, Part 1
Conditional Use (File# 17-120556-LB)
Critical Areas Land Use Permit (File #17-120557-LO)

Dear Ms. Bedwell:

Puget Sound Energy, Inc. (PSE) provides the following responses to the City of Bellevue's (City's) August 14th, 2018, letter requesting additional information on the above referenced permit applications. The responses follow the order in which they are presented in the City's letter.

Land Use Review Comments

Map Book: The map books have been repaginated to better facilitate review. These are included with this submittal.

Substation Site Plan: The existing conditions site plan for the Richards Creek substation (Drawing D-18160, Sheet 1) has been updated with the critical areas information and is included with this submittal. An update to the Critical Areas report that captures the areas of impact at Richards Creek will be submitted under separate cover.

Load Forecast: Please see the attached memorandum on this topic.

1. What was the actual peak Eastside customer demand for the summer of 2017? Please indicate what the [summer] peak load period was and express the peak in terms of hourly demand. Please clarify what is considered the Eastside in this context.

PSE does not track Eastside actual load data in real time as part of its regular operations. PSE does track the system peak. The 2017 system summer peak exceeded PSE's forecasted 2018 summer normalized system peak used in the Eastside studies. This demonstrates that the forecasts that PSE used in its planning studies are accurate, although perhaps a bit conservative. Where previous analysis focused on the Eastside as a part of the existing system, PSE undertook specific complex engineering analysis for those purposes. However, PSE uses forecasting, not past actuals, to ensure that the existing transmission system meets regulatory criteria. As stated in the report prepared for Bellevue by Utility Systems Efficiencies, Inc. (2015): "Several hypothetical scenarios were studied as part of the Optional Technical Analysis (OTA). Each one showed overloads in the 2017/18 timeframe, indicating project need in order for PSE to meet federal regulatory requirements for system reliability."

PSE's system planning studies that comply with federal planning standards (NERC TPL-01-004) used peak area forecasting as an input for the studies, which demonstrated that there are transmission system deficiencies (violations) that must be addressed. The magnitude or duration of the violation is used as input to develop an appropriate solution to address the violation.

Energize Eastside utilized the federal planning standard (NERC TPL-01-004) requirements in developing solutions to resolve the deficiencies identified in PSE's planning. The impacted area is generally the east side of Lake Washington (as generally shown on Figure 2-1 of the *Puget Sound Energy, Energize Eastside Outage Cost Study* (Nexant 2015).

2. Does PSE have any data on what drove higher electrical consumption in 2017 and/or whether the rate of growth assumed in the needs analysis for Energize Eastside is likely to remain the same or to change, either higher or lower?

PSE does not have specific data related to consumption sources. Additionally, general consumption (a person's use of energy over a period of time) is not a factor that is used to meet federal planning standards (i.e. what is needed to meet peak demand under various contingencies). Based on PSE's forecasts, peak loads are expected to continue to increase over the 20 year planning horizon.

3. During the 2017 peak load period, what was the flow, if any, across the Northern Intertie?

Operationally, there are always power flows across the Northern Intertie. Typically, the power flows from north to south during the summer and south to north in the winter. This topic was addressed in the report prepared for Bellevue by Utility Systems Efficiencies, Inc. (2015):

"The Optional Technical Analysis examined this issue by reducing the Northern Intertie flow to zero (no transfers to Canada). Although this scenario is not actually possible due to extant treaties, it was modeled to provide data on the drivers for the EE project, to examine if regional requirements might be driving the need. The results showed that in winter 2017/18, even with the Northern Intertie adjusted to zero flow, the Talbot Hill 230/115 kV transformer #2 would still be overloaded by several contingencies (several different outage scenarios). Again, the projected overloads indicate a project need at the local level to meet reliability regulations."

4. During the 2017 peak load period, what was the output of PSE's power plants in the northern part of the Puget Sound Region?

During the 2017 summer peak load, various PSE generation sources were operating; however, whether or not generation was turned on is relevant to operational parameters and not federal planning standards. Federal planning standards are used to determine the need for the Energize Eastside project. In addition, as stated in the report prepared for Bellevue by Utility Systems Efficiencies, Inc. (2015):

"Several hypothetical scenarios were studied as part of the Optional Technical Analysis (OTA). Each one showed overloads in the 2017/18 timeframe, indicating project need in order for PSE to meet federal

regulatory requirements for system reliability. The OTA results showed that reducing the Eastside area growth from 2.4% to 1.5% per year in the period from winter 2013/14 to winter 2017/18 still resulted in project need. Reducing PSE's King County growth while keeping the Eastside growth the same similarly resulted in a project need. Turning on additional generation in the Puget Sound area also resulted in a project need." Therefore, area generation being turned on or off does not change the need for Energize Eastside.

5. Was there a correspondingly higher rate of growth in the winter peak customer demand in winter 2017-2018?

Federal planning criteria do not differentiate between summer and winter peaks. The transmission system is planned to address overload scenarios during a variety of contingencies regardless of the time of year.

Alternative Pole Height-Somerset Neighborhood: The six separate requests under this topic are addressed below.

1. Feasibility: While it may be feasible to reduce the heights of the poles through this area (poles 7/3 through 8/2), trade-offs and obstacles must be considered. The electrical and magnetic fields ("EMF") levels and the potential for interaction with the pipeline would increase with any reduction in pole height, and there would be significantly more poles. However, by balancing the span lengths and maintaining safety clearances, preliminary analysis indicates that pole heights could, on average, be reduced by around 16 feet. Under this configuration, the number of poles would more than double and poles would have to be sited on properties that currently do not have poles. Additional access to new properties would need to be developed and assessed for feasibility. The quantity of excavation would also more than double due to the increased number of poles. For illustrative purposes, please see the attached revised photo simulations for KOP Central 18 and KOP Central 39. These show the Conceptual Project (*i.e.,* CUP Application) and the City's Alternative.

2. EMF Levels: As stated in the EMF report (Power Engineers, March 2017), "[r]aising phase conductors higher allows more room for EMF to decrease in value at the measured height of one meter from the ground." PSE worked with Power Engineers to develop an alternative pole layout in the Somerset area using approximately twice the number of poles (C-16 structure type) in order to reduce the overall height. While this approach reduces the average pole height by around 16 feet, the corresponding calculated EMF levels would increase with any pole height reduction. Using the reduced C-16 pole height scenario, the number of poles in the Somerset area would increase from 18 to 42. The calculated maximum EMF would increase approximately 5.5 times (for both electric and magnetic fields) when compared to the existing design (C-16).

Hypothetically, if C-17 pole structures were used throughout the Somerset area (rather than at some limited, specific locations under the existing design), the calculated maximum electric and magnetic fields would increase by approximately 7 and 10 times, respectively.

Additionally, the "[e]lectromagnetic induction is the primary effect of the HVAC transmission line on the buried pipeline during normal (steady state) operation" per the DNV-GL study. Since the EMF levels increase with the shorter poles, so does the potential interaction with collocated pipeline(s). With the shorter pole heights, the source of the EMF (the phase wires in this case) is brought closer to the ground level, thereby decreasing the separation distance between the phase wires and the pipeline. The strength of the EMF decreases with greater distance from the source. Thus, in the existing corridor, with the pole heights comprising the largest component of this separation distance, decreasing the pole heights and the corresponding separation distance between the pipeline and transmission line phase wires would act to increase the induced AC potential on the co-located pipeline segments.

3. Vegetation Impacts: Additional trees would be expected to be removed if pole heights are decreased. Although the lowest conductor sag point would not change, the addition of poles and associated access and construction areas would have more impacts on the ground. With fewer taller poles, the conductors are installed with more sag (*i.e.,* they curve more), so the conductor attachment points at the poles are farther from the ground, which, in turn, allows for taller vegetation to be located near the poles.

4. Pole Diameter: The difference in pole diameter between the existing design and the shortened C-16 configuration would be nominal as the general taper of the poles is low. It would be expected that the diameter of the shorter poles would generally be reduced by only a few inches.

5. C-17 Structure Type: The C-17 pole type allows for lower overall pole heights; however, they were designed to specifically facilitate crossing under the Seattle City Light 230 kV transmission lines in Renton. The C-17 design changes the conductor arrangement from a delta configuration to a flat or horizontal arrangement. Changing the wire configuration will also result in the following impacts: over double the number of poles as compared to the existing C-16 configuration; increased electric and magnetic fields (approximately 7 and 10 times, respectively) as cross-cancellation is significantly reduced when the wires are arranged horizontally; increased pipeline interaction; and increase vegetation removal.

6. Additional Parcel Impacts: In order to reduce pole height in the Somerset area, approximately 24 additional poles would be required, 17 of which would be on properties that do not currently have poles. Conceptual pole locations that could be used to facilitate the shorter pole design are depicted on figures 1 through 4. It is important to note that access to the new pole locations has not been assessed nor designed.

Tree Removal and Vegetation Management: Information related to tree removal and vegetation management will be submitted under separate cover.

Reconfiguration of 115kV lines around Richards Creek substation: The Lakeside substation is PSE's primary 115 kV switching station on the Eastside. Electricity is supplied to the station from the Sammamish and Talbot Hill substations along the two existing Sammamish-Lakeside-Talbot Hill 115 kV

transmission lines, which form the "backbone" of the Eastside electric system. There are thirteen 115 kV transmission lines that originate at the Lakeside substation and connect with as many distribution substations in the Eastside area. As a result of the number of transmission lines in and out of the Lakeside substation and the boundaries of PSE's property and easements, it is necessary to re-locate and re-configure many of these transmission lines to accommodate the Energize Eastside project. The relocated lines are primarily located south of the Lakeside substation and west and south of the proposed Richard's Creek substation. The specific 115 kV line work south of the Lakeside substation, which is part of the South Segment CUP, is described below and is depicted on Appendix C (Substation Site Plan) within the Map Book.

Shuffleton-Lakeside 115 kV Line: To accommodate the required wire clearance between the upgraded 230kV Talbot Hill-Richards Creek line and the existing Shuffleton-Lakeside line, the Shuffleton-Lakeside line moves to the west. The relocated Shuffleton-Lakeside line will be strung on new steel poles between the Lakeside substation and the southern boundary of the Richards Creek substation yard. At Talbot Hill-Richards Creek 230 kV #2 pole 8/10 (western circuit) near the King County Transfer Station, the Shuffleton-Lakeside 115 kV and the Talbot Hill-Richards Creek 230 kV #2 (western circuit) line will share a steel double circuit pole, with the Shuffleton-Lakeside line turning 70 degrees and continuing to the west at pole 8/5.

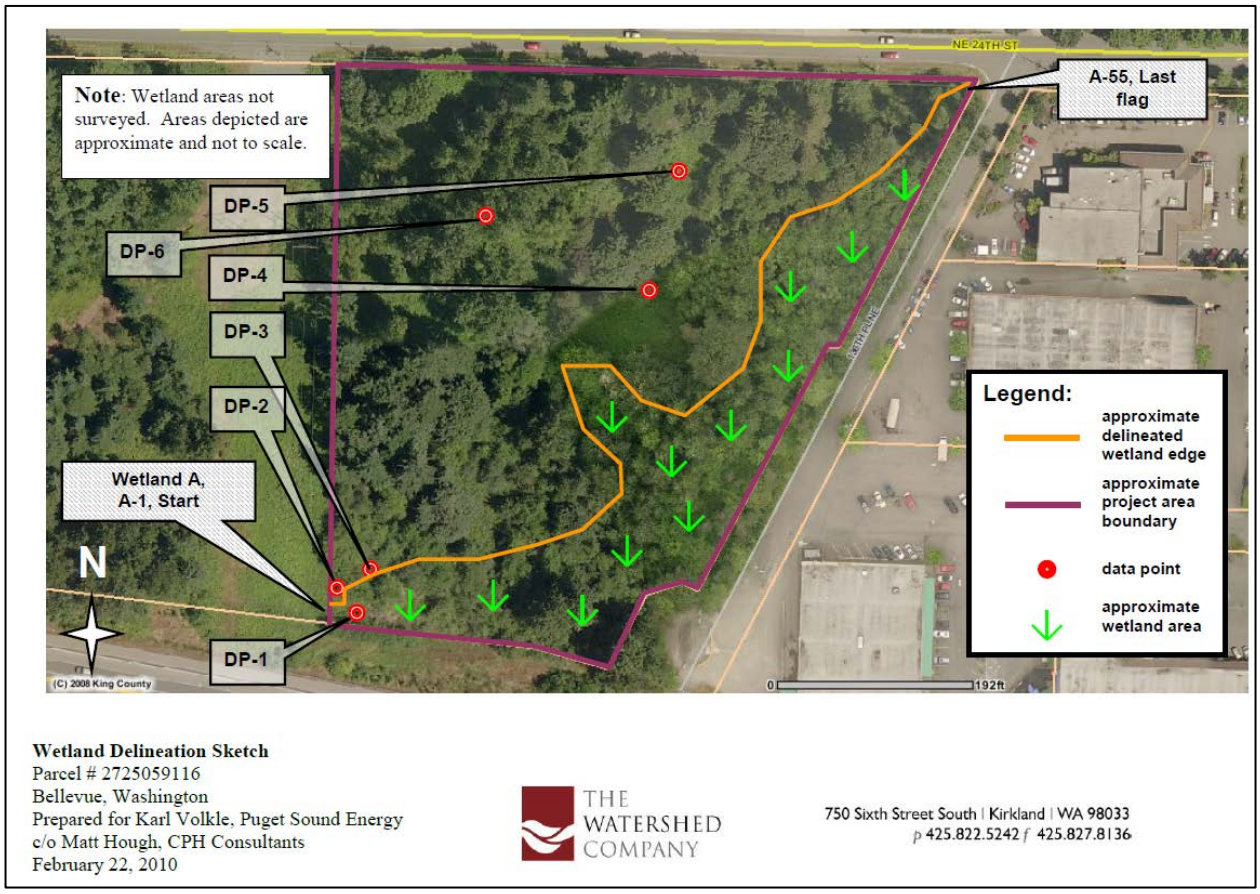
Lakeside-Goodes Corner 115kV Line: In the vicinity of the Lakeside and new Richards Creek substations, the Lakeside-Goodes Corner line is currently on double circuit structures with the existing Talbot Hill-Lakeside #1 line (which will be upgraded to 230 kV). When the existing Talbot Hill-Lakeside #1 and #2 115 kV lines are upgraded to 230 kV as part of the Energize Eastside project, they will be attached to the south side of the new Richards Creek substation; therefore the Lakeside-Goodes Corner line will require new poles to support it. Starting at Lakeside Substation the Lakeside-Goodes Corner line will be moved to the east on steel poles (similar to the C-17 pole type) and cross under both the Richards Creek-Lakeside 115 kV line and the Sammamish-Richards Creek 230 kV #2 line (west circuit). As the Lakeside-Goodes Corner line travels south, it will be relocated west of its existing location for the length of the Richards Creek substation. At the southern limit of the Richards Creek substation, the Lakeside-Goodes Corner line will turn to the southeast for one span and cross under the Sammamish-Richards Creek 230 kV #2 line and the Talbot Hill-Richards Creek 230 kV #1 and #2 lines before proceeding due south. Between poles 8/10 and 9/1 on the Talbot Hill-Richards Creek 230 kV #1 line a new wood pole will be installed for the Lakeside-Goodes Corner line to facilitate keeping it within the existing easement. From this point, the Lakeside-Goodes Corner line will be co-located with the Talbot Hill-Richards Creek 230 kV #1 line on poles 8/9 and 8/10. As the Lakeside-Goodes Corner line continues south it crosses I-90, where it makes a 90 degree turn to the east. At the 90 degree turn south of I-90, this line will be placed on a new steel pole located east of Talbot Hill-Richards Creek 230 kV #1 line, pole 8/8 (eastern circuit).

Richards Creek-Lakeside 115 kV Line: The Richards Creek-Lakeside line is a new short line between the new Richards Creek substation and the Lakeside substation. The Richards Creek-Lakeside line requires two new steel poles (structures 115-1 and 115-2) and is three spans in length. Pole 115-1 will be a double circuit pole with both the Richards Creek-Lakeside 115 kV line and the Sammamish-Richards Creek 230 kV #1 line.

Public Comment: PSE will provide responses to the public comments under separate cover.

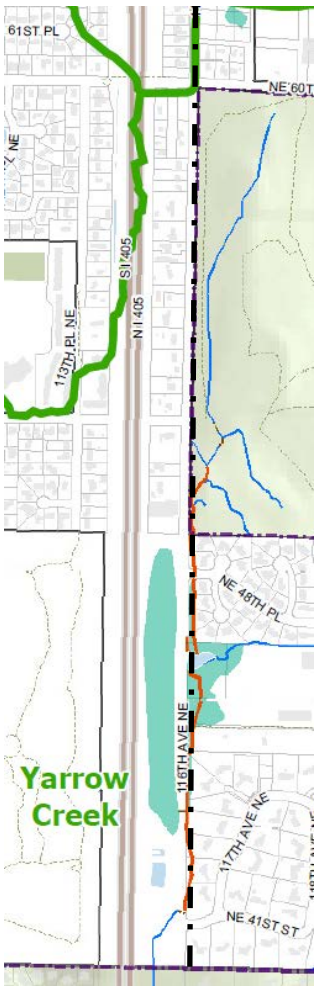
Critical Areas: During initial planning of Energize Eastside in 2014, three substation sites were identified and evaluated both by PSE and the Community Advisory Group. The substations sites were named Richards Creek (subject of CUP application), Westminster, and Vernell. These sites were chosen because they are all owned by PSE with the intent of using them for future substation sites (shown on Bellevue Comprehensive Plan Map UT-7). As part of the 2014 evaluation, Critical Areas were factors that were considered, specifically, wetlands, stream crossings, and steep slopes. Both the Richards Creek and Westminster sites are located along the existing SAM-LAK-TAL corridor (i.e., *Willow* route); however, the Vernell site would require the new 230 kV transmission lines to follow a different corridor (i.e., *Sycamore* route) between the Sammamish and Lakeside substations, as well as the installation of additional 115 kV lines between the Clyde Hill and Ardmore substations.

The critical areas associated with the Richards Creek substation site are included in the CUP and LO permit applications. The Westminster site would have used the same 230 kV transmission line corridor that connects the Sammamish substation to the Richards Creek substation (*Willow* route), and so would have similar impacts to those analyzed in the permit applications. The Westminster site, however, is undeveloped and is currently forested with known wetlands located along the eastern portion of the site (See figure below). The siting of a substation at this location would likely cause new impacts to critical areas.



A new 230 kV transmission line route (*Sycamore* route) would be required to connect the Vernell site to the Sammamish substation in Redmond. The Sycamore route was located west of the existing dual 115 kV transmission line corridor (*Willow* route) and is about 3 miles longer than the *Willow* route. A substantial portion of the Sammamish-Vernell 230 kV transmission line corridor would traverse through the city of Kirkland along 116th Avenue NE, which parallels the western extent of Bridle Trails State Park. In addition to the new 230 kV transmission line, in order to use the Vernell site, approximately 2.3 miles of new 115 kV transmission line would need to be constructed between the Vernell site and the Ardmore substation located at 15335 NE 24th Street in Redmond. Additionally, another mile of new 115 kV transmission line would be required to connect the Clyde Hill substation (2401 Bellevue Way NE, Bellevue) to the Vernell site. The Vernell site was removed from further consideration in 2014 because it was not recommended for additional study by the Community Advisory Group. Therefore, specific critical areas information related to the 230 kV line, Vernell site, and appurtenant 115 kV transmission lines corridors was not collected.

The GIS-based data that was collected for the Community Advisory Group process can be used to make a relative comparison between the *Willow* (Richards Creek and Westminster) and *Sycamore* (Vernell) routes. In general, the *Sycamore* route would cross approximately nine more wetlands, four fewer streams, and four more geologic faults than the Willow route. Also, using the CAG GIS data, it is estimated that approximately 1,300 more trees would be subject to removal with the Sycamore route. Most of these trees would be along the western extent of Bridle Trails State Park and 116th Avenue NE, where a number of streams (including known salmonid locations) and wetlands have been identified on Kirkland's Sensitive Areas map (2018).



Clearing and Grading – Geotechnical Considerations

Please see the attached memorandum from GeoEngineers dated September 14, 2018.

Transportation

1) The City's understanding of the Richards Creek substation operation is correct. When complete, the substation will not have full-time employees; therefore, trip generating patterns or characteristics will not occur. Trips to the site related to inspections and maintenance will occur. As stated in the EIS, "A small number of vehicle trips are expected to be generated when the completed substation is operational." This typically equates to around one round trip vehicle trip per month during standard operation conditions. Additionally, the Richards Creek substation is located adjacent to PSE's Lakeside substation; therefore, the length of the trips to either substation can be minimized.

2) The additional details that have been requested will be submitted as part of the Clear and Grade Permit application.

Right of Way Use Permit

PSE acknowledges that to work in the City ROW that a Right-of-Way Use Permit will be required. PSE or its contractor will apply for the permit separately.

Thank you for you effort in processing our application. Please let us know if additional clarification is needed.

Sincerely,

Brad Strauch
Senior Land Planner

GeoEngineers

Memorandum

17425 NE Union Hill Road, Suite 250, Redmond, Washington 98052 - Telephone: 425.861.6000, Fax: 425.861.6050 www.geoengineers.com

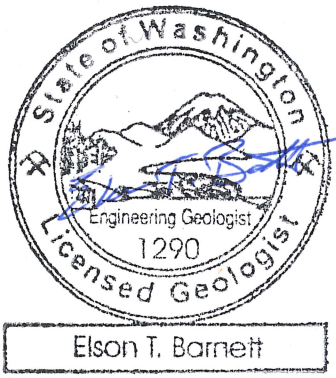
To: Kelly Purnell, Puget Sound Energy

From: Elson T. "Chip" Barnett, LG, LEG;
Timothy D. Bailey, PE
Andrew J. Caneday, LG, LEG

Date: September 14, 2018

File: 0186-871-07

Subject: Energize Eastside Bellevue and Richards Creek Substation: City of Bellevue Comment Response



INTRODUCTION

GeoEngineers, Inc. (GeoEngineers) has prepared this memorandum in response to a City of Bellevue (City) land use review comment related to the Critical Areas Report for the Richards Creeks Substation, dated July 11, 2017. The general location of the Richards Creek Substation is presented in Figure 1, Vicinity Map. Kelly Purnell of Puget Sound Energy (PSE) requested this memorandum during a phone conversation with Chip Barnett on August 16, 2018. This memorandum incorporates comments from Kerry Kriner of PSE received on September 6, 2018. The City provided the following land use review comment in a letter dated August 14, 2018:

> "Geotechnical Considerations
>
> Landslide Deposits
>
> The Washington State Department of Natural Resources (DNR) has completed a final draft of a map of landslide deposits in the City of Bellevue. A copy of the May 2018 final draft is attached. The map indicates landslide deposits in the area of the proposed Richards Creek Substation. The geotechnical report and addenda for the Richards Creek Substation do not mention landslide deposits in this area. Please have the geotechnical engineer review the DNR map and provide comments on the map and on potential impacts of landslide deposits on the proposed Richards Creek Substation."

COMMENT RESPONSE

We reviewed the draft DNR May 2018 landslide map of Bellevue provided by the City, as well as logs of borings completed in the area mapped as a landslide deposit. We also reviewed aerial imagery and Light Detection and Ranging (LiDAR) hillshade maps of the project area and conducted a reconnaissance of the site in December 2014 and in February 2017. The approximate locations of the borings and the limits of the DNR-mapped landslide in the vicinity of the Richards Creek Substation are presented in Figures 2 and 3.

Borings performed in the vicinity of the Richards Creek Substation suggest that the area is underlain by fill and recessional outwash overlying dense to very dense glacial till. We observed no evidence of landslide deposits in our borings and we observed no indication of landslide activity in the steep slope area on the LiDAR hillshade

(Figure 3) and during our site reconnaissance. Furthermore, it is our opinion that the area mapped as a landslide does not include geomorphic characteristics consistent with a landslide. Based on our review of the LiDAR data (Figure 3), the mapped area does not appear to be a landslide but rather cut and fill slopes associated with site development and roadways, including 139 Avenue SE that is east of the proposed PSE substation.

Based on our review of the available data, it is our opinion that the existing soils underlying the proposed Richards Creek Substation do not appear to be landslide deposits and the mapping performed by DNR is a general characterization of potential conditions within a broader area including the project site and does not represent the actual conditions at the project site.

We appreciate the opportunity to assist you on this project. Please contact us if you have any questions concerning this memorandum or our services.

Attachments:

Figure 1, Vicinity Map

Figure 2. Site Plan Aerial

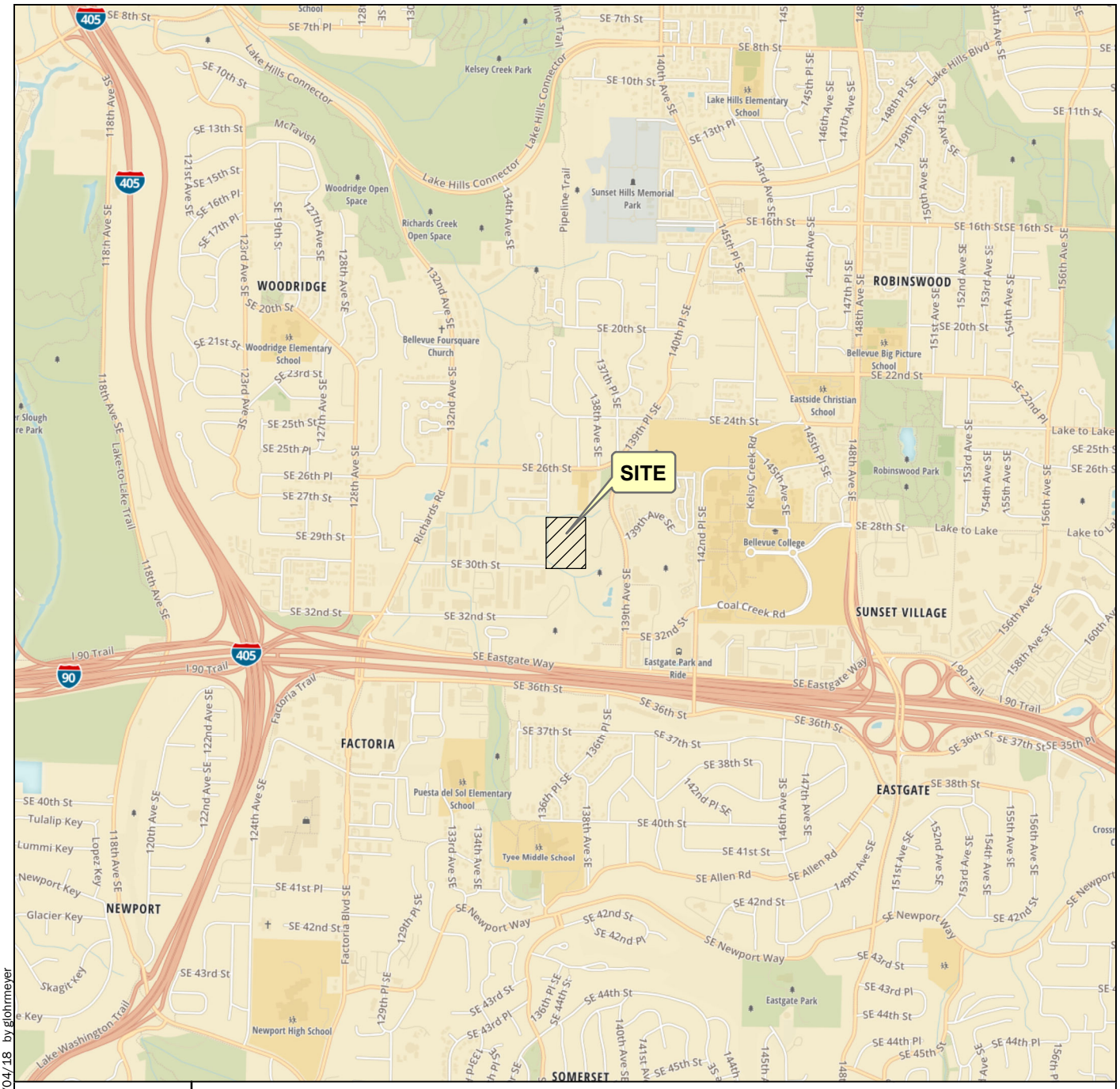
Figure 3. Site Plan Hillshade

Attachment A. Boring Logs

Attachment B. Previous Explorations

ETB:TDB:AJC:cam

Disclaimer: Any electronic form, facsimile or hard copy of the original document (email, text, table, and/or figure), if provided, and any attachments are only a copy of the original document. The original document is stored by GeoEngineers, Inc. and will serve as the official document of record.



Notes:

1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Data Source: Mapbox Open Street Map, 2016

Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet

Vicinity Map

PSE Energize Eastside Comment Response
Bellevue, Washington

GeoEngineers

Figure 1

P:\0\0186871\GIS\MXD\0186871107_F01_VicinityMap.mxd Date Exported: 09/04/18 by glohrmeyer

DSD 001159

Notes:

1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Data Source: Landslide boundary digitized from City of Bellevue "Landslide Deposits in the City of Bellevue DNR Final Draft - May 2018

Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet

B-1 B-2 J1, G2-1 TP-2 TP-3 HH-1

B-1 — Boring completed with monitoring well by Geoengineers (2014)

B-3 — Boring completed by GeoEngineers (2014)

J2, G2-1 — Boring completed with monitoring well by Geoengineers (2015) for the Energize Eastside Project

TP-1 — Test pit completed by Converse Consultants (1984)

HH-1 — Hand exploration completed by Converse Consultants (1984)

Energize Eastside Right-of-Way

City of Bellevue mapped landslide

N W E S

150 0 150

Feet

Site Plan - Aerial

PSE Energize Eastside Comment Response
Bellevue, Washington

GeoEngineers

Figure 2

P:\001\86871\GIS\MXD\086871107_F02_SitePlan-Aerial.mxd Date Exported: 09/14/18 by glohmeyer

DSD 001160

Notes:

1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

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HH-1 Hand exploration completed by Converse Consultants (1984)

Energize Eastside Right-of-Way

City of Bellevue mapped landslide

N W E S

150 0 150

Feet

Site Plan - Hillshade

PSE Energize Eastside Comment Response
Bellevue, Washington

GeoEngineers

Figure 3

P:\0\018687\1\GIS\MXD\018687107_F03_SitePlan-Hillshade.mxd Date Exported: 09/14/18 by glohrmeyer

DSD 001161

ATTACHMENT A
Boring Logs

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS GRAPH	SYMBOLS LETTER	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES
				GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES
	MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
MORE THAN 50% RETAINED ON NO. 200 SIEVE	SAND AND SANDY SOILS	CLEAN SANDS (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS
				SP	POORLY-GRADED SANDS, GRAVELLY SAND
	MORE THAN 50% OF COARSE FRACTION PASSING NO. 4 SIEVE	SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND - SILT MIXTURES
				SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS, ROCK FLOUR, CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
MORE THAN 50% PASSING NO. 200 SIEVE	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS AND SILTS OF MEDIUM TO HIGH PLASTICITY
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: Multiple symbols are used to indicate borderline or dual soil classifications

ADDITIONAL MATERIAL SYMBOLS

SYMBOLS GRAPH	SYMBOLS LETTER	TYPICAL DESCRIPTIONS
	AC	Asphalt Concrete
	CC	Cement Concrete
	CR	Crushed Rock/ Quarry Spalls
	TS	Topsoil/ Forest Duff/Sod

Groundwater Contact

Measured groundwater level in exploration, well, or piezometer

Measured free product in well or piezometer

Graphic Log Contact

Distinct contact between soil strata

Approximate contact between soil strata

Material Description Contact

Contact between geologic units

Contact between soil of the same geologic unit

Sampler Symbol Descriptions

2.4-inch I.D. split barrel

Standard Penetration Test (SPT)

Shelby tube

Piston

Direct-Push

Bulk or grab

Continuous Coring

Blowcount is recorded for driven samplers as the number of blows required to advance sampler 12 inches (or distance noted). See exploration log for hammer weight and drop.

A "P" indicates sampler pushed using the weight of the drill rig.

A "WOH" indicates sampler pushed using the weight of the hammer.

Laboratory / Field Tests

%F	Percent fines
%G	Percent gravel
AL	Atterberg limits
CA	Chemical analysis
CP	Laboratory compaction test
CS	Consolidation test
DS	Direct shear
HA	Hydrometer analysis
MC	Moisture content
MD	Moisture content and dry density
OC	Organic content
PM	Permeability or hydraulic conductivity
PI	Plasticity index
PP	Pocket penetrometer
PPM	Parts per million
SA	Sieve analysis
TX	Triaxial compression
UC	Unconfined compression
VS	Vane shear

Sheen Classification

NS	No Visible Sheen
SS	Slight Sheen
MS	Moderate Sheen
HS	Heavy Sheen
NT	Not Tested

NOTE: The reader must refer to the discussion in the report text and the logs of explorations for a proper understanding of subsurface conditions. Descriptions on the logs apply only at the specific exploration locations and at the time the explorations were made; they are not warranted to be representative of subsurface conditions at other locations or times.

KEY TO EXPLORATION LOGS

GeoEngineers

FIGURE A-1

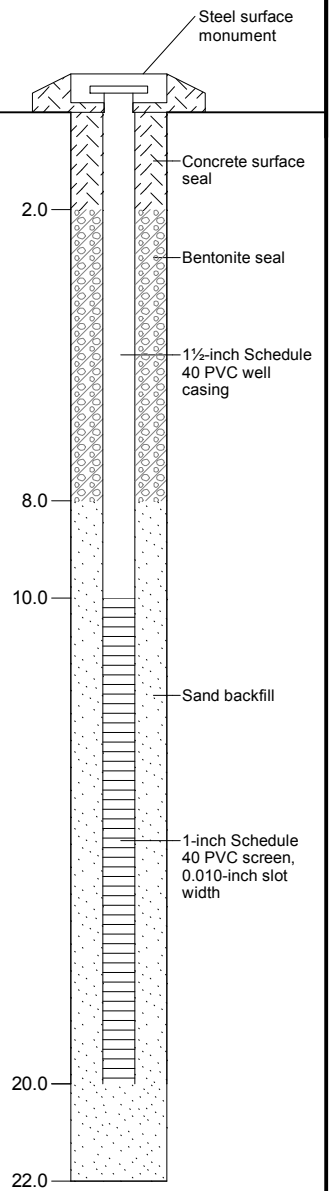
Drilled Start 12/17/2014	End 12/17/2014	Total Depth (ft) 36.5	Logged By APL / Checked By CEW	Driller Geologic Drill	Drilling Method Hollow-stem Auger

Hammer Data: Rope & Cathead, 140 (lbs) / 30 (in) Drop		Drilling Equipment: Deep Rock XL Trailer Rig	DOE Well I.D.: VIJ 5K3 A 2 (in) well was installed on 12/17/2014 to a depth of 22 (ft).
Surface Elevation (ft): 106.31 Vertical Datum: NAVD88		Top of Casing Elevation (ft):	Groundwater: Date Measured 12/17/2014; Depth to Water (ft) 3.8; Elevation (ft) 102.5
Easting (X): 1313609.001 Northing (Y): 215862.8174		Horizontal Datum: LiDAR	

Notes:

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	Blows/foot	Collected Sample: Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)
105	0						SM	Brown silty fine to coarse sand with gravel (dense, wet) (fill)		
		6	35	1 SA					11	22
					▼		SM	Brown silty fine to medium sand with occasional gravel (loose, moist to wet) (recessional outwash)		
100	5	2	5	2				(Groundwater encountered at approximately 5 feet during drilling)		
							SM	Brown to gray silty fine to medium sand (medium dense, wet)		
		3	18	3						
95	10	18	14	4				Becomes grayish brown		
	15	18	22	5 %F					13	16
90							SP-SM	Gray fine to medium sand with silt and occasional gravel (medium dense, wet)		
	20	18	23	6						
85	25									

WELL LOG



Note: Please see Figure A-1 for explanation of symbols

Log of Boring B-1

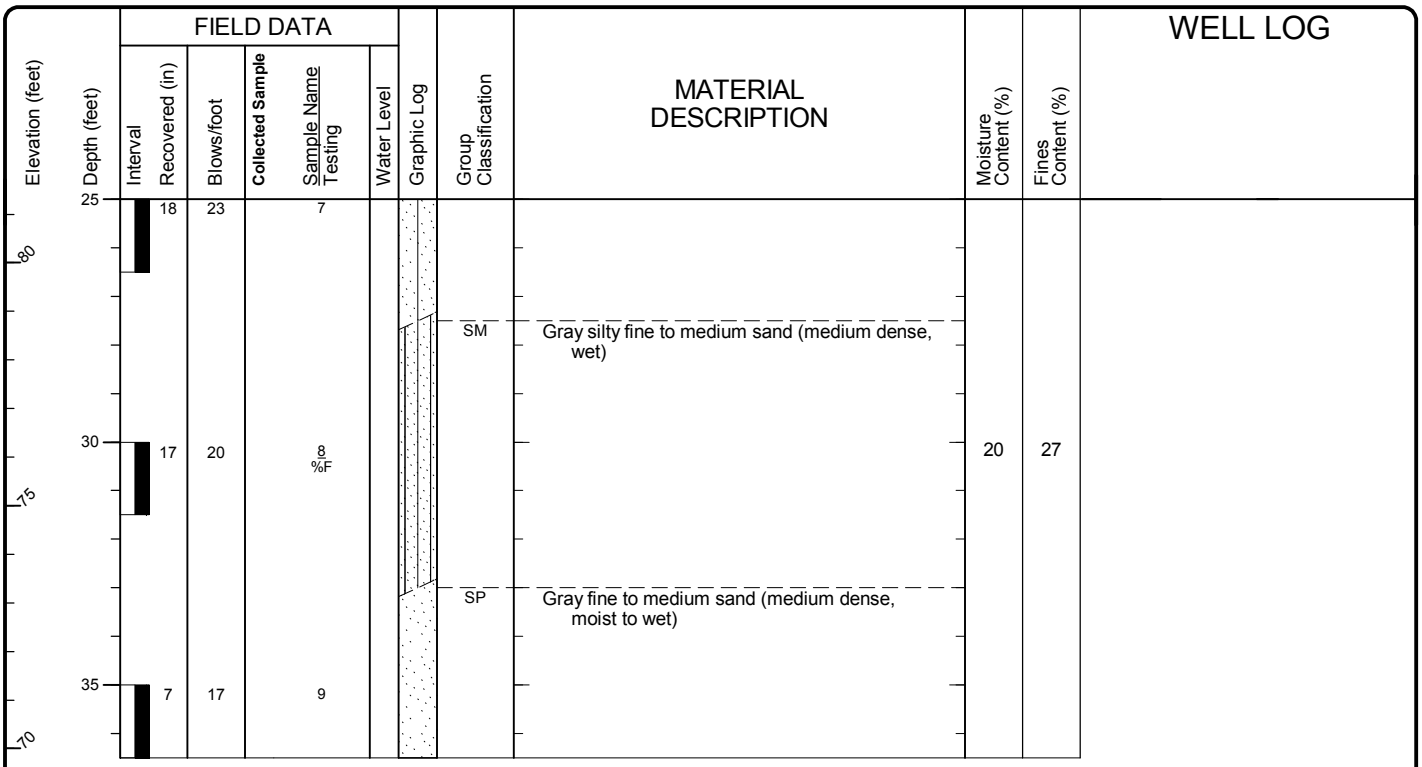
GeoEngineers

Project: Richards Creek Substation
Project Location: Bellevue, Washington
Project Number: 0186-922-01

Figure A-2
Sheet 1 of 2

DSD 001164

Seattle: Date:9/22/16 Path:W:\PROJECTS\0186922\GINT\0186922201.GPJ DBTemplate/LibTemplate:GEOENGINEERS_DF_STD_US.GDT/GEI8_GEOTECH_WELL_%F



Note: Please see Figure A-1 for explanation of symbols

Log of Boring B-1 (continued)

GeoEngineers

Project: Richards Creek Substation
Project Location: Bellevue, Washington
Project Number: 0186-922-01

Figure A-2
Sheet 2 of 2

DSD 001165

Seattle: Date:9/22/16 Path:W:\PROJECTS\0186922\GINT\0186922201.GPJ DBTemplate/LibTemplate:GEOENGINEERS_DF_STD_US.GDT/GEIB_GEOTECH_WELL_%F

Drilled Start 12/17/2014	End 12/17/2014	Total Depth (ft) 36.5	Logged By APL / Checked By CEW	Driller Geologic Drill	Drilling Method Hollow-stem Auger
Hammer Data: Rope & Cathead, 140 (lbs) / 30 (in) Drop			Drilling Equipment: Deep Rock XL Trailer Rig		
Surface Elevation (ft): 100.75	Vertical Datum: NAVD88		Top of Casing Elevation (ft):		
Easting (X): 1313467.444	Northing (Y): 216099.6631		Horizontal Datum: LiDAR		

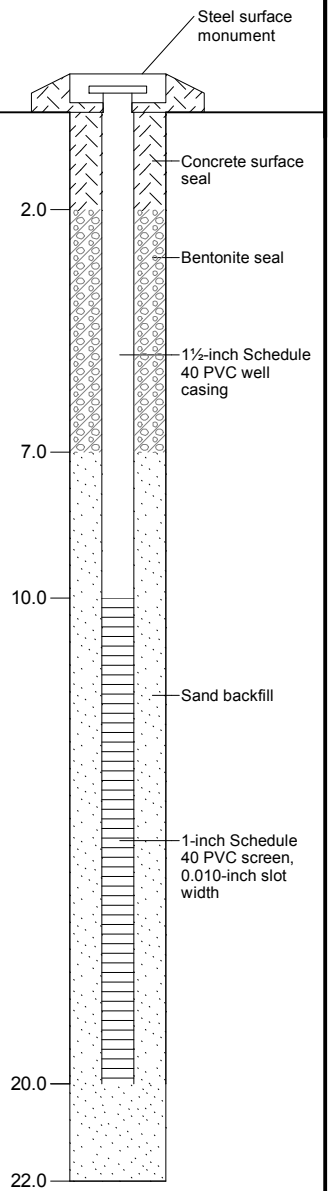
DOE Well I.D.: BIJ 584
A 2 (in) well was installed on 12/17/2014 to a depth of 22 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)
12/17/2014	7.4	93.4

Notes:

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	Blows/foot	Collected Sample / Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)
100	0						GP-GM	Brown fine to coarse gravel with silt and trace organics (loose, moist) (fill)		
		6	6	1						
							SM	Dark brown silty fine to medium sand (loose, moist) (fill)		
95	5	18	14	2 SA			GP-GM	Brown fine to coarse gravel with silt and sand (medium dense, moist) (fill)	8	6
		3	4	3	▼		SM	Brown silty fine to medium sand with occasional gravel (loose, wet) (recessional outwash)		
90	10	18	6	4 %F				(Groundwater encountered at approximately 10 feet during drilling)	26	15
							SM	Brown silty fine to medium sand with occasional gravel (medium dense, wet)		
85	15	18	53*	5				(*High blowcount due to gravel content)		
80	20	18	14	6						
							SP-SM	Brown fine to medium sand with silt and occasional gravel (medium dense, wet)		
	25									

WELL LOG



Note: Please see Figure A-1 for explanation of symbols

Log of Boring B-2

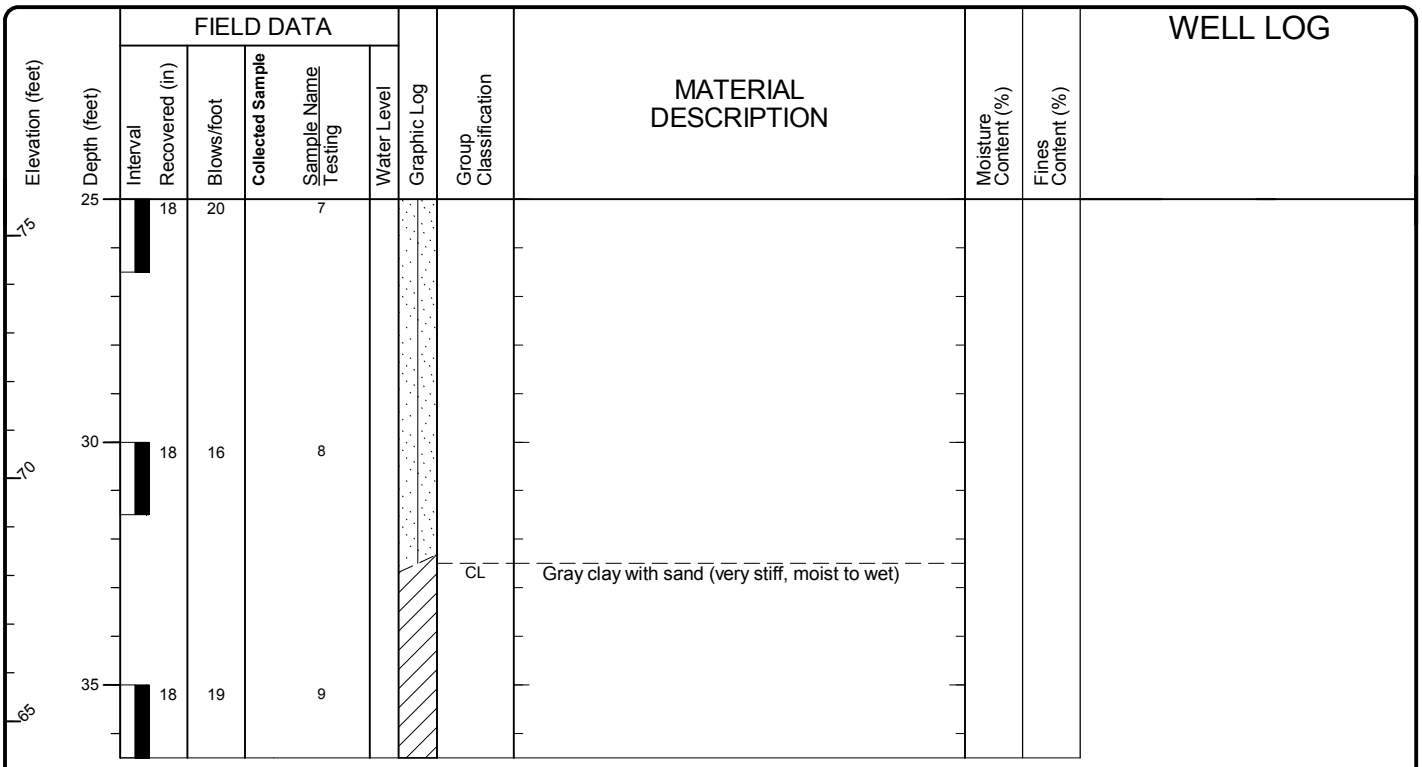
GeoEngineers

Project: Richards Creek Substation
Project Location: Bellevue, Washington
Project Number: 0186-922-01

Figure A-3
Sheet 1 of 2

DSD 001166

Seattle: Date:9/22/16 Path:W:\PROJECTS\0186922\GINT\0186922001.GPJ DBTemplate/LibTemplate:GEOENGINEERS_DF_STD_US.GDT/GEI8_GEOTECH_WELL_%F



Note: Please see Figure A-1 for explanation of symbols

Log of Boring B-2 (continued)

GeoEngineers

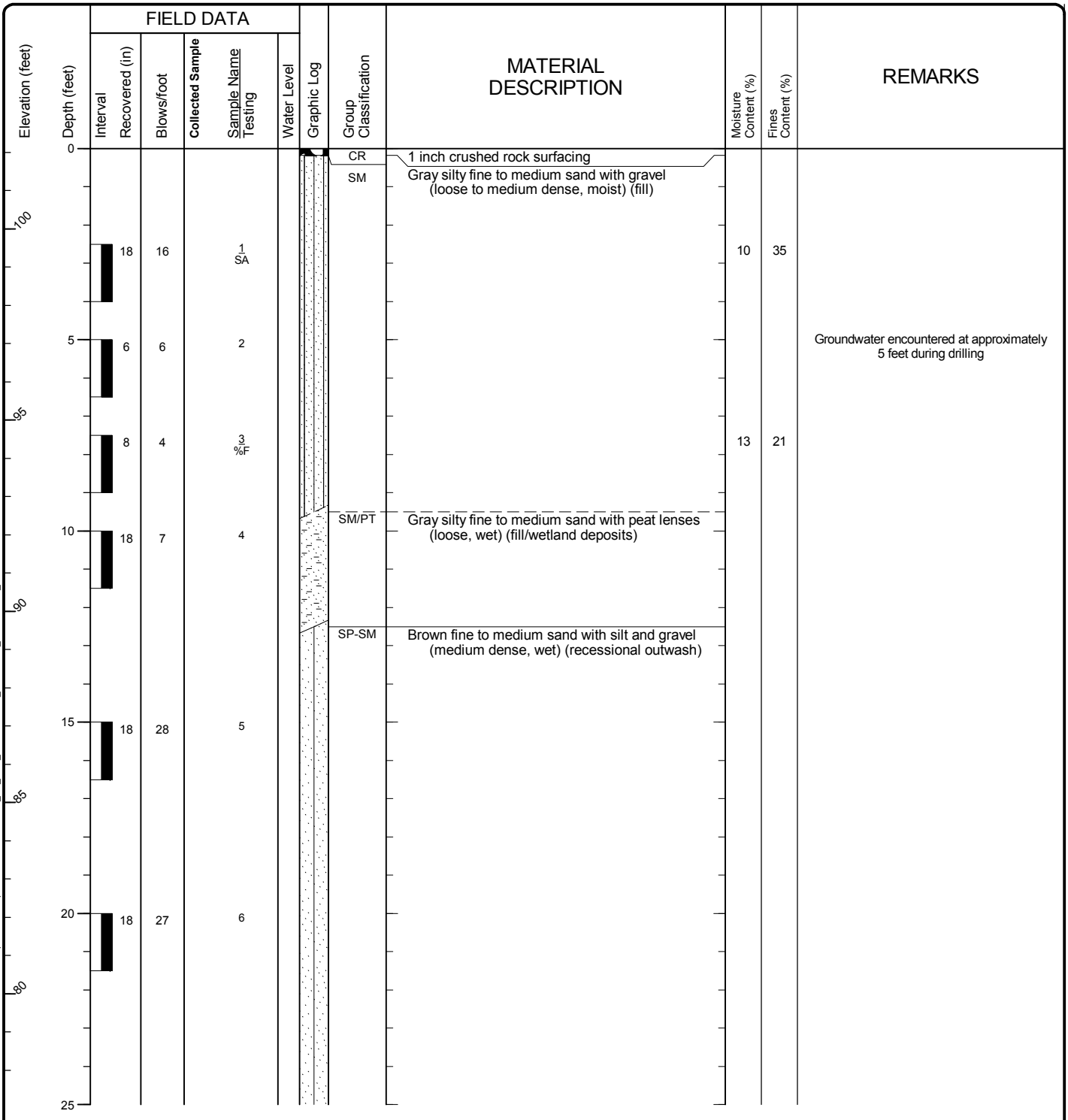
Project: Richards Creek Substation
Project Location: Bellevue, Washington
Project Number: 0186-922-01

Figure A-3
Sheet 2 of 2

DSD 001167

Seattle: Date:9/22/16 Path:W:\PROJECTS\0186922\GINT\0186922201.GPJ DBTemplate/LibTemplate:GEOENGINEERS_DF_STD_US.GDT/GEI8_GEOTECH_WELL_%F

Drilled	Start 12/17/2014	End 12/17/2014	Total Depth (ft) 36.5	Logged By APL / Checked By CEW	Driller Geologic Drill	Drilling Method Hollow-stem Auger
Surface Elevation (ft) 102.1 / Vertical Datum NAVD88			Hammer Data Rope & Cathead 140 (lbs) / 30 (in) Drop		Drilling Equipment Deep Rock XL Trailer Rig	
Easting (X) 1313487.143 / Northing (Y) 215949.8592			System Datum LiDAR		Groundwater: Date Measured / Depth to Water (ft) / Elevation (ft) — See Remarks	
Notes:						



Note: Please see Figure A-1 for explanation of symbols

Log of Boring B-3

GeoEngineers

Project: Richards Creek Substation
Project Location: Bellevue, Washington
Project Number: 0186-922-01

Figure A-4
Sheet 1 of 2

DSD 001168

Seattle: Date:9/22/16 Path:W:\PROJECTS\0186922\GINT\0186922201.GPJ DBTemplate/LibTemplate:GEOENGINEERS_DF_STD_US.GDT/GEIB_GEOTECH_STANDARD_%F

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	FIELD DATA: Blows/foot	FIELD DATA: Collected Sample / Sample Name Testing	FIELD DATA: Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
	25	18	17	7							
75											
	30	18	23	8							
70											
	35	18	14*	9							*Blowcount may not be representative due to heave

Note: Please see Figure A-1 for explanation of symbols

Log of Boring B-3 (continued)

GeoEngineers

Project: Richards Creek Substation
Project Location: Bellevue, Washington
Project Number: 0186-922-01

Figure A-4
Sheet 2 of 2

DSD 001169

Seattle: Date:9/22/16 Path:W:\PROJECTS\0186922\GINT\0186922201.GPJ DBTemplate/LibTemplate:GEOENGINEERS_DF_STD_US.GDT/GEI8_GEOTECH_STANDARD_%F

Drilled Start 12/17/2014 End 12/17/2014	Total Depth (ft) 16.5	Logged By APL Checked By CEW	Driller Geologic Drill	Drilling Method Hollow-stem Auger
Surface Elevation (ft) 87.06 Vertical Datum NAVD88		Hammer Data Rope & Cathead 140 (lbs) / 30 (in) Drop		Drilling Equipment Deep Rock XL Trailer Rig
Easting (X) 1313340.088 Northing (Y) 215816.0898		System Datum LiDAR		Groundwater Date Measured / Depth to Water (ft) / Elevation (ft): See Remarks
Notes:				

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	Blows/foot	Collected Sample / Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
	0						GP-GM	Brown fine to coarse gravel with silt, sand and trace organics (medium dense to dense, moist to wet) (fill)			
85		18	30	1 SA					8	16	
							SM	Brown silty fine to medium sand with gravel (medium dense, moist) (fill)			
	5	12	23	2				No recovery			
80		0	16	3			GP-GM	Gray fine to coarse gravel with silt and sand (medium dense, wet) (recessional outwash)			Groundwater encountered at approximately 7.5 feet during drilling
	10	18	24	4 %F					13	9	
75							SP-SM	Brown fine to medium sand with silt and gravel (medium dense to dense, wet)			
	15	18	32	5							

Note: Please see Figure A-1 for explanation of symbols

Log of Boring B-4

GeoEngineers

Project: Richards Creek Substation
Project Location: Bellevue, Washington
Project Number: 0186-922-01

Figure A-5
Sheet 1 of 1

DSD 001170

Seattle: Date:9/22/16 Path:W:\PROJECTS\0186922\GINT\0186922201.GPJ DBTemplate/LibTemplate:GEOENGINEERS_DF_STD_US.GDT/GEIB_GEOTECH_STANDARD_%F

Drilled Start 12/19/2014 End 12/19/2014	Total Depth (ft) 31.5	Logged By APL Checked By CEW	Driller Geologic Drill	Drilling Method Hollow-stem Auger
Surface Elevation (ft) 120.93 Vertical Datum NAVD88		Hammer Data Rope & Cathead 140 (lbs) / 30 (in) Drop		Drilling Equipment Track Mounted Drill Rig
Easting (X) 1313687.339 Northing (Y) 215790.4353		System Datum LiDAR		Groundwater Date Measured / Depth to Water (ft) / Elevation (ft): See Remarks
Notes:				

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	Blows/foot	Collected Sample: Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
120	0						SP	Brown gray fine to medium sand with silt and trace organics (medium dense, moist)			
		5	16	1							
115	5	7	16	2 %F			SP-SM	Brownish gray fine to medium sand with silt and gravel (medium dense to dense, moist) (recessional outwash)	3	7	
		13	31	3							
110	10	2	48*	4			GP-GM	Brown fine to coarse gravel with silt and sand (medium dense, wet)			Groundwater encountered at approximately 10 feet during drilling *Blowcount not representative due to gravel content
							SP-SM	Brown fine to medium sand with silt and occasional gravel (medium dense to dense, wet)			
105	15	18	22	5 %F					13	11	
100	20	18	25	6							
	25										

Note: Please see Figure A-1 for explanation of symbols

Log of Boring B-5

GeoEngineers

Project: Richards Creek Substation
Project Location: Bellevue, Washington
Project Number: 0186-922-01

Figure A-6
Sheet 1 of 2

DSD 001171

Seattle: Date:9/22/16 Path:W:\PROJECTS\0186922\GINT\0186922201.GPJ DBTemplate/LibTemplate:GEOENGINEERS_DF_STD_US.GDT/GEIB_GEOTECH_STANDARD_%F

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	FIELD DATA: Blows/foot	FIELD DATA: Collected Sample / Sample Name Testing	FIELD DATA: Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
-95	25	18	34	7							
							SM	Brown silty fine to medium sand (dense, wet) (glacial till)			
-90	30	18	38	8							

Note: Please see Figure A-1 for explanation of symbols

Log of Boring B-5 (continued)

GeoEngineers

Project: Richards Creek Substation
Project Location: Bellevue, Washington
Project Number: 0186-922-01

Figure A-6
Sheet 2 of 2

DSD 001172

Seattle: Date:9/22/16 Path:W:\PROJECTS\0186922\GINT\0186922201.GPJ DBTemplate/LibTemplate:GEOENGINEERS_DF_STD_US.GDT/GEI8_GEOTECH_STANDARD_%F

Drilled	Start 12/17/2014	End 12/17/2014	Total Depth (ft)	31.5	Logged By / Checked By	APL / CEW	Driller	Geologic Drill	Drilling Method	Hollow-stem Auger
Surface Elevation (ft) / Vertical Datum	124.23 / NAVD88		Hammer Data	Rope & Cathead 140 (lbs) / 30 (in) Drop			Drilling Equipment	Track Mounted Drill Rig		
Easting (X) / Northing (Y)	1313725.363 / 216013.5373		System Datum	LiDAR			Groundwater	Date Measured	Depth to Water (ft)	Elevation (ft)
Notes:								See Remarks		

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	Blows/foot	Collected Sample: Sample Name / Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
	0						SM	Brown silty fine to medium sand with trace organics (fine roots) (loose, moist to wet)			
120		15	7	1							
	5	6	7	2							Groundwater encountered at approximately 5 feet during drilling
		2	7	3			ML	Brown sandy silt (medium stiff, wet)			
115							SP-SM	Gray fine to medium sand with silt (medium dense, wet) (recessional outwash)			
	10	18	18	4							
							SM	Brown silty fine sand with occasional gravel (medium dense, wet)			
110	15	18	29	5 %F					18	39	
							SP-SM	Gray fine to medium sand with silt (medium dense, wet)			
105											
	20	18	24	6							
100	25										

Note: Please see Figure A-1 for explanation of symbols

Log of Boring B-6

GeoEngineers

Project: Richards Creek Substation
Project Location: Bellevue, Washington
Project Number: 0186-922-01

Figure A-7
Sheet 1 of 2

DSD 001173

Seattle: Date:9/22/16 Path:W:\PROJECTS\0186922\GINT\0186922201.GPJ DBTemplate/LibTemplate:GEOENGINEERS_DF_STD_US.GDT/GEIB_GEOTECH_STANDARD_%F

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	FIELD DATA: Blows/foot	FIELD DATA: Collected Sample / Sample Name Testing	FIELD DATA: Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
	25	18	23	7							
-95							SM	Gray silty fine to medium sand with gravel (very dense, moist to wet) (glacial till)			
	30	16	98/10"	8							

Note: Please see Figure A-1 for explanation of symbols

Log of Boring B-6 (continued)

GeoEngineers

Project: Richards Creek Substation
Project Location: Bellevue, Washington
Project Number: 0186-922-01

Figure A-7
Sheet 2 of 2

DSD 001174

Seattle: Date:9/22/16 Path:W:\PROJECTS\0186922\GINT\0186922201.GPJ DBTemplate/LibTemplate:GEOENGINEERS_DF_STD_US.GDT/GEI8_GEOTECH_STANDARD_%F

Drilled Start 12/19/2014 End 12/19/2014	Total Depth (ft) 21.5	Logged By APL Checked By CEW	Driller Geologic Drill	Drilling Method Hollow-stem Auger
Surface Elevation (ft) 109.8 Vertical Datum NAVD88		Hammer Data Rope & Cathead 140 (lbs) / 30 (in) Drop		Drilling Equipment Track Mounted Drill Rig
Easting (X) 1313639.237 Northing (Y) 216170.6708		System Datum LiDAR		Groundwater Date Measured / Depth to Water (ft) / Elevation (ft): See Remarks
Notes:				

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	Blows/foot	Collected Sample / Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
	0						SM	Brown silty fine to medium sand with gravel and trace organics (medium dense, moist to wet) (fill)			
105		8	15	1							
	5	13	29	2			SM	Brown silty fine to medium sand with gravel (medium dense, wet) (recessional outwash)			
		18	16	3			SM	Brown to gray silty fine to medium sand (medium dense, wet)			Groundwater encountered at approximately 6 feet during drilling
100	10	14	12	4 %F					24	24	
							SP-SM	Gray fine to medium sand with silt (medium dense, wet)			
95	15	18	16	5			SM	Gray silty fine sand (medium dense, wet)			
							SM	Gray silty fine to medium sand (medium dense, wet) (glacial till)			
90	20	8	26	6							

Note: Please see Figure A-1 for explanation of symbols

Log of Boring B-7

GeoEngineers

Project: Richards Creek Substation
Project Location: Bellevue, Washington
Project Number: 0186-922-01

Figure A-8
Sheet 1 of 1

DSD 001175

Seattle: Date:9/22/16 Path:W:\PROJECTS\0186922\GINT\0186922201.GPJ DBTemplate/LibTemplate:GEOENGINEERS_DF_STD_US.GDT/GEIB_GEOTECH_STANDARD_%F

Drilled Start 12/19/2014 End 12/19/2014	Total Depth (ft) 16.5	Logged By APL Checked By CEW	Driller Geologic Drill	Drilling Method Hollow-stem Auger
Surface Elevation (ft) 100.77 Vertical Datum NAVD88		Hammer Data Rope & Cathead 140 (lbs) / 30 (in) Drop		Drilling Equipment Track Mounted Drill Rig
Easting (X) 1313569.145 Northing (Y) 216247.6339		System Datum LiDAR		Groundwater Date Measured / Depth to Water (ft) / Elevation (ft): See Remarks
Notes:				

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	Blows/foot	Collected Sample / Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
100	0	15	5	1			SM	Brown with oxidation staining silty fine to medium sand with occasional gravel (loose, wet) (fill)			
95	5	15	17	2			SM	Brown silty fine to medium sand (medium dense, wet) (recessional outwash)			Groundwater encountered at approximately 5 feet during drilling
		12	30	3			SM	Brown with oxidation staining silty fine to medium sand with occasional gravel and silt lenses (medium dense, wet)			
90	10	13	24	4			SM	Brown to gray silty fine to medium sand (medium dense, wet)			
85	15	12	23	5 %F					15	16	

Note: Please see Figure A-1 for explanation of symbols

Log of Boring B-8

GeoEngineers

Project: Richards Creek Substation
Project Location: Bellevue, Washington
Project Number: 0186-922-01

Figure A-9
Sheet 1 of 1

DSD 001176

Seattle: Date:9/22/16 Path:W:\PROJECTS\0186922\GINT\0186922201.GPJ DBTemplate/LibTemplate:GEOENGINEERS_DF_STD_US.GDT/GEIB_GEOTECH_STANDARD_%F

ATTACHMENT B
Previous Explorations

Drilled Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
8/31/2015	8/31/2015	50.33	KMS / NT	Geologic Drill Inc.	Hollow-stem Auger

Hammer Data	Auto 140 (lbs) / 30 (in) Drop	Drilling Equipment	D50 Track Rig
Surface Elevation (ft) Vertical Datum	92 NAVD88	Top of Casing Elevation (ft)	
Latitude Longitude	47.58538° -122.15791°	Horizontal Datum	Geographic WGS84

DOE Well I.D.: BIJ 533
A 2 (in) well was installed on 8/31/2015 to a depth of 50 (ft).

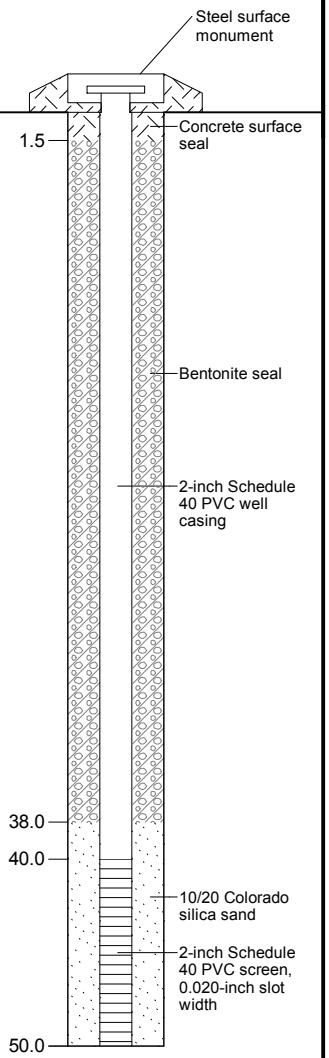
Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)
9/16/2015	0.0	92.0

Notes: Field screening was completed to a depth of 15 feet; no sheen was observed.

Depth (feet)	Elevation (feet)	Interval Recovered (in)	Blows/foot	Collected Sample / Sample Name Testing	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)
0	90				SM	Dark brown silty fine sand with organic matter (loose, wet)		
5	85	16	8	1				
					SW-SM	Gray fine to coarse sand with silt and gravel (loose to medium dense, wet) (recessional outwash?)		
10	80	9	27	2				
15	75	0	65	3*				
					SM	Gray silty fine to medium sand with occasional gravel (very dense, moist to wet) (weathered glacial till?)		
20	70	18	57	4 MD		(Dry density = 118 pcf)	8	
25	65	18	24	5 SA			12	31
30	60	18	24	6				
35	55	5	50/5"	7	SM	Gray silty fine to medium sand with occasional gravel (very dense, moist) (glacial till?) (Rough drilling at 34 feet)		
40	50	11.5	50/5.5"	8				
45	45	5	50/5"	9 MD		(Dry density = 115 pcf)	9	
50			50/4"	10				

*California sample taken

WELL LOG



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well J1 (TL 8/9)

GeoEngineers

Project: PSE - Energize Eastside Design Phase
Project Location: Bellevue, Washington
Project Number: 0186-871-05

Figure A-23
Sheet 1 of 1

DSD 001178

Redmond: Date:12/2/15 Path:P:\0018687\1GINT\0186871105.GPJ DBTemplateLibTemplate:GEOENGINEERS8.GDT/GEI8_GEOTECH_WELL

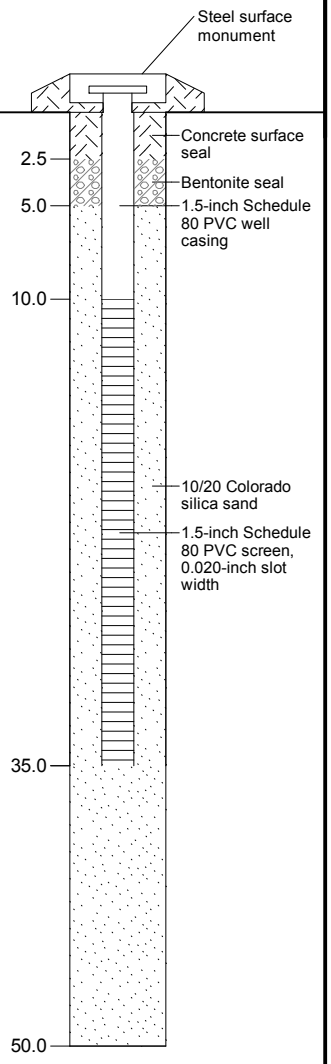
Drilled Start 11/20/2015	End 11/20/2015	Total Depth (ft) 51.5	Logged By NLP / Checked By NT	Driller Geologic Drill Inc.	Drilling Method Hollow-stem Auger

Hammer Data: Auto 140 (lbs) / 30 (in) Drop		Drilling Equipment: D50 Track Rig	DOE Well I.D.: BIK 311 A 1.5 (in) well was installed on 11/20/2015 to a depth of 35 (ft).
Surface Elevation (ft) Vertical Datum: Undetermined		Top of Casing Elevation (ft)	Groundwater: Date Measured 11/20/2015; Depth to Water (ft) 6.0; Elevation (ft)
Latitude Longitude		Horizontal Datum: Geographic	

Notes: Field screening was completed to a depth of 15 feet; no sheen was observed.

Depth (feet)	Interval Recovered (in)	Blows/foot	Collected Sample / Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)
0						SM	Brown silty sand and gravel (loose, moist to wet) (fill)		
5	12	2	1	▼		PT	Brown peat (soft, moist to wet)		
						SP-SM	Gray fine to medium sand with silt and gravel (medium dense, wet)		
10	0	34	2						
15	0	37	3						
	12	31	4				With lenses of fine to coarse sand with gravel		
20	12	25	5						
25	18	17	6						
30	18	7	7			SM/SP-SM	Gray-brown interbedded silty fine sand and fine to medium sand with silt (loose to medium dense, wet) (4 feet of heaving sand at 30 feet)		
35		12	8			SM	Gray silty fine sand (medium dense, wet)		
40	18	13	9			ML/SM	Gray interbedded silt with sand and silty fine sand (medium dense, wet)		
45		38	10				Grades to dense		
						SP-SM	Gray fine to coarse sand with silt (dense, wet)		
50		33	11			SM	Gray silty fine to medium sand with lenses of fine to medium sand		

WELL LOG



Note: Please see Figure A-1 for explanation of symbols

Log of Monitoring Well G2-1

GeoEngineers

Project: PSE - Energize Eastside Design Phase
Project Location: Bellevue, Washington
Project Number: 0186-871-05

Figure A-18
Sheet 1 of 1

DSD 001179

Redmond: Date:12/2/15 Path:P:\0018687\1GINT\018687105.GPJ DBTemplateLibTemplate:GEOENGINEERS8.GDT/GEI8_GEOTECH_WELL

LOG OF TEST PIT NO. 1

Location: See Drawing 1 Elevation: Approx. 77

Surface Conditions: Grass, brush, and blackberries

Depth in feet	Moisture Content-%	Sample	Symbol	DESCRIPTION	REMARKS
1				(0.0 - 1.7) **ORGANIC SILT** (Fill); dark brown, trace fine sand, scattered pieces of wood; wet, soft	
2				(1.7 - 3.8) **SAND & GRAVEL** (Fill); gray-brown, fine to coarse, trace silt; wet, medium dense	moderate caving of test pit walls
3					
4				(3.8 - 5.0) **PEAT**; amorphous; wet, soft to medium stiff	
5					
6				(5.0 - 6.2) **SILT**; brown, little fine to coarse sand, scattered gravel; wet, loose	
7				(6.2 - 7.6) **SILT & SAND**; gray-brown, fine to coarse, trace gravel; wet, medium dense	
8				Bottom of test pit at depth 7.6' Groundwater seepage observed below approx. 2.2' Completed 4/3/84	

DFR4

PROPOSED POLE YARD
Bellevue, Washington
for Puget Sound Power and Light Company

Project No
84-5107

Converse Consultants Geotechnical Engineering and Applied Sciences

Drawing No
2

DSD 001180

LOG OF TEST PIT NO. 2

Location: See Drawing 1

Elevation: Approx. 108

Surface Conditions: Scattered small trees, brush

Depth in feet	Moisture Content-%	Sample	Symbol	DESCRIPTION	REMARKS
1				(0.0 - 0.4) **DUFF**	
2				(0.4 - 4.4) **SAND**; gray-brown, fine to medium, trace coarse, trace gravel, trace silt, numerous roots to approx. depth 2'; slightly moist, medium dense	
3		1			
4					
5				(4.4 - 8.3) **SAND**; gray, fine to coarse, little gravel, trace silt; slightly moist, dense	
6		2			
7				wet below depth 6.6'	
8					
9				(8.3 - 9.5) **SILT**; mottled gray and brown, trace to little fine sand; wet, dense	
10				(9.5 - 10.4) **SAND**; brown, fine to medium, trace silt, thin interbeds of brown silt; wet, medium dense	
				Bottom of test pit at depth 10.4'	
				Groundwater seepage observed below approx. 6.6'	
				Completed 4/3/84	

PROPOSED POLE YARD
Bellevue, Washington
for Puget Sound Power and Light Company

Project No
84-5107

Converse Consultants Geotechnical Engineering and Applied Sciences

Drawing No
3

DSD 001181

LOG OF TEST PIT NO. 3

Location: See Drawing 1

Elevation: Approx. 110

Surface Conditions: Scattered small trees, brush

Depth in feet	Moisture Content-%	Sample	Symbol	DESCRIPTION	REMARKS
1				(0.0 - 0.4) **DUFF**	
2				(0.4 - 3.6) **SAND**; brown, fine to medium, trace coarse, trace gravel, trace silt (10%), occasional cobble, numerous roots to approx. 3' depth; slightly moist, medium dense	
3					
4		1		(3.6 - 10.4) **SAND**; gray, fine to coarse, little gravel, trace silt; slightly moist, dense	
5					
6					
7				very dense	
8					
9					
10					
				Bottom of test pit at depth 10.4'	
				Groundwater seepage observed below approx. 8.6'	
				Completed 4/3/84	

PROPOSED POLE YARD
Bellevue, Washington
for Puget Sound Power and Light Company

Project No
84-5107

Converse Consultants Geotechnical Engineering and Applied Sciences

Drawing No.
4

DSD 001182

LOG OF TEST PIT NO. 4

Location: See Drawing 1

Elevation: Approx. 107

Surface Conditions: Scattered small trees, brush

Depth in feet	Moisture Content-%	Sample	Symbol	DESCRIPTION	REMARKS
1				(0.0 - 0.4) **DUFF**	
2				(0.4 - 3.5) **SAND**; brown, fine to medium, trace coarse, trace silt (10%), trace gravel, numerous roots to approx. depth 2'; slightly moist, loose	
3					
4				(3.5 - 8.1) **SAND**; gray, fine to coarse, little gravel, trace silt, occasional cobble; slightly moist, medium dense to dense	
5					
6					
7					
8					
9				(8.1 - 11.8) **SANDY SILT**; mottled gray & brown, fine to medium sand, thin interbeds of fine to medium sand with trace to little silt, thin interbeds of clayey silt with little fine sand; wet, medium dense	
10					
11					
12				Bottom of test pit at depth 11.8'	
				Groundwater seepage observed below approx. 11.4'	
				Completed 4/3/84	

PROPOSED POLE YARD
Bellevue, Washington
for Puget Sound Power and Light Company

Project No
84-5107

Converse Consultants Geotechnical Engineering and Applied Sciences

Drawing No
5

DSD 001183

LOG OF TEST PIT NO. 5

Location: See Drawing 1

Elevation: Approx. 104

Surface Conditions: Fill surface, scattered grass

Depth in feet	Moisture Content-%	Sample	Symbol	DESCRIPTION	REMARKS
1				(0.0 - 1.2) **SILT & SAND** (Fill); dark brown, fine to coarse sand, scattered gravel, encountered aluminum debris; moist, loose	
2				(1.2 - 3.4) **SILTY SAND** (Fill); brown, fine to medium, trace coarse sand, scattered gravel, scattered pieces of concrete and asphalt rubble up to 1-1/2' across; slightly moist, loose	
3					
4				(3.4 - 5.4) **SAND**; brown, fine to medium, trace coarse sand, trace gravel, trace to little silt; slightly moist, medium dense	
5					
6				(5.4 - 10.6) **SILTY SAND**; gray-brown, fine, scattered gravel, thin interbeds of silt & fine to medium sand; moist, medium dense	
7				wet below approx. 7.1'	
8					
9					
10					
				Bottom of test pit at depth 10.6'	
				Groundwater seepage observed below approx. 7.1'	
				Completed 4/3/84	

PROPOSED POLE YARD
Bellevue, Washington
for Puget Sound Power and Light Company

Project No
84-5107

Drawing No
6

Converse Consultants Geotechnical Engineering and Applied Sciences

DSD 001184

LOG OF TEST PIT NO. 6

Location: See Drawing 1 Elevation: Approx. 107

Surface Conditions: Scattered clumps of grass

Depth in feet	Moisture Content-%	Sample	Symbol	DESCRIPTION	REMARKS
1				(0.0 - 1.7) **SAND** (Fill); gray, fine to coarse, trace to little gravel, little silt, scattered pieces of concrete & asphalt rubble, wood, and tree branches; moist, loose	
2					
3				(1.7 - 4.6) **CLAYEY SILT** (Fill); dark gray, fine to medium sand, scattered tree branches, occasional piece of asphalt rubble; moist, very loose wet below approx. 3.1'	
4					
5					
6				(4.6 - 7.3) **SAND** (Fill); gray, fine to coarse, some clayey silt, numerous tree branches, and pieces of asphalt; wet, very loose	
7					
				Bottom of test pit at depth 7.3' Test pit terminated due to soil running into pit as excavated below approx. 3' Groundwater seepage observed below approx. 3.1' Completed 4/3/84	

PROPOSED POLE YARD
Bellevue, Washington
for Puget Sound Power and Light Company

Project No
84-5107

Converse Consultants Geotechnical Engineering and Applied Sciences

Drawing No
7

DSD 001185

LOG OF TEST PIT NO. 7

Location: See Drawing 1 Elevation: Approx. 108

Surface Conditions: Grass, fill mounds, scattered concrete rubble

Depth in feet	Moisture Content-%	Sample	Symbol	DESCRIPTION	REMARKS
1				(0.0 - 1.9) **SILTY SAND** (Fill); gray-brown, fine to medium; slightly moist, loose	
2				(1.9 - 4.1) **SILTY SAND** (Fill); dark gray-brown, fine to medium, scattered tree branches, pieces of pipe & asphalt rubble; moist, loose asphalt rubble layer from 2.4' to 3.1'	
3					
4					
5				(4.1 - 6.6) **SILTY SAND** (Fill); gray, fine to medium, trace coarse, little gravel, occasional cobble; slightly moist, dense wet below approx. 4.4'	massive caving of test pit walls below approx. 5.5'
6					
7				(6.6 - 9.6) **SAND** (Fill); brown, fine to coarse, little silt, trace gravel, occasional cobble and boulder, scattered metal debris, wire, asphalt rubble, tree branches, and wood pieces; wet, medium dense	
8					
9					
				Bottom of test pit at depth 9.6' Groundwater seepage observed below approx. 4.4' Completed 4/3/84	

PROPOSED POLE YARD
Bellevue, Washington
for Puget Sound Power and Light Company

Project No
84-5107

Converse Consultants Geotechnical Engineering and Applied Sciences

Drawing No
8

DSD 001186

HAND DUG HOLE HH-1

Depth (feet)	Description
0.0 - 2.8	PEAT; amorphous; wet
2.8 - 3.1	SAND & GRAVEL; gray-brown, fine to coarse, trace silt; wet
	Bottom of hole at depth 3.1' Water standing in hole at depth 1.2' Completed 4/3/84

HAND DUG HOLE HH-2

Depth (feet)	Description
0.0 - 1.3	PEAT; amorphous; wet
1.3 - 2.0	SAND & GRAVEL; gray-brown, fine to coarse, trace silt; wet
	Bottom of hole at depth 2.0' Completed 4/3/84

LOG OF HAND DUG HOLES

PROPOSED POLE YARD
Bellevue, Washington
for Puget Sound Power and Light Company

Project No.
84-5107

Drawing No.
9

Converse Consultants Geotechnical Engineering and Applied Sciences

DSD 001187

GeoEngineers

Memorandum

17425 NE Union Hill Road, Suite 250, Redmond, WA 98052 - Telephone: 425.861.6000, Fax: 425.861.6050

www.geoengineers.com

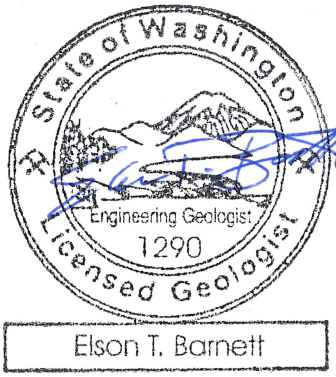
To: Kelly Purnell, Puget Sound Energy

From: Elson T. "Chip" Barnett, LG, LEG;
Andrew J. Caneday, LG, LEG

Date: September 21, 2018

File: 0186-871-07 Task 0300

Subject: Energize Eastside South Bellevue and Geologic Hazard Critical Areas: City of Bellevue Comment Response



INTRODUCTION

GeoEngineers, Inc. (GeoEngineers) has prepared this memorandum in response to a City of Bellevue (City) land use review comment related to the Critical Areas Report for the South Bellevue area July 11, 2017. Kelly Purnell and Kerry Kriner of Puget Sound Energy (PSE) requested this memorandum during a phone conversation with Chip Barnett on September 7, 2018. The memorandum also addresses review comments from PSE received on September 20, 2018. The City provided the following land use review comment in a memorandum dated August 14, 2018:

> *"Critical Areas:*
>
> *Geologic Hazard Areas*
>
> *Geologic Hazard Areas are not only regulated for issues of slope stability and safety, but these areas also frequently include vegetation that provides additional critical areas functions. The Critical Areas Report should quantify impacts to vegetation and their critical area functions within a Geologic Hazard Critical Area and associated buffers or structures setbacks. Appropriate mitigation is necessary to address impacts to these functions (i.e. habitat, hydrology, water quality etc.). Provide a discussion of the existing functions these areas provide and describe proposed mitigation to replace these impacted functions.*
>
> *Page 24 of the South Bellevue Critical Areas Report identifies mapped areas of 40% slope but goes on to state 'many of these areas are developed and include rockeries, landscaped residential or commercial development slopes and cut slopes associated with paved roadways.' The critical areas regulations do take into consideration the presence of rockeries or other retaining features, and areas containing these features are not considered steep slopes. However, the code does not distinguish between natural and un-natural (i.e., man made slopes). Therefore, even if a slope qualifies as a steep slope but contains residential or commercial landscaping, these areas are still regulated as a steep slope and should not be removed from impact analysis.*
>
> *Please revise areas excluded from analysis consistent with the critical area regulations described above. If areas continue to be excluded because of the presence of retaining features, please explain and identify which map pages these areas can be found so we can evaluate concurrence with these regulations."*

COMMENT RESPONSE

We provide comment responses below for man-made areas and structure setbacks.

Man-made Areas

The City review comment states that the code does not distinguish between natural and man-made slope areas in terms of critical area regulations and asked that impacts from the transmission line project be addressed. We reviewed updated mapping from The Watershed Company provided on September 12, 2018 that includes man-made areas previously removed from our analysis for geologic hazard critical areas. The man-made areas include cut and fill slopes, rockeries and walls and are listed below:

- North of 132nd Avenue SE.
- East of the intersection of Somerset Drive SE and 134th Place SE, north to Somerset Place SE.
- East of the intersection of Somerset Drive SE and Somerset Boulevard SE.
- East of 136th Place SE between SE 43rd Place and SE 43rd Street; and two trees between this area and the intersection of Somerset Drive SE and Somerset Boulevard SE.
- North of the intersection of SE 43rd Street and the PSE right-of-way (ROW).
- South of SE 42nd Street.
- Between SE 37th Street and SE 36th Street.
- East of SE 32nd Street.
- The Richards Creek Substation and Lakeside Substation area.
- Access south of SE 26th Street.
- Cut slopes at Coal Creek Parkway SE.

Each of these man-made areas listed above were previously cleared of vegetation, including considerable grading, during original site construction resulting in little (or no) tree removal in these previously disturbed areas. Previous vegetation removal and grading did not cause wide-spread slope instability or erosion.

The proposed installation of new poles will be less intrusive than the grading and clearing activities associated with the original construction of the made-made areas resulting in little (or no) tree removal in these previously disturbed areas. Furthermore, Best Management Practices (BMPs) proposed under this permit will further reduce the potential for instability and erosion compared to the original construction. As outlined in Land Use Code (LUC) 20.25H.125, pole type construction is the preferred method of construction within steep slope areas. Pole installation has a much smaller footprint than residential or commercial building development contemplated in the regulations.

In localized areas, we anticipate a temporary reduction in evapotranspiration of 50 percent in the first year from removal of vegetation. Our estimate is based on the planned use of BMPs to reduce soil erosion and replanting of shrubs and trees conducive to an existing utility corridor. We anticipate that the potential impacts from the proposed vegetation removal will be considerably less than the impacts during original construction of the man-made areas. During original construction, the impact would have likely been reduction of

evapotranspiration of 100 percent locally for a period of more than 1 year depending on how quickly the disturbed ground was replanted. We also anticipate no reduction in slope stability from tree removal because the root mass will not be removed, and replanted trees and shrubs should be established well before root degradation.

Structure Setbacks

Although PSE poles are not regulated as structures, we have provided guidance for structure setbacks and tree removal as requested. We reviewed the location of each proposed pole relative to the location of mapped critical areas provided by the Watershed Company. The critical area buffer and structure setback from the City code for landslide hazards and steep slopes is provided in Table 1 below:

TABLE 1: SELECTED PORTION OF CITY OF BELLEVUE CODE

Critical Area Category or Type	Critical Area Buffer Width	Structure Setback	Modification of Buffer or Setback
Landslide hazards	Toe-of-slope: None Top-of-slope: 50 feet	Toe-of-slope: 75 feet Top-of-slope: None	LUC 20.25H.120 LUC 20.25H.230
Steep slopes	Toe-of-slope: None Top-of-slope: 50 feet	Toe-of-slope: 75 feet Top-of-slope: None	LUC 20.25H.120 LUC 20.25H.230

No poles are proposed within the landslide hazard areas, landslide hazard area buffers, or their setbacks. Table 2 below provides a description of pole locations that are within the mapped areas downslope of the steep slope 75-foot setback areas and our conclusions and recommendations. Some of the pole locations described in Table 2 include replacement of existing poles within the 75-foot setback. It is our opinion that by using standard BMPs the proposed pole installation or replacement will not impact critical area function. The installation of poles on sloped areas is similar to the installation of soldier piles or soil nails and locally reduces the potential for slope movement or instability. Therefore, the poles in the 75-foot setback areas described below should not increase the risk for slope instability or adverse impacts to geologic hazard areas. The table below identifies sites from north to south. In general, for the areas described below, we recommend that standard BMPs are used and soil cuttings for pole installation are disposed of or end-hauled to a stable location.

TABLE 2: SUMMARY TABLE OF POLES WITHIN MAPPED GEOLOGIC HAZARDS AND SETBACKS

75-foot Structure Setback downslope from Steep Slope	Conclusion and Recommendation
Steep slopes 150 feet north of ROW intersection with SE 43rd Street	Replacement poles 8/2 locations are approximately 30 feet northwest and downslope of the steep slopes that include landscaped residential cut and fill slopes. The ROW appears to be regularly maintained and is vegetated with English ivy. Replacement of the poles will continue to provide anchoring of the slope, similar to the existing poles. We recommend the use of track-mounted or limited access equipment for the excavation for the pole west of the park.
Cut slope on the east side of SE 44th Street.	Replacement poles 8/1 are located at the base of the cut slope along SE 44th Street. Cut slope appears to be stable. Access will be from the paved areas of the roadway or a paved residential driveway limiting potential impact.
Cut slope on the east side of SE 44th Street.	Proposed pole 7/18 is located downslope on the west side of roadway, approximately 70 feet away from the cut slope. The cut slope appears stable. Access will be from the paved areas away from the cut slope limiting potential impact the cut slope.

75-foot Structure Setback downslope from Steep Slope	Conclusion and Recommendation
Landscape retaining wall near 134th Place SE and Somerset Drive SE	Replacement poles 7/16 are located within ROW 150 feet east of the roadway intersection. The poles are located upslope and downslope of the retaining wall. The retaining wall appears stable. Access will be limited through residential areas. We recommend the use of track-mounted or limited access equipment for the excavation for the poles.
Steep slope in residential backyard approximately 30 feet upslope of 132nd Avenue SE	The replacement poles 7/13 are downslope or near the toe of the mapped steep slope that is stable. The pole closest to the steep slope is approximately 40 feet downslope from the mapped toe of the slope. We recommend access occurs from the roadway on track-mounted or limited access equipment for the excavation of the poles to reduce the potential impact to the steep slope area.
Cut slope adjacent to PSE Somerset Substation	Three proposed poles 6/7 are located approximately 170 feet east of Coal Creek Parkway and approximately 30 feet east of the PSE Somerset Substation. Two poles 6/7 are located 20 feet downslope of the stable cut slope. We recommend the use of track-mounted or limited access equipment for pole excavation to reduce the potential impact to the cut slope.

It is our opinion that the poles within the setback areas described in the table above can be installed with a low risk of impact to the geologic hazard critical area.

We appreciate the opportunity to assist you on this project. Please contact us if you have any questions concerning this memorandum or our services.

ETB:AJC:cam:leh

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Geologic Hazards Evaluation and Preliminary Geotechnical Engineering Services

Energize Eastside Project
King County, Washington

for
Puget Sound Energy

December 19, 2014

GeoEngineers
Earth Science + Technology

DSD 001192

Geologic Hazards Evaluation and Preliminary Geotechnical Engineering Services

Energize Eastside Project
King County, Washington

for
Puget Sound Energy

December 19, 2014

GeoEngineers

8410 154th Avenue NE
Redmond, Washington 98052
425.861.6000

Geologic Hazards Evaluation and Preliminary Geotechnical Engineering Services

Energize Eastside Project
King County, Washington

File No. 0186-871-02

December 19, 2014

Prepared for:

Puget Sound Energy
355 110th Avenue NE, EST-04W
Bellevue, Washington 98004

Attention: Victoria Wilson and Andrew Lightfoot, PE

Prepared by:

GeoEngineers, Inc.
8410 154th Avenue NE
Redmond, Washington 98052
425.861.6000

NANCY L. TOCHKO — STATE OF WASHINGTON — 23904 — REGISTERED PROFESSIONAL ENGINEER

12-19-2014

Eliya R. Hogan
Geologist

Nancy L. Tochko, PE
Senior Geotechnical Engineer

Bo McFadden, PE, LEG
Principal

NLT:ERH:JJM:nld

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APPENDICES

Appendix A. Geologic Hazards Definitions by Jurisdiction
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INTRODUCTION

This report presents the results of our geologic hazards assessment and preliminary geotechnical engineering services for the Energize Eastside project in King County, Washington. Our services have been provided in general accordance with the proposal between GeoEngineers and Puget Sound Energy (PSE) dated September 25, 2014. These services were verbally authorized by Victoria Wilson with PSE on September 29, 2014 and formal authorization was received on October 14, 2014. Preliminary results were presented in a draft report dated November 4, 2014.

PROJECT DESCRIPTION

The Energize Eastside project is tasked with upgrading the transmission capability along the eastside corridor, beginning at the Sammamish substation in Redmond and ending at the Talbot Hill substation in Renton. There are currently a total of 11 proposed routes which use a portion of 16 identified route segments. We previously completed a preliminary review of existing information and geologic mapping along one of the proposed routes, currently labeled the "Willow" route, in 2012 under verbal approval of Jim Kearnes with PSE. GeoEngineers also provided GIS and some permitting services for the Lakeside 230 kV Project, much of which also follows the "Willow" route. The proposed route segments are shown on the Vicinity and Segment Index Map, Figure 1.

At this time, PSE is continuing to obtain community input as to the preferred route selection, and hopes to narrow the route to a preferred alternative by the end of the year. You have requested that we provide a general summary of geologic hazards and soil conditions expected along each of the 16 identified route segments, and provide general recommendations as to appropriate spacing of explorations along each identified segment.

PURPOSE AND SCOPE OF SERVICES

Our scope of services includes two tasks, with Task 1 consisting of providing geologic hazard maps based on available information, and Task 2 consisting of a preliminary of subsurface conditions expected along each of the route segments and an initial assessment of explorations necessary to further evaluate conditions along the segments. Our scope for each task is summarized below.

Task 1. Geologic Hazard Assessment

GeoEngineers conducted a geologic hazards assessment along each segment to categorize and map potential hazard areas based solely on existing hazard maps and/or by criteria defined by corresponding regulatory jurisdictions. For this phase, no ground truthing or field reconnaissance was completed. The services provided by GeoEngineers for Task 1 consisted of the following scope items:

1. Review readily available geologic maps that encompass each segment, as well as the United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) soils map of King County and any other data provided by PSE such as previous studies completed by others.
2. Compile geologic hazards maps which delineate steep slopes, potential landslide hazards, and erosion and coal mine hazard areas for each segment.

3. Present maps for each segment showing the geologic hazards.

Task 2. Preliminary Geotechnical Engineering Services (Evaluation of Soil Conditions)

The purpose of Task 2 was to compile and review existing available boring and/or test pit logs along each segment as a means to evaluate likely subsurface soil and ground water conditions present. This information is intended to provide a basis for identifying challenging soil or ground water conditions along portions of each segment, and to provide guidance as to an appropriate exploration program when the preferred route is selected. The services provided by GeoEngineers for Task 2 consisted of the following scope items:

1. Review readily available subsurface information available on the Washington State Department of Ecology (Ecology) Water Well logs database and the Washington Department of Natural Resources (DNR) Subsurface Geology Information System portal, and existing in-house subsurface information.
2. Summarize the anticipated subsurface conditions and identify possible challenging soil or groundwater conditions for each segment.
3. Develop recommendations for spacing of future explorations for the final selected route.
4. Provide this written report presenting a summary of our findings and preliminary conclusions regarding likely design and construction considerations pertinent to route selection, along with supporting maps. The compiled subsurface information has been saved internally by GeoEngineers until a final route is selected.

GEOLOGY

Our understanding of geology in the Energize Eastside project vicinity and along the potential PSE segments and routes is based on review of 1:100,000 scale geologic maps published by the DNR and on a review of geologic maps published by King County. The mapped geologic units are shown in Figures 2 through 46, with each segment presented in alphabetical order.

The native soils in the vicinity of the site are the result of glacial and post glacial processes. The glacial deposits are derived from several regional glaciations. The most recent, the Frazer glaciation included three phases (stades) with the last phase occurring from about 13,500 to 15,000 years ago. This phase is called the Vashon glaciation. Based on our review, surface geology along the segments can be grouped into two primary categories: glacial and recent alluvial deposits. Bedrock and peat are also present, but only across very limited portions of the segments.

In general, segments in the northern part of the project area cross deposits of the most recent glacial period (Fraser age) and include glacial till (Qgt), advance continental glacial outwash (Qga(t)), and minor amounts of glacial drift (Qgu) and alluvium (Qa). Proposed segments in the central region of the project area cross similar deposits including glacial till (Qgt), continental and advance glacial outwash (Qga and Qgat), and minor exposures of alluvium (Qa), peat deposits (Qp) and isolated areas of Eocene nearshore sedimentary rocks (OEn). Segments in the southern region of the PSE project area also cross glacial till (Qgt), continental glacial outwash (Qgo), and lesser amounts of alluvium (Qa), and advance continental outwash (Qga), and pre-Fraser continental glacial drift and nonglacial deposits (Qgpc), and Eocne marine

sedimentary rocks (OEm). A summary of the geologic conditions along each segment is presented in more detail below.

Glacial till was deposited after being transported and dropped by a glacier, and typically consists of dense, unsorted, unstratified, and unconsolidated deposits of silt, clay, sand, gravel, cobbles, and occasional boulders. Glacial outwash consists of fluvially-deposited sediments sourced from the front of glaciers, and is typically comprised of poorly sorted, well rounded gravel with sand. Advance glacial outwash is outwash which was overridden by the advancing glacier; recessional outwash was deposited as the glaciers retreated. The peat deposits included on the map are the organic and organic-rich sediments deposited in closed depressions in and adjacent to wetlands. Alluvium typically consists of medium stiff or medium dense silt, sand, or gravel deposited through fluvial processes. Eocene units are comprised of bedrock and other deposits that were present prior to glacial activity in the area.

GEOLOGIC HAZARD AREAS

General

The potential transmission line routes being considered for the Energize Eastside project pass through the jurisdictions of Redmond, Kirkland, Bellevue, Newcastle, Renton, and King County. Each jurisdiction delineates geologic hazard areas through criteria which may be shared with other jurisdictions, or established separately. GeoEngineers reviewed these criteria, and obtained hazard maps published or adopted by each jurisdiction to perform our preliminary geologic hazards assessment. This report focuses on landslide, erosion, seismic, and coal mine hazard areas, as well as steep slopes and active fault (defined by the United States Geologic Survey [USGS]) intersections along each potential PSE transmission line route segment. A summary of each jurisdiction's definitions for the geologic hazard areas is presented in Table 1 and in Appendix A. The geologic hazards for each segment are shown on Figures 47 through 91, with each segment presented in alphabetical order.

Identification of Potential Hazard Areas

GeoEngineers conducted a preliminary geologic hazards assessment by compiling data from the DNR maps, NRCS soils map of King County, and county- and jurisdiction-based hazard maps. The combined geologic hazards maps developed for this study are based on GIS data obtained from each jurisdiction, and/or on criteria defined in jurisdictional codes. Exceptions to this standard include seismic and coal mine hazards data for the city of Newcastle. Since the city of Newcastle was once incorporated into the city of Bellevue, and currently does not have GIS data or well-defined criteria for seismic and coal mine hazards, GeoEngineers used GIS data provided by the city of Bellevue to identify these hazard areas. .

Our preliminary assessment of the project area extended to 150 feet of each side of every segment; therefore each segment discussed below includes an approximately 300-foot-wide corridor. We summarize the terrain, geology, and soils across which each proposed segment will pass. We also identify areas along each segment that intersect identified steep slope, landslide, seismic, erosion, and/or coal mine hazards.

Each proposed segment passes through one or more jurisdictions. While each jurisdiction has a distinct set of criteria defining geologic hazards, many similarities exist. General definitions for each hazard are described below. Specific criteria defined by each jurisdiction and used in our research and map

compilation are outlined in Table 1 and in Appendix A. A brief overview of each hazard is summarized as follows:

- Landslide Hazards/Steep Slopes: Generally, areas may be susceptible to landslides or slope failure when a combination of geologic factors are present, including steep slopes (generally defined as slopes with greater than 40 percent gradient), weak geologic lithology, slopes having impermeable layers overlain by permeable layers, bedding planes that are parallel or subparallel to slope gradient, the presence of seeps or springs along erosive soils on slopes, the occurrence of undercutting at the base of a slope, or historic or recent land movement in the area. Occasionally, classifications of "low," "moderate," or "high" are also applied to landslide hazard areas; these are often identified by the USGS, the state, and local agencies and are generally based on the number of hazardous factors associated with an area, the likelihood of landslide occurrence, and/or the likelihood of an area being affected by a landslide. Some of the jurisdictions include slopes as flat as 15 percent in their definition of a landslide hazard area. In our geologic assessment, we focused only on moderate to high landslide hazard areas and steep slope areas, i.e., mainly on slopes 40 percent or steeper.
- Erosion Hazards: Erosion hazard areas are generally identified based on one or more of the following criteria: (1) soils are mapped as "severely erosive" by the NRCS; (2) soils are mapped as "very severely erosive" by the NRCS; (3) land is rapidly incised by an adjacent river; (4) soil is dry, loose, unvegetated, and easily transported by wind. Steep slope areas are often also classified as an erosion hazard area.
- Seismic Hazards: Areas susceptible to seismic hazards are generally located in river/waterway flood plains, in steep slope areas, and/or are close to or intersected by active earthquake faults. Additionally, they may be underlain by relatively loose soils such as alluvium, recessional outwash, or peat. In the event of an earthquake, these types of soil are susceptible to liquefaction and soil strength loss and/or soil settlement during significant ground shaking. Occasionally, classifications of "low," "moderate," or "high" seismic risk are also applied to seismic hazard areas; these are generally based on the underlying soil types, steepness of the terrain, proximity to high groundwater or surface water, and earthquake faults. In our geologic assessment, we focused only on moderate to high seismic hazard areas.
- Coal mine hazards: Coal mine hazard areas are typically delineated by jurisdictions in areas which have current and/or abandoned mine sites. Generally, jurisdictions provide a map of these sites, and indicate specific areas at risk of collapse due to the presence of mines, mine shafts, and other cavities. However, to actually evaluate whether a high risk of a coal mine hazard is present in an area of interest, additional research into old maps of mine works is usually required.

A summary of the geologic hazards along each segment is presented in Table 2. In addition, each segment is briefly described below, with particular emphasis given to areas mapped as geologically hazardous areas, especially steep slopes and seismic hazards which could either present challenges in construction or result in higher design loads.

Segment A

General

- **Alignment:** Segment A begins at the Sammamish substation in Redmond, heads south for approximately 800 feet, then west along a greenbelt for a distance of approximately 0.5 mile, and then turns south for approximately 400 feet where it meets Segments B and C in Redmond.

- **Terrain:** The terrain along Segment A is relatively level from the substation to where the segment turns west, and then slopes gently to moderately upward to the western edge of the greenbelt. After the turn to the south, the terrain slopes gently to moderately downslope to the south into the Willows Creek drainage area, and then slopes upward for the last 50 to 100 feet of this segment.
- **Geology:** Surface geology along and within 150 feet of the segment includes Quaternary alluvium (Qa), pre-Fraser glacial drift (Qgu), and alternating exposures of Fraser-age advance continental glacial outwash (Qga and Qga(t)) and glacial till (Qgt). In general, the northern portion by the substation is mapped as alluvium and the remainder of the segment is underlain by glacial soils.
- **Soil:** Soil units include Indiana loamy sand and Alderwood gravelly sandy loam; soils are generally classified by the NRCS as silty gravel (GM) and silty sand (SM) depending on the area, and based on Unified Soil Classification System (USCS) standards.

Hazard Areas

- **Steep slopes:** Steep slopes (slopes greater than 40 percent) are intermittently mapped along the greenbelt, and in the center of the southwestern extent of the segment (less than 0.1 mile total), and along about 0.1 mile at the southern end of the segment.
- **Landslide:** Approximately 0.1 to 0.25 mile in the center of the segment and about 0.1 mile near the southern end of the segment are mapped as potential landslide hazard areas.
- **Erosion:** Areas susceptible to erosion are predominately mapped in the eastern third and southwest portions of the segment, and extend less than 0.5 mile.
- **Seismic:** Seismic risk is mapped within the segment in the area immediately south of the Sammamish substation. No known active faults intersect this segment.
- **Coal mine:** No coal mine hazards are mapped along or near this segment.

Segment B

General

- **Alignment:** Segment B starts at the terminus of Segment A in Redmond, and extends west and south through areas of Redmond, Kirkland and King County for a total distance of approximately 6.2 miles. The segment is located to the east of, and generally parallels to I-405 beginning at about NE 70th Street. Between NE 60th Street and about NE 50th Street, the segment is very close to the boundary between Kirkland and King County. The segment cross SR 520, continues south through Bellevue near the alignment of the old railroad right-of-way (ROW), and ends approximately 300 feet northwest of the intersection between NE 1st Street and Main Street.
- **Terrain:** Segment B will begin on the vegetated lower slope of the Willows Creek drainage, but heads upslope to the west to a relatively flat and developed area. The terrain remains flat and mostly developed along the majority of the segment. Most of this segment follows along existing streets or other right-of way. Between NE 48th Place to NE 41st Street the segment passes over a few minor slopes and drainage paths, but in general the topography is relatively consistent.
- **Geology:** From the northern extent of Segment B to about 1,200 feet north of SR 520, surface geology along and within the segment includes Fraser-age advance continental glacial outwash (Qga and Qga(t)) and Fraser-age continental glacial till (Qgt). Fraser-age continental glacial recessional

outwash (Qgo) is mapped for approximately 0.8 mile along the segment from near the intersection of 115th Avenue NE and 116th Avenue NE. It is also mapped for about 0.3 mile within the segment, between NE 12th Street and NE 8th Street. Although not shown on the geologic maps, previous explorations also document that surficial deposits of peat are present in the vicinity of Lake Bellevue, south of NE 12th Street. In summary, this segment will pass through predominantly dense glacial deposits, other than in the vicinity between SR 520 and NE 8th Street, where it will intersect looser deposits of outwash, and possibly considerable thicknesses of surficial peat near Lake Bellevue.

- **Soil:** Soil units include Alderwood gravelly sandy loam, Arents Alderwood material, Everett gravelly sandy loam, Indianola loamy fine sand, Kitsap silt loam, Norma sandy loam, and Seattle muck. Soils are generally classified by the NRCS as silty gravel (GM) and silty sand (SM) depending on the area, and based on USCS standards.

Hazard Areas

- **Steep slopes:** Segment B passes through Redmond, Kirkland, and King County jurisdictions. In Redmond, steep slopes are located east of NE 89th Court for about 0.2 mile. The city of Kirkland designates a slope as "steep" when it has a slope of 15 percent or steeper. However, GeoEngineers recognizes that slopes critical in design and most likely to be a hazard are generally defined as those which are generally 40 percent or steeper. For this reason, we show steep slopes as defined by the city of Kirkland on the attached and applicable Geologic Hazards Maps, but limit our discussion here only to slopes 40 percent or steeper. Based on this criteria, steep slopes in Kirkland frequently occur in small localized areas along the segment; many of which are likely the result of past infrastructure grading. Areas along the segment more consistently mapped as steep slopes occur between NE 70th Street and NE 60th Street, and again from about NE 48th Place to the Kirkland - Bellevue city boundaries.
- In Bellevue, steep slopes are observed along the segment between NE 34th Street and NE 30th Place (about 0.2 mile), near crossings of WA-520 and NE 12th Street, as well as along the southernmost 0.3 mile of the segment.
- There are only small isolated steep slopes along the portion of the segment within King County.
- **Landslide:** In Redmond, the alignment crosses potential landslide hazard areas for about 0.2 mile at the northern end of the segment. In Kirkland and Bellevue, criteria for potential landslide areas include slopes of 15 percent or steeper, which is shown on the attached hazard maps. However, in our identification of potentially hazardous areas, we focus on areas with 40 percent slope or steeper. Based on this criterion, the segment alignment intersects or passes within 150 feet of potential landslide hazard areas in the same locations identified above under "steep slopes."
- **Erosion:** Areas susceptible to erosion are mapped for about 0.2 mile at the northern end of the segment in Redmond and for about 0.5 mile between SR 520 and NE 12th Street in Bellevue.
- **Seismic:** No areas of seismic risk are mapped along the segment. No known active faults intersect the proposed segment.
- **Coal mine:** No coal mine hazards are mapped along or near this segment.

Segment C

General

- **Alignment:** Segment C also starts at the terminus of Segment A in Redmond, and heads directly south for about 3.2 miles, angles slightly to the southwest from NE 28th Street to NE 27th Street, and then continues directly south to the south side of SR 520 in Bellevue, for a total distance of approximately 3.7 miles. This segment follows along the existing PSE ROW.
- **Terrain:** Segment C begins on the lower slope of the Willows Creek drainage but immediately heads upslope to the south and emerges in about 0.2 miles onto relatively flat and developed terrain. Terrain along the segment remains mostly flat and passes in and out of developed and undeveloped regions, often following a narrow cleared path currently used by the Sammamish Lakeside Line. Two minor exceptions to the flat landscape typically occur where the segment crosses drainage channels or depressions; one area is located between Old Redmond Road and NE 54th Place, the other is located near NE 44th Street.
- **Geology:** Surface geology along the segment includes Fraser-age advance continental glacial outwash (Qga and Qga(t)) and Fraser-age continental glacial till (Qgt).
- **Soil:** Soil units include Alderwood gravelly sandy loam, Arents Alderwood material, Bellingham silt loam, Everett gravelly sandy loam, and Indianola loamy fine sand. Soils are generally classified by the NRCS as silty gravel (GM) and silty sand (SM) depending on the area, and based on USCS standards.

Hazard Areas

- **Steep slopes:** From north to south, steep slopes (greater than 40 percent) along the segment are predominately mapped in Redmond within the Willows Creek drainage north of Redmond Way for about 0.3 mile, and in Bellevue mapped south of NE 40th Street for about 0.1 mile, and north of NE 24th Street for about 0.15 mile.
- **Landslide:** In Redmond, potential landslide hazard areas are mapped in the same locations as identified above under "steep slopes." In Bellevue, criteria for a potential landslide area include slopes of 15 percent or steeper, which is shown on the attached hazard maps. However, in our identification of potentially hazardous areas, we focus on areas with slopes 40 percent or steeper. Based on this criterion, the segment alignment intersects or passes within 150 feet of potential landslide hazard areas in the same locations identified above under "steep slopes."
- **Erosion:** Areas susceptible to erosion are mapped at the northern and southern ends of the segment, and two small areas are crossed along the segment, for a total distance of less than 0.5 mile.
- **Seismic:** No seismic risk is mapped along the segment. No known active faults intersect the proposed segment.
- **Coal mine:** No coal mine hazards are mapped along or near this segment.

Segment D

General

- **Alignment:** In general, Segment D extends along Bellevue roads for a total of 2.1 miles. Beginning south of SR 520, the segment heads southwest for about 300 feet, then south for about 400 feet to

NE 20th Street, then west along NE 20th Street, south along 132nd Avenue NE and southwest along Bel-Red Road. From Bel-Red Road the segment turns south on 120th Avenue NE to NE 1st Street where It then curves west, until it reaches its terminus at the southern end of Segment B.

- **Terrain:** Segment D will begin in a parking lot, and then follows main roads in Bellevue across relatively flat terrain, climbing slightly upward along Bel-Red Road, and then climbing upward slightly along the side of Wilberton Hill north of NE 5th Street.
- **Geology:** Fraser-age advance continental glacial outwash (Qga and Qga(t)) and Fraser-age continental glacial till (Qgt) are mapped across the north end of the segment, but after about 0.4 mile Fraser-age continental glacial recessional outwash (Qgo) is mapped for about 0.6 mile. Glacial till is mapped for the rest of the segment length, except for a small area of recessional outwash (Qgo) near Lake Bellevue in the vicinity of Bel-Red Road and NE 8th Street.
- **Soil:** Soil units include Alderwood gravelly sandy loam, Bellingham silt loam, Everett gravelly sandy loam, and Norma sandy loam. Soils are generally classified by the NRCS as silty sand (SM), silty gravel (GM), and silt (ML) depending on the area, and based on USCS standards.

Hazard Areas

- **Steep slopes:** Steep slopes (greater than 40 percent) are scattered along the segment, but greater concentrations occur along the southern portion. These include approximately 0.25 mile along Bel-Red Road between 120th Avenue NE and 124th Avenue NE, less than 0.1 mile at 120th Avenue NE and NE 5th Street, and approximately 0.1 mile along the south side of NE 1st Street. Most of the steep slopes in the area are outside of the actual segment alignment.
- **Landslide:** As described for Segment C potential landslide areas in Bellevue, in our identification of potentially hazardous areas we focus on slopes of 40 percent or steeper. Based on this criterion, the segment alignment intersects or passes within 150 feet of potential landslide hazard areas in the same locations identified above under “steep slopes.”
- **Erosion:** No erosion hazard areas are mapped along the segment.
- **Seismic:** No seismic risk is mapped along the segment. No known active faults intersect the proposed segment.
- **Coal mine:** No coal mine hazards are mapped along or near this segment.

Segment E

General

- **Alignment:** Segment E begins in Bellevue just north of the intersection between NE 20th Street and Northup Way and heads directly south to the Lakeside substation, for a total of about 3 miles. The Lakeside substation is located just south of SE 26th Street about 0.6 miles north of I-90. This segment follows along existing PSE ROW.
- **Terrain:** Segment E begins by passing through a flat parking lot, and then extends directly south along a relatively flat greenbelt adjacent to neighborhoods and a golf course. At SE 8th Street it will bend slightly southeast for about 600 feet before turning south again, following an unnamed relatively flat access road along the periphery of neighborhoods and privately owned land.

At SE 8th Street the segment will also begin a gradual climb over a hill, with the ground surface near SE 26th Street transitioning into relatively flat terrain.

- **Geology:** Surface geology along the segment includes Fraser-age advance continental glacial outwash (Qga), Fraser-age continental glacial till (Qgt), and Fraser-age continental glacial recessional outwash (Qgo). Recessional outwash is mapped in the north portion of the segment for about 0.5 mile from NE 20th Street to the vicinity of NE 12th Place, and for about 1 mile along the segment from Lake Hills Connector to just south of SE 26th Street. The remainder of the segment is mapped as glacial till and advance outwash.
- **Soil:** Soil units include Alderwood gravelly sandy loam, Arents Alderwood material, Bellingham silt loam, Everett-Alderwood gravelly sandy loam, Everett gravelly sandy loam, and Ragnar-Indianola association. Soils are generally classified by the NRCS as silty gravel (GM), silty sand (SM), and silt (ML) depending on the area, and based on USCS standards.

Hazard Areas

- **Steep slopes:** Steep slopes (greater than 40 percent) are generally concentrated in the middle portion of Segment E, from the vicinity of Main Street and 136th Avenue NE to SE 20th Street and 130th Place SE, totaling a distance of approximately 1.3 miles along the segment.
- **Landslide:** As described for Segment C potential landslide areas in Bellevue, in our identification of potentially hazardous areas we focus on slopes of 40 percent or steeper. Based on this criterion, the segment alignment intersects or passes within 150 feet of potential landslide hazard areas in the same locations identified above under "steep slopes."
- **Erosion:** The southern half of the segment passes through an erosion hazard area, from the vicinity of 136th Avenue NE and SE 1st Street to the Lakeside substation near SE 26th Street, for a total of about 1.5 miles.
- **Seismic:** No seismic risk is mapped along the segment. No known active faults intersect the proposed segment.
- **Coal mine:** No coal mine hazards are mapped along or near this segment.

Segment F

General

- **Alignment:** Segment F begins at the termination of Segments B and D in Bellevue just north of the intersection between SE 1st Street and Main Street. From there it heads south along the old railroad ROW, west across I-405 at SE 9th Street, then continues south sub parallel to the west side of I-405 and along 118th Avenue SE and the old railroad ROW to SE 32nd Street for a total distance of approximately 2.1 miles.
- **Terrain:** The segment begins on a relatively flat railroad grade, constructed within a west-facing slope. Just south of SE 5th Street it heads down a steep slope and through relatively flat terrain toward SE 9th Street where it turns west and heads upslope to cross over the I-405 corridor. The then head down 118th Avenue SE. The segment follows 118th Avenue SE to the south over relatively flat terrain for about 0.7 mile, before turning southeast and following the railroad to SE 32nd Street.

- **Geology:** Fraser-age continental glacial till (Qgt) is mapped across the northern and southern portions of the segment. Small areas of pre-Fraser continental glacial drift and nonglacial deposits (Qgpc) and Fraser-age advance continental glacial outwash (Qga) are mapped along the center of the segment. Peat deposits are mapped west of the segment close to I-90 and near 118th Avenue SE, and may possibly underlie a portion of the segment.
- **Soil:** Soil units include Alderwood gravelly sandy loam, Bellingham silt loam, Kitsap silt loam and Seattle muck. Soils are generally classified by the NRCS as silty gravel (GM) and silt (ML) depending on the area, and based on USCS standards.

Hazard Areas

- **Steep slopes:** Steep slopes (greater than 40 percent) are mapped along much of the segment except for a distance of about 0.4 mile, just south of the intersection between SE 8th Street and I-405.
- **Landslide:** As described for Segment C potential landslide areas in Bellevue, in our identification of potentially hazardous areas we focus on slopes of 40 percent or steeper. Based on this criterion, the segment alignment intersects or passes within 150 feet of potential landslide hazard areas in the same locations identified above under "steep slopes."
- **Erosion:** Erosion hazard areas are mapped along the segment from the vicinity of I-405 and SE 8th Street to the southern end of the segment; a total distance of about 1.5 miles, or over two thirds of the segment length.
- **Seismic:** No seismic risk is mapped along the segment. An east to west trending reverse fault (part of the Seattle fault zone) passes through the southernmost portion of the segment, in south Bellevue.
- **Coal mine:** No coal mine hazards are mapped along or near this segment.

Segment G1

General

- **Alignment:** Segment G1 generally trends east-west, beginning on the northwest side of the intersection of I-405 and I-90 in Bellevue. It extends east across I-405 toward SE 31st Street, and then southeast to follow SE 32nd Street to Richards Road, for a total distance of approximately 0.5 mile. This segment connects to Segment G2 that in turn extends east to Lakeside substation.
- **Terrain:** This segment passes through only developed areas and relatively flat topography with the exception of embankments along the I-405 corridor.
- **Geology:** Pre-Fraser continental glacial drift and nonglacial deposits (Qgpc) and Fraser-age continental glacial till (Qgt) deposits are mapped across the western portion of the segment; Fraser-age continental glacial recessional outwash (Qgo) is mapped in the east portion near the vicinity of SE 32nd Street and Richards Road.
- **Soil:** Soil units include Alderwood gravelly sandy loam, Arents Alderwood material, and Everett-Alderwood gravelly sandy loam. Soils are generally classified by the NRCS as silty sand (SM) and silty gravel (GM) depending on the area, based on the USCS standards.

Hazard Areas

- **Steep slope:** Steep slopes (greater than 40 percent) are predominately mapped along the I-405 corridor and along about 0.1 mile of the segment, north and south of SE 32nd Street.
- **Landslide:** As described for Segment C potential landslide areas in Bellevue, in our identification of potentially hazardous areas we focus on slopes of 40 percent or steeper. Based on this criterion, the segment alignment intersects or passes within 150 feet of potential landslide hazard areas in the same locations identified above under "steep slopes."
- **Erosion:** An erosion hazard area is mapped along less than 0.2 mile of the segment where it is crosses I-405.
- **Seismic:** No seismic risk is mapped along the segment. No known active faults intersect the proposed segment; however, this segment is located within the Seattle fault zone.
- **Coal mine:** No coal mine hazards are mapped along or near this segment.

Segment G2

General

- **Alignment:** Segment G2 located in Bellevue begins at the east end of Segment G1 then heads east to the Lakeside substation. The segment heads north along Richards Road and then east along SE 30th Street to 130th Avenue SE where it turns north-northeast to the substation, for a total distance of approximately 0.7 mile.
- **Terrain:** This segment extends through developed areas and relatively flat terrain.
- **Geology:** Fraser-age continental glacial outwash (Qgo) is mapped across over half of the length of this segment; Fraser-age continental glacial till (Qgt) is mapped across the remaining 0.3 mile, covering the eastern portion of the segment.
- **Soil:** Soil units include Everett-Alderwood gravelly sandy loam and Everett gravelly sandy loam. Soils are generally classified by the NRCS as silty gravel (GM) based on the USCS standards.

Hazard Areas

- **Steep slope:** Steep slopes (greater than 40 percent) are predominately mapped along about 0.2 mile of the segment west of Richards Road, between SE 32nd Street and SE 30th Street.
- **Landslide:** As described for Segment C potential landslide areas in Bellevue, in our identification of potentially hazardous areas we focus on slopes of 40 percent or steeper. Based on this criterion, the segment alignment intersects or passes within 150 feet of potential landslide hazard areas in the same locations identified above under "steep slopes."
- **Erosion:** An erosion hazard area extending less than 0.1 mile along the segment is mapped near the intersection of Richards Road and SE 30th Street.
- **Seismic:** No potential seismic hazards are mapped along the segment. A reverse fault (part of the Seattle fault zone) trending roughly east-west passes through the northernmost portion of the segment.
- **Coal mine:** No coal mine hazards are mapped along or near this segment.

Segment H

General

- **Alignment:** Segment H begins near the intersection of SE 32nd Street and 118th Avenue SE in Bellevue, and follows the old railroad ROW south to just south of Coal Creek, for a total distance of approximately 1.1 mile.
- **Terrain:** This segment is generally located part way down a 150- to 300-foot-high railroad embankment slope. After crossing Coal Creek Parkway SE, the segment will follow the railroad ROW along the top of a 20- to 30-foot-high railroad embankment for a distance of about 700 feet, passing between main roads and neighborhoods.
- **Geology:** Pre-Fraser continental glacial drift and nonglacial deposits (Qgpc) are mapped in the north portion of the segment, and Fraser-age continental glacial till (Qgt) in the central portion. Less dense deposits of Fraser-age continental glacial outwash (Qgo) and Quaternary alluvium (Qa) are mapped at the southern end of the segment.
- **Soil:** Soil units include Alderwood gravelly sandy loam. Soil along this segment is generally classified by the NRCS as silty gravel (GM) or peat (PT) based on the USCS standards.

Hazard Areas

- **Steep slope:** Steep slopes (greater than 40 percent) are present within the buffer along the entire length of the segment.
- **Landslide:** As described for Segment C potential landslide areas in Bellevue, in our identification of potentially hazardous areas we focus on slopes of 40 percent or steeper. Based on this criterion, the segment alignment intersects or passes within 150 feet of potential landslide hazard areas in the same locations identified above under "steep slopes."
- **Erosion:** The entire length of the segment is mapped as an erosion hazard area.
- **Seismic:** Seismic risk is mapped along about 0.2 mile of the segment, from the vicinity of the intersection of Newport Key and Lake Washington Boulevard SE to the end of the segment, south of Coal Creek.
- **Coal mine:** No coal mine hazards are mapped along or near this segment.

Segment I

General

- **Alignment:** Segment I begins south of the Lakeside substation where Segments G1 and G2 meet, near the intersection of SE 32nd Street and Richards Road in Bellevue. The segment heads south along Richards Road, crossing the I-90 corridor, and then south along Factoria Boulevard to Coal Creek Parkway SE.
- **Terrain:** The segment passes through developed areas and relatively flat terrain.
- **Geology:** Continental glacial outwash (Qgo) is mapped for approximately 0.6 mile from the northern part of the segment to the vicinity of SE 40th Place and Factoria Boulevard SE. The rest of the segment is mapped as Fraser-age continental glacial till (Qgt). A small area of Eocene nearshore sedimentary rocks (OEn) is mapped near the vicinity of SE 44th Street and Factoria Boulevard SE.

- **Soil:** Soil units include Alderwood gravelly sandy loam, Bellingham silt loam, Everett-Alderwood gravelly sandy loam, Indianola loamy fine sand, Seattle muck, Norma sandy loam. Soil along this segment is generally classified by the NRCS as silty sand (SM), silty gravel (GM), or peat (PT) based on the USCS standards.

Hazard Areas

- **Steep slope:** Steep slopes (greater than 40 percent) are predominately mapped in the northern part of the segment at the I-90 corridor, between SE 40th Lane and SE 41st Place for about 0.1 mile, and from SE Newport Way to Coal Creek Parkway SE about 0.2 mile. These steep slopes mainly appear related to grading for development and infrastructure improvements.
- **Landslide:** As described for Segment C potential landslide areas in Bellevue, in our identification of potentially hazardous areas we focus on slopes of 40 percent or steeper. Based on this criterion, the segment alignment intersects or passes within 150 feet of potential landslide hazard areas in the same locations identified above under "steep slopes."
- **Erosion:** No areas along the segment are mapped as erosion hazards.
- **Seismic:** No seismic risk is mapped along the segment.
- **Coal mine:** No coal mine hazards are mapped along or near this segment.

Segment J

General

- **Alignment:** Segment J begins at the Lakeside substation, and follows the existing transmission line corridor south to SE Newport Way, then southwest to the intersection with Coal Creek Parkway SE just south of Forest Drive SE, for a total of approximately 2.4 miles.
- **Terrain:** This segment passes through predominately developed land in Bellevue. It will begin on relatively flat terrain and climb gradually for about 0.3 mile to SE Eastgate Way, and then continue on relatively flat terrain through developed and privately owned land to its southwestern extent.
- **Geology:** The majority of the northern part of this segment is mapped as Fraser-age continental glacial outwash (Qgo). Surface geology along the rest of the segment is mapped as Fraser-age continental glacial till (Qgt), except for a small area (less than 0.1 mile) mapped as of Eocene nearshore sedimentary rocks (OEn) located near the vicinity of the intersection between SE 44th Street and SE 43rd Street.
- **Soil:** Soil units include Alderwood gravelly sandy loam, Alderwood and Kitsap soils, Arents Alderwood material, Beausite gravelly sandy loam, Everett gravelly sandy loam, and Indianola loamy fine sand. Soil along this segment is generally classified by the NRCS as silty sand (SM) or silty gravel (GM) based on the USCS standards.

Hazard Areas

- **Steep slope:** Steep slopes (greater than 40 percent) are mapped for approximately 0.2 mile in the northern part of the segment (north and adjacent to the I-90 corridor); and along much of the segment south of SE Newport Way.

- **Landslide:** As described for Segment C potential landslide areas in Bellevue, in our identification of potentially hazardous areas we focus on slopes of 40 percent or steeper. Based on this criterion, the segment alignment intersects or passes within 150 feet of potential landslide hazard areas in the same locations identified above under "steep slopes."
- **Erosion:** Erosion hazard areas are mapped along most of the south portion of the segment south of SE Newport Way.
- **Seismic:** No seismic risk is mapped along the segment.
- **Coal mine:** No coal mine hazards are mapped along or near this segment.

Segment K1

General

- **Alignment:** Segment K1 begins on the west side of I-405 and south of Coal Creek Parkway SE (end of Segment H), and heads southeast following Coal Creek Parkway SE to the intersection of Factoria Boulevard SE (end of Segment I), for a total of approximately 0.6 mile within Bellevue.
- **Terrain:** This segment extends along a portion of the Coal Creek drainage, crossing the I-405 corridor and then following Coal Creek Parkway SE for the remainder of the segment.
- **Geology:** Quaternary alluvium (Qa) is mapped across the western 0.3 miles, then Fraser-age continental glacial till (Qgt) is mapped across about the next 0.1 miles, and Fraser-age continental glacial outwash (Qgo) mapped across most of the remainder of the segment.
- **Soil:** Soil units include Alderwood gravelly sandy loam, Alderwood and Kitsap soils, and Norma sandy loam. Soil along this segment is generally classified by the NRCS as silty gravel (GM) or silty sand (SM), based on the USCS standards.

Hazard Areas

- **Steep slope:** Steep slopes (greater than 40 percent) are mapped along the entire length of the segment, mainly along cut and fill roadway embankments.
- **Landslide:** As described for Segment C potential landslide areas in Bellevue, in our identification of potentially hazardous areas we focus on slopes of 40 percent or steeper. Based on this criterion, the segment alignment intersects or passes within 150 feet of potential landslide hazard areas in the same locations identified above under "steep slopes."
- **Erosion:** An erosion hazard area is mapped along Coal Creek Parkway SE; approximately 0.3 mile total.
- **Seismic:** Seismic risk is mapped along about 0.3 mile of the segment, from the vicinity of 124th Avenue SE to the western end of the segment.
- **Coal mine:** No coal mine hazards are mapped along or near this segment.

Segment K2

General

- **Alignment:** Segment K2 extends southeast from east end of Segment K1, following Coal Creek Parkway SE from Factoria Boulevard SE to Coal Creek. The total length of Segment K2 is about 0.9 mile, in Bellevue.
- **Terrain:** This segment begins along the southern edge of a topographic plateau along Coal Creek Parkway SE, and extends through an area where the roadway gradually cuts into the slope as it heads southeast, and then gradually follow topographies downhill toward Coal Creek.
- **Geology:** Fraser-age continental glacial till (Qgt) is predominately mapped along this segment, but Fraser-age advance continental glacial outwash (Qga) is mapped for about 0.2 mile in the central portion of the segment.
- **Soil:** Soil units include Alderwood gravelly sandy loam, Alderwood and Kitsap soils, and Norma sandy loam. Soil along this segment is generally classified by the NRCS as silty gravel (GM) or silty sand (SM), based on the USCS standards.

Hazard Areas

- **Steep slope:** Steep slopes (greater than 40 percent) are mapped along much of the entire length of the segment.
- **Landslide:** As described for Segment C potential landslide areas in Bellevue, in our identification of potentially hazardous areas we focus on slopes of 40 percent or steeper. Based on this criterion, the segment alignment intersects or passes within 150 feet of potential landslide hazard areas in the same locations identified above under “steep slopes.”
- **Erosion:** Erosion hazard areas are mapped along nearly the entire length of the segment. Only approximately 0.15 mile at the northwestern tip is not mapped as an erosion hazard.
- **Seismic:** Seismic risk is mapped for a distance less than 0.1 mile adjacent to the northern part of the segment, near the intersection of Coal Creek Parkway SE and Factoria Boulevard SE.
- **Coal mine:** No coal mine hazards are mapped along or near this segment.

Segment L

General

- **Alignment:** Segment L begins in Bellevue near I-405 and Coal Creek Parkway SE at the south end of Segment H. The segment heads south on the west side of I-405, subparallel to the shoreline of Lake Washington, enters Newcastle, continuing south to the south end of Gene Coulon Park in Renton where it then turns east to cross the I-405 corridor before heading southeast along an existing transmission line corridor toward east Renton where it ends just south of SE 3rd Street, on the north side of the Cedar River. The total length of Segment L is about 6.9 miles.
- **Terrain:** This segment will follow Lake Washington Boulevard North, close to the Lake Washington shoreline. The northern two-thirds of the segment will experience very little change in elevation and pass through both developed and undeveloped land. As the segment continues southeast from I-405 it slowly climbs in elevation across both developed and undeveloped land.

- **Geology:** Holocene fill (Qf), Quaternary alluvium (Qa), Fraser-age advance continental glacial outwash (Qga), Fraser-age continental glacial recessional outwash (Qgo), Fraser-age continental glacial drift (Qpgc), and Fraser-age continental glacial till (Qgt) are mapped along portions of this segment. The north portion of the segment is mapped as continental glacial drift (Qpgc), Fraser-age advance continental glacial outwash (Qga), and Fraser-age continental glacial recessional outwash (Qgo). Alluvium (Qa) is mapped in the north central portion of the segment (former May Creek delta) from the vicinity of the intersection between Lake Washington Boulevard NE and NE 51st Street to about North 40th Place and Williams Avenue North. Recessional outwash (Qgo) is mapped from this point along Lake Washington Boulevard North to about North 32nd Street where continental glacial till (Qgt) and continental glacial drift (Qpgc) are mapped to near the north end of Gene Coulon Park and from near the south end of the Park to the end of the segment. Fill (Qf) is mapped in a small section of the southern portion of the segment near Gene Coulon Park. Additionally, although not shown on the geologic maps, previous explorations document that surficial deposits of peat are present in the northern part of the segment.
- **Soil:** Soil units include Alderwood gravelly sandy loam, Alderwood and Kitsap soils, Bellingham silt loam, Briscot silt loam, Everett gravelly sandy loam, Indianola fine sand, Kitsap silt loam, Norma sandy loam, Ragnar-Indianola association, and Seattle muck. Soil along this segment is generally classified by the NRCS as silty gravel (GM) or silty sand (SM), based on the USCS standards. Pits are also present within the buffer.

Hazard Areas

- **Steep slope:** Steep slopes (greater than 40 percent) occur along much of the northern part of the segment, from Coal Creek Parkway SE in Bellevue to about SE 68th Street in a portion of King County north of the Renton limits. Steep slopes also occur intermittently from SE 68th Street to Gene Coulon Park in Renton, at the I-405 corridor crossing to about Sunset Boulevard, and along much of the southern end of the segment.
- **Landslide:** In Bellevue and Newcastle, criteria for a potential landslide areas include slopes of 15 percent or more, which is shown on the attached hazard maps. However, in our identification of potentially hazardous areas, we focus on areas with slopes 40 percent or steeper. Based on this criterion, the segment alignment in Bellevue and Newcastle intersects or passes within 150 feet of potential landslide hazard areas in the same locations identified above under "steep slopes." In King County jurisdictional areas, potential landslide hazard areas are mapped along the segment from the proximity of SE 66th Street to the King County - Renton boundary (about 0.35 mile). In Renton, potential landslide areas are based off Renton GIS data. Focusing on mapped landslide hazard areas which also are located on slopes greater than 40 percent, we identify that potential hazards are primarily located in the following areas: between North 40th Street to North 26th Street (about 1.1 miles); just north of North 20th Street (about 0.1 mile); about 0.25 mile from about North 20th Street to SR-900; about 0.1 mile from WA-900 to Sunset Boulevard NE; intermittently from Sunset Boulevard NE to NE 4th Street (about 0.2 mile); and intermittently from NE 3rd Street to Glennwood Place SE (about 0.2 mile).
- **Erosion:** Erosion hazard areas are mapped along the segment in the following areas: from the vicinity of Decatur Key near the northern part of the segment to the vicinity of SE 61st Street (about 1.4 miles); and then from SE 64th Street to the King County – Newcastle boundary (about 0.4 mile);

from the vicinity of North 29th Street to just south of North 27th Place (about 0.2 mile); and from North 20th Street to NE 3rd Street (about 1.9 miles).

- **Seismic:** Potential seismic hazard areas are mapped west of the segment along the shoreline of Lake Washington in Bellevue, from the northern end of the segment to the Bellevue-King County boundary. In Newcastle, potential seismic hazard areas are mapped along the segment alignment from the King County – Newcastle to North 40th Street, and then on the west side of the alignment from North 40th Street to the vicinity of NE Park Drive, that is along most of the portion of the segment near Lake Washington, totaling almost 5 miles.
- **Coal mine:** No coal mine hazards are mapped along or near this segment.

Segment M

General

- **Alignment:** Segment M begins in Bellevue at the south end of Segments J and K2, near the intersection of Coal Creek Parkway SE and Coal Creek. The segment heads southwest along an existing transmission line corridor toward the intersection of SE 60th Street and 128th Avenue SE, turn directly south for about 2.3 miles through Newcastle to near NE 25th Street and 128th Avenue SE in Renton, and then angle southwest and south to meet Segment L just south of SE 3rd Street, on the north side of the Cedar River. This segment follows along the existing PSE ROW. Segment M covers a total distance of about 5.3 miles.
- **Terrain:** This segment will begin in the middle of the Coal Creek drainage valley, but immediately head southwest and upslope to relatively flat and developed terrain. South of 125th Avenue SE the segment will run along the top of a topographic high and then slope back down toward May Creek in Newcastle. The segment then climbs over a developed area before crossing Honey Dew Creek in Renton, where it then will remain on relatively flat land until the southern end of the segment.
- **Geology:** Surface geology mapped along the proposed segment alignment includes Fraser-age advance continental glacial outwash (Qga), Fraser-age continental glacial outwash (Qgo), Fraser-age continental glacial till (Qgt), eocene volcanoclastic deposits or rocks (Evc(t)), and Eocene nearshore sedimentary rocks (OEn), Glacial till (Qgt) is mapped across the north portion of the segment to near the south Newcastle city limits. Recessional outwash (Qgo) and glacial outwash (Qga) are mapped to the south in the central part of the segment where it crosses May Creek. To the south of the May Creek area, the segment crosses glacial till (Qgt), glacial advance outwash (Qga) and glacial outwash (Qgo). Eocene bedrock is mapped at isolated areas, including the north end of the segment in Bellevue and in Newcastle near SE 80th Way,
- **Soil:** Soil units include Alderwood gravelly sandy loam, Alderwood and Kitsap soils, Arents-Alderwood material, Arents Everett material, Everett gravelly sandy loam, Indianola fine sand, Orcas peat, and Ovall gravelly loam. Soil along this segment is generally classified by the NRCS as silty gravel (GM) or silty sand (SM), based on the USCS standards.

Hazard Areas

- **Steep slope:** Steep slopes (greater than 40 percent) are concentrated in the following areas: along about 0.3 mile of the segment near Coal Creek, from Coal Creek Parkway SE to SE 60th Street; along about 0.1 mile at the May Creek area between about SE May Creek Park Drive and SE 95th Way; along about 0.1 mile at the Honey Dew Creek crossing between about SE 104th Street to

NE 18th Street; and a total of about 0.2 mile of the segment between NE 4th Street and the end of the segment.

- **Landslide:** As described for Segment L, in our identification of potential landslide areas in Bellevue and Newcastle we focus on slopes of 40 percent or steeper. Based on this criterion, the segment alignment through Bellevue and Newcastle intersects or passes within 150 feet of potential landslide hazard areas in the same locations identified above under "steep slopes." In Renton, potential hazard areas are mapped between Newport Court NE and NE 16th Street (about 0.15 mile), about 0.1 mile near NE 12th Street, and a few hundred feet near the intersection of NE 6th Street and Monroe Avenue NE.
- **Erosion:** In Newcastle, potential erosion hazard areas are predominately mapped along the alignment from the vicinity of SE 78th Place to about 0.1 mile north of SE 95th Way (about 2.5 miles). In the city of Renton, potential erosion hazard areas are mapped from the vicinity of SE 104th Street to NE 17th Street (about 0.2 mile).
- **Seismic:** No seismic hazards are mapped along this segment.
- **Coal mine:** No coal mine hazards are mapped along or near this segment.

Segment N

General

- **Alignment:** Segment N begins in east Renton at the end of Segments L and M, just south of SE 3rd Street. The segment will head southeast across the Cedar River valley, up the valley wall to the vicinity of SE 8th Street and Harrington Place SE, and then turn west to the Talbot Hill substation, for a total of about 1.3 miles.
- **Terrain:** This segment heads down and then back up the steep slopes of a Cedar River valley, turns west, passes over about 0.1 mile of variable terrain, and finally crosses relatively flat terrain to the end of the segment.
- **Geology:** Surface geology includes pre-Fraser continental glacial drift and nonglacial deposits (Qgpc), Fraser-age continental glacial outwash (Qgo), Fraser-age continental glacial till (Qgt), Quaternary alluvium (Qa) and Eocene marine sedimentary rocks (OEm). Recessional outwash (Qgo) is mapped for only about 0.1 mile at the northern tip of the segment; alluvium (Qa) is mapped in the Cedar River valley floor for about 0.1 mile.
- **Soil:** Soil units include Alderwood gravelly sandy loam, Alderwood and Kitsap soils, Arents-Alderwood material, Everett gravelly sandy loam, Indianola fine sand, and Puyallup fine sandy loam. Soil along this segment is generally classified by the NRCS as silty gravel (GM) or silty sand (SM), based on the USCS standards.

Hazard Areas

- **Steep slope:** Steep slopes (greater than 40 percent) are mapped across the Cedar River valley, for about 0.2 mile from SE 3rd Street to Highway 169, about 0.1 mile from Cedar River Trail to SE 8th Street, and about 0.1 mile from Harrington Place SE for about 0.15 mile west along the segment.

- **Landslide:** Potential landslide hazard areas are present along the segment alignment from SE 4th Street to WA-169 (about 0.15 mile), for about 0.15 mile from SE 8th Street both northward and westward along the alignment, and for a few hundred feet near the northwest corner of the Talbot Hill substation.
- **Erosion:** Erosion hazard areas in the segment are located along both sides of the Cedar River valley.
- **Seismic:** Seismic risk is mapped for about 0.1 mile along the segment in the Cedar River valley.
- **Coal mine:** No coal mine hazards are mapped along or near this segment.

CONCLUSIONS AND RECOMMENDATIONS

General

Geologic conditions for each segment are presented above in the Geologic Hazards Areas section of this report, and are also summarized in Table 1. In general, soil conditions across the entire project area will vary from very soft peat to loose sandy alluvium to recessional (unconsolidated) granular deposits, to very dense glacially consolidated till and outwash deposits. Bedrock is mapped in the area and may be present at isolated locations in Factoria (Segment I, Figure 27), within the Somerset/Newport Hills area (Segment J, Figures 29 and 30), near the Coal Creek corridor (Segments J, K2 and M, Figure 32), in the Newcastle area (Segment M, Figure 41), and on the south valley wall of the Cedar River valley (Segment N, Figure 46). A description of anticipated soil conditions and general guidelines for future explorations for each segment is presented in the following sections of this report.

In general, the ability of the soils to withstand the anticipated downward and lateral loads will be lowest where peat or alluvium are present and highest where glacially consolidated deposits are present. Deeper and possibly larger diameter foundations will likely be necessary where loose or soft deposits are present.

Segment A

Segment A is about 0.6 miles in length. We anticipate that Segment A would include at least one dead end structure at the substation, with two heavy angle poles and tangent poles situated along the segment alignment. The eastern portion of Segment A follows along an existing PSE ROW. We anticipate that the eastern third to quarter of this segment will encounter loose alluvial deposits, and that the remainder of the segment will encounter mainly granular deposits which have been glacially consolidated and glacial till. Existing subsurface information is limited along this segment and generally only present near the existing Sammamish substation.

For Segment A, we recommend that an exploration be completed at the following locations:

- At the dead-end structure by the existing substation;
- At each heavy angle structure;
- One additional exploration between the Sammamish substation and the heavy angle structure to the south;
- About 500 feet apart on the main east-west tangent; and
- One at the southern terminus of this segment

Segment B

Segment B is about 6.2 miles in length, and starts near the Willows Creek drainage on the east edge of the upland portion of west Redmond, jogs to the west across the upland Kirkland areas until it reaches the I-405 corridor at about NE 70th Street, and follows the I-405 corridor on the east side and moves slightly to the east through Bellevue to its terminus near Main Street. We anticipate that Segment B would have six to eight heavy angle structures and three to four light angle structures. Most of Segment B is outside of existing PSE ROW, but portions of it appear to follow the old railroad tracks through Bellevue and follow existing street ROWs.

We anticipate that Segment B will mainly encounter glacially consolidated deposits, with the exception of a small area near Bellevue Lake which may encounter surficial deposits of peat below fill. The northern portion of this segment crossing the upland portion of Kirkland has scattered existing information near the proposed alignment. Along I-405 north of SR 520, limited explorations are available, mainly along the I-405 corridor. Near and south of SR 520, numerous existing subsurface explorations are available.

For Segment B, we recommend that an exploration be completed at the following locations:

- At each heavy angle structure;
- About every 0.75 to 1 mile, except for where existing information is sufficient to reduce this number, along the tangent and light angle structure areas; and
- At least two additional explorations will likely be appropriate for the tangent portion situated along the old railroad tracks west of Bellevue Lake. Depending on the pole spacing relative to existing explorations, more than two additional explorations might be recommended.

Segment C

Segment C is about 3.7 miles in length and extends from the south end of Segment A in Kirkland fairly straight south to just south of SR 520. We anticipate that Segment C might not have any dead end structures, and would likely have only one to three heavy and light angle structures. Segment C follows along an existing PSE ROW.

We anticipate that Segment C will mainly encounter glacially consolidated till and advance outwash deposits. Very few existing explorations are present along this segment. For Segment C, we recommend that an exploration be completed at the following locations:

- At each heavy angle structure; and
- About every 1 mile along the remainder.

Segment D

Segment D is about 2.1 miles in length and extends from the southern terminus of Segment C south of SR 520 southwest along Bel-Red Road, and terminates at the southern terminus of Segment B near Main Street and SE 1st Street. We anticipate that Segment D might have five to eight heavy angle structures, and possibly two to five light angle structures.

We anticipate that Segment D will mainly encounter recessional outwash, glacially consolidated till and advance outwash deposits. Limited existing subsurface information is present along portions of this segment. For Segment D, we recommend that an exploration be completed at the following locations:

- At each heavy angle structure; and
- About every 1 mile along the remainder, except for where existing information is sufficient to reduce this number.

Segment E

Segment E is about 3 miles in length and extends from the southern terminus of Segment C due south along the 140th Avenue NE roadway and terminates at the Lakeside substation. We anticipate that Segment E will mainly have tangent structures except for possibly at the substation.

We anticipate that Segment E will mainly encounter recessional outwash, glacially consolidated till and advance outwash deposits. Existing subsurface information is present at isolated portions of this segment. For Segment E, we recommend that explorations be completed at the following locations:

- At the dead end structure (if needed at the substation); and
- About every 0.75 to 1 mile along the tangent portions, except for where existing information is sufficient to reduce this number.

Segment F

Segment F is about 2.1 miles in length and extends from the southern terminus of Segments B/D to the south on the east side of I-405 near the old railroad tracks, crosses I-405 and continues south along 118th Avenue SE and on the railroad tracks on the west side of I-405, terminating just north of I-90. We anticipate that Segment F might have four to six heavy angle and two to four light angle structures.

We anticipate that Segment F will mainly encounter recessional outwash, glacially consolidated till and advance outwash deposits. Existing subsurface information is present at limited locations along the alignment and near the I-405 corridor. A small portion of Segment F south of SE 8th Street might encounter peat deposits although the peat is mapped further to the west. For Segment F, we recommend that an exploration be completed at the following locations:

- At each heavy angle structure;
- About every 1 mile along the remainder, except for where existing information is sufficient to reduce this number; and
- Where existing information suggests that peat might be present near the alignment, additional explorations might be appropriate at every pole structure.

Segment G1

Segment G1 is about 0.5 miles in length and extends to the east on the north side of I-90 from the southern terminus of Segment F to the western terminus of Segment G2. We anticipate that Segment G1 might have one to two heavy angle and two to three light angle structures.

We anticipate that Segment G2 will mainly encounter glacially consolidated till across most of the segment with the exception of the west end, where glacial drift is mapped, and the east end where recessional outwash is mapped. Only limited existing subsurface information is available, mainly at each end of the segment and along the I-405 corridor. For Segment G1, we recommend that an exploration be completed at the following locations:

- At each heavy angle structure; and
- About every 1 mile along the remainder and at each terminus of this segment.

Segment G2

Segment G2 is about 0.7 miles in length and extends to the east of Segment G1 to the Lakeside substation. We anticipate that Segment G2 might have two to three heavy and one to three light angle structures.

We anticipate that Segment G2 will mainly encounter glacially consolidated till across the northern portion and recessional outwash deposits across the southern/western portion. Only limited existing subsurface information is available, mainly at each end of the segment. For Segment G2, we recommend that an exploration be completed at the following locations:

- At each heavy angle structure; and
- About every 1 mile along the remainder and at each terminus of this segment.

Segment H

Segment H is about 1.1 miles in length and extends to the south from the southern terminus of Segment F, continues to the south between 118th Avenue SE and 120th Avenue SE and continues to the south west of I-405 to just south of the Coal Creek Parkway underpass with I-405. Segment H might have seven to 10 light or heavy angle structures.

We anticipate that Segment H will encounter variable soil conditions along its alignment, varying from possible fill near the I-405 and I-90 interchange, to loose and/or soft alluvium at the southern portion across the Coal Creek drainage, to glacially consolidated deposits along most of the alignment. Although the alignment is east of the mapped peat deposits, existing explorations located just west of the proposed alignment near the I-90 corridor but outside of the mapped peat area, did encounter peat. Existing subsurface information is mainly present near the I-90 corridor and near Coal Creek Parkway. For Segment H, we recommend that an exploration be completed at the following locations:

- At each heavy angle structure;
- At every light angle structure where glacial till is not mapped;
- About every 1 mile along the remainder and at each terminus of this segment; and
- Near the southern terminus in the area with mapped alluvium.

Segment I

Segment I is about 1.2 miles in length and extends to the south from the western terminus of Segment G2, crossing I-90 and continuing south along Factoria Boulevard, terminating at the intersection

with Coal Creek Parkway. We anticipate that Segment I might have one to four heavy and one to three light angle structures.

We anticipate that Segment I will mainly encounter recessional outwash deposits across the northern and glacially consolidated till across the southern portion. Bedrock is shown along a portion of the alignment about 800 to 1,000 feet in distance near the intersection with SE Newport Way. At this time, there are not sufficient existing explorations to determine if and/or how deep bedrock is present in this area. Some existing subsurface information is present along Factoria Boulevard. For Segment I, we recommend that an exploration be completed at the following locations:

- At each heavy angle structure;
- At every light angle structure where glacial till is not mapped;
- At every pole structure near mapped bedrock; and
- About every 1 mile along the remainder and at each terminus of this segment except where existing information is sufficient to reduce this number.

Segment J

Segment J is about 2.4 miles in length and extends to the south from the Lakeside substation across the I-90 corridor, up and over the Somerset Hills, and terminates at Coal Creek parkway. We anticipate that Segment J might have one to two heavy and two to four light angle structures.

We anticipate that Segment J will mainly encounter recessional outwash deposits across the northern portion and glacially consolidated till across the southern portion. Bedrock is shown to intersect a small portion of the alignment near the top of Somerset Hill. Very little existing subsurface information is available along this segment. For Segment J, we recommend that an exploration be completed at the following locations:

- At each heavy angle structure;
- At every pole structure near mapped bedrock; and
- About every 1 mile along the remainder and at each terminus of this segment.

Segment K1

Segment K1 is about 0.6 miles in length and is a short segment connecting Segments H and L to Segments I and K2. Segment K1 goes west to east, crossing I-405 and following along Coal Creek Parkway to the intersection with Factoria Boulevard. Segment K1 might have one to two heavy and one to four light angle structures.

We anticipate that Segment K1 will encounter alluvial deposits overlying glacially consolidated deposits across the western third of the segment, and recessional outwash deposits and glacially consolidated till across the remainder of the project. Only limited existing subsurface information is present along this segment. For Segment K1 we recommend that an exploration be completed at the following locations:

- At each heavy angle structure;
- At every light angle structure where glacial till is not mapped; and

- About every 1 mile along the remainder and at each terminus of this segment.

Segment K2

Segment K2 is about 0.9 mile in length and is a short segment connecting Segments K1 and I to Segment M. Segment K2 goes south, following along Coal Creek Parkway to where the existing ROW veers off of the roadway. Segment K1 might have one to two dead end structures, and five to eight light or heavy angle structures.

We anticipate that Segment K2 will encounter mainly glacially consolidated glacial till and advance outwash. Very little existing subsurface information is available for along this segment. We recommend that an exploration be completed at the following locations:

- At each heavy angle structure;
- At every light angle structure where glacial till is not mapped; and
- About every 1 mile along the remainder and at each terminus of this segment.

Segment L

Segment L is about 6.9 miles in length and is a long segment which closely follows the Lake Washington shoreline south of Newport Shores. Segment L starts south of Coal Creek, following the old railroad tracks present on the west side of I-405, and continues following the railroad tracks to just south of Gene Coulon Park, at which point the segment jogs to the east, crosses I-405, and continues south to the upland portion of Renton, terminating just north of the Cedar River Valley. Segment L might have six to eight heavy and more than 20 light angle structures.

We anticipate that the northern portion of Segment L will encounter glacially consolidated and recessional deposits, alluvial deposits along the portion through the Hazelwood area, outwash and glacial deposits south of Hazelwood, fill and alluvium in the lower Renton area by Gene Coulon Park, and glacial drift and outwash deposits across the remainder southern portion of the segment. Limited existing subsurface information is present at scattered locations along this segment. For Segment L we recommend that an exploration be completed at the following locations:

- At each heavy angle structure;
- At every light angle structure where glacially consolidated soils are not mapped;
- About every 0.25 miles along the tangent portions where alluvium or fill is mapped; and
- About every 0.75 to 1 mile along the remainder and at each terminus of this segment, except where existing information is sufficient to reduce this number.

Segment M

Segment M is about 5.3 miles in length and extends from the south end of Segments K2 and J near Coal Creek Parkway south across King County, Newcastle and North Renton, terminating in the upland portion of Renton north of the Cedar River Valley. Segment M might have three to four heavy and two to four light angle structures.

We anticipate that Segment M will encounter mainly glacially consolidated till across the northern half, glacially consolidate till, advance outwash, and recessional outwash across the May Creek Drainage area, and recessional outwash across the southern portion of the segment. Bedrock is mapped along a short portion of this segment near the intersection of 128th Lane SE and 129th Place SE in the southern portion of Newcastle. Very little existing subsurface information is present along this segment. For Segment M we recommend that an exploration be completed at the following locations:

- At each heavy angle structure;
- At every light angle structure where glacially consolidated soils are not mapped;
- At every pole structure within the area mapped as bedrock; and
- About every 0.75 to 1 mile along the remainder and at each terminus of this segment, except where existing information is sufficient to reduce this number.

Segment N

Segment N is about 1.3 miles in length and crosses from the upland portion of Renton across the Cedar River valley and back up to the Talbot Hill substation. Segment N might have six to eight heavy and two to three light angle structures.

We anticipate that Segment N will encounter recessional outwash and glacial drift north of the Cedar River Valley, and glacial drift and glacial till south of the valley. Bedrock is mapped on the south valley wall. Very little existing subsurface information is present along this segment except at the Talbot Hill substation. We recommend that an exploration be completed at the following locations:

- At each heavy angle structure;
- At every light angle structure where glacially consolidated soils are not mapped; and
- About every 0.75 to 1 mile along the remainder and at each terminus of this segment, except where existing information is sufficient to reduce this number. Where the distance between heavy angle structures is more than 2,000 feet but less than 2 miles, one centered between the heavy angle structures.

LIMITATIONS

We have prepared this report for the exclusive use of PSE and their authorized agents for the Energize Eastside project located in King County, Washington.

The purpose of our services was to review published data and observe the existing surface conditions along the transmission line corridor as a basis for developing an opinion regarding the presence of geologic hazards. Within the limitations of scope, schedule and budget, our services have been executed in accordance with generally accepted practices in the field of geotechnical engineering in this area at the time this report was prepared. No warranty or other conditions, express or implied, should be understood.

Please refer to Appendix B, titled "Report Limitations and Guidelines for Use," for additional information pertaining to use of this report.

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TABLES

GeoEngineers

DSD 001224

Table 1. Definitions of Terms for Hazardous Areas, as Defined by Jurisidictional Codes

Jurisdictions	Landslides Hazard Areas	Erosion Hazard Areas	Seismic Hazard Areas	Steep Slopes Criteria	Coal Mine Hazard Areas
Redmond	1. Areas of historic failures, such as: (a) Areas designated as quaternary slumps or landslides on maps published by the United States Geologic Survey (USGS), or (b) Those areas designated by the United States Department of Agriculture (USDA) Soil Conservation Service (SCS) as having a "severe" limitation for building site development. 2. Areas containing a combination of slopes steeper than 15 percent, springs or groundwater seepage, and hillsides intersecting geologic contacts with a relatively permeable sediment overlying a relatively impermeable sediment or bedrock. 3. Areas that have shown movement during the Holocene epoch (from 10,000 years ago to the present) or which are underlain or covered by mass wastage debris of that epoch. 4. Slopes that are parallel or subparallel to planes of weakness in subsurface materials. 5. Slopes having gradients steeper than 80 percent subject to rockfall during seismic shaking. 6. Areas potentially unstable as a result of rapid stream incision, stream bank erosion, and undercutting by wave action. 7. Any area with a slope 40 percent or steeper with a vertical relief of 10 feet or more.	Lands or areas underlain by soils identified by the U.S. Department of Agriculture Soil Conservation Service (SCS) as having "severe" or "very severe" rill and inter-rill erosion hazards. This includes, but is not limited to, the following group of soils when they occur on slopes of 15 percent or greater: 1. Alderwood-Kitsap (AkF) 2. Alderwood gravelly sandy loam (AgD) 3. Kitsap silt loam (KpD) 4. Everett (EvD) 5. Indianola (InD)	Lands or areas subject to severe risk of damage as a result of earthquake-induced ground shaking, slope failure, settlement, or soil liquefaction.	An area which is equal to or in excess of 40 percent slope.	Mine hazard areas are not defined by the city of Redmond.
Kirkland	**Moderate** landslide hazard areas: areas sloping between 15 percent and 40 percent and underlain by relatively permeable soils consisting largely of sand and gravel or highly competent glacial till. **High** landslide hazard areas: areas sloping 40 percent or greater, areas subject to previous landslide activities and areas sloping between 15 percent and 40 percent with zones of emergent groundwater or underlain by or embedded with impermeable silts or clays.	Areas containing soils which, according to the USDA Soil Conservation Service King County Soil Survey dated 1973, may experience severe to very severe erosion hazard. This group of soils includes, but is not limited to, the following when they occur on slopes of 15 percent or greater: 1. Alderwood gravelly sand loam (AgD) 2. Kitsap silt loam (KpD), Ragnar Indianola Association (RdE) 3. Portions of the Everett gravelly sand loams (EvD) 4. Indianola Loamy fine sands (InD)	Those areas subject to severe risk of earthquake damage as a result of seismically induced settlement or soil liquefaction, which conditions occur in areas underlain by cohesionless soils of low density usually in association with a shallow groundwater table.	An area which has a grade over 15 percent.*	Mine hazard areas are not defined by the city of Kirkland.
Bellevue	Areas of slopes of 15 percent or more with more than 10 feet of rise, which also display any of the following characteristics: 1. Areas of historic failures, including those areas designated as Quaternary slumps, earthflows, mudflows, or landslides. 2. Areas that have shown movement during the Holocene Epoch (past 13,500 years) or that are underlain by landslide deposits. 3. Slopes that are parallel or subparallel to planes of weakness in subsurface materials. 4. Slopes exhibiting geomorphological features indicative of past failures, such as hummocky ground and back-rotated benches on slopes. 5. Areas with seeps indicating a shallow ground water table on or adjacent to the slope face. 6. Areas of potential instability because of rapid stream incision, stream bank erosion, and undercutting by wave action.	(Not defined in the Bellevue Land Use or Zoning Code.)	(Not defined in the Bellevue land use and zoning code).	Slopes of 40 percent or more that have a rise of at least 10 feet and exceed 1000 square feet in area.	Areas designated on the Coal Mine Areas (CMA) maps or in the general regulations of the City's Coal Mine Areas (LUC 20.25H.130).

Jurisdictions	Landslides Hazard Areas	Erosion Hazard Areas	Seismic Hazard Areas	Steep Slopes Criteria	Coal Mine Hazard Areas
Newcastle	Areas in the city subject to severe risks of landslides, including the following: 1. Any area with a combination of: (a) Slopes steeper than 15 percent (b) Impermeable soils, such as silt and clay, frequently interbedded with granular soils, such as sand and gravel, and (c) Springs or groundwater seepage 2. Any area which has shown movement during the Holocene epoch, from 10,000 years ago to the present, or which is underlain by mass wastage debris from that epoch. 3. Any area potentially unstable as a result of rapid stream incision, stream bank erosion or undercutting by wave action. 4. Any area which shows evidence of or is at risk from snow avalanches. 5. Any area located on an alluvial fan, presently subject to or potentially subject to inundation by debris flows or deposition of stream-transported sediments.	Areas in the city of Newcastle underlain by soils which are subject to severe erosion when disturbed. Such soils include but are not limited to those classified as having a severe to very severe erosion hazard according to the USDA Soil Conservation Service, the 1973 King County Soils Survey, or any subsequent revisions or addition by or to these sources. These soils include, but are not limited to: 1. Any occurrence of River Wash ("Rh") and any of the following when they occur on slopes 15 percent or steeper: (a) The Alderwood gravelly sandy loam (AgD) (b) The Alderwood and Kitsap soils (AkF) (c) The Beausite gravelly sandy loam (BeD and BeF) (d) The Kitsap silt loam (KpD) (e) The Ovall gravelly loam (OvD and OvF)	Areas in the city of Newcastle subject to severe risk of earthquake damage as a result of soil liquefaction in areas underlain by cohesionless soils of low density and usually in association with a shallow groundwater table or of other seismically induced settlement.	An area which is equal to or in excess of 40 percent slope.	Coal mine hazard areas are not defined by the city of Newcastle.
Renton	**Low**: Areas with slopes less than fifteen percent (15%). **Medium** : Areas with slopes between 15 percent and 40 percent and underlain by soils that consist largely of sand, gravel or glacial till. **High**: Areas with slopes greater than 40 percent, and areas with slopes between 15 percent and 40 percent and underlain by soils consisting largely of silt and clay. **Very High**: Areas of known mappable landslide deposits.	**Low**: Areas with soils characterized by the Natural Resource Conservation Service (formerly U.S. Soil Conservation Service) as having slight or moderate erosion potential, and that slope less than 15%. **High**: Areas with soils characterized by the Natural Resource Conservation Service (formerly U.S. Soil Conservation Service) as having severe or very severe erosion potential, and that slope more steeply than 15%.	**Low:** Areas underlain by dense soils or bedrock. **High**: Areas underlain by soft or loose, saturated soils.	Steep slopes are not defined by the city of Renton, but are included on the city's "Sensitive Areas" map.	**Low**: Areas with no known mine workings and no predicted subsidence. While no mines are known in these areas, undocumented mining is known to have occurred. **Medium**: Areas where mine workings are deeper than 200 feet for steeply dipping seams, or deeper than 15 times the thickness of the seam or workings for gently dipping seams. These areas may be affected by subsidence. **High**: Areas with abandoned and improperly sealed mine openings and areas underlain by mine workings shallower than two hundred feet (200 ft) in depth for steeply dipping seams, or shallower than fifteen (15) times the thickness of the seam or workings for gently dipping seams. These areas may be affected by collapse or other subsidence.
King County	Geologic features that together present hazards to development both above and below the landslide. Such hazards include slope failures, large-scale block failures, debris flows, rock falls, rapid undercutting by stream erosion or wave action, and snow avalanches. Landslide hazard areas may be separated into two varieties for the purposes of considering the applicable development restrictions: 1. Landslide hazard areas that are also steep slopes (> 40% grade). 2. Landslide hazard areas that are on slopes of less than 40% grade.	Areas thought to be underlain by soils that are subject to severe erosion when exposed. The definition for erosion hazard areas includes, but is not limited to, several particular soil types that commonly erode rapidly because of the nature of their constituents and the engineering properties of the soil.	Areas where the foundation soils may be subject to liquefaction (loss of strength and bearing capacity) or lateral spreading during an earthquake.	Slopes greater than 40% grade and greater than 10 feet tall.	**Low** ('Declassified') coal mine hazard areas are those areas where the risk of catastrophic collapse is not significant and that the hazard assessment report has determined do not require any special engineering or hazard mitigation. These areas typically include sites not underlain by underground workings and sites underlain by underground workings that are in excess of 300 feet below the surface. **'Moderate'** coal mine hazard areas are those areas that pose significant risk of property damage because of coal mine subsidence, but that can be mitigated through special engineering or architectural recommendations. These areas often include areas underlain or directly affected by abandoned underground workings that are less than 300 feet deep or with overburden cover-to-seam thickness ratios of less than 10 to one, depending on the inclination of the seam. **High** ('Significant') coal mine hazard areas include those sites that pose a significant risk of catastrophic surface collapse, such as unmitigated openings (portals, adits, mine shafts, sinkholes, improperly filled mine openings) and other areas of past or probable surface collapse, including shallow subsurface workings extending to a depth of 100 feet.

Notes:

Shading indicates jurisdictional metadata was available and used for this project.

* "Steep slopes" are not specifically defined in Kirkland codes in the context of critical areas, sensitive areas, or geologic hazards. Steep slope grade is thus borrowed from Ch. 115.20, in which the following is stated concerning the housing of animals in residential zones: "Paddock areas shall not be located on "steep slopes (over 15 percent grade)..." (115.20.5.(e)(1)(c).

Table 2

Summary of Geologic Hazards
PSE Energize Eastside Project
King County, Washington

Segment	Geol. units*	NRCS Soils; *Parent Material*	USCS Soil Type***	Steep Slopes	Erosion	Landslides	Active Intersecting Faults***	Seismic	Coal Mine Hazards
A	Qa Qgu Qga(t) Qga Qgt	Alderwood gravelly sandy loam; *basalt till with some volcanic ash* Indianola loamy fine sand; *glacial till*	GM SM	Steep slopes are intermittently mapped along the greenbelt, and in the center of the southwestern extent of the segment (less than 0.1 mile total), and along about 0.1 mile at the southern end of the segment.	Areas susceptible to erosion are predominately mapped in the eastern third and southwest portions of the segment, and extend less than 0.5 mile.	Approximately 0.1 to 0.25 mile in the center of the segment and about 0.1 mile near the southern end of the segment are mapped as potential landslide hazard areas.	No intersecting active faults	Seismic risk is mapped within the segment in the area immediately south of the Sammamish substation.	No coal mine hazards
B	Qga(t) Qga Qgt Qgo	Alderwood gravelly sandy loam; *basalt till with some volcanic ash* Arents, Alderwood material; *basalt till* Everett gravelly sandy loam; *glacial outwash with some volcanic ash* Indianola loamy fine sand; *glacial till* Kitsap silt loam; *lacustrine deposits with some volcanic ash* Norma sandy loam; *alluvium* Seattle muck; *grassy organic material*	GM SM	Segment B passes through Redmond, Kirkland, and King County jurisdictions. In Redmond, steep slopes are located east of NE 89th Ct for about 0.2 mile. The city of Kirkland designates a slope as "steep" when it has a slope of 15 percent or steeper. However, GeoEngineers recognizes that slopes critical in design and most likely to be a hazard are generally defined as those which are generally 40 percent or steeper. Based on this criteria, steep slopes in Kirkland frequently occur in small localized areas along the segment; many of which are likely the result of past infrastructure grading. Areas along the segment more consistently mapped as steep slopes occur between NE 70th St and NE 60th St, and again from about NE 48th Pl to the Kirkland - Bellevue city boundaries. In Bellevue, steep slopes are observed along the segment between NE 34th St and NE 30th Pl (about 0.2 mile), near crossings of WA-520 and NE 12th St, as well as along the southernmost 0.3 mile of the segment. There are only small isolated steep slopes along the portion of the segment within King County.	Areas susceptible to erosion are mapped for about 0.2 mile at the northern end of the segment in Redmond and for about 0.5 mile between SR 520 and NE 12th Street in Bellevue.	In Redmond, the alignment crosses potential landslide hazard areas for about 0.2 mile at the northern end of the segment. In Kirkland and Bellevue, criteria for potential landslide areas include slopes of 15 percent or steeper, which is shown on the attached hazard maps. However, using a 40% criteria, the segment alignment intersects or passes within 150 feet of potential landslide hazard areas in the same locations identified above under "steep slopes."	No intersecting active faults	No areas of seismic risk are mapped along the segment.	No coal mine hazards
C	Qga(t) Qga Qgt Qgo	Alderwood gravelly sandy loam; *basalt till with some volcanic ash* Arents, Alderwood material; *basalt till* Bellingham silt loam; *alluvium* Everett gravelly sandy loam; *glacial outwash with some volcanic ash* Indianola loamy fine sand; *glacial till*	GM SM	From north to south, steep slopes are predominately mapped in Redmond within the Willows Creek drainage north of Redmond Way for about 0.3 mile, and in Bellevue mapped south of NE 40th St for about 0.1 mile, and north of NE 24th Street for about 0.15 mile.	Areas susceptible to erosion are mapped at the northern and southern ends of the segment, and two small areas are crossed along the segment, for a total distance of less than 0.5 mile.	In Redmond, potential landslide hazard areas are mapped in the same locations as identified above under "steep slopes." In Bellevue, we focus on areas with slopes 40 percent or steeper. Based on this criterion, the segment alignment intersects or passes within 150 feet of potential landslide hazard areas in the same locations identified above under "steep slopes."	No intersecting active faults	No seismic risk is mapped along the segment.	No coal mine hazards
D	Qga Qgt Qgo	Alderwood gravelly sandy loam; *basalt till with some volcanic ash* Bellingham silt loam; alluvium Everett gravelly sandy loam; *glacial outwash with some volcanic ash* Norma sandy loam; *alluvium*	SM GM ML	Steep slopes are scattered along the segment, but greater concentrations occur along the southern portion. These include approximately 0.25 mile along Bel Red Road between 120th Avenue NE and 124th Avenue NE, less than 0.1 mile at 120th Avenue NE and NE 5th Street, and approximately 0.1 mile along the south side of NE 1st Street. Most of the steep slopes in the area are outside of the actual segment alignment.	No areas along the segment/buffer are mapped as erosion hazards	As described for Segment C potential landslide areas in Bellevue, the segment alignment intersects or passes within 150 feet of potential landslide hazard areas in the same locations identified above under "steep slopes."	No intersecting active faults	No seismic risk is mapped along the segment.	No coal mine hazards
E	Qga Qgo Qgt	Alderwood gravelly sandy loam; *basalt till with some volcanic ash* Arents, Alderwood material; *basalt till* Bellingham silt loam; *alluvium* Everett-Alderwood gravelly sandy loam; *basalt till with some volcanic ash* Everett gravelly sandy loam; *glacial outwash with some volcanic ash* Ragnar-Indianola association; *glacial outwash*	GM SM ML	Steep slopes are generally concentrated in the middle portion of Segment E, from the vicinity of Main Street and 136th Avenue NE to SE 20th Street and 130th Place SE, totaling a distance of approximately 1.3 miles along the segment.	The southern half of the segment passes through an erosion hazard area, from the vicinity of 136th Avenue NE and SE 1st Street to the Lakeside substation near SE 26th Street, for a total of about 1.5 miles.	As described for Segment C potential landslide areas in Bellevue, the segment alignment intersects or passes within 150 feet of potential landslide hazard areas in the same locations identified above under "steep slopes."	No intersecting active faults	No seismic risk is mapped along the segment.	No coal mine hazards
F	Qga Qgpc Qgt	Alderwood gravelly sandy loam; *basalt till with some volcanic ash* Bellingham silt loam; *alluvium* Kitsap silt loam; *lacustrine deposits with some volcanic ash* Seattle muck; *grassy organic material*	GM ML	Steep slopes are mapped along much of the segment except for a distance of about 0.4 mile, just south of the intersection between SE 8th Street and I-405.	Erosion hazard areas are mapped along the segment from the vicinity of I-405 and SE 8th Street to the southern end of the segment; a total distance of about 1.5 miles, or over two thirds of the segment length.	As described for Segment C potential landslide areas in Bellevue, the segment alignment intersects or passes within 150 feet of potential landslide hazard areas in the same locations identified above under "steep slopes."	An east to west trending reverse fault (part of the Seattle fault zone) passes through the southernmost portion of the segment, in south Bellevue.	No seismic risk is mapped along the segment.	No coal mine hazards
G1	Qgo Qgt	Alderwood gravelly sandy loam; *basalt till with some volcanic ash* Arents, Alderwood material; *basalt till* Everett-Alderwood gravelly sandy loam; *basalt till with some volcanic ash*	SM GM	Steep slopes are predominately mapped along the I-405 corridor and along about 0.1 mile of the segment, north and south of SE 32nd Street.	An erosion hazard area is mapped along less than 0.2 mile of the segment where it is crosses I-405.	As described for Segment C potential landslide areas in Bellevue, the segment alignment intersects or passes within 150 feet of potential landslide hazard areas in the same locations identified above under "steep slopes."	No known active faults intersect the proposed segment; however, this segment is located within the Seattle fault zone.	No seismic risk is mapped along the segment.	No coal mine hazards

Segment	Geol. units*	NRCS Soils; *Parent Material*	USCS Soil Type***	Steep Slopes	Erosion	Landslides	Active Intersecting Faults***	Seismic	Coal Mine Hazards
G2	Qgo Qgt	Everett-Alderwood gravelly sandy loam; *basalt till with some volcanic ash* Everett gravelly sandy loam; *glacial outwash with some volcanic ash*	GM	Steep slopes are predominately mapped along about 0.2 mile of the segment west of Richards Road, between SE 32nd Street and SE 30th Street.	An erosion hazard area extending less than 0.1 mile along the segment is mapped near the intersection of Richards Road and SE 30th Street.	As described for Segment C potential landslide areas in Bellevue, the segment alignment intersects or passes within 150 feet of potential landslide hazard areas in the same locations identified above under "steep slopes."	A reverse fault (part of the Seattle fault zone) trending roughly east-west passes through the northernmost portion of the segment.	No seismic risk is mapped along the segment.	No coal mine hazards
H	Qa Qgt Qgpc	Alderwood gravelly sandy loam; *basalt till with some volcanic ash*	GM PT	Steep slopes are present within the buffer along the entire length of the segment.	The entire length of the segment is mapped as an erosion hazard area.	As described for Segment C potential landslide areas in Bellevue, the segment alignment intersects or passes within 150 feet of potential landslide hazard areas in the same locations identified above under "steep slopes."	No intersecting active faults but within the Seattle Fault Zone	Seismic risk is mapped along about 0.2 mile of the segment, from the vicinity of the intersection of Newport Key and Lake Washington Boulevard SE to the end of the segment, south of Coal Creek.	No coal mine hazards
I	OEn Qgo Qgt	Alderwood gravelly sandy loam; *basalt till with some volcanic ash* Bellingham silt loam; *alluvium* Everett-Alderwood gravelly sandy loam; *basalt till with some volcanic ash* Indianola loamy fine sand; *glacial till* Seattle muck; *grassy organic material* Norma sandy loam; *alluvium*	SM GM ML	Steep slopes are predominately mapped in the northern part of the segment at the I-90 corridor, between SE 40th Lane and SE 41st Place for about 0.1 mile, and from SE Newport Way to Coal Creek Parkway SE about 0.2 mile. These steep slopes mainly appear related to grading for development and infrastructure improvements.	No areas along the segment are mapped as erosion hazards.	As described for Segment C potential landslide areas in Bellevue, the segment alignment intersects or passes within 150 feet of potential landslide hazard areas in the same locations identified above under "steep slopes."	No intersecting active faults but within the Seattle Fault Zone	No seismic risk is mapped along the segment.	No coal mine hazards
J	OEn Qgo Qgt	Alderwood gravelly sandy loam; *basalt till with some volcanic ash* Alderwood and Kitsap soils; *basalt till with some volcanic ash* Arents, Alderwood material; *basalt till* Beausite gravelly sandy loam; *till over residuum from sandstone* Everett gravelly sandy loam; *glacial outwash with some volcanic ash* Indianola loamy fine sand; *glacial till*	SM GM	Steep slopes are mapped for approximately 0.2 mile in the northern part of the segment (north and adjacent to the I-90 corridor); and along much of the segment south of SE Newport Way.	Erosion hazard areas are mapped along most of the south portion of the segment south of SE Newport Way.	As described for Segment C potential landslide areas in Bellevue, the segment alignment intersects or passes within 150 feet of potential landslide hazard areas in the same locations identified above under "steep slopes."	Approximate E/W trending reverse fault, approximately 5.3 miles in length, passes through southernmost portion of segment E, at junction with segments G2 and J in Bellevue.	No seismic risk is mapped along the segment.	No coal mine hazards
K1	Qa Qga Qgo Qgt	Alderwood gravelly sandy loam; *basalt till with some volcanic ash* Alderwood and Kitsap soils; *basalt till with some volcanic ash* Norma sandy loam; *alluvium*	GM SM	Steep slopes are mapped along the entire length of the segment, mainly along cut and fill roadway embankments.	An erosion hazard area is mapped along Coal Creek Parkway SE; approximately 0.3 mile total.	As described for Segment C potential landslide areas in Bellevue, the segment alignment intersects or passes within 150 feet of potential landslide hazard areas in the same locations identified above under "steep slopes."	No intersecting active faults but within the Seattle Fault Zone	Seismic risk is mapped along about 0.3 mile of the segment, from the vicinity of 124th Avenue SE to the western end of the segment.	No coal mine hazards
K2	Qga Qgt	Alderwood gravelly sandy loam; *basalt till with some ash* Alderwood and Kitsap soils; *basalt till with some ash* Norma sandy loam; *alluvium*	GM SM	Steep slopes are mapped along much of the entire length of the segment.	Erosion hazard areas are mapped along nearly the entire length of the segment. Only approximately 0.15 mile at the northwestern tip is not mapped as an erosion hazard.	As described for Segment C potential landslide areas in Bellevue, the segment alignment intersects or passes within 150 feet of potential landslide hazard areas in the same locations identified above under "steep slopes."	No intersecting active faults but within the Seattle Fault Zone	Seismic risk is mapped for a distance less than 0.1 mile adjacent to the northern part of the segment, near the intersection of Coal Creek Parkway SE and Factoria Boulevard SE.	No coal mine hazards
L	Qa Qgf Qga Qgo Qgpc Qgt	Alderwood gravelly sandy loam; *basalt till with some ash* Alderwood and Kitsap soils; *basalt till with some ash* Briscot silt loam; *alluvium* Kitsap silt loam; *lacustrine deposits with minor ash* Seattle muck; *grassy organic material* Bellingham silt loam; *alluvium* Everett gravelly sandy loam; *glacial outwash with some ash* Indianola loamy fine sand; *glacial till* Norma sandy loam; *alluvium* Ragnar-Indianola association; *glacial outwash* Pits; *NA*	GM SM ML	Steep slopes occur along much of the northern part of the segment, from Coal Creek Parkway SE in Bellevue to about SE 68th Street in a portion of King County north of the Renton limits. Steep slopes also occur intermittently from SE 68th Street to Gene Coulon Park in Renton, at the I-405 corridor crossing to about Sunset Boulevard, and along much of the southern end of the segment.	Erosion hazard areas are mapped along the segment in the following areas: from the vicinity of Decatur Key near the northern part of the segment to the vicinity of SE 61st Street (about 1.4 miles); and then from SE 64th St to the King County – Newcastle boundary (about 0.4 mile); from the vicinity of N 29th St to just south of N 27th Place (about 0.2 mile); and from N 20th St to NE 3rd Street (about 1.9 miles).	In Bellevue and Newcastle, criteria for a potential landslide areas include slopes of 15% or more, which is shown on the attached hazard maps. However, using a 40% criteria, the segment alignment in Bellevue and Newcastle intersects or passes within 150 feet of potential landslide hazard areas in the same locations identified above under "steep slopes." In King County jurisdictional areas, potential landslide hazard areas are mapped along the segment from the proximity of SE 66th St to the King County - Renton boundary (about 0.35 mile). In Renton,potential landslide areas are based off Renton GIS data. Focusing on mapped landslide hazard areas which also are located on slopes greater than 40%, we identify that potential hazards are primarily located in the following areas: between N 40th Street to N 26th St (about 1.1 miles); just north of N 20th St (about 0.1 mile); about 0.25 mile from about N 20th St to SR-900; about 0.1 mile from WA-900 to Sunset Blvd NE; intermittently from Sunset Blvd NE to NE 4th St (about 0.2 mile); and intermittently from NE 3rd St to Glennwood Pl SE (about 0.2 mile).	Two approximate E/W trending faults (part of the Seattle fault) pass through the northern and central parts of segment L, in Bellevue and Renton.	Potential seismic hazard areas are mapped west of the segment along the shoreline of Lake Washington in Bellevue, from the northern end of the segment to the Bellevue-King County boundary. In Newcastle, potential seismic hazard areas are mapped along the segment alignment from the King County – Newcastle to N 40th Street, and then on the west side of the alignment from N 40th Street to the vicinity of NE Park Dr, that is along most of the portion of the segment near Lake Washington, totaling almost 5 miles.	No coal mine hazards

Segment	Geol. units*	NRCS Soils; *Parent Material*	USCS Soil Type***	Steep Slopes	Erosion	Landslides	Active Intersecting Faults***	Seismic	Coal Mine Hazards
M	Evc(t) OEn Qga Qgo Qgt	Alderwood gravelly sandy loam; *basalt till with some ash* Alderwood and Kitsap soils; *basalt till with some volcanic ash* Arents, Alderwood material; *basalt till* Arents, Everett material; *basalt till* Everett gravelly sandy loam; *glacial outwash with some volcanic ash* Indianola loamy fine sand; *glacial till* Orcas peat; *mossy organic material* Ovall gravelly loam; *glacial drift over residuum with some volcanic ash* Pits; *NA*	GM SM	Steep slopes (greater than 40 percent) are concentrated in the following areas: along about 0.3 mile of the segment near Coal Creek, from Coal Creek Parkway SE to SE 60th Street; along about 0.1 mile at the May Creek area between about SE May Creek Park Drive and SE 95th Way; along about 0.1 mile at the Honey Dew Creek crossing between about SE 104th Street to NE 18th Street; and a total of about 0.2 mile of the segment between NE 4th Street and the end of the segment.	In Newcastle, potential erosion hazard areas are predominately mapped along the alignment from the vicinity of SE 78th Pl to about 0.1 mile north of SE 95th Way (about 2.5 miles). In the city of Renton, potential erosion hazard areas are mapped from the vicinity of SE 104th St to NE 17th St (about 0.2 mile).	As described for Segment L, in our identification of potential landslide areas in Bellevue and Newcastle we focus on slopes of 40 percent or steeper. Based on this criterion, the segment alignment through Bellevue and Newcastle intersects or passes within 150 feet of potential landslide hazard areas in the same locations identified above under "steep slopes." In Renton, potential hazard areas are mapped between Newport Ct NE and NE 16th St (about 0.15 mile), about 0.1 mile near NE 12th St, and a few hundred feet near the intersection of NE 6th St and Monroe Ave NE.	Two approximate E/W trending faults (part of the Seattle fault) pass through the northern and central parts of segment M, in Newcastle and Renton.	No seismic hazards are mapped along this segment.	No coal mine hazards
N	OEm Qa Qgo Qgpc Qgt	Alderwood gravelly sandy loam; *basalt till with some volcanic ash* Alderwood and Kitsap soils; *basalt till with some volcanic ash* Arents, Alderwood material; *basalt till* Everett gravelly sandy loam; *glacial outwash with some volcanic ash* Indianola loamy fine sand; *glacial till* Puyallup fine sandy loam; *alluvium* Pits; *NA*	GM SM	Steep slopes (greater than 40 percent) are mapped across the Cedar River valley, for about 0.2 mile from SE 3rd Street to Highway 169, about 0.1 mile from Cedar River Trail to SE 8th Street, and about 0.1 mile from Harrington Place SE for about 0.15 mile west along the segment.	Erosion hazard areas in the segment are located along both sides of the Cedar River valley.	Potential landslide hazard areas are present along the segment alignment from SE 4th Street to WA-169 (about 0.15 mile), for about 0.15 mile from SE 8th St both northward and westward along the alignment, and for a few hundred feet near the northwest corner of the Talbot Hill substation.	No intersecting active faults	Seismic risk is mapped for about 0.1 mile along the segment in the Cedar River valley.	"Moderate" coal mine hazard area mapped along approximately 0.6 mile of the segment/buffer, from Harrington Pl SE to the southwestern extent of the segment/buffer.

Notes:

*arranged from north to south

**Unified Soil Classification System; arranged from most to least common

***Latest Pleistocene to present

FIGURES

GeoEngineers

DSD 001230

Office: RED Path: \\red\projects\0\0186871\GIS\MXD\018687102_Geology_SegmentIndex.mxd Map Revised: 03 November 2014 glohrmeyer

Data Source: ESRI Street Map data.
Geology data from Washington DNR.

Notes:
1. The locations of all features shown are approximate.
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Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet

N W E S

1 0 1
Miles

Vicinity Map and Segment Index

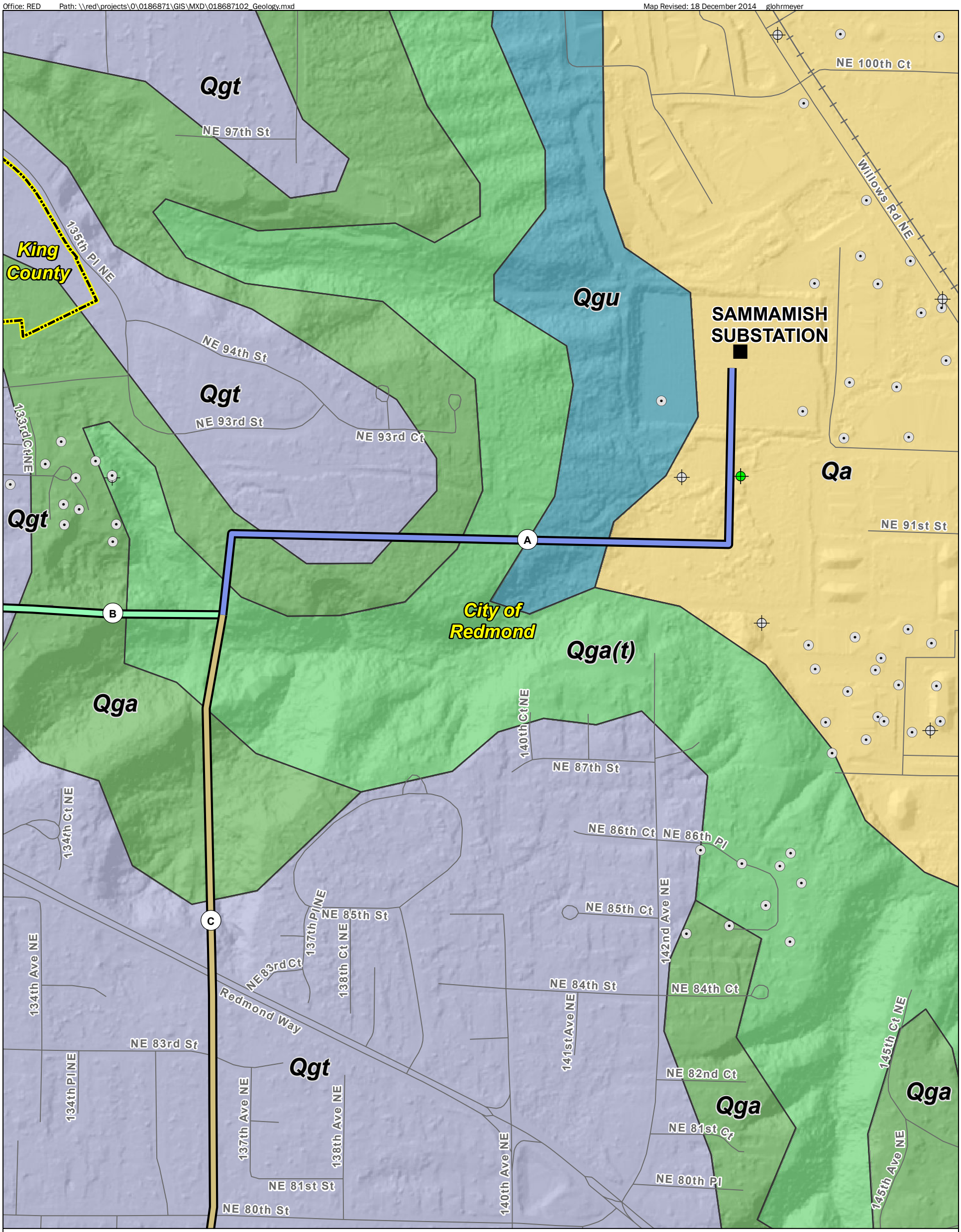
PSE Energize Eastside Project
Geohazards Evaluation
King County, Washington

GeoEngineers

Figure 1

DSD 001231

Office: RED Path: \\red\projects\0\0186871\GIS\MXD\018687102_Geology.mxd Map Revised: 18 December 2014 glohrmeyer



Route Segment
Substation
Seattle Fault Zone
City Boundary
GeoEngineers Geotechnical Project Location

DNR Geotechnical Borings within 150 Foot Buffer

Geotechnical
Test pit

DNR Geotechnical Borings within Project Extent

Geotechnical
Test pit

Geologic Unit (DNR 100k)

Youngest → Oldest

- Qls: mass-wasting deposits, mostly landslides
- Qf - Artificial fill, including modified land
- Qa: Alluvium
- Qp: peat deposits
- Qgo: continental glacial outwash
- Qgt: continental glacial till
- Qgpc: continental glacial drift
- Qgu: glacial drift, undivided
- Qga: advance continental glacial outwash
- Qga(t): advance continental glacial outwash
- Oem: marine sedimentary rocks
- Oen: nearshore sedimentary rocks
- Ec(2r): continental sedimentary deposits or rocks
- Ec(2t) - continental sedimentary deposits or rocks
- Evc(t) - volcaniclastic deposits or rocks
- Water

N W E S

400 0 400
Feet

Data Source: ESRI Street Map data. Geology data from Washington DNR. Topography from King County LiDAR.

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Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet

Geologic Units
Segment A

PSE Energize Eastside Project
Geohazards Evaluation
King County, Washington

GeoEngineers

Figure 2

DSD 001232

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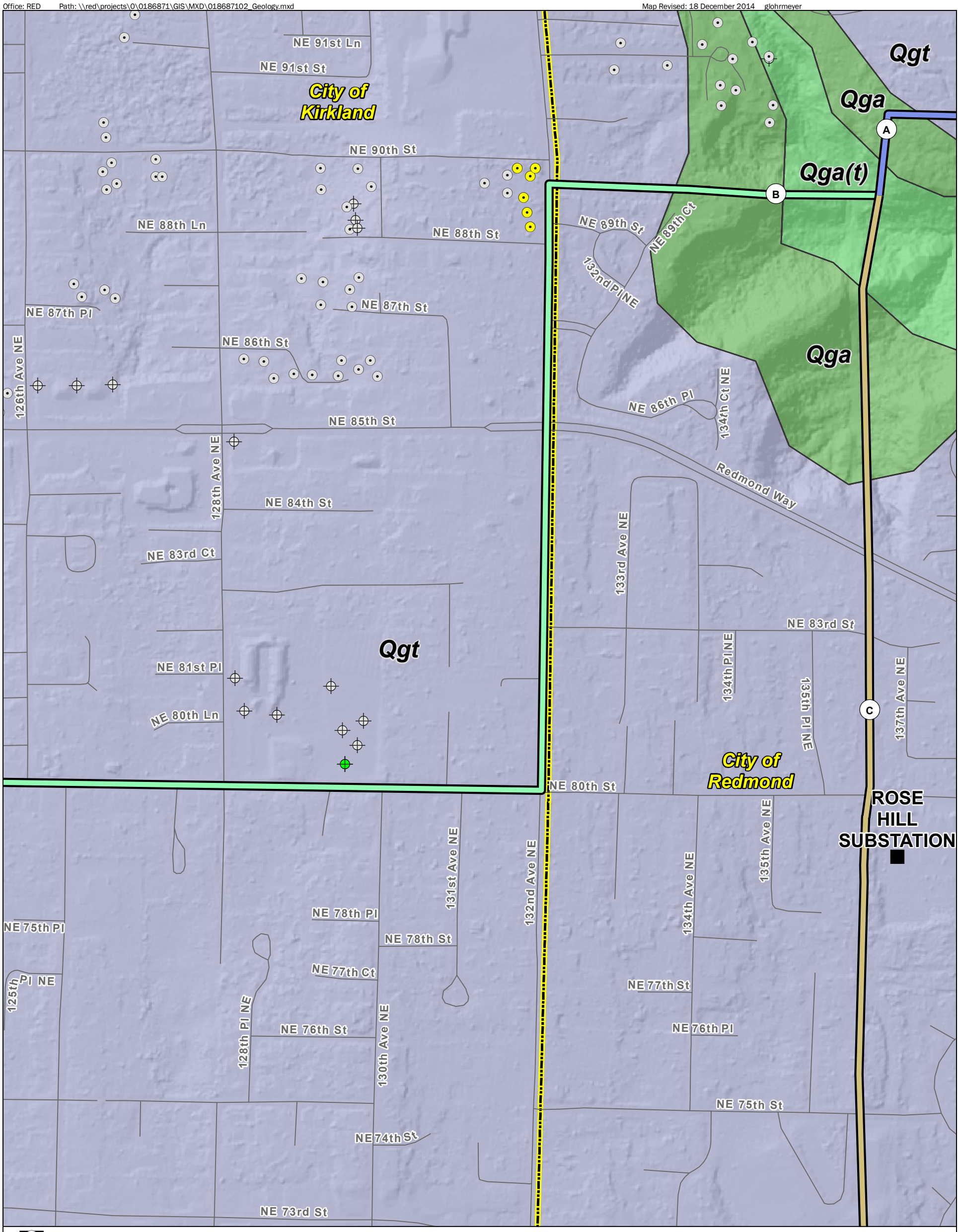

Route Segment
Substation
Seattle Fault Zone
City Boundary
GeoEngineers Geotechnical Project Location

DNR Geotechnical Borings within 150 Foot Buffer

Geotechnical
Test pit

DNR Geotechnical Borings within Project Extent

Geotechnical
Test pit

Data Source: ESRI Street Map data. Geology data from Washington DNR. Topography from King County LiDAR.

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Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet

Geologic Unit (DNR 100k)
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- Ec(2t) - continental sedimentary deposits or rocks
- Evc(t) - volcaniclastic deposits or rocks
- Water

N
W E
S

400 0 400
Feet

Geologic Units
Segment B

PSE Energize Eastside Project
Geohazards Evaluation
King County, Washington

GeoEngineers

Figure 3

DSD 001233

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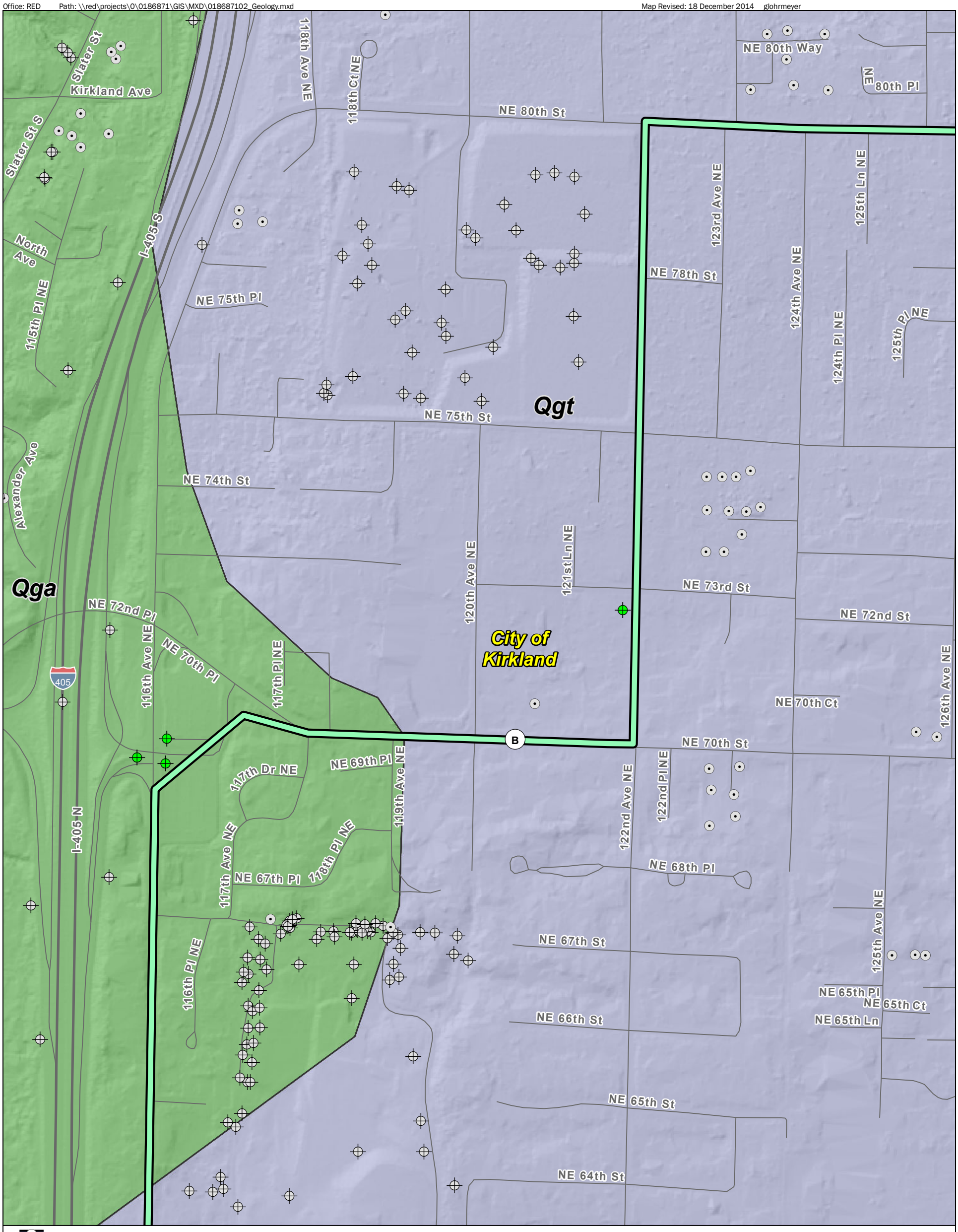

Route Segment
Substation
Seattle Fault Zone
City Boundary
GeoEngineers Geotechnical Project Location

DNR Geotechnical Borings within 150 Foot Buffer

Geotechnical
Test pit

DNR Geotechnical Borings within Project Extent

Geotechnical
Test pit

Geologic Unit (DNR 100k)

Youngest ⟶ Oldest

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- Water

N
W E
S

400 0 400
Feet

Data Source: ESRI Street Map data. Geology data from Washington DNR. Topography from King County LiDAR.

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Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet

Geologic Units
Segment B

PSE Energize Eastside Project
Geohazards Evaluation
King County, Washington

GeoEngineers

Figure 4

DSD 001234

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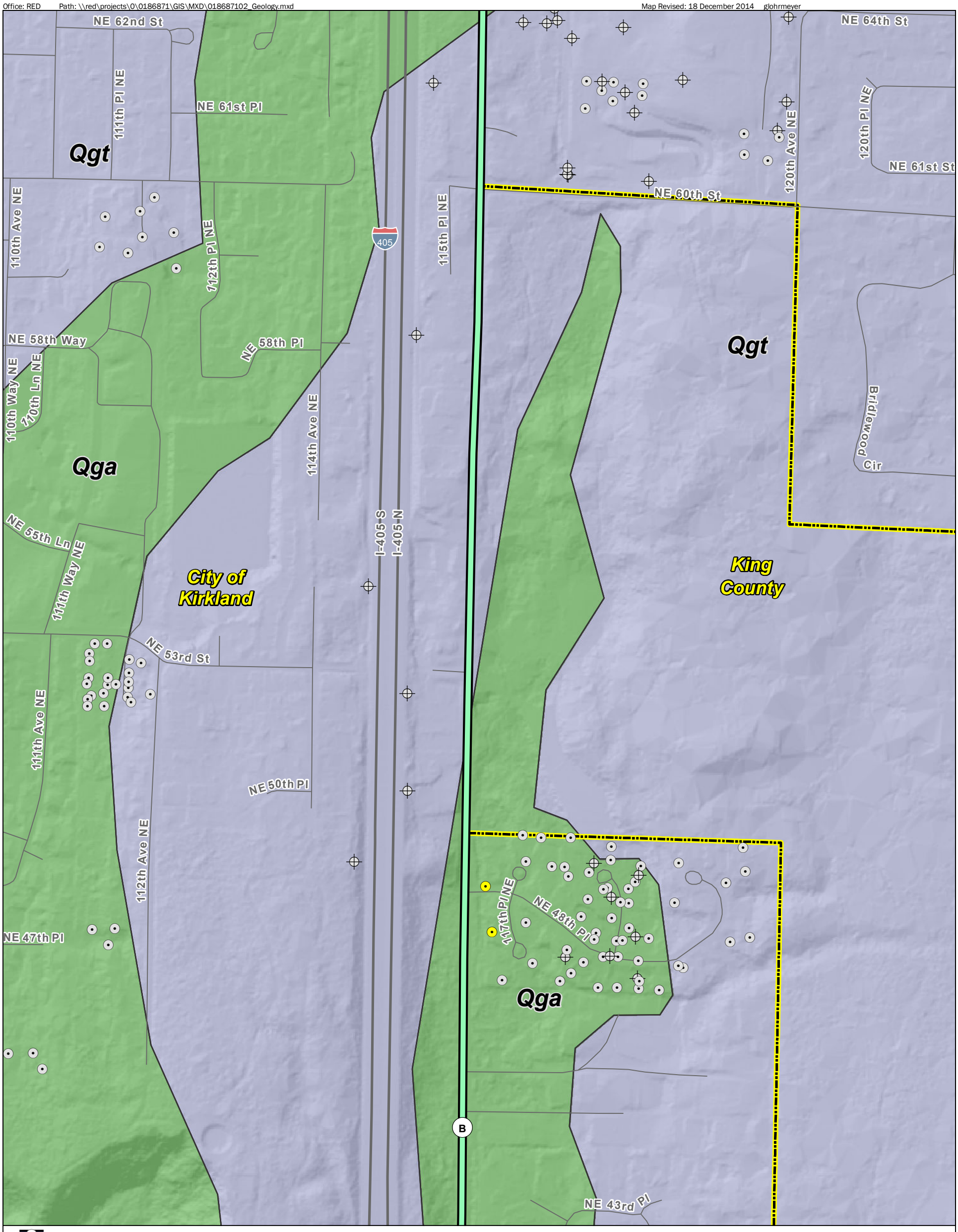

Route Segment
Substation
Seattle Fault Zone
City Boundary
GeoEngineers Geotechnical Project Location

DNR Geotechnical Borings within 150 Foot Buffer

Geotechnical
Test pit

DNR Geotechnical Borings within Project Extent

Geotechnical
Test pit

Geologic Unit (DNR 100k)

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Data Source: ESRI Street Map data. Geology data from Washington DNR. Topography from King County LiDAR.

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Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet

N W E S

400 0 400
Feet

Geologic Units
Segment B

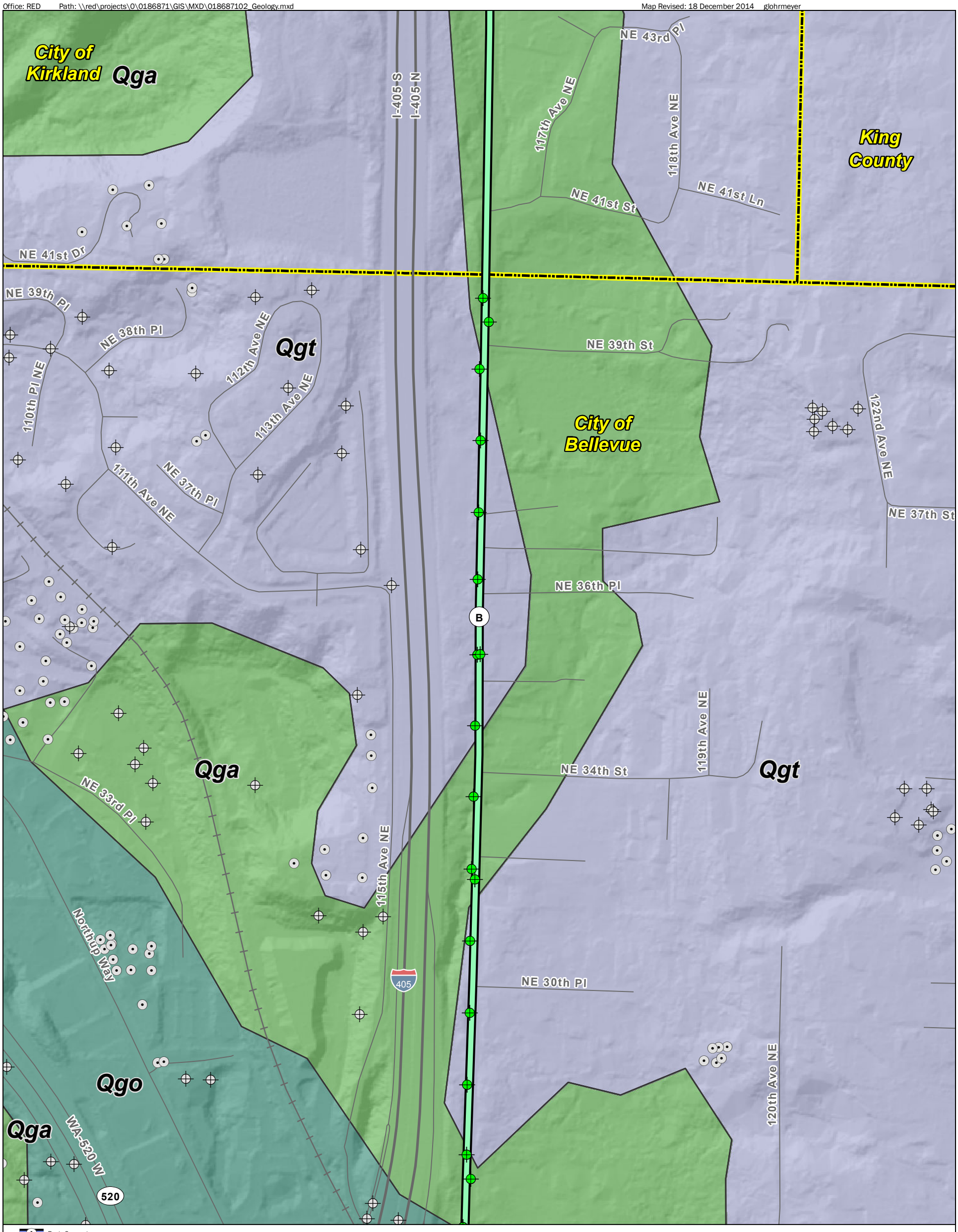
PSE Energize Eastside Project
Geohazards Evaluation
King County, Washington

GeoEngineers

Figure 5

DSD 001235

Office: RED Path: \\red\projects\0\0186871\GIS\MXD\018687102_Geology.mxd Map Revised: 18 December 2014 glohrmeyer



Route Segment
Substation
Seattle Fault Zone
City Boundary
GeoEngineers Geotechnical Project Location

DNR Geotechnical Borings within 150 Foot Buffer

Geotechnical
Test pit

DNR Geotechnical Borings within Project Extent

Geotechnical
Test pit

Data Source: ESRI Street Map data. Geology data from Washington DNR. Topography from King County LiDAR.

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Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet

Geologic Unit (DNR 100k)
Youngest ⟶ Oldest

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- Water

N W E S

400 0 400
Feet

Geologic Units
Segment B

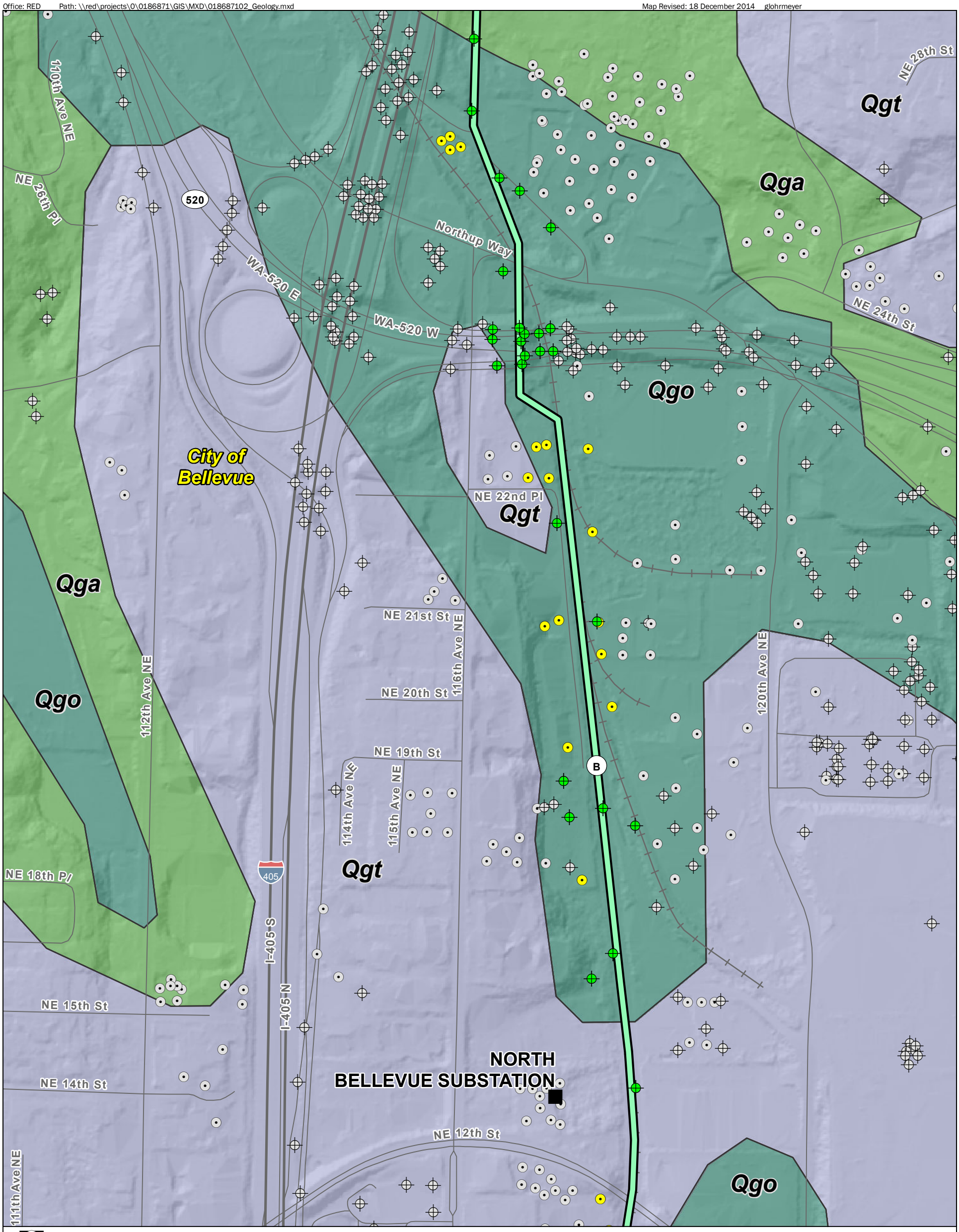
PSE Energize Eastside Project
Geohazards Evaluation
King County, Washington

GeoEngineers

Figure 6

DSD 001236

Office: RED Path: \\red\projects\0\0186871\GIS\MXD\018687102_Geology.mxd Map Revised: 18 December 2014 glohrmeyer



Route Segment
Substation
Seattle Fault Zone
City Boundary
GeoEngineers Geotechnical Project Location

DNR Geotechnical Borings within 150 Foot Buffer

Geotechnical
Test pit

DNR Geotechnical Borings within Project Extent

Geotechnical
Test pit

Geologic Unit (DNR 100k)

Youngest ⟶ Oldest

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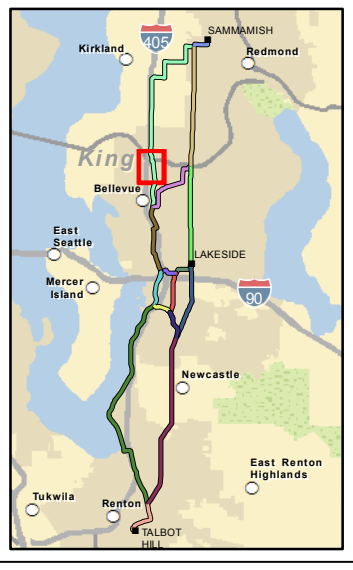
Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet



N W E S

400 0 400
Feet

Geologic Units
Segment B

PSE Energize Eastside Project
Geohazards Evaluation
King County, Washington

GeoEngineers

Figure 7

DSD 001237

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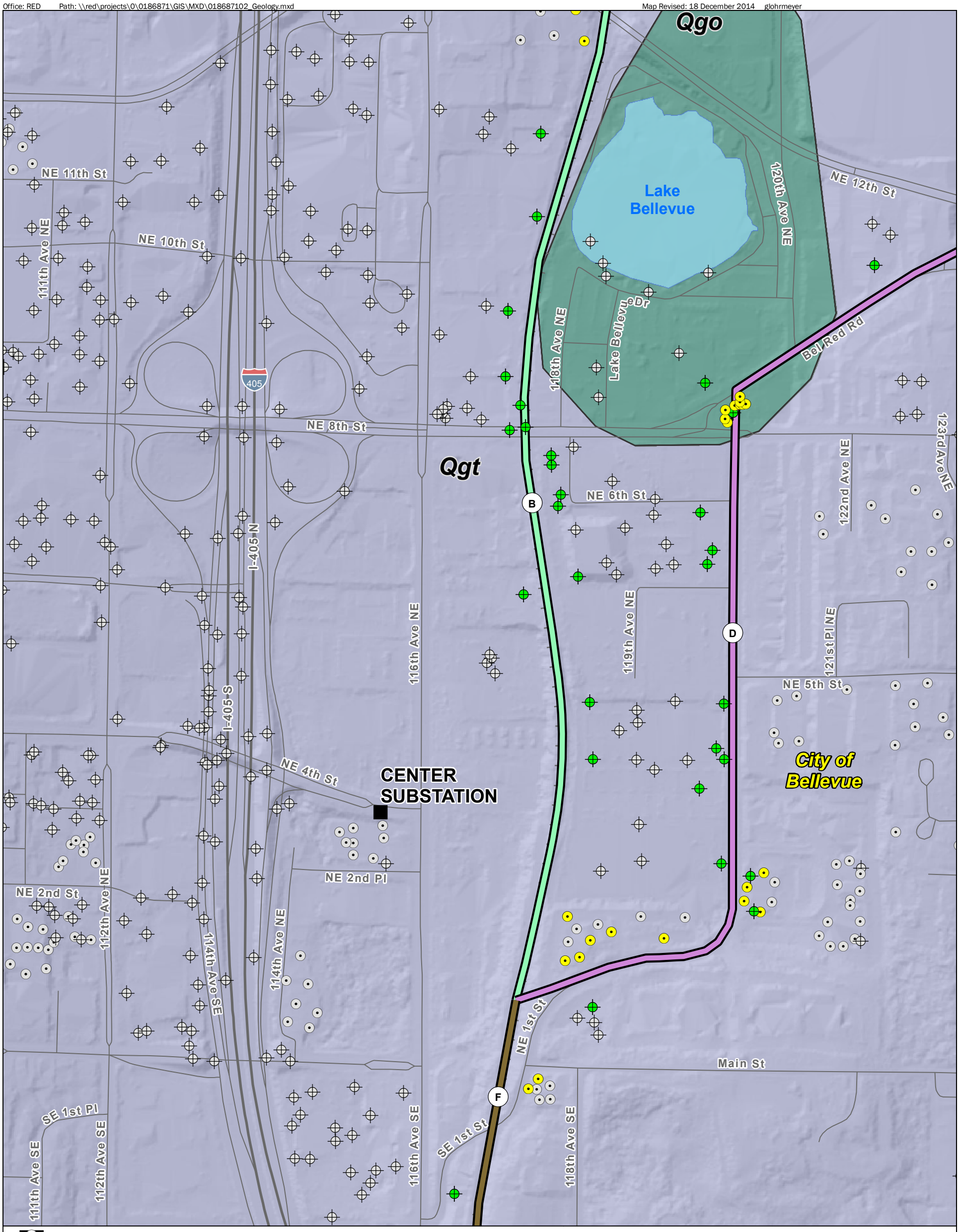

Route Segment

Substation

Seattle Fault Zone

City Boundary

GeoEngineers Geotechnical Project Location

DNR Geotechnical Borings within 150 Foot Buffer

Geotechnical

Test pit

DNR Geotechnical Borings within Project Extent

Geotechnical

Test pit

Geologic Unit (DNR 100k)

Youngest → Oldest

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- Water

N W E S

400 0 400

Feet

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Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet

Geologic Units
Segment B

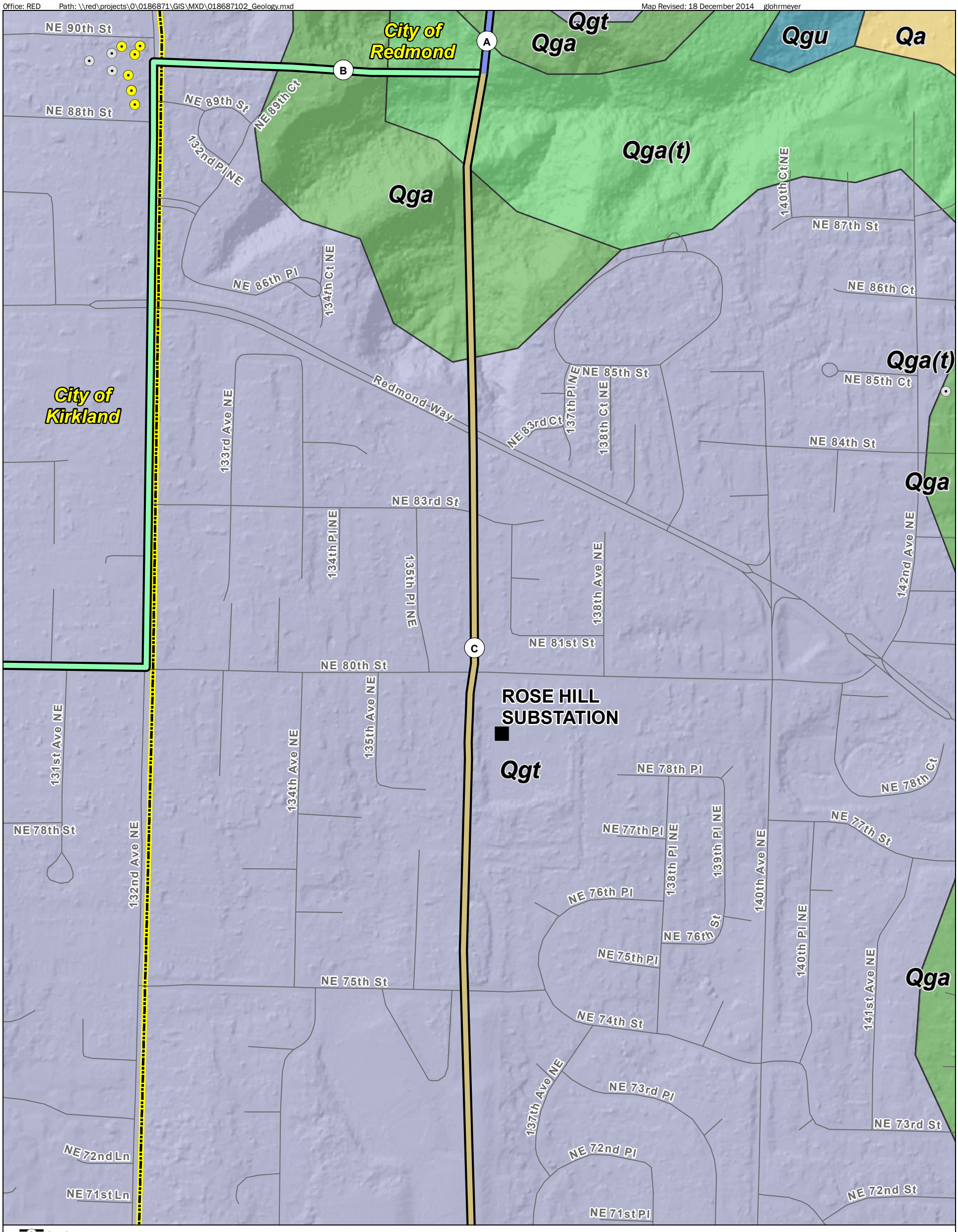
PSE Energize Eastside Project
Geohazards Evaluation
King County, Washington

GeoEngineers

Figure 8

DSD 001238

Office: RED Path: \\red\projects\0\0186871\GIS\MXD\018687102_Geology.mxd Map Revised: 18 December 2014 glohrmeyer



Route Segment
Substation
Seattle Fault Zone
City Boundary
GeoEngineers Geotechnical Project Location

DNR Geotechnical Borings within 150 Foot Buffer

Geotechnical
Test pit

DNR Geotechnical Borings within Project Extent

Geotechnical
Test pit

Geologic Unit (DNR 100k)
Youngest → Oldest

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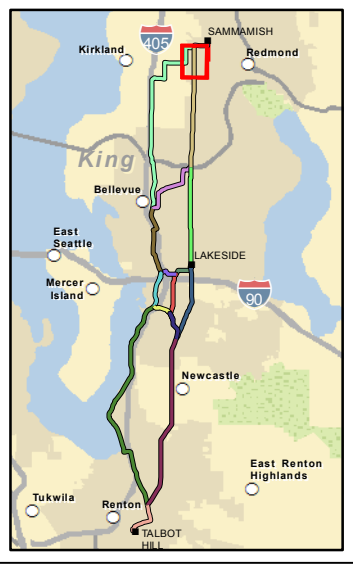
Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet



N
W E
S

400 0 400
Feet

Geologic Units
Segment C

PSE Energize Eastside Project
Geohazards Evaluation
King County, Washington

GeoEngineers

Figure 9

DSD 001239

Office: RED Path: \\red\projects\0\0186871\GIS\MXD\018687102_Geology.mxd Map Revised: 18 December 2014 glohrmeyer

City of Redmond
City of Kirkland
City of Bellevue
King County
BRIDAL TRAILS SUBSTATION
NE 70th Dr
NE 70th St
134th Ave NE
NE 69th Way
Old Redmond Rd
NE 70th Pl
138th Pl NE
NE 72nd Pl
NE 71st Pl
NE 69th St
NE 69th Pl
138th Ave NE
141st Ct NE
142nd Ct NE
140th Pl NE
141st Pl NE
NE 65th St
NE 66th St
135th Ave NE
139th Pl NE
NE 63rd Ct
132nd Ave NE
133rd Ave NE
NE 63rd St
137th Pl NE
139th Ave NE
NE 62nd St
136th Ave NE
NE 60th Way
NE 61st St
NE 60th St
Qgt
Qga
NE 55th Pl
140th Ave NE
NE 54th Pl
134th Pl NE
C

Route Segment
Substation
Seattle Fault Zone
City Boundary
GeoEngineers Geotechnical Project Location

DNR Geotechnical Borings within 150 Foot Buffer
Geotechnical
Test pit

DNR Geotechnical Borings within Project Extent
Geotechnical
Test pit

Data Source: ESRI Street Map data. Geology data from Washington DNR. Topography from King County LiDAR.

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Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet

Geologic Unit (DNR 100k)
Youngest ⟶ Oldest

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- Oen: nearshore sedimentary rocks
- Ec(2r): continental sedimentary deposits or rocks
- Ec(2t) - continental sedimentary deposits or rocks
- Evc(t) - volcaniclastic deposits or rocks
- Water

N W E S

400 0 400
Feet

Geologic Units
Segment C

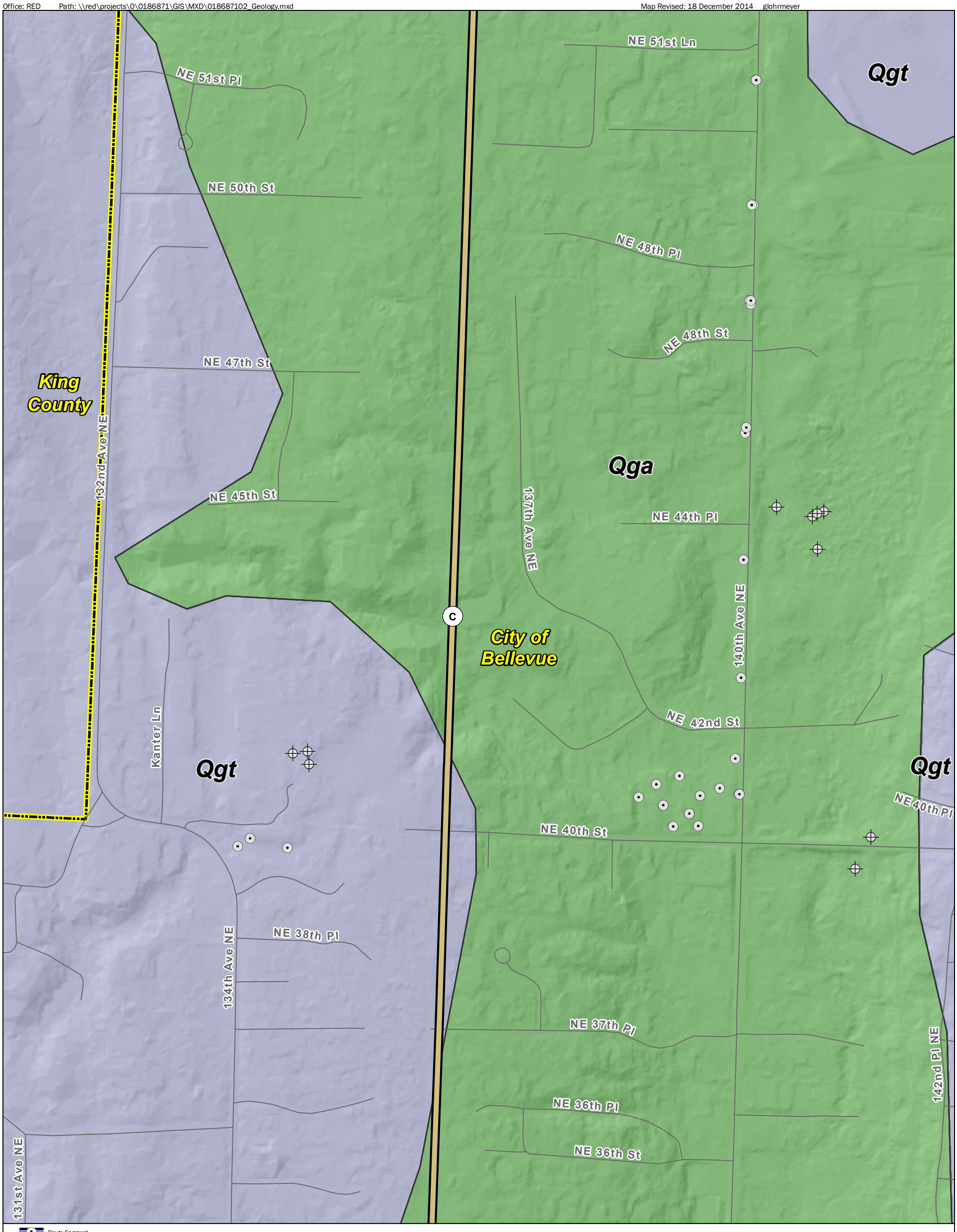
PSE Energize Eastside Project
Geohazards Evaluation
King County, Washington

GeoEngineers

Figure 10

DSD 001240

Office: RED Path: \\red\projects\0\0186871\GIS\MXD\018687102_Geology.mxd Map Revised: 18 December 2014 glohrmeyer



Route Segment

Substation

Seattle Fault Zone

City Boundary

GeoEngineers Geotechnical Project Location

DNR Geotechnical Borings within 150 Foot Buffer

Geotechnical

Test pit

DNR Geotechnical Borings within Project Extent

Geotechnical

Test pit

Geologic Unit (DNR 100k)

Youngest ⟶ Oldest

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Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet

N W E S

400 0 400

Feet

Geologic Units
Segment C

PSE Energize Eastside Project
Geohazards Evaluation
King County, Washington

GeoEngineers

Figure 11

DSD 001241

Office: RED Path: \\red\projects\0\0186871\GIS\MXD\018687102_Geology.mxd Map Revised: 18 December 2014 glohrmeyer

City of Bellevue

Qgt

Qga

Qga(t)

Qgo

NE 34th Pl
NE 33rd Ln
131st Ave NE
NE 33rd St
134th Ln NE
134th Ave NE
NE 32nd Pl
NE 31st Pl
137th Ave NE
135th Ave NE
NE 30th St
NE 30th Pl
130th Pl NE
131st Pl NE
NE 29th Pl
NE 28th St
C
140th Ave NE
NE 27th St
142nd Pl NE
NE 26th Pl
NE 25th St
NE 24th St
136th Pl NE
WA-520 E
WA-520 W
520
NE 21st St
D
E
NE 20th St

Route Segment
Substation
Seattle Fault Zone
City Boundary
GeoEngineers Geotechnical Project Location

DNR Geotechnical Borings within 150 Foot Buffer

Geotechnical
Test pit

DNR Geotechnical Borings within Project Extent

Geotechnical
Test pit

Data Source: ESRI Street Map data. Geology data from Washington DNR. Topography from King County LiDAR.

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Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet

Geologic Unit (DNR 100k)
Youngest ⟶ Oldest

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- Water

N W E S

400 0 400
Feet

Geologic Units
Segment C

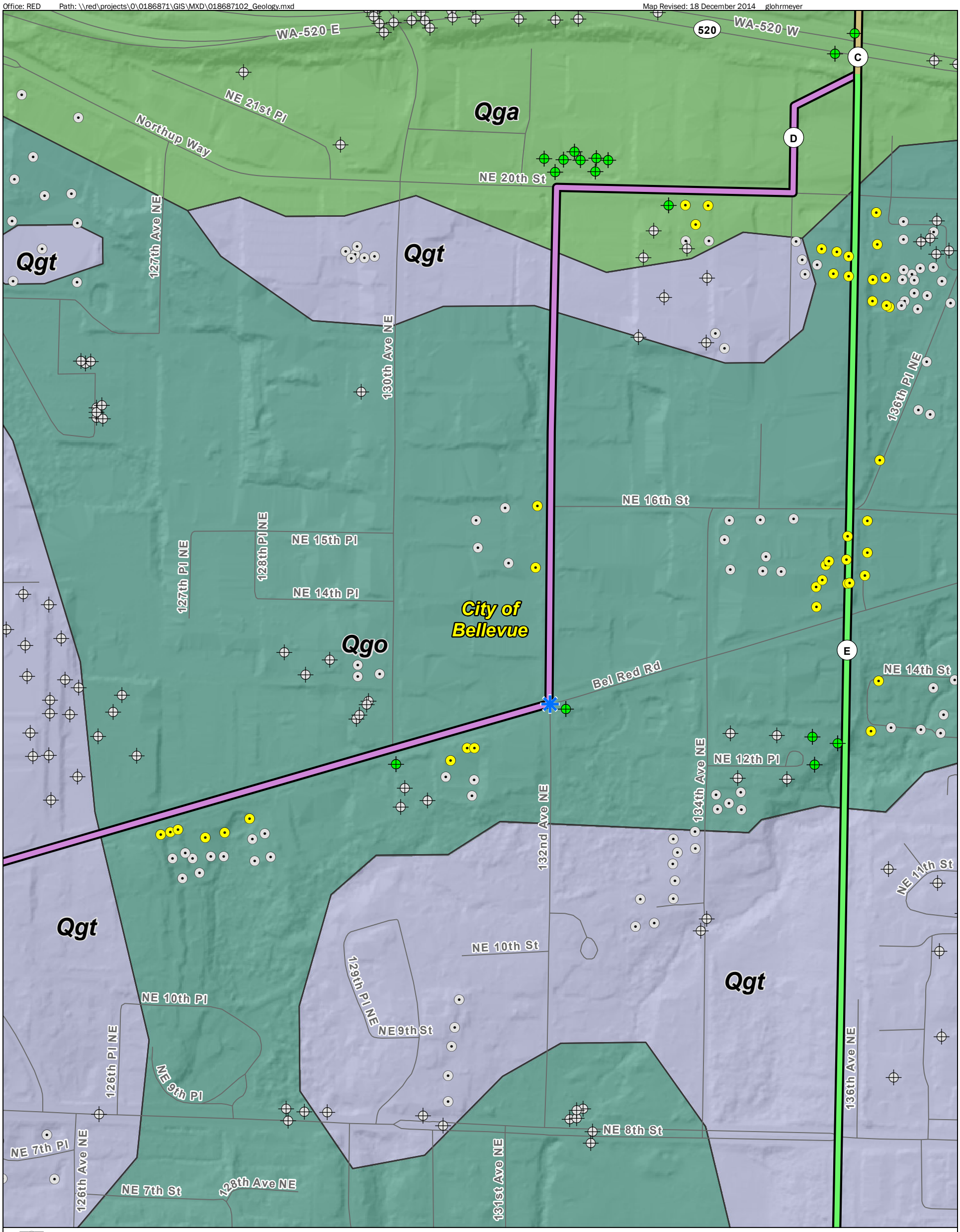
PSE Energize Eastside Project
Geohazards Evaluation
King County, Washington

GeoEngineers

Figure 12

DSD 001242

Office: RED Path: \\red\projects\0\0186871\GIS\MXD\018687102_Geology.mxd Map Revised: 18 December 2014 glohrmeyer



Route Segment
Substation
Seattle Fault Zone
City Boundary
GeoEngineers Geotechnical Project Location

DNR Geotechnical Borings within 150 Foot Buffer

Geotechnical
Test pit

DNR Geotechnical Borings within Project Extent

Geotechnical
Test pit

Data Source: ESRI Street Map data. Geology data from Washington DNR. Topography from King County LiDAR.

Notes:
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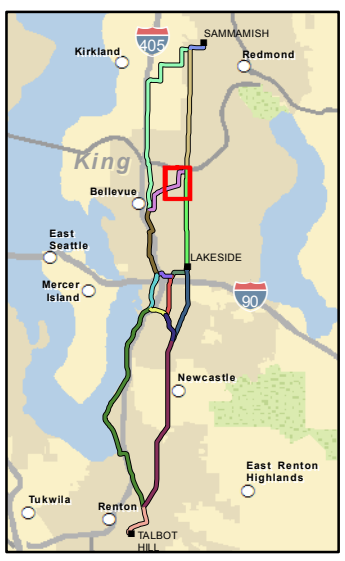
Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet

Geologic Unit (DNR 100k)
Youngest ⟶ Oldest

- Qls: mass-wasting deposits, mostly landslides
- Qf - Artificial fill, including modified land
- Qa: Alluvium
- Qp: peat deposits
- Qgo: continental glacial outwash
- Qgt: continental glacial till
- Qgpc: continental glacial drift
- Qgu: glacial drift, undivided
- Qga: advance continental glacial outwash
- Qga(t): advance continental glacial outwash
- Oem: marine sedimentary rocks
- Oen: nearshore sedimentary rocks
- Ec(2r): continental sedimentary deposits or rocks
- Ec(2t) - continental sedimentary deposits or rocks
- Evc(t) - volcaniclastic deposits or rocks
- Water



N
W E
S

400 0 400
Feet

Geologic Units
Segment D

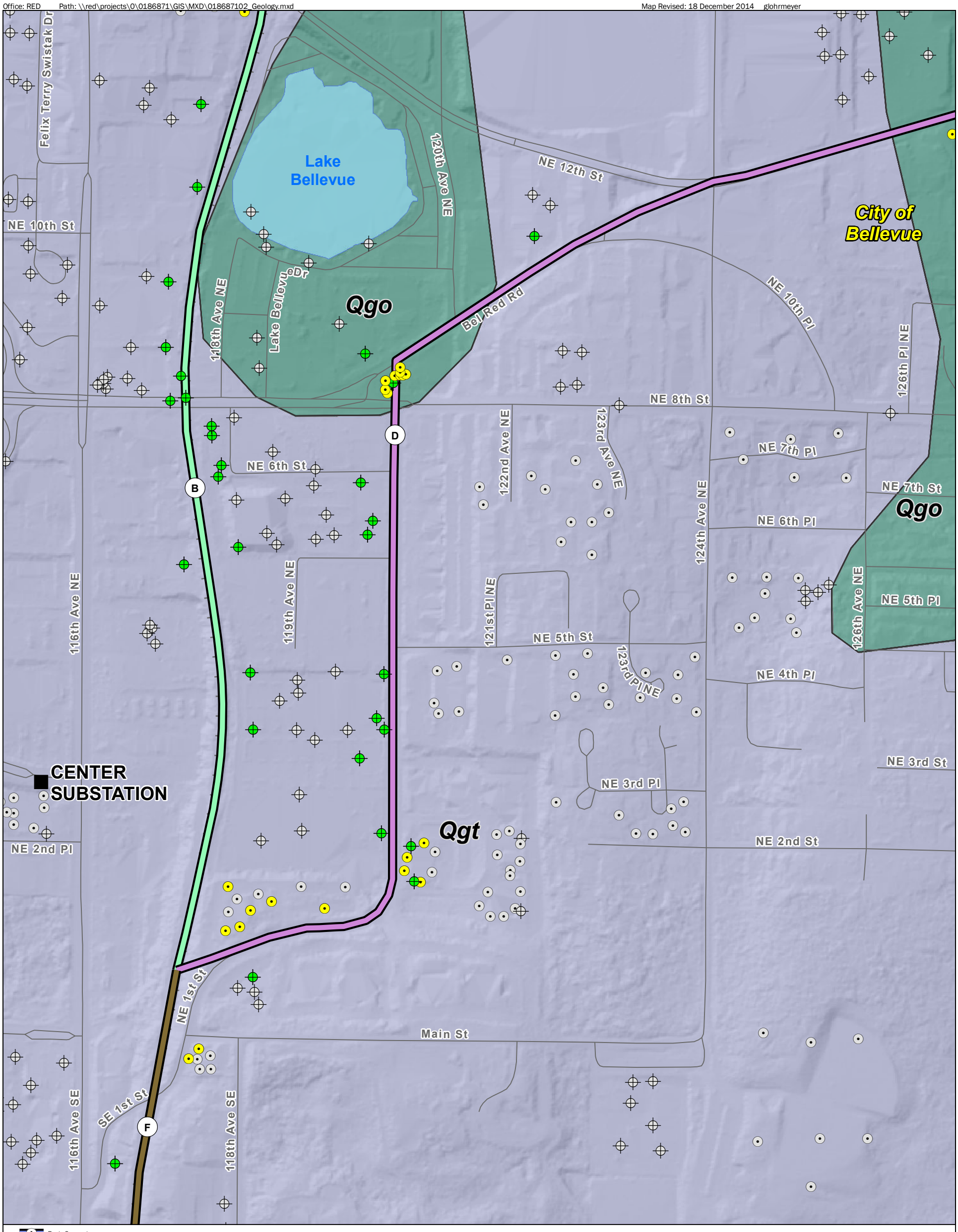
PSE Energize Eastside Project
Geohazards Evaluation
King County, Washington

GeoEngineers

Figure 13

DSD 001243

Office: RED Path: \\red\projects\0\0186871\GIS\MXD\018687102_Geology.mxd Map Revised: 18 December 2014 glohrmeyer



Route Segment
Substation
Seattle Fault Zone
City Boundary
GeoEngineers Geotechnical Project Location

DNR Geotechnical Borings within 150 Foot Buffer

Geotechnical
Test pit

DNR Geotechnical Borings within Project Extent

Geotechnical
Test pit

Geologic Unit (DNR 100k)

Youngest ⟶ Oldest

- Qls: mass-wasting deposits, mostly landslides
- Qf - Artificial fill, including modified land
- Qa: Alluvium
- Qp: peat deposits
- Qgo: continental glacial outwash
- Qgt: continental glacial till
- Qgpc: continental glacial drift
- Qgu: glacial drift, undivided
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- Qga(t): advance continental glacial outwash
- Oem: marine sedimentary rocks
- Oen: nearshore sedimentary rocks
- Ec(2r): continental sedimentary deposits or rocks
- Ec(2t) - continental sedimentary deposits or rocks
- Evc(t) - volcaniclastic deposits or rocks
- Water

Data Source: ESRI Street Map data. Geology data from Washington DNR. Topography from King County LiDAR.

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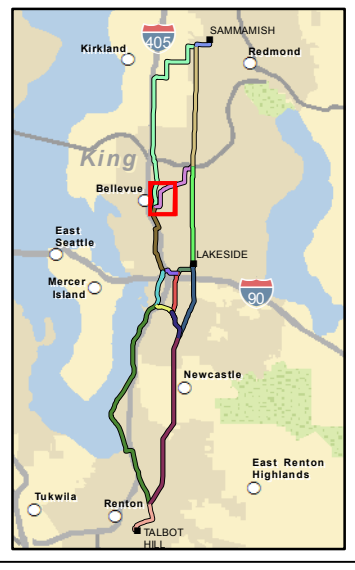
Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet



N
W E
S

400 0 400
Feet

Geologic Units
Segment D

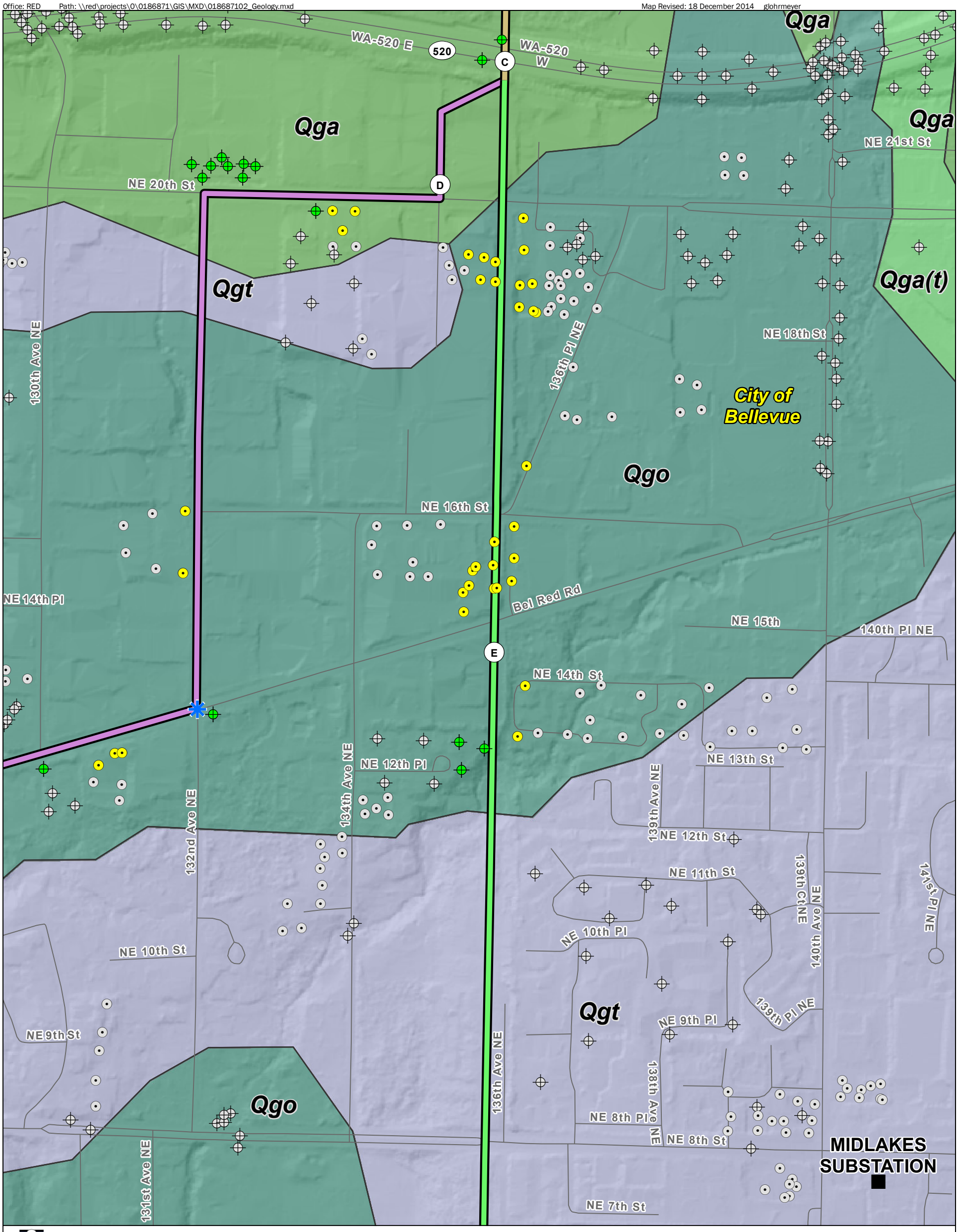
PSE Energize Eastside Project
Geohazards Evaluation
King County, Washington

GeoEngineers

Figure 14

DSD 001244

Office: RED Path: \\red\projects\0\0186871\GIS\MXD\018687102_Geology.mxd Map Revised: 18 December 2014 glohrmeyer



Route Segment

Substation

Seattle Fault Zone

City Boundary

GeoEngineers Geotechnical Project Location

DNR Geotechnical Borings within 150 Foot Buffer

Geotechnical

Test pit

DNR Geotechnical Borings within Project Extent

Geotechnical

Test pit

Geologic Unit (DNR 100k)

Youngest ⟶ Oldest

- Qls: mass-wasting deposits, mostly landslides
- Qf - Artificial fill, including modified land
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- Qp: peat deposits
- Qgo: continental glacial outwash
- Qgt: continental glacial till
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- Qgu: glacial drift, undivided
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- Ec(2r): continental sedimentary deposits or rocks
- Ec(2t) - continental sedimentary deposits or rocks
- Evc(t) - volcaniclastic deposits or rocks
- Water

Data Source: ESRI Street Map data. Geology data from Washington DNR. Topography from King County LiDAR.

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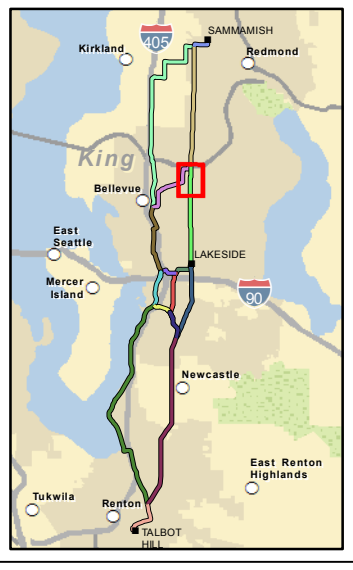
Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet



N W E S

400 0 400

Feet

Geologic Units
Segment E

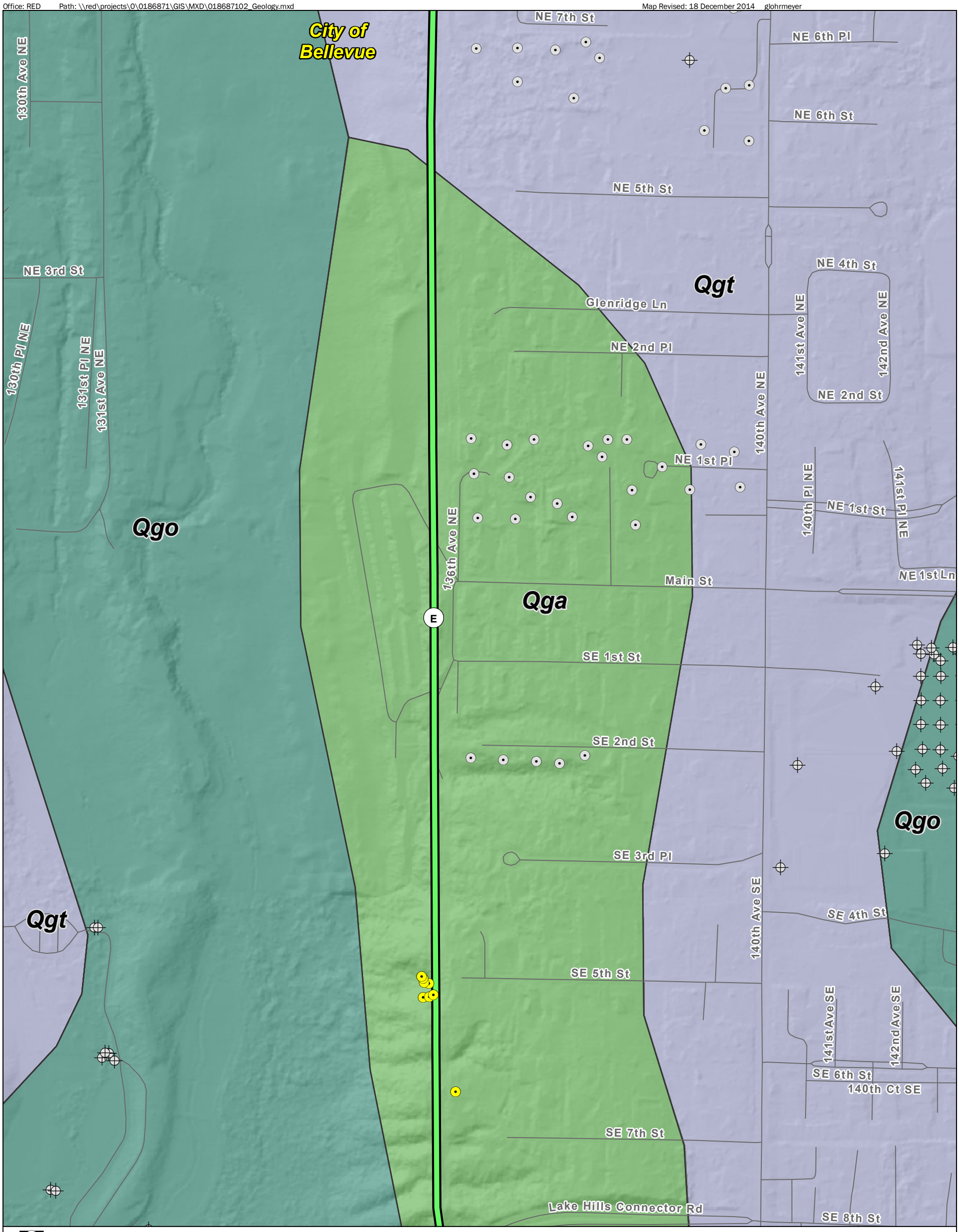
PSE Energize Eastside Project
Geohazards Evaluation
King County, Washington

GeoEngineers

Figure 15

DSD 001245

Office: RED Path: \\red\projects\0\0186871\GIS\MXD\018687102_Geology.mxd Map Revised: 18 December 2014 glohrmeyer



Route Segment
Substation
Seattle Fault Zone
City Boundary
GeoEngineers Geotechnical Project Location

DNR Geotechnical Borings within 150 Foot Buffer

Geotechnical
Test pit

DNR Geotechnical Borings within Project Extent

Geotechnical
Test pit

Geologic Unit (DNR 100k)

Youngest ⟶ Oldest

- Qls: mass-wasting deposits, mostly landslides
- Qf - Artificial fill, including modified land
- Qa: Alluvium
- Qp: peat deposits
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- Qgt: continental glacial till
- Qgpc: continental glacial drift
- Qgu: glacial drift, undivided
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- Qga(t): advance continental glacial outwash
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- Oen: nearshore sedimentary rocks
- Ec(2r): continental sedimentary deposits or rocks
- Ec(2t) - continental sedimentary deposits or rocks
- Evc(t) - volcaniclastic deposits or rocks
- Water

Data Source: ESRI Street Map data. Geology data from Washington DNR. Topography from King County LiDAR.

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Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet

N W E S

400 0 400
Feet

Geologic Units
Segment E

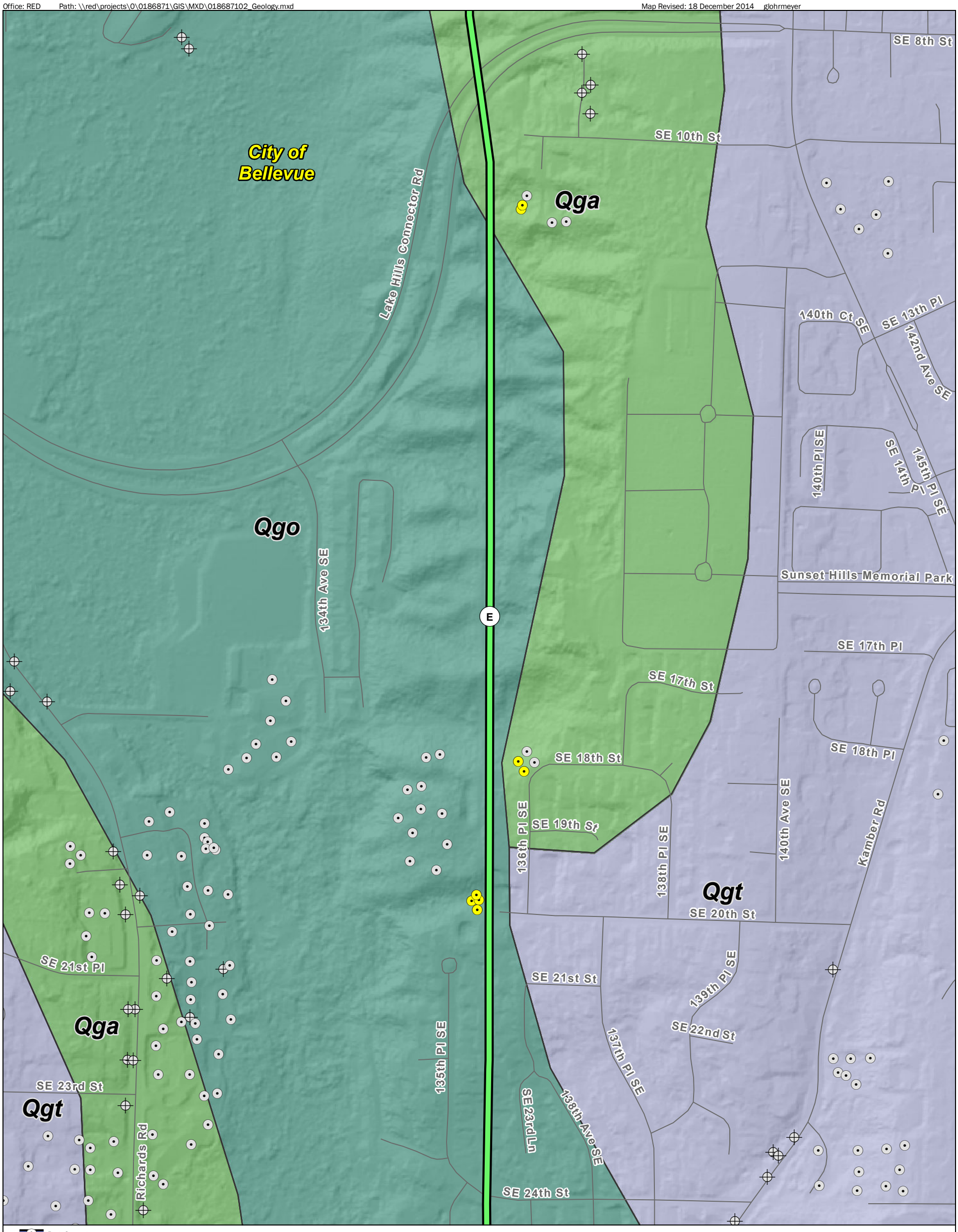
PSE Energize Eastside Project
Geohazards Evaluation
King County, Washington

GeoEngineers

Figure 16

DSD 001246

Office: RED Path: \\red\projects\0\0186871\GIS\MXD\018687102_Geology.mxd Map Revised: 18 December 2014 glohrmeyer



Route Segment
Substation
Seattle Fault Zone
City Boundary
GeoEngineers Geotechnical Project Location

DNR Geotechnical Borings within 150 Foot Buffer

Geotechnical
Test pit

DNR Geotechnical Borings within Project Extent

Geotechnical
Test pit

Geologic Unit (DNR 100k)
Youngest ⟶ Oldest

- Qls: mass-wasting deposits, mostly landslides
- Qf - Artificial fill, including modified land
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- Ec(2r): continental sedimentary deposits or rocks
- Ec(2t) - continental sedimentary deposits or rocks
- Evc(t) - volcaniclastic deposits or rocks
- Water

N
W E
S

400 0 400
Feet

Data Source: ESRI Street Map data. Geology data from Washington DNR. Topography from King County LiDAR.

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Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet

Geologic Units
Segment E

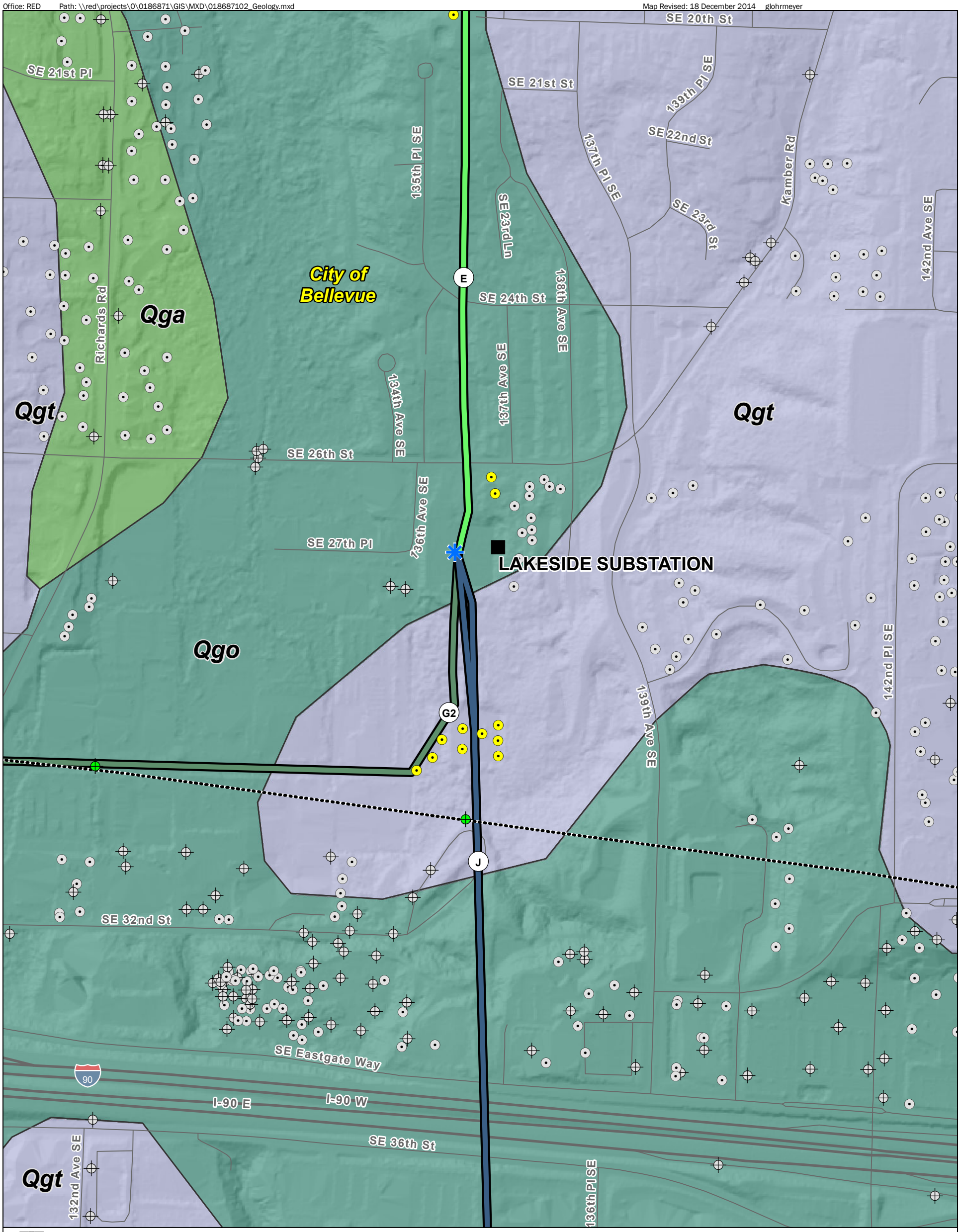
PSE Energize Eastside Project
Geohazards Evaluation
King County, Washington

GeoEngineers

Figure 17

DSD 001247

Office: RED Path: \\red\projects\0\0186871\GIS\MXD\018687102_Geology.mxd Map Revised: 18 December 2014 glohrmeyer



Route Segment
Substation
Seattle Fault Zone
City Boundary
GeoEngineers Geotechnical Project Location

DNR Geotechnical Borings within 150 Foot Buffer

Geotechnical
Test pit

DNR Geotechnical Borings within Project Extent

Geotechnical
Test pit

Geologic Unit (DNR 100k)

Youngest ⟶ Oldest

- Qls: mass-wasting deposits, mostly landslides
- Qf - Artificial fill, including modified land
- Qa: Alluvium
- Qp: peat deposits
- Qgo: continental glacial outwash
- Qgt: continental glacial till
- Qgpc: continental glacial drift
- Qgu: glacial drift, undivided
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- Ec(2t) - continental sedimentary deposits or rocks
- Evc(t) - volcaniclastic deposits or rocks
- Water

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Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet

N W E S

400 0 400
Feet

Geologic Units
Segment E

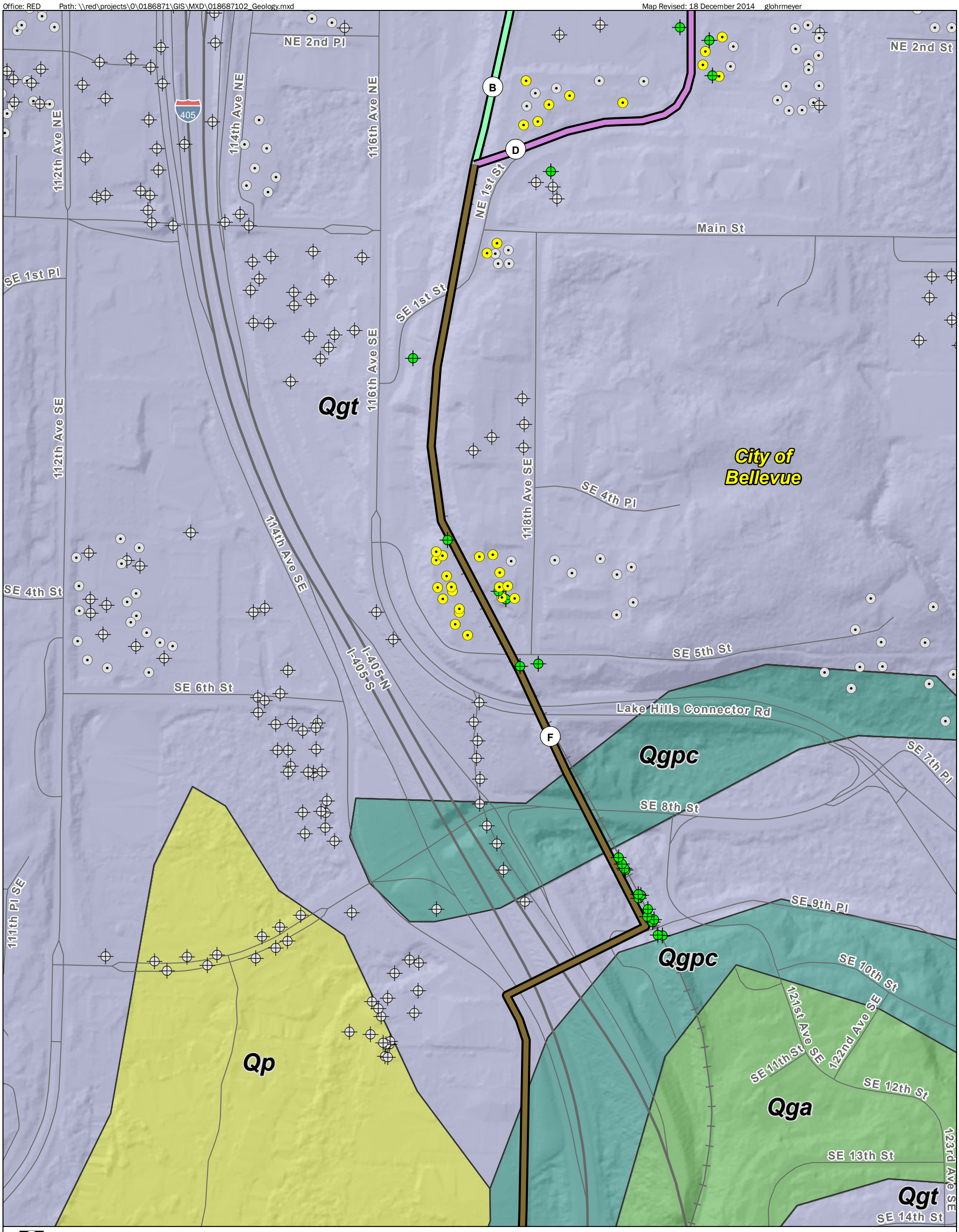
PSE Energize Eastside Project
Geohazards Evaluation
King County, Washington

GeoEngineers

Figure 18

DSD 001248

Office: RED Path: \\red\projects\0\0186871\GIS\MXD\018687102_Geology.mxd Map Revised: 18 December 2014 glohrmeyer



Route Segment
Substation
Seattle Fault Zone
City Boundary
GeoEngineers Geotechnical Project Location

DNR Geotechnical Borings within 150 Foot Buffer

Geotechnical
Test pit

DNR Geotechnical Borings within Project Extent

Geotechnical
Test pit

Geologic Unit (DNR 100k)
Youngest ⟶ Oldest

- Qls: mass-wasting deposits, mostly landslides
- Qf - Artificial fill, including modified land
- Qa: Alluvium
- Qp: peat deposits
- Qgo: continental glacial outwash
- Qgt: continental glacial till
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- Qga(t): advance continental glacial outwash
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- Oen: nearshore sedimentary rocks
- Ec(2r): continental sedimentary deposits or rocks
- Ec(2t) - continental sedimentary deposits or rocks
- Evc(t) - volcaniclastic deposits or rocks
- Water

N
W E
S

400 0 400
Feet

Data Source: ESRI Street Map data. Geology data from Washington DNR. Topography from King County LiDAR.

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Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet

Geologic Units
Segment F

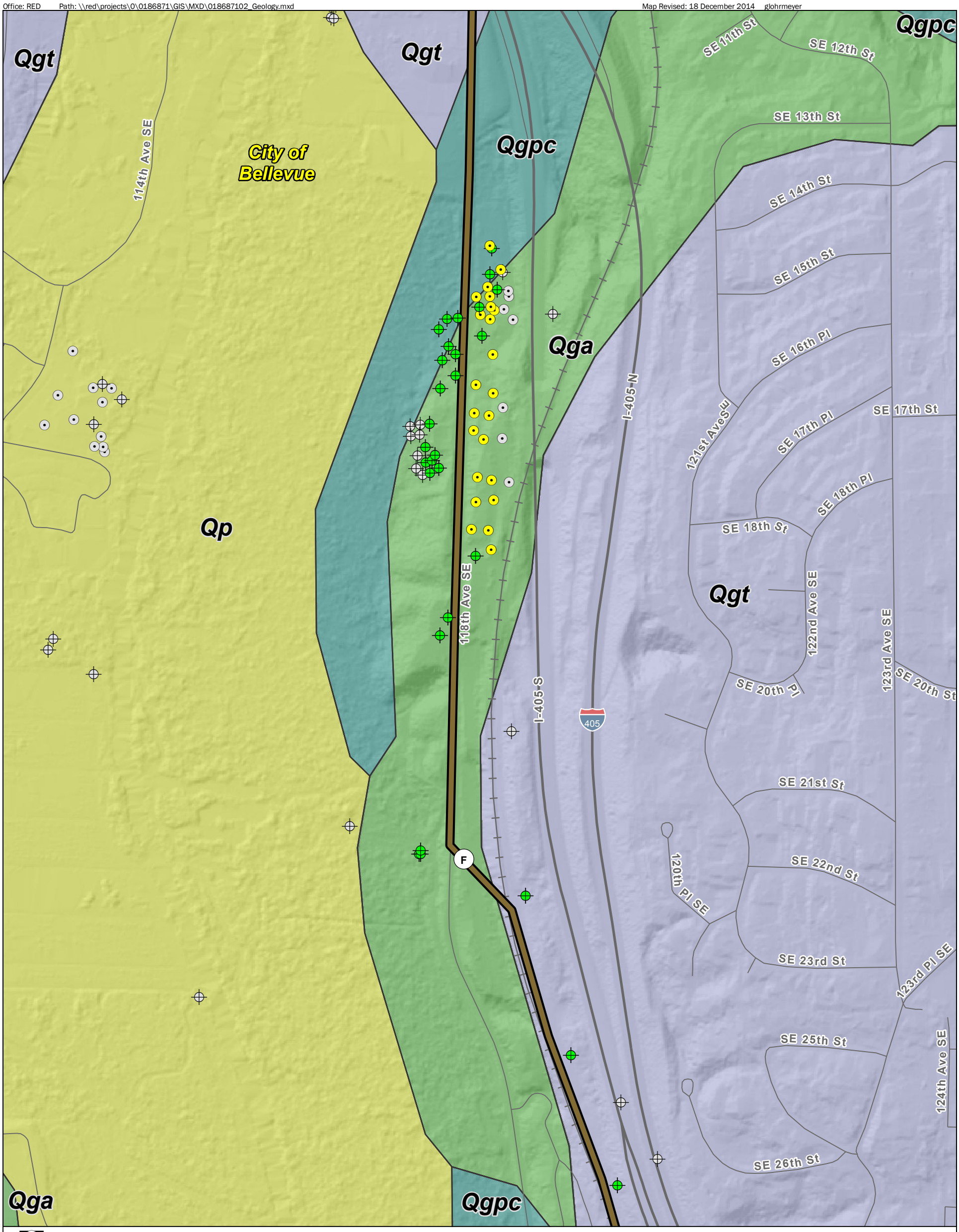
PSE Energize Eastside Project
Geohazards Evaluation
King County, Washington

GeoEngineers

Figure 19

DSD 001249

Office: RED Path: \\red\projects\0\0186871\GIS\MXD\018687102_Geology.mxd Map Revised: 18 December 2014 glohrmeyer



Route Segment
Substation
Seattle Fault Zone
City Boundary
GeoEngineers Geotechnical Project Location

DNR Geotechnical Borings within 150 Foot Buffer

Geotechnical
Test pit

DNR Geotechnical Borings within Project Extent

Geotechnical
Test pit

Data Source: ESRI Street Map data. Geology data from Washington DNR. Topography from King County LiDAR.

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Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet

Geologic Unit (DNR 100k)
Youngest ⟶ Oldest

- Qls: mass-wasting deposits, mostly landslides
- Qf - Artificial fill, including modified land
- Qa: Alluvium
- Qp: peat deposits
- Qgo: continental glacial outwash
- Qgt: continental glacial till
- Qgpc: continental glacial drift
- Qgu: glacial drift, undivided
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- Qga(t): advance continental glacial outwash
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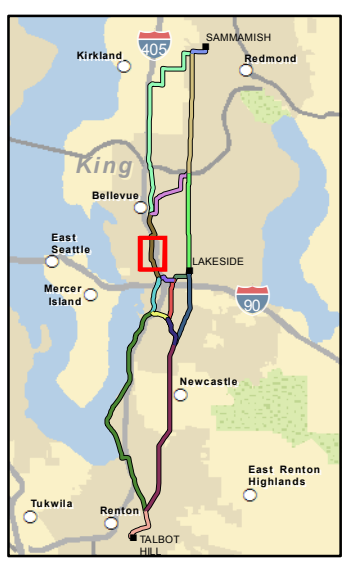
- Oen: nearshore sedimentary rocks
- Ec(2r): continental sedimentary deposits or rocks
- Ec(2t) - continental sedimentary deposits or rocks
- Evc(t) - volcaniclastic deposits or rocks
- Water



N W E S

400 0 400
Feet

Geologic Units
Segment F

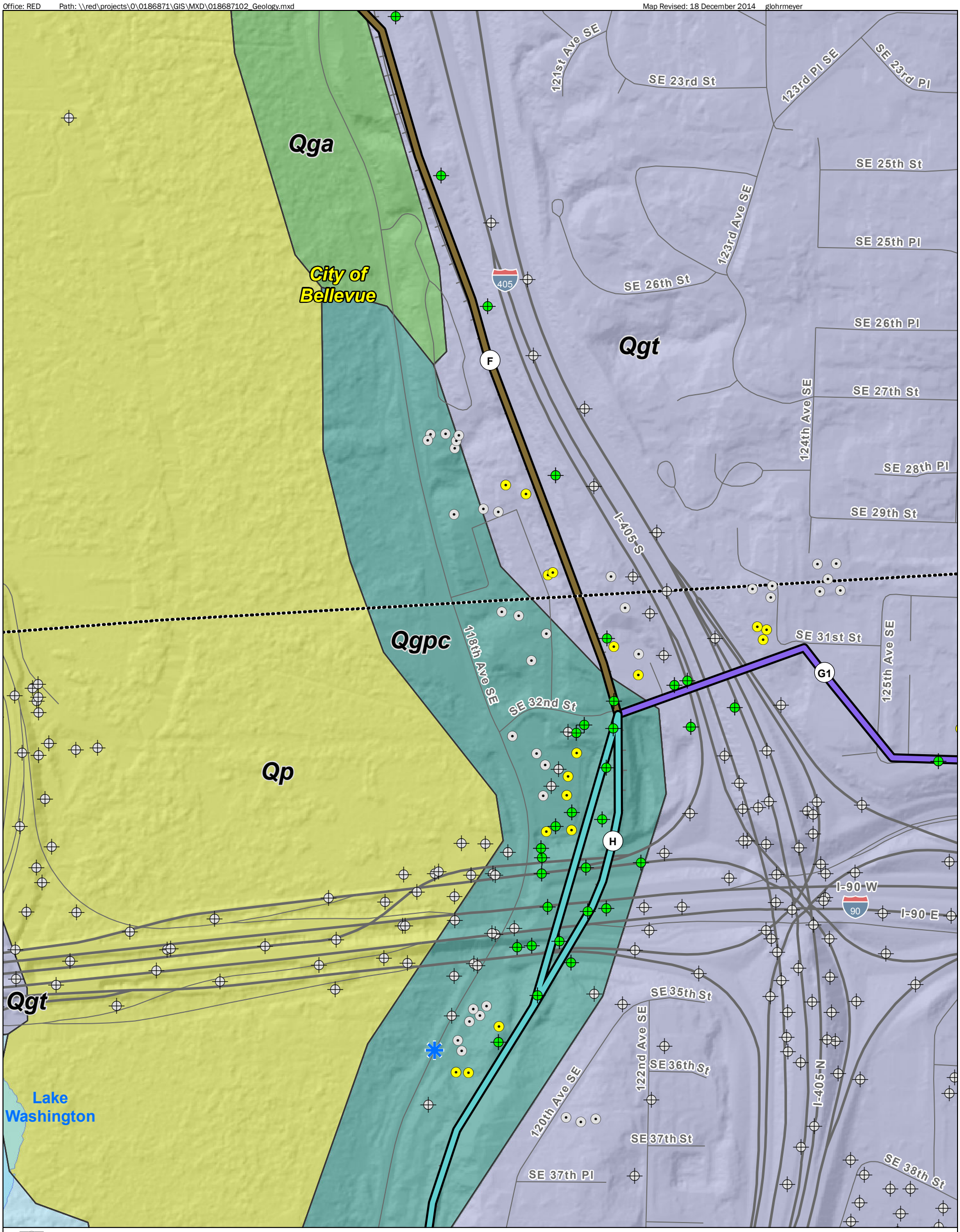
PSE Energize Eastside Project
Geohazards Evaluation
King County, Washington

GeoEngineers

Figure 20

DSD 001250

Office: RED Path: \\red\projects\0\0186871\GIS\MXD\018687102_Geology.mxd Map Revised: 18 December 2014 glohrmeyer



Route Segment
Substation
Seattle Fault Zone
City Boundary
GeoEngineers Geotechnical Project Location

DNR Geotechnical Borings within 150 Foot Buffer

Geotechnical
Test pit

DNR Geotechnical Borings within Project Extent

Geotechnical
Test pit

Geologic Unit (DNR 100k)

Youngest ⟶ Oldest

- Qls: mass-wasting deposits, mostly landslides
- Qf - Artificial fill, including modified land
- Qa: Alluvium
- Qp: peat deposits
- Qgo: continental glacial outwash
- Qgt: continental glacial till
- Qgpc: continental glacial drift
- Qgu: glacial drift, undivided
- Qga: advance continental glacial outwash
- Qga(t): advance continental glacial outwash
- Oem: marine sedimentary rocks
- Oen: nearshore sedimentary rocks
- Ec(2r): continental sedimentary deposits or rocks
- Ec(2t) - continental sedimentary deposits or rocks
- Evc(t) - volcaniclastic deposits or rocks
- Water

Data Source: ESRI Street Map data. Geology data from Washington DNR. Topography from King County LiDAR.

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Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet

N W E S

400 0 400
Feet

Geologic Units
Segment F

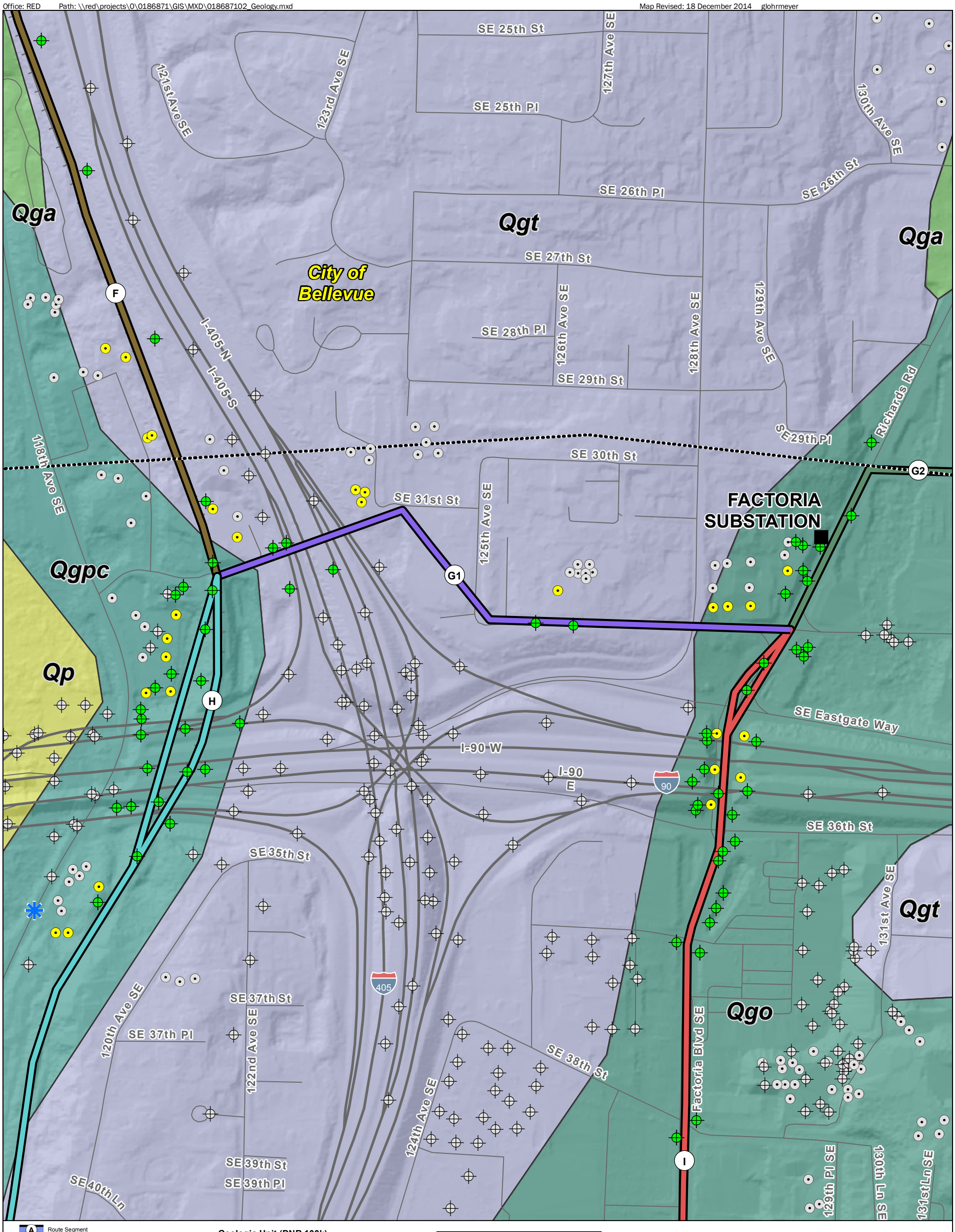
PSE Energize Eastside Project
Geohazards Evaluation
King County, Washington

GeoEngineers

Figure 21

DSD 001251

Office: RED Path: \\red\projects\0\0186871\GIS\MXD\018687102_Geology.mxd Map Revised: 18 December 2014 glohrmeyer



Route Segment
Substation
Seattle Fault Zone
City Boundary
GeoEngineers Geotechnical Project Location

DNR Geotechnical Borings within 150 Foot Buffer

Geotechnical
Test pit

DNR Geotechnical Borings within Project Extent

Geotechnical
Test pit

Geologic Unit (DNR 100k)

Youngest → Oldest

- Qls: mass-wasting deposits, mostly landslides
- Qf - Artificial fill, including modified land
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- Qp: peat deposits
- Qgo: continental glacial outwash
- Qgt: continental glacial till
- Qgpc: continental glacial drift
- Qgu: glacial drift, undivided
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- Qga(t): advance continental glacial outwash
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- Oen: nearshore sedimentary rocks
- Ec(2r): continental sedimentary deposits or rocks
- Ec(2t) - continental sedimentary deposits or rocks
- Evc(t) - volcaniclastic deposits or rocks
- Water

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Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet

N W E S

400 0 400
Feet

Geologic Units
Segment G1

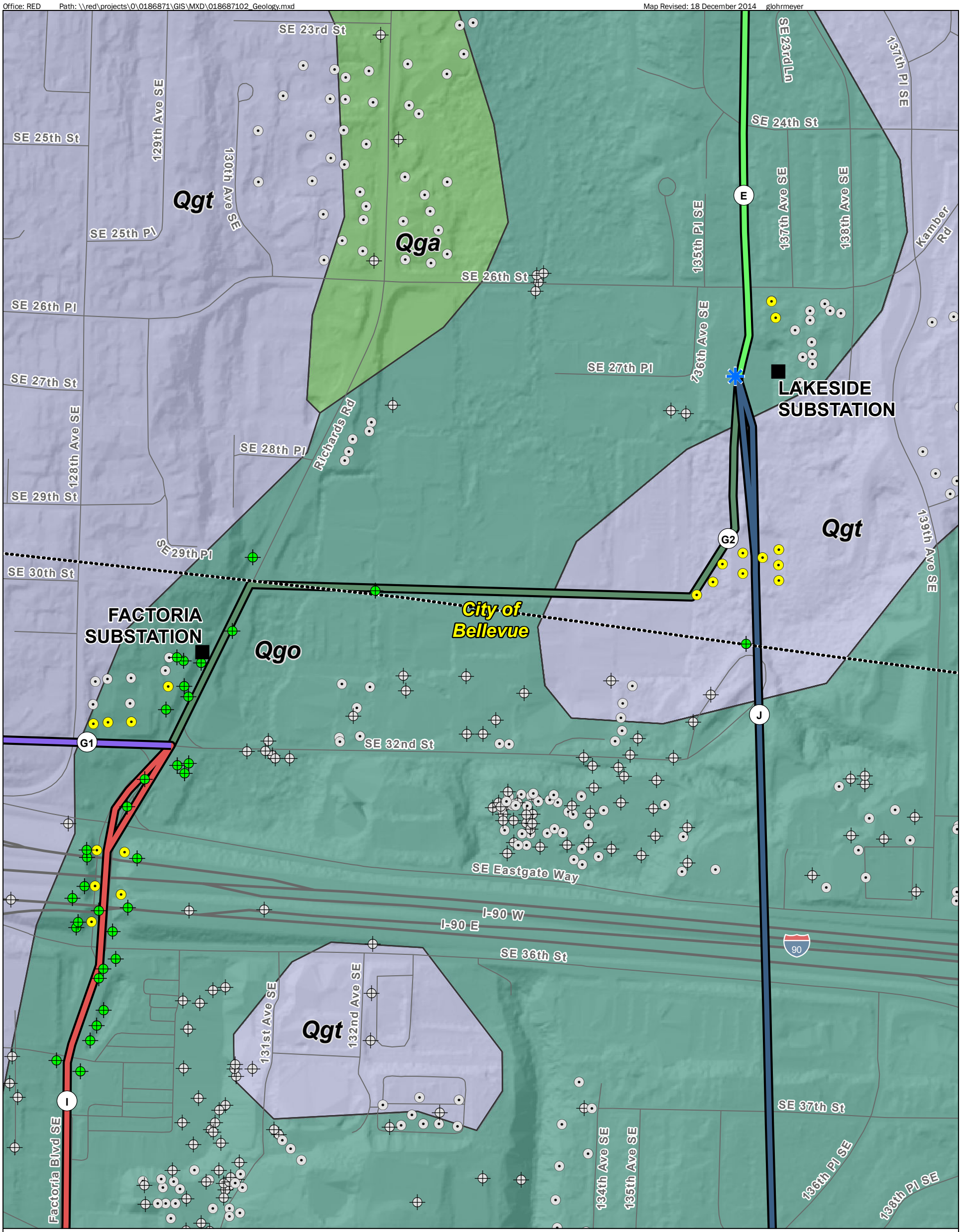
PSE Energize Eastside Project
Geohazards Evaluation
King County, Washington

GeoEngineers

Figure 22

DSD 001252

Office: RED Path: \\red\projects\0\0186871\GIS\MXD\018687102_Geology.mxd Map Revised: 18 December 2014 glohrmeyer



Route Segment
Substation
Seattle Fault Zone
City Boundary
GeoEngineers Geotechnical Project Location

DNR Geotechnical Borings within 150 Foot Buffer

Geotechnical
Test pit

DNR Geotechnical Borings within Project Extent

Geotechnical
Test pit

Data Source: ESRI Street Map data. Geology data from Washington DNR. Topography from King County LiDAR.

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Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet

Geologic Unit (DNR 100k)
Youngest ⟶ Oldest

- Qls: mass-wasting deposits, mostly landslides
- Qf - Artificial fill, including modified land
- Qa: Alluvium
- Qp: peat deposits
- Qgo: continental glacial outwash
- Qgt: continental glacial till
- Qgpc: continental glacial drift
- Qgu: glacial drift, undivided
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- Qga(t): advance continental glacial outwash
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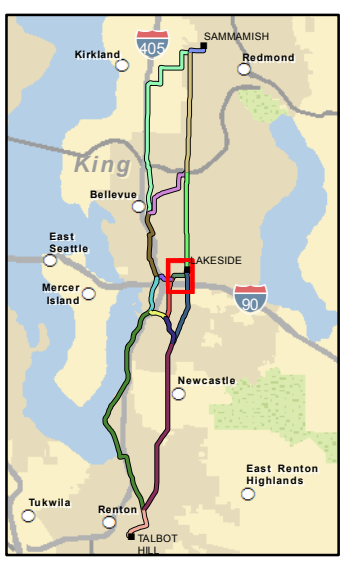
- Oen: nearshore sedimentary rocks
- Ec(2r): continental sedimentary deposits or rocks
- Ec(2t) - continental sedimentary deposits or rocks
- Evc(t) - volcaniclastic deposits or rocks
- Water



N W E S

400 0 400
Feet

Geologic Units
Segment G2

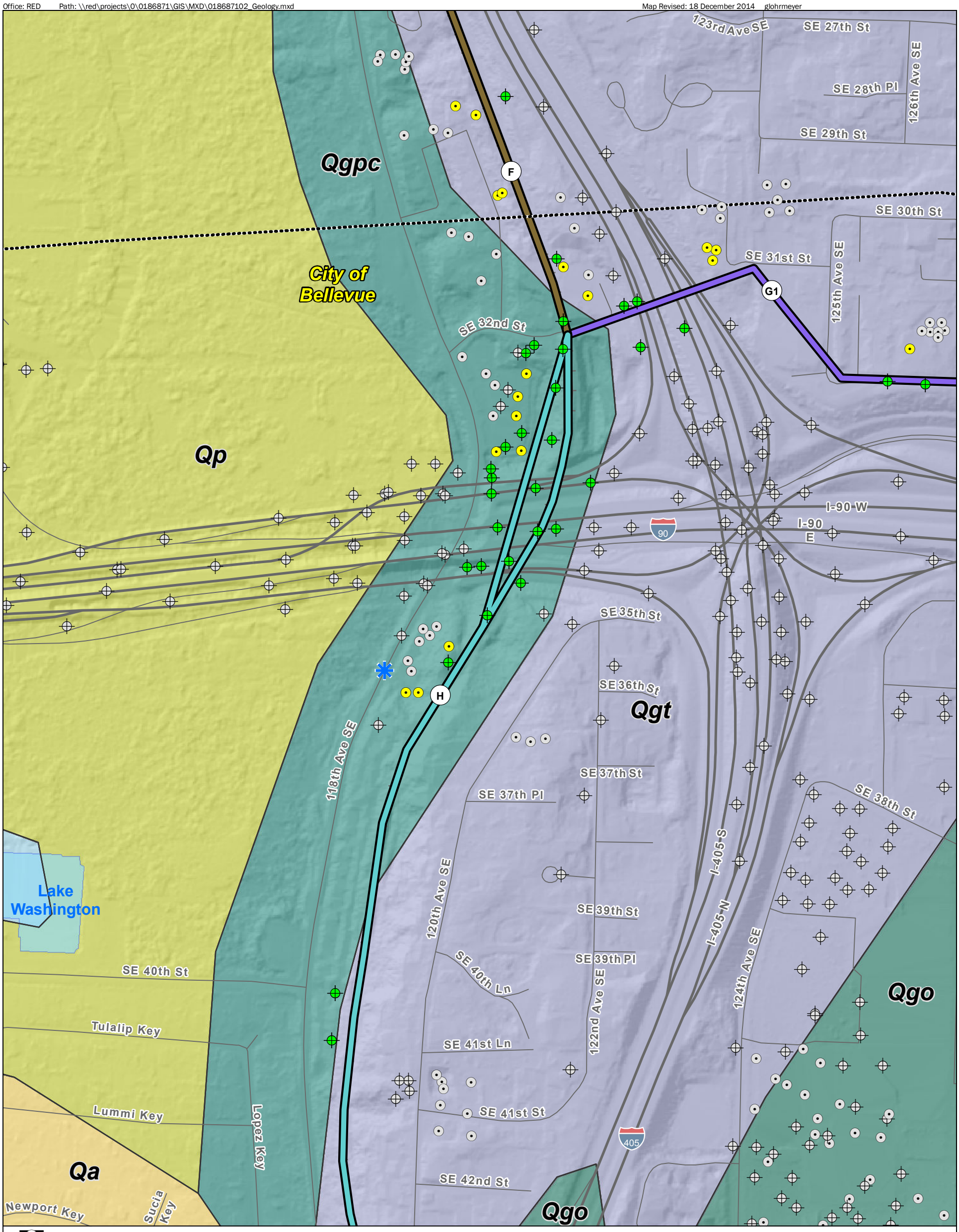
PSE Energize Eastside Project
Geohazards Evaluation
King County, Washington

GeoEngineers

Figure 23

DSD 001253

Office: RED Path: \\red\projects\0\0186871\GIS\MXD\018687102_Geology.mxd Map Revised: 18 December 2014 glohrmeyer



Route Segment
Substation
Seattle Fault Zone
City Boundary
GeoEngineers Geotechnical Project Location

DNR Geotechnical Borings within 150 Foot Buffer

Geotechnical
Test pit

DNR Geotechnical Borings within Project Extent

Geotechnical
Test pit

Data Source: ESRI Street Map data. Geology data from Washington DNR. Topography from King County LiDAR.

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Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet

Geologic Unit (DNR 100k)
Youngest ⟶ Oldest

- Qls: mass-wasting deposits, mostly landslides
- Qf - Artificial fill, including modified land
- Qa: Alluvium
- Qp: peat deposits
- Qgo: continental glacial outwash
- Qgt: continental glacial till
- Qgpc: continental glacial drift
- Qgu: glacial drift, undivided
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- Oen: nearshore sedimentary rocks
- Ec(2r): continental sedimentary deposits or rocks
- Ec(2t) - continental sedimentary deposits or rocks
- Evc(t) - volcaniclastic deposits or rocks
- Water

N W E S

400 0 400
Feet

Geologic Units
Segment H

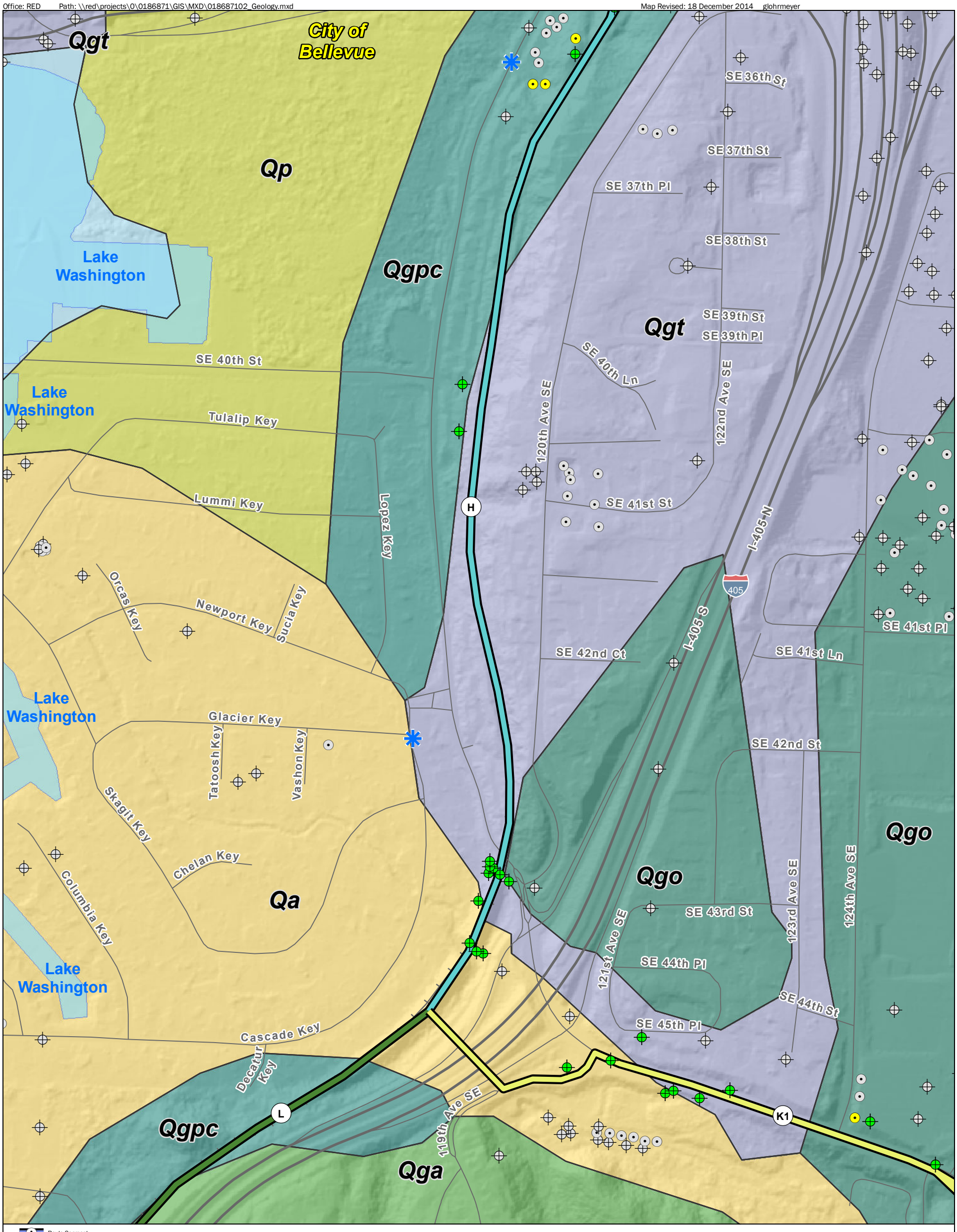
PSE Energize Eastside Project
Geohazards Evaluation
King County, Washington

GeoEngineers

Figure 24

DSD 001254

Office: RED Path: \\red\projects\0\0186871\GIS\MXD\018687102_Geology.mxd Map Revised: 18 December 2014 glohrmeyer



Route Segment
Substation
Seattle Fault Zone
City Boundary
GeoEngineers Geotechnical Project Location

DNR Geotechnical Borings within 150 Foot Buffer

Geotechnical
Test pit

DNR Geotechnical Borings within Project Extent

Geotechnical
Test pit

Geologic Unit (DNR 100k)

Youngest → Oldest

- Qls: mass-wasting deposits, mostly landslides
- Qf - Artificial fill, including modified land
- Qa: Alluvium
- Qp: peat deposits
- Qgo: continental glacial outwash
- Qgt: continental glacial till
- Qgpc: continental glacial drift
- Qgu: glacial drift, undivided
- Qga: advance continental glacial outwash
- Qga(t): advance continental glacial outwash
- Oem: marine sedimentary rocks
- Oen: nearshore sedimentary rocks
- Ec(2r): continental sedimentary deposits or rocks
- Ec(2t) - continental sedimentary deposits or rocks
- Evc(t) - volcaniclastic deposits or rocks
- Water

Data Source: ESRI Street Map data. Geology data from Washington DNR. Topography from King County LiDAR.

Notes:
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Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet

N W E S

400 0 400
Feet

Geologic Units
Segment H

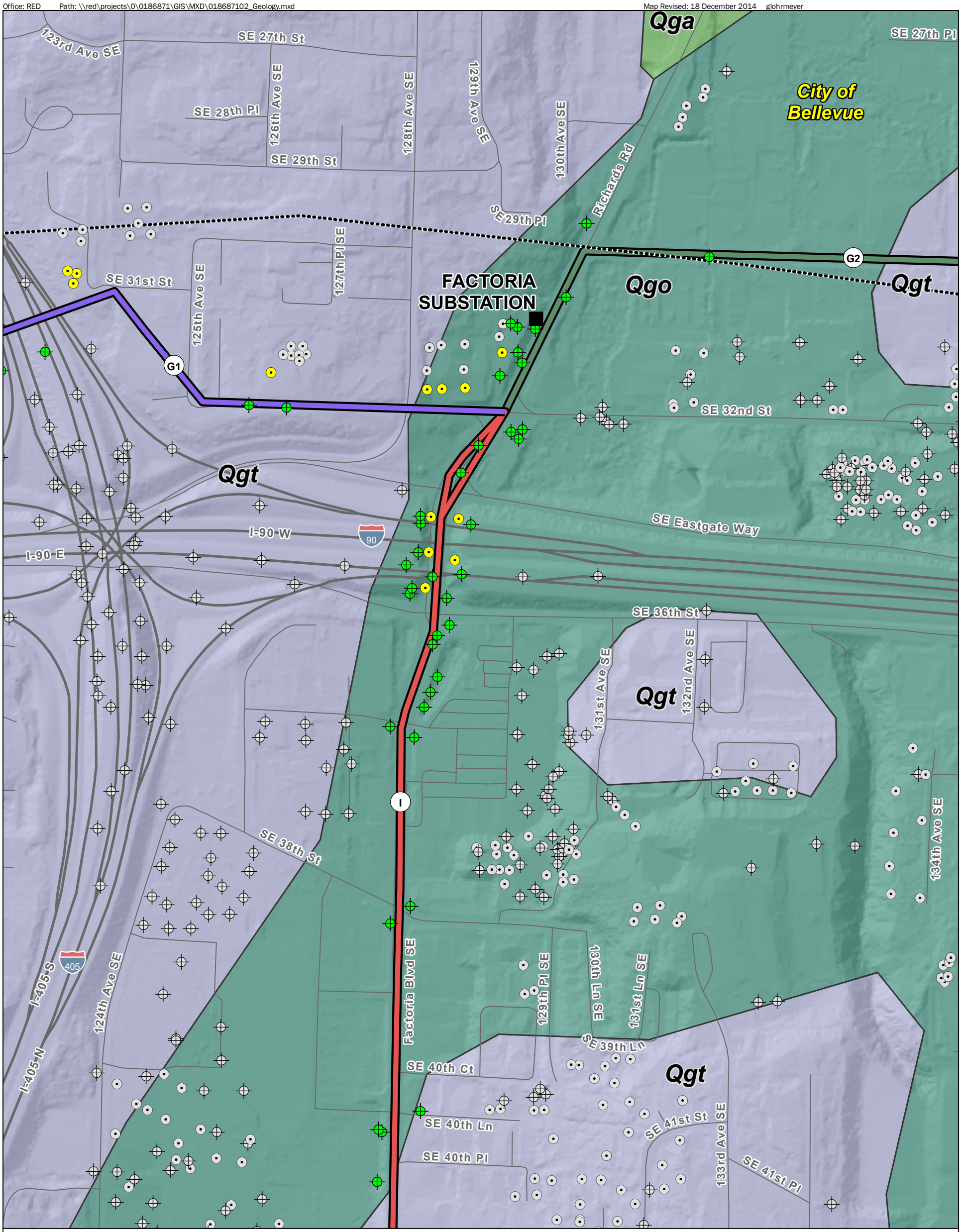
PSE Energize Eastside Project
Geohazards Evaluation
King County, Washington

GeoEngineers

Figure 25

DSD 001255

Office: RED Path: \\red\projects\0\0186871\GIS\MXD\018687102_Geology.mxd Map Revised: 18 December 2014 glohrmeyer



Route Segment
Substation
Seattle Fault Zone
City Boundary
GeoEngineers Geotechnical Project Location

DNR Geotechnical Borings within 150 Foot Buffer

Geotechnical
Test pit

DNR Geotechnical Borings within Project Extent

Geotechnical
Test pit

Geologic Unit (DNR 100k)
Youngest ⟶ Oldest

- Qls: mass-wasting deposits, mostly landslides
- Qf - Artificial fill, including modified land
- Qa: Alluvium
- Qp: peat deposits
- Qgo: continental glacial outwash
- Qgt: continental glacial till
- Qgpc: continental glacial drift
- Qgu: glacial drift, undivided
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- Qga(t): advance continental glacial outwash
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- Oen: nearshore sedimentary rocks
- Ec(2r): continental sedimentary deposits or rocks
- Ec(2t) - continental sedimentary deposits or rocks
- Evc(t) - volcaniclastic deposits or rocks
- Water

Data Source: ESRI Street Map data. Geology data from Washington DNR. Topography from King County LiDAR.

Notes:
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Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet

N W E S

400 0 400
Feet

Geologic Units
Segment I

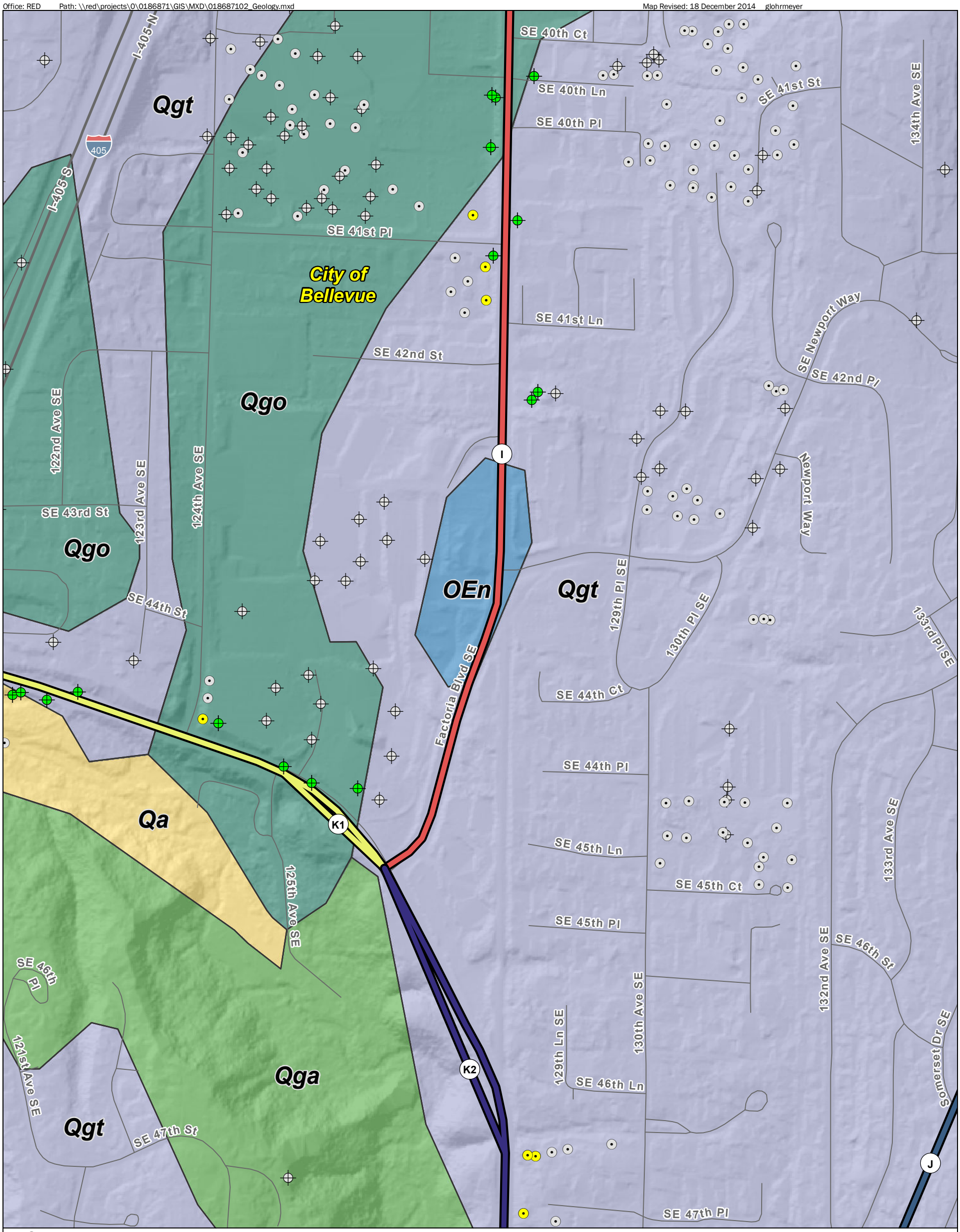
PSE Energize Eastside Project
Geohazards Evaluation
King County, Washington

GeoEngineers

Figure 26

DSD 001256

Office: RED Path: \\red\projects\0\0186871\GIS\MXD\018687102_Geology.mxd Map Revised: 18 December 2014 glohrmeyer



Route Segment
Substation
Seattle Fault Zone
City Boundary
GeoEngineers Geotechnical Project Location

DNR Geotechnical Borings within 150 Foot Buffer

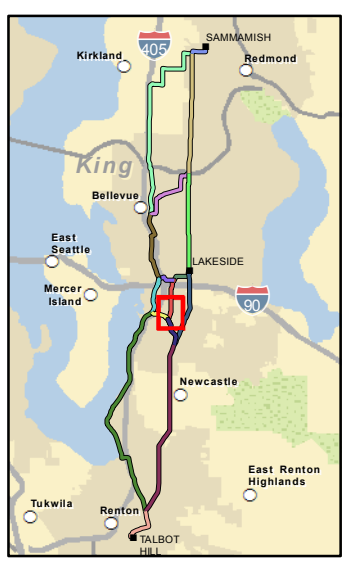
Geotechnical
Test pit

DNR Geotechnical Borings within Project Extent

Geotechnical
Test pit

Geologic Unit (DNR 100k)
Youngest ⟶ Oldest

- Qls: mass-wasting deposits, mostly landslides
- Qf - Artificial fill, including modified land
- Qa: Alluvium
- Qp: peat deposits
- Qgo: continental glacial outwash
- Qgt: continental glacial till
- Qgpc: continental glacial drift
- Qgu: glacial drift, undivided
- Qga: advance continental glacial outwash
- Qga(t): advance continental glacial outwash
- Oem: marine sedimentary rocks
- Oen: nearshore sedimentary rocks
- Ec(2r): continental sedimentary deposits or rocks
- Ec(2t) - continental sedimentary deposits or rocks
- Evc(t) - volcaniclastic deposits or rocks
- Water



N W E S

400 0 400
Feet

Data Source: ESRI Street Map data. Geology data from Washington DNR. Topography from King County LiDAR.

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Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet

Geologic Units
Segment I

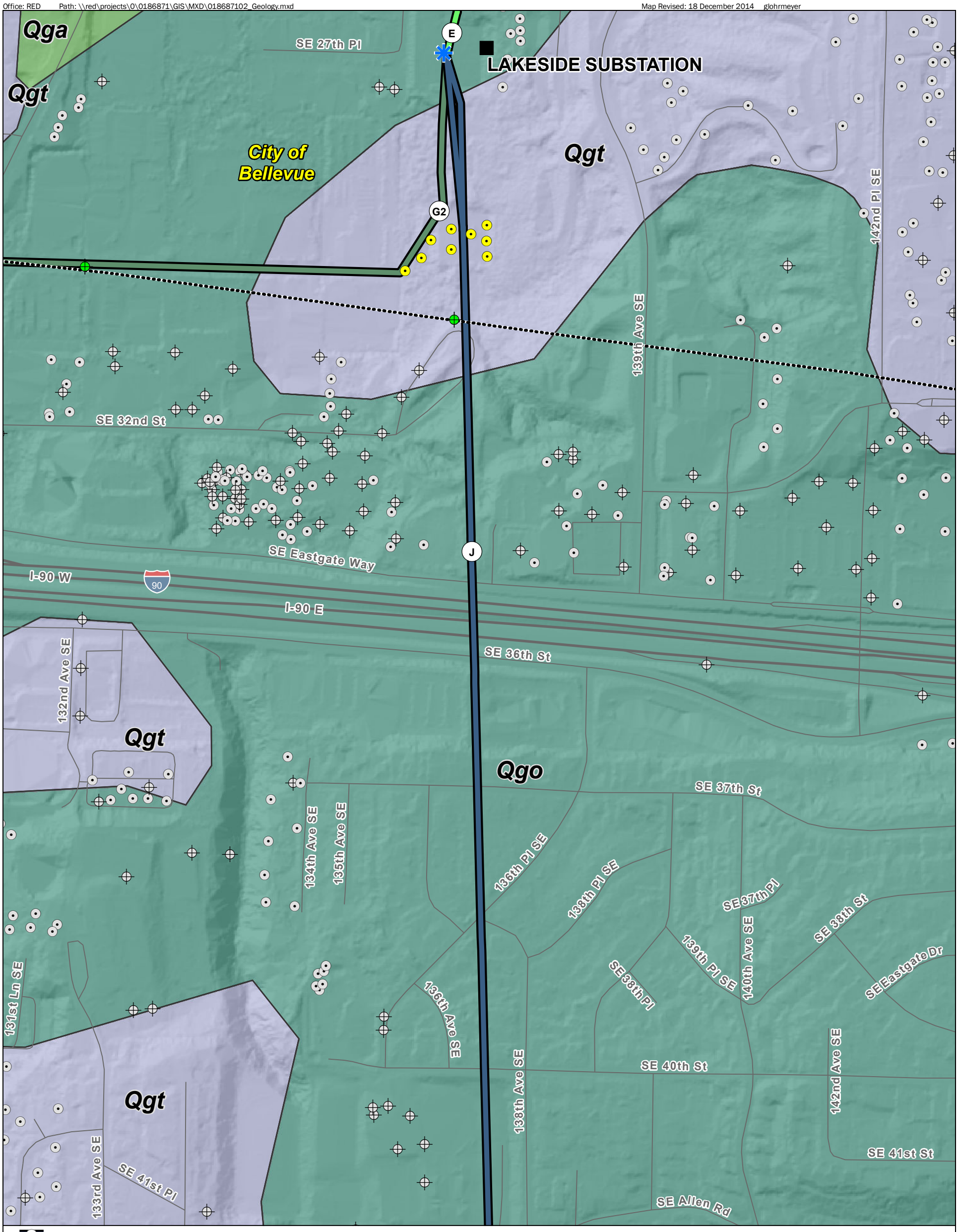
PSE Energize Eastside Project
Geohazards Evaluation
King County, Washington

GeoEngineers

Figure 27

DSD 001257

Office: RED Path: \\red\projects\0\0186871\GIS\MXD\018687102_Geology.mxd Map Revised: 18 December 2014 glohrmeyer



Route Segment
Substation
Seattle Fault Zone
City Boundary
GeoEngineers Geotechnical Project Location

DNR Geotechnical Borings within 150 Foot Buffer

Geotechnical
Test pit

DNR Geotechnical Borings within Project Extent

Geotechnical
Test pit

Geologic Unit (DNR 100k)

Youngest → Oldest

- Qls: mass-wasting deposits, mostly landslides
- Qf - Artificial fill, including modified land
- Qa: Alluvium
- Qp: peat deposits
- Qgo: continental glacial outwash
- Qgt: continental glacial till
- Qgpc: continental glacial drift
- Qgu: glacial drift, undivided
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- Qga(t): advance continental glacial outwash
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- Oen: nearshore sedimentary rocks
- Ec(2r): continental sedimentary deposits or rocks
- Ec(2t) - continental sedimentary deposits or rocks
- Evc(t) - volcaniclastic deposits or rocks
- Water

Data Source: ESRI Street Map data. Geology data from Washington DNR. Topography from King County LiDAR.

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Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet

N W E S

400 0 400
Feet

Geologic Units
Segment J

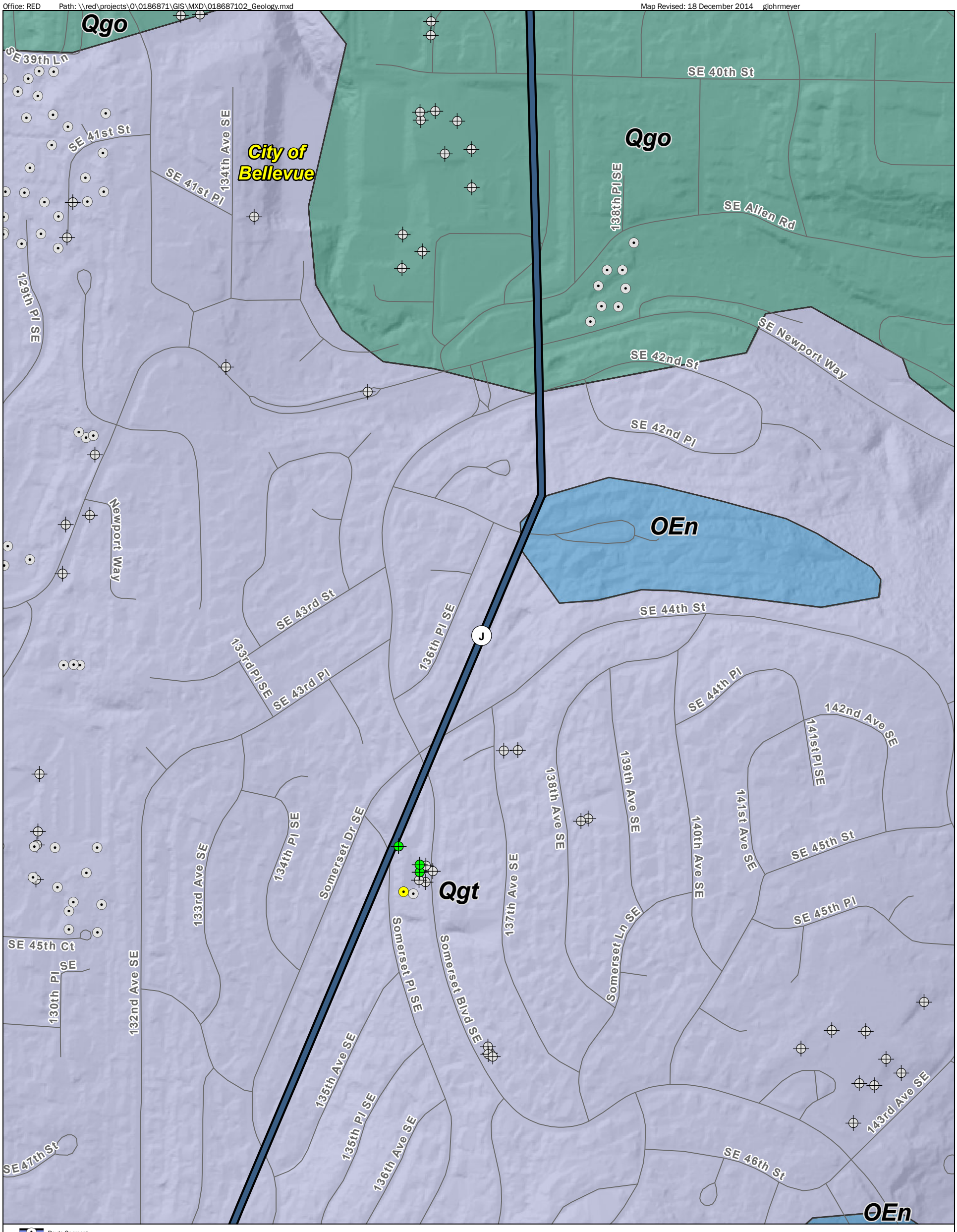
PSE Energize Eastside Project
Geohazards Evaluation
King County, Washington

GeoEngineers

Figure 28

DSD 001258

Office: RED Path: \\red\projects\0\0186871\GIS\MXD\018687102_Geology.mxd Map Revised: 18 December 2014 glohrmeyer



Route Segment
Substation
Seattle Fault Zone
City Boundary
GeoEngineers Geotechnical Project Location

DNR Geotechnical Borings within 150 Foot Buffer

Geotechnical
Test pit

DNR Geotechnical Borings within Project Extent

Geotechnical
Test pit

Geologic Unit (DNR 100k)

Youngest → Oldest

- Qls: mass-wasting deposits, mostly landslides
- Qf - Artificial fill, including modified land
- Qa: Alluvium
- Qp: peat deposits
- Qgo: continental glacial outwash
- Qgt: continental glacial till
- Qgpc: continental glacial drift
- Qgu: glacial drift, undivided
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- Qga(t): advance continental glacial outwash
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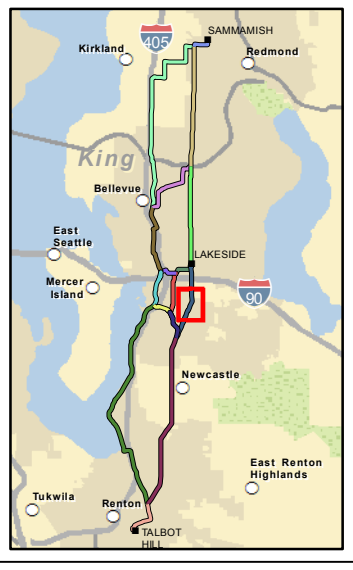
- Oen: nearshore sedimentary rocks
- Ec(2r): continental sedimentary deposits or rocks
- Ec(2t) - continental sedimentary deposits or rocks
- Evc(t) - volcaniclastic deposits or rocks
- Water



N
W E
S

400 0 400
Feet

Data Source: ESRI Street Map data. Geology data from Washington DNR. Topography from King County LiDAR.

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Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet

Geologic Units
Segment J

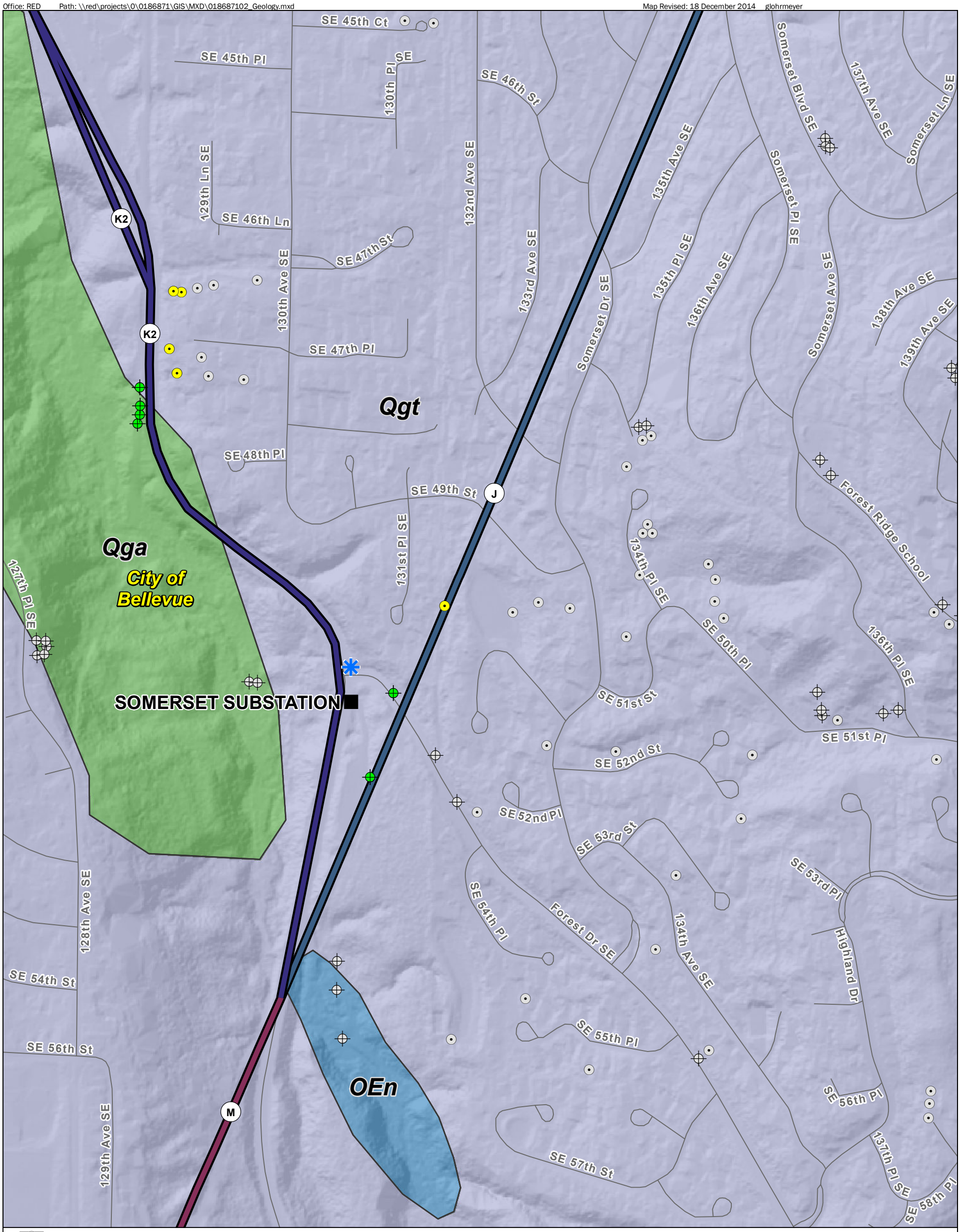
PSE Energize Eastside Project
Geohazards Evaluation
King County, Washington

GeoEngineers

Figure 29

DSD 001259

Office: RED Path: \\red\projects\0\0186871\GIS\MXD\018687102_Geology.mxd Map Revised: 18 December 2014 glohrmeyer



Route Segment
Substation
Seattle Fault Zone
City Boundary
GeoEngineers Geotechnical Project Location

DNR Geotechnical Borings within 150 Foot Buffer

Geotechnical
Test pit

DNR Geotechnical Borings within Project Extent

Geotechnical
Test pit

Geologic Unit (DNR 100k)

Youngest ⟶ Oldest

- Qls: mass-wasting deposits, mostly landslides
- Qf - Artificial fill, including modified land
- Qa: Alluvium
- Qp: peat deposits
- Qgo: continental glacial outwash
- Qgt: continental glacial till
- Qgpc: continental glacial drift
- Qgu: glacial drift, undivided
- Qga: advance continental glacial outwash
- Qga(t): advance continental glacial outwash
- Oem: marine sedimentary rocks
- Oen: nearshore sedimentary rocks
- Ec(2r): continental sedimentary deposits or rocks
- Ec(2t) - continental sedimentary deposits or rocks
- Evc(t) - volcaniclastic deposits or rocks
- Water

N W E S

400 0 400
Feet

Data Source: ESRI Street Map data. Geology data from Washington DNR. Topography from King County LiDAR.

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Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet

Geologic Units
Segment J

PSE Energize Eastside Project
Geohazards Evaluation
King County, Washington

GeoEngineers

Figure 30

DSD 001260

Office: RED Path: \\red\projects\0\0186871\GIS\MXD\018687102_Geology.mxd Map Revised: 18 December 2014 glohrmeyer

Qp
Qgpc
Sucia Key
Newport Key
118th Ave SE
120th Ave SE
SE 42nd Ct
405
I-405 S
I-405 N
SE 41st Ln
SE 41st Pl
Qgo
Glacier Key
Vashon Key
H
SE 42nd St
Skagit Key
Qa
Qgo
SE 43rd St
123rd Ave SE
124th Ave SE
I
OEn
Cascade Key
SE 44th Pl
SE 44th St
Qgt
L
Qgpc
City of Bellevue
Factoria Blvd SE
Qgt
K1
Lake Heights St
SE 45th Pl
176th Ave SE
SE 46th St
119th Ave SE
125th Ave SE
Qga
SE 46th Pl
K2
121st Ave SE
SE 47th St
Qgt
SE 48th St
SE 47th Pl
122nd Ave SE
SE 48th Pl
SE 49th Pl
123rd Pl SE
SE 49th St
117th Ave SE

Route Segment
Substation
Seattle Fault Zone
City Boundary
GeoEngineers Geotechnical Project Location

DNR Geotechnical Borings within 150 Foot Buffer

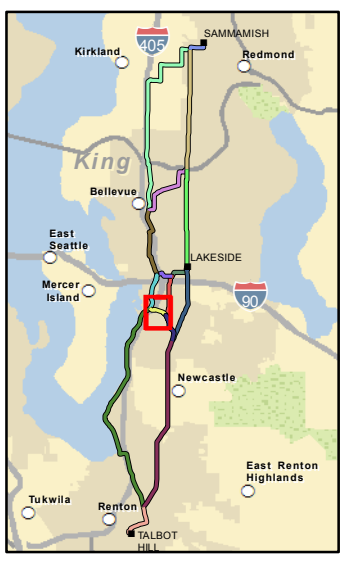
Geotechnical
Test pit

DNR Geotechnical Borings within Project Extent

Geotechnical
Test pit

Geologic Unit (DNR 100k)
Youngest → Oldest

- Qls: mass-wasting deposits, mostly landslides
- Qf - Artificial fill, including modified land
- Qa: Alluvium
- Qp: peat deposits
- Qgo: continental glacial outwash
- Qgt: continental glacial till
- Qgpc: continental glacial drift
- Qgu: glacial drift, undivided
- Qga: advance continental glacial outwash
- Qga(t): advance continental glacial outwash
- Oem: marine sedimentary rocks
- Oen: nearshore sedimentary rocks
- Ec(2r): continental sedimentary deposits or rocks
- Ec(2t) - continental sedimentary deposits or rocks
- Evc(t) - volcaniclastic deposits or rocks
- Water



N W E S

400 0 400
Feet

Data Source: ESRI Street Map data. Geology data from Washington DNR. Topography from King County LiDAR.

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Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet

Geologic Units
Segment K1

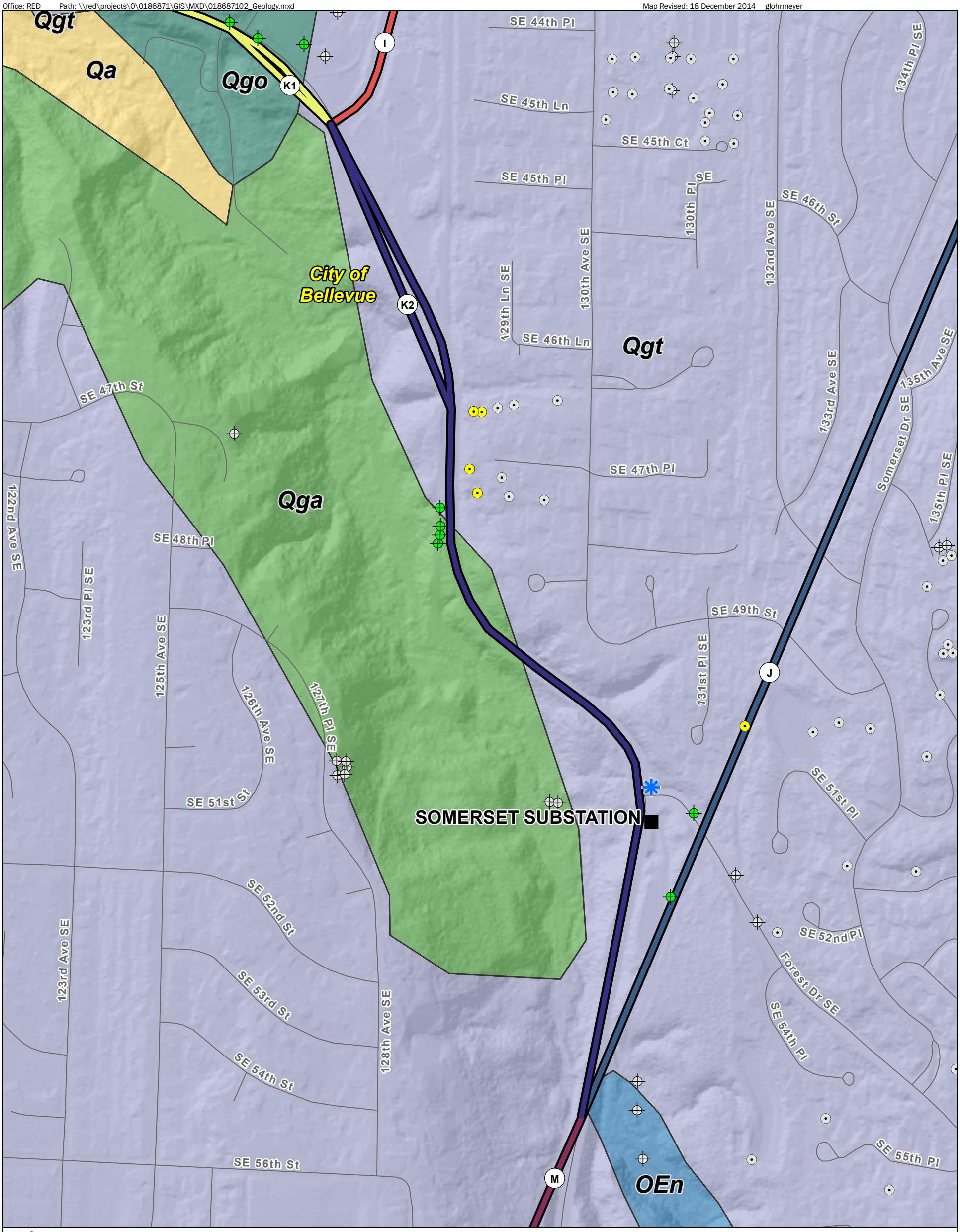
PSE Energize Eastside Project
Geohazards Evaluation
King County, Washington

GeoEngineers

Figure 31

DSD 001261

Office: RED Path: \\red\projects\0\0186871\GIS\MXD\018687102_Geology.mxd Map Revised: 18 December 2014 glohrmeyer



Route Segment
Substation
Seattle Fault Zone
City Boundary
GeoEngineers Geotechnical Project Location

DNR Geotechnical Borings within 150 Foot Buffer

Geotechnical
Test pit

DNR Geotechnical Borings within Project Extent

Geotechnical
Test pit

Data Source: ESRI Street Map data. Geology data from Washington DNR. Topography from King County LiDAR.

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Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet

Geologic Unit (DNR 100k)
Youngest → Oldest

- Qls: mass-wasting deposits, mostly landslides
- Qf - Artificial fill, including modified land
- Qa: Alluvium
- Qp: peat deposits
- Qgo: continental glacial outwash
- Qgt: continental glacial till
- Qgpc: continental glacial drift
- Qgu: glacial drift, undivided
- Qga: advance continental glacial outwash
- Qga(t): advance continental glacial outwash
- Oem: marine sedimentary rocks
- Oen: nearshore sedimentary rocks
- Ec(2r): continental sedimentary deposits or rocks
- Ec(2t) - continental sedimentary deposits or rocks
- Evc(t) - volcaniclastic deposits or rocks
- Water

N W E S

400 0 400
Feet

Geologic Units
Segment K2

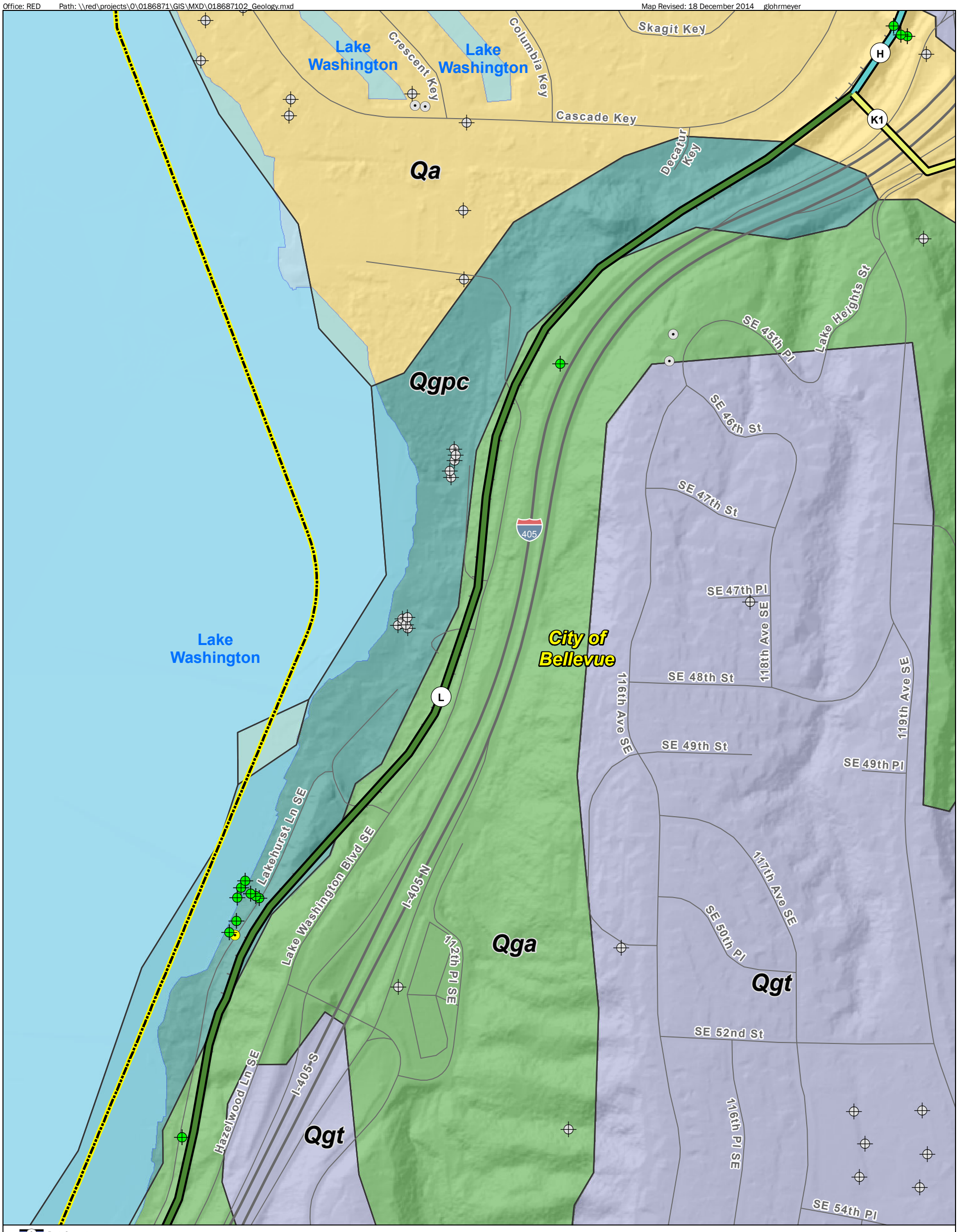
PSE Energize Eastside Project
Geohazards Evaluation
King County, Washington

GeoEngineers

Figure 32

DSD 001262

Office: RED Path: \\red\projects\0\0186871\GIS\MXD\018687102_Geology.mxd Map Revised: 18 December 2014 glohrmeyer



Route Segment
Substation
Seattle Fault Zone
City Boundary
GeoEngineers Geotechnical Project Location

DNR Geotechnical Borings within 150 Foot Buffer

Geotechnical
Test pit

DNR Geotechnical Borings within Project Extent

Geotechnical
Test pit

Geologic Unit (DNR 100k)
Youngest ⟶ Oldest

- Qls: mass-wasting deposits, mostly landslides
- Qf - Artificial fill, including modified land
- Qa: Alluvium
- Qp: peat deposits
- Qgo: continental glacial outwash
- Qgt: continental glacial till
- Qgpc: continental glacial drift
- Qgu: glacial drift, undivided
- Qga: advance continental glacial outwash
- Qga(t): advance continental glacial outwash
- Oem: marine sedimentary rocks
- Oen: nearshore sedimentary rocks
- Ec(2r): continental sedimentary deposits or rocks
- Ec(2t) - continental sedimentary deposits or rocks
- Evc(t) - volcaniclastic deposits or rocks
- Water

N W E S

400 0 400
Feet

Data Source: ESRI Street Map data. Geology data from Washington DNR. Topography from King County LiDAR.

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Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet

Geologic Units
Segment L

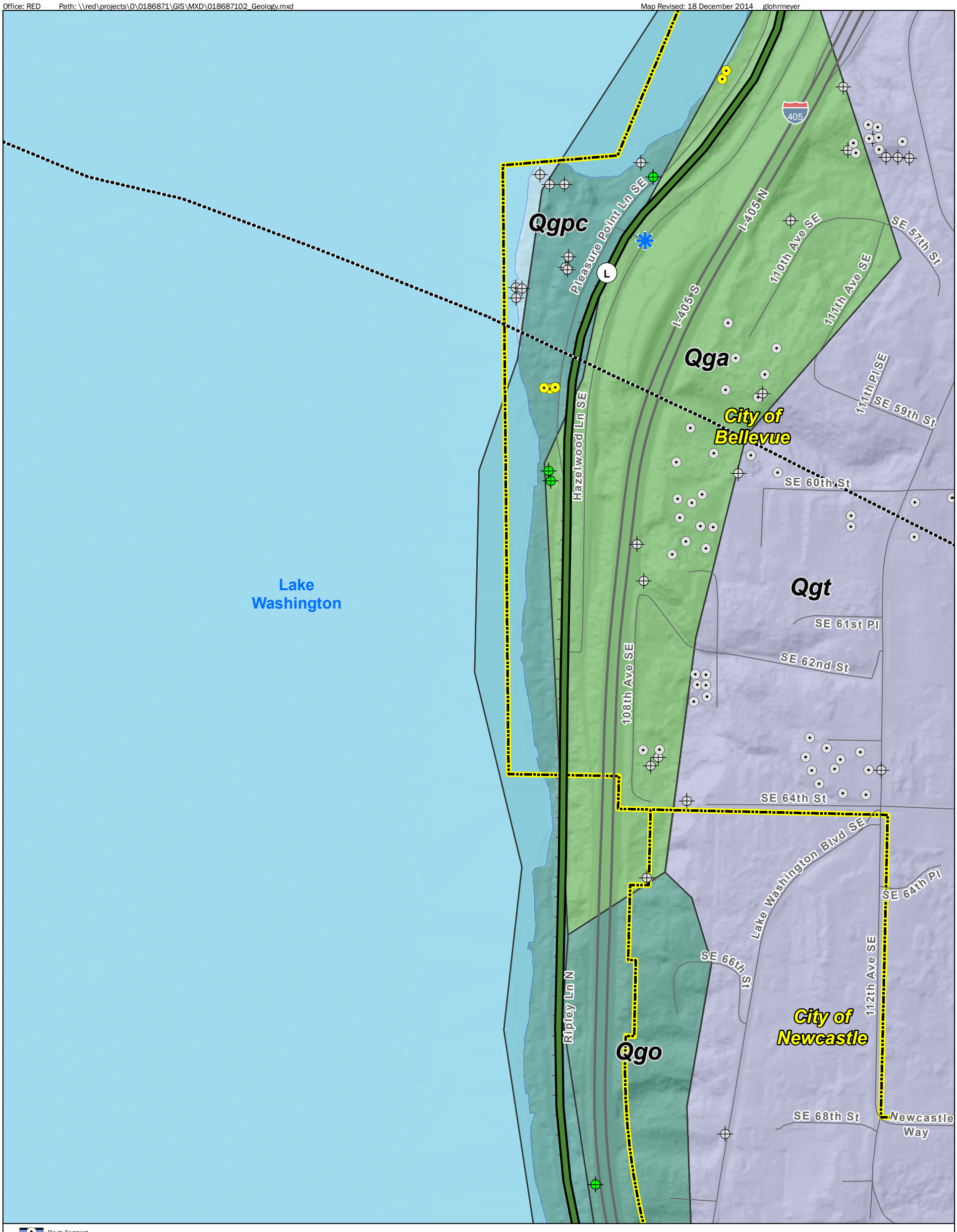
PSE Energize Eastside Project
Geohazards Evaluation
King County, Washington

GeoEngineers

Figure 33

DSD 001263

Office: RED Path: \\red\projects\0\0186871\GIS\MXD\018687102_Geology.mxd Map Revised: 18 December 2014 glohrmeyer



Route Segment
Substation
Seattle Fault Zone
City Boundary
GeoEngineers Geotechnical Project Location

DNR Geotechnical Borings within 150 Foot Buffer

Geotechnical
Test pit

DNR Geotechnical Borings within Project Extent

Geotechnical
Test pit

Data Source: ESRI Street Map data. Geology data from Washington DNR. Topography from King County LiDAR.

Notes:
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Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet

Geologic Unit (DNR 100k)
Youngest ⟶ Oldest

- Qls: mass-wasting deposits, mostly landslides
- Qf - Artificial fill, including modified land
- Qa: Alluvium
- Qp: peat deposits
- Qgo: continental glacial outwash
- Qgt: continental glacial till
- Qgpc: continental glacial drift
- Qgu: glacial drift, undivided
- Qga: advance continental glacial outwash
- Qga(t): advance continental glacial outwash
- Oem: marine sedimentary rocks
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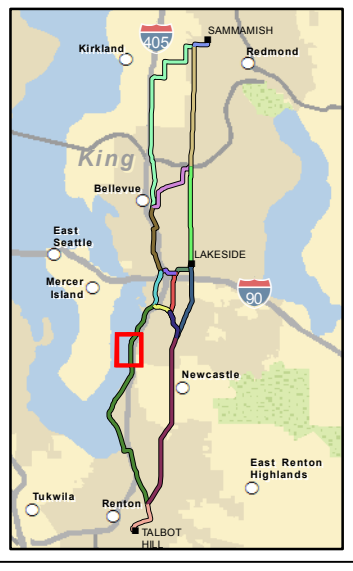
- Ec(2r): continental sedimentary deposits or rocks
- Ec(2t) - continental sedimentary deposits or rocks
- Evc(t) - volcaniclastic deposits or rocks
- Water



N W E S

400 0 400
Feet

Geologic Units
Segment L

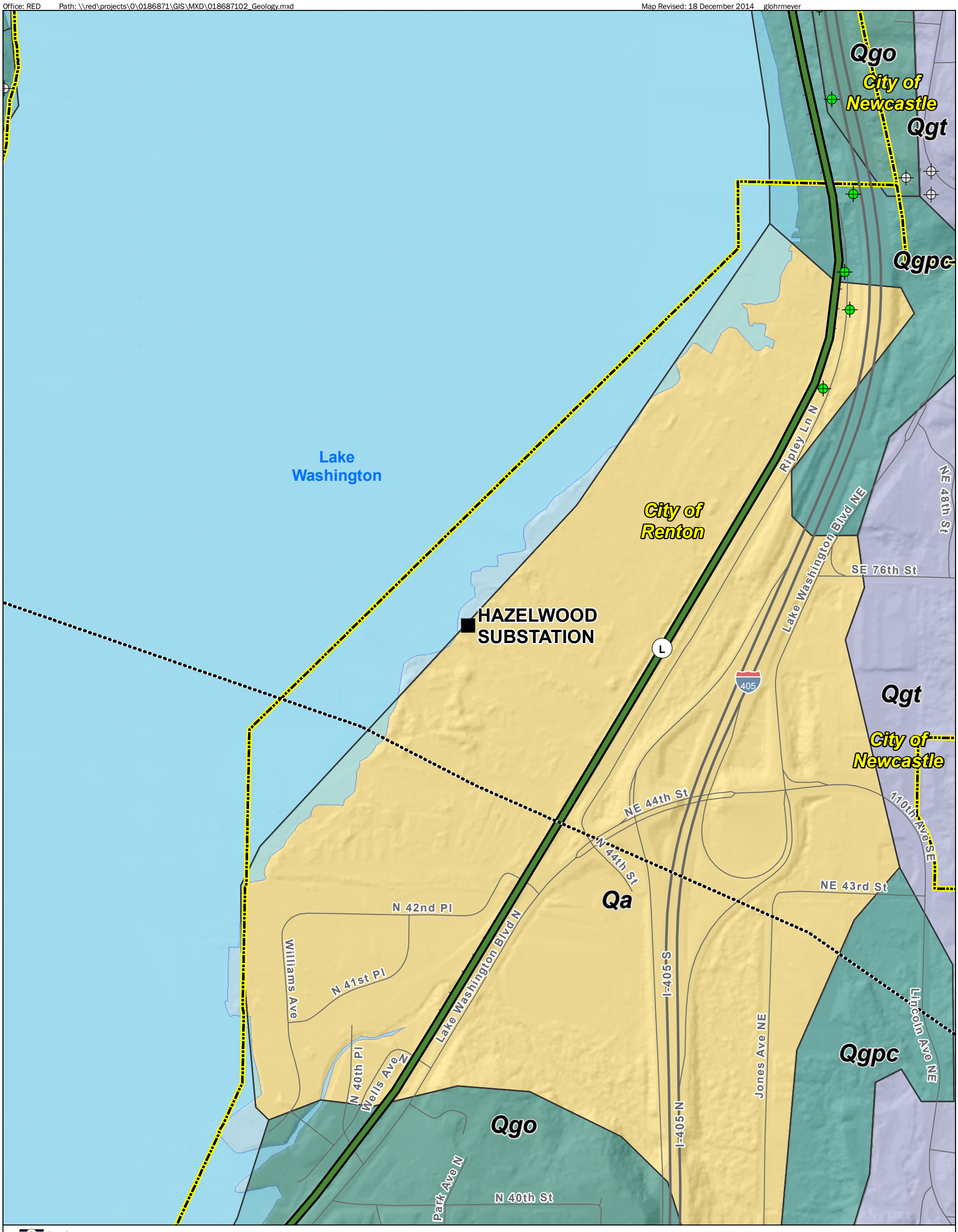
PSE Energize Eastside Project
Geohazards Evaluation
King County, Washington

GeoEngineers

Figure 34

DSD 001264

Office: RED Path: \\red\projects\0\0186871\GIS\MXD\018687102_Geology.mxd Map Revised: 18 December 2014 glohrmeyer



Route Segment
Substation
Seattle Fault Zone
City Boundary
GeoEngineers Geotechnical Project Location

DNR Geotechnical Borings within 150 Foot Buffer

Geotechnical
Test pit

DNR Geotechnical Borings within Project Extent

Geotechnical
Test pit

Geologic Unit (DNR 100k)

Youngest → Oldest

- Qls: mass-wasting deposits, mostly landslides
- Qf - Artificial fill, including modified land
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- Qp: peat deposits
- Qgo: continental glacial outwash
- Qgt: continental glacial till
- Qgpc: continental glacial drift
- Qgu: glacial drift, undivided
- Qga: advance continental glacial outwash
- Qga(t): advance continental glacial outwash
- Oem: marine sedimentary rocks
- Oen: nearshore sedimentary rocks
- Ec(2r): continental sedimentary deposits or rocks
- Ec(2t) - continental sedimentary deposits or rocks
- Evc(t) - volcaniclastic deposits or rocks
- Water

N
W E
S

400 0 400
Feet

Data Source: ESRI Street Map data. Geology data from Washington DNR. Topography from King County LiDAR.

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Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet

Geologic Units
Segment L

PSE Energize Eastside Project
Geohazards Evaluation
King County, Washington

GeoEngineers

Figure 35

DSD 001265

Office: RED Path: \\red\projects\0\0186871\GIS\MXD\018687102_Geology.mxd Map Revised: 18 December 2014 glohrmeyer

Route Segment
Substation
Seattle Fault Zone
City Boundary
GeoEngineers Geotechnical Project Location

DNR Geotechnical Borings within 150 Foot Buffer

Geotechnical
Test pit

DNR Geotechnical Borings within Project Extent

Geotechnical
Test pit

Data Source: ESRI Street Map data. Geology data from Washington DNR. Topography from King County LiDAR.

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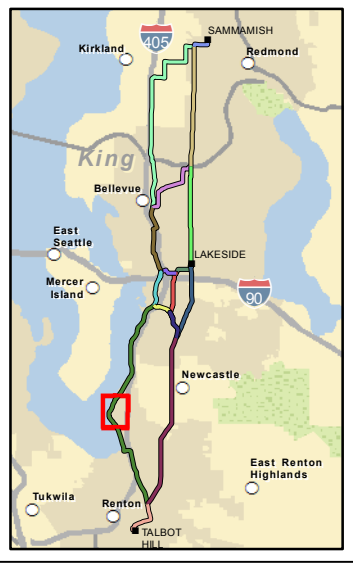
Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet

Geologic Unit (DNR 100k)
Youngest ⟶ Oldest

- Qls: mass-wasting deposits, mostly landslides
- Qf - Artificial fill, including modified land
- Qa: Alluvium
- Qp: peat deposits
- Qgo: continental glacial outwash
- Qgt: continental glacial till
- Qgpc: continental glacial drift
- Qgu: glacial drift, undivided
- Qga: advance continental glacial outwash
- Qga(t): advance continental glacial outwash
- Oem: marine sedimentary rocks
- Oen: nearshore sedimentary rocks
- Ec(2r): continental sedimentary deposits or rocks
- Ec(2t) - continental sedimentary deposits or rocks
- Evc(t) - volcaniclastic deposits or rocks
- Water



N W E S

400 0 400
Feet

Geologic Units
Segment L

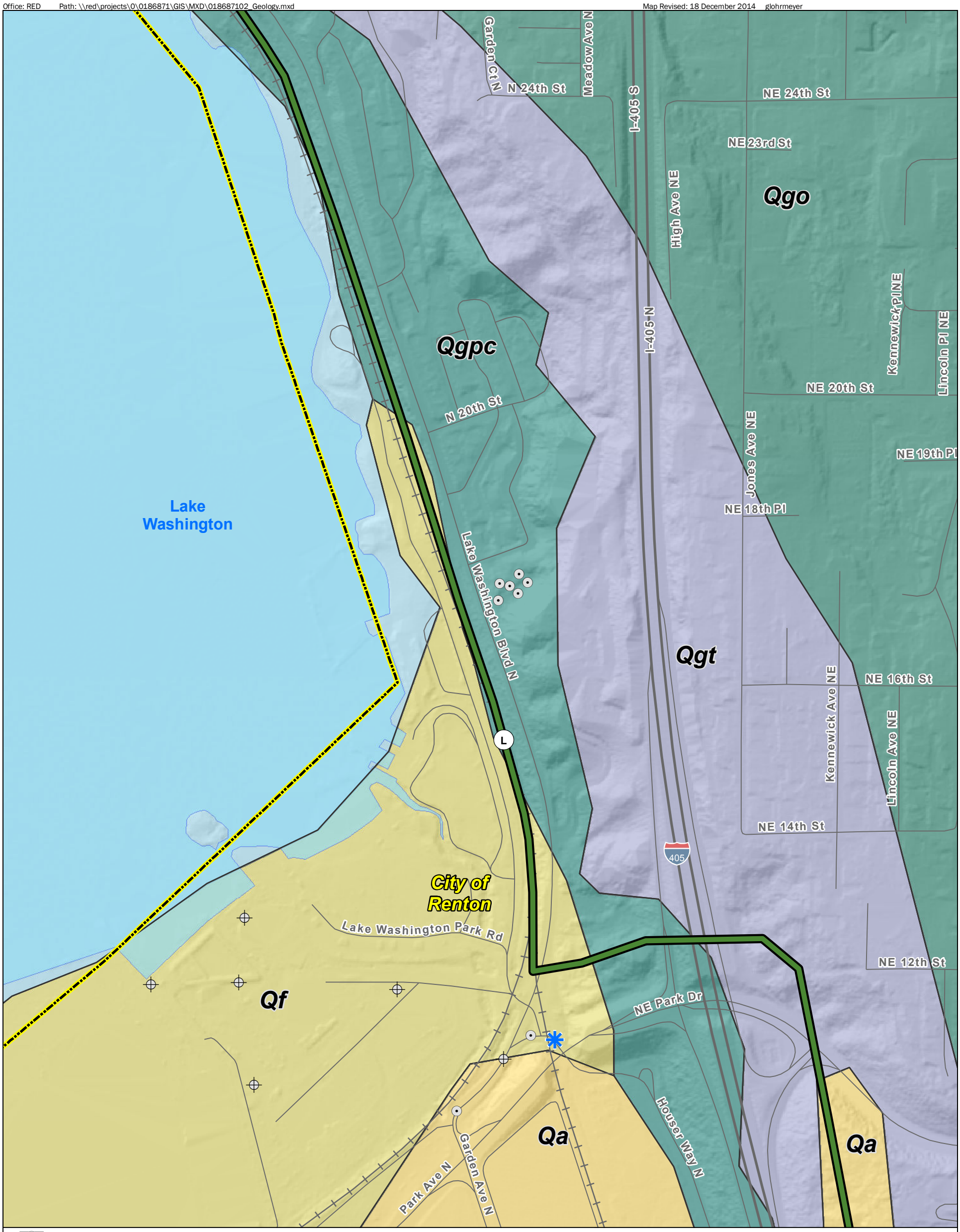
PSE Energize Eastside Project
Geohazards Evaluation
King County, Washington

GeoEngineers

Figure 36

DSD 001266

Office: RED Path: \\red\projects\0\0186871\GIS\MXD\018687102_Geology.mxd Map Revised: 18 December 2014 glohrmeyer



Route Segment
Substation
Seattle Fault Zone
City Boundary
GeoEngineers Geotechnical Project Location

DNR Geotechnical Borings within 150 Foot Buffer

Geotechnical
Test pit

DNR Geotechnical Borings within Project Extent

Geotechnical
Test pit

Geologic Unit (DNR 100k)

Youngest ⟶ Oldest

- Qls: mass-wasting deposits, mostly landslides
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- Qp: peat deposits
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- Qgt: continental glacial till
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- Qgu: glacial drift, undivided
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- Evc(t) - volcaniclastic deposits or rocks
- Water

Data Source: ESRI Street Map data. Geology data from Washington DNR. Topography from King County LiDAR.

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Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet

N
W E
S

400 0 400
Feet

Geologic Units
Segment L

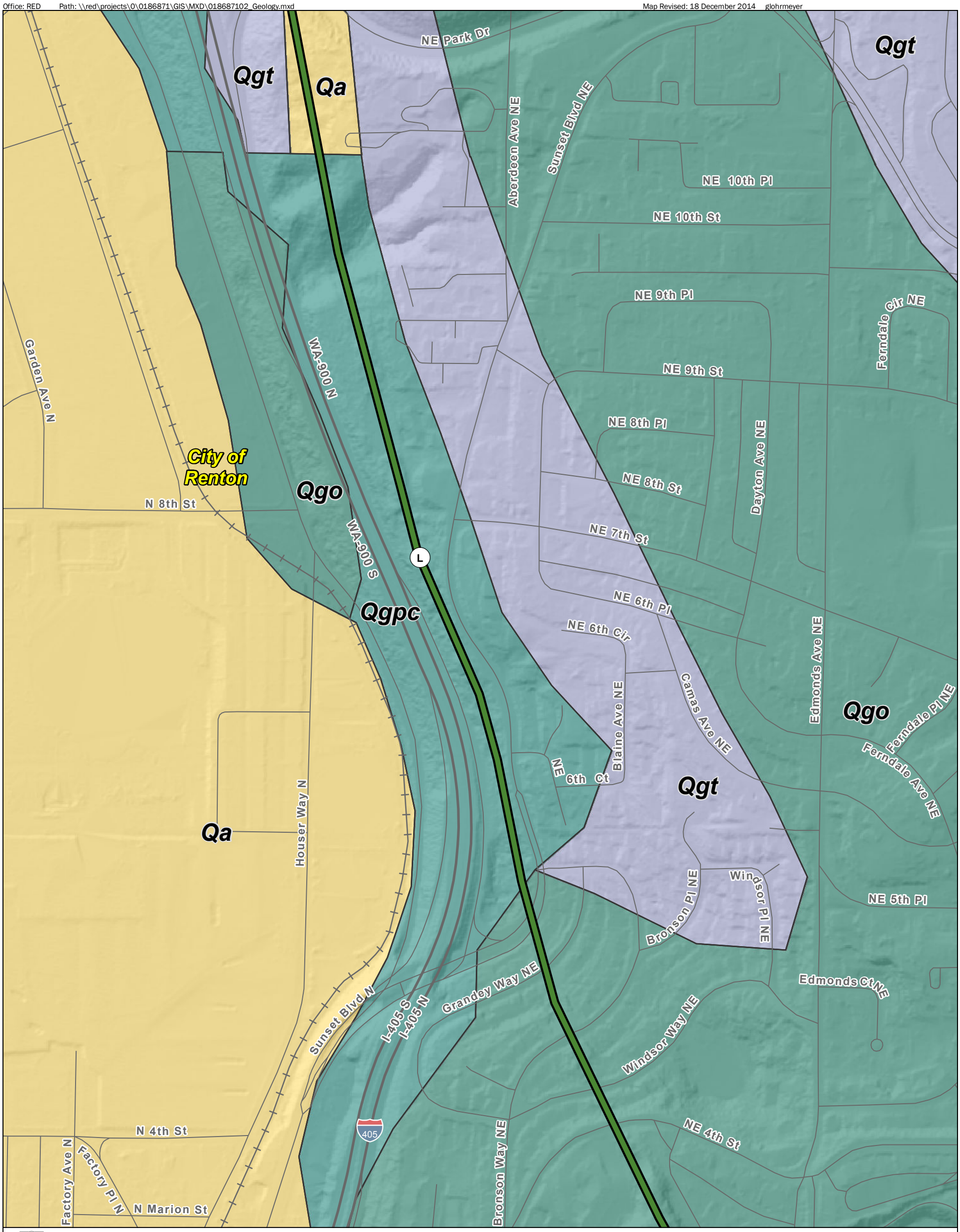
PSE Energize Eastside Project
Geohazards Evaluation
King County, Washington

GeoEngineers

Figure 37

DSD 001267

Office: RED Path: \\red\projects\0\0186871\GIS\MXD\018687102_Geology.mxd Map Revised: 18 December 2014 glohrmeyer



Route Segment
Substation
Seattle Fault Zone
City Boundary
GeoEngineers Geotechnical Project Location

DNR Geotechnical Borings within 150 Foot Buffer

Geotechnical
Test pit

DNR Geotechnical Borings within Project Extent

Geotechnical
Test pit

Data Source: ESRI Street Map data. Geology data from Washington DNR. Topography from King County LiDAR.

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Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet

Geologic Unit (DNR 100k)
Youngest ⟶ Oldest

- Qls: mass-wasting deposits, mostly landslides
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- Ec(2r): continental sedimentary deposits or rocks
- Ec(2t) - continental sedimentary deposits or rocks
- Evc(t) - volcaniclastic deposits or rocks
- Water

N W E S

400 0 400
Feet

Geologic Units
Segment L

PSE Energize Eastside Project
Geohazards Evaluation
King County, Washington

GeoEngineers

Figure 38

DSD 001268

Office: RED Path: \\red\projects\0\0186871\GIS\MXD\018687102_Geology.mxd Map Revised: 18 December 2014 glohrmeyer

Qa
Qgpc
Qgo
Qgpc
Qa
Qgpc
Qls
Ec(2r)
Qls

Sunset Blvd N
I-405 N
Grandey Way NE
I-405 S
405
Windsor Way NE
Edmonds Ct NE
Ferndale Ave NE
NE 4th Ct
Index Pl NE
Index Ave NE
NE 5th Pl
Jefferson Ave NE
NE 4th St
Bronson Way NE
Edmonds Ave NE
Vuemont Pl NE
NE 2nd Pl
NE 3rd St
L
City of Renton
Edmonds Pl NE
NE 2nd St
NE 1st St
Glennwood Pl NE
Monterey Dr NE
Capri Ave NE
Monterey Pl NE
Blaine Ave NE
Mt Olivet Cemetary
Glennwood Ave SE
Glennwood Pl SE
M
Index Ave SE
SE 2nd Pl
Blaine Dr SE
Blaine Ct SE
Camas Ave SE
SE 2nd Ct
Ferndale Ave SE
Kirkland Ave SE
SE 3rd Ct
Index Pl SE
Glennwood Ct
Harrington Ct
Harrington Ave
SE 4th St
SE 3rd St
SE Maple Valley Hwy
N
Maple Valley Hwy
SE 5th St
SE 6th St

Route Segment
Substation
Seattle Fault Zone
City Boundary
GeoEngineers Geotechnical Project Location

DNR Geotechnical Borings within 150 Foot Buffer
Geotechnical
Test pit

DNR Geotechnical Borings within Project Extent
Geotechnical
Test pit

Data Source: ESRI Street Map data. Geology data from Washington DNR. Topography from King County LiDAR.

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Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet

Geologic Unit (DNR 100k)
Youngest ⟶ Oldest

- Qls: mass-wasting deposits, mostly landslides
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- Qga: advance continental glacial outwash
- Qga(t): advance continental glacial outwash
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- Oen: nearshore sedimentary rocks
- Ec(2r): continental sedimentary deposits or rocks
- Ec(2t) - continental sedimentary deposits or rocks
- Evc(t) - volcaniclastic deposits or rocks
- Water

N
W E
S

400 0 400
Feet

Geologic Units
Segment L

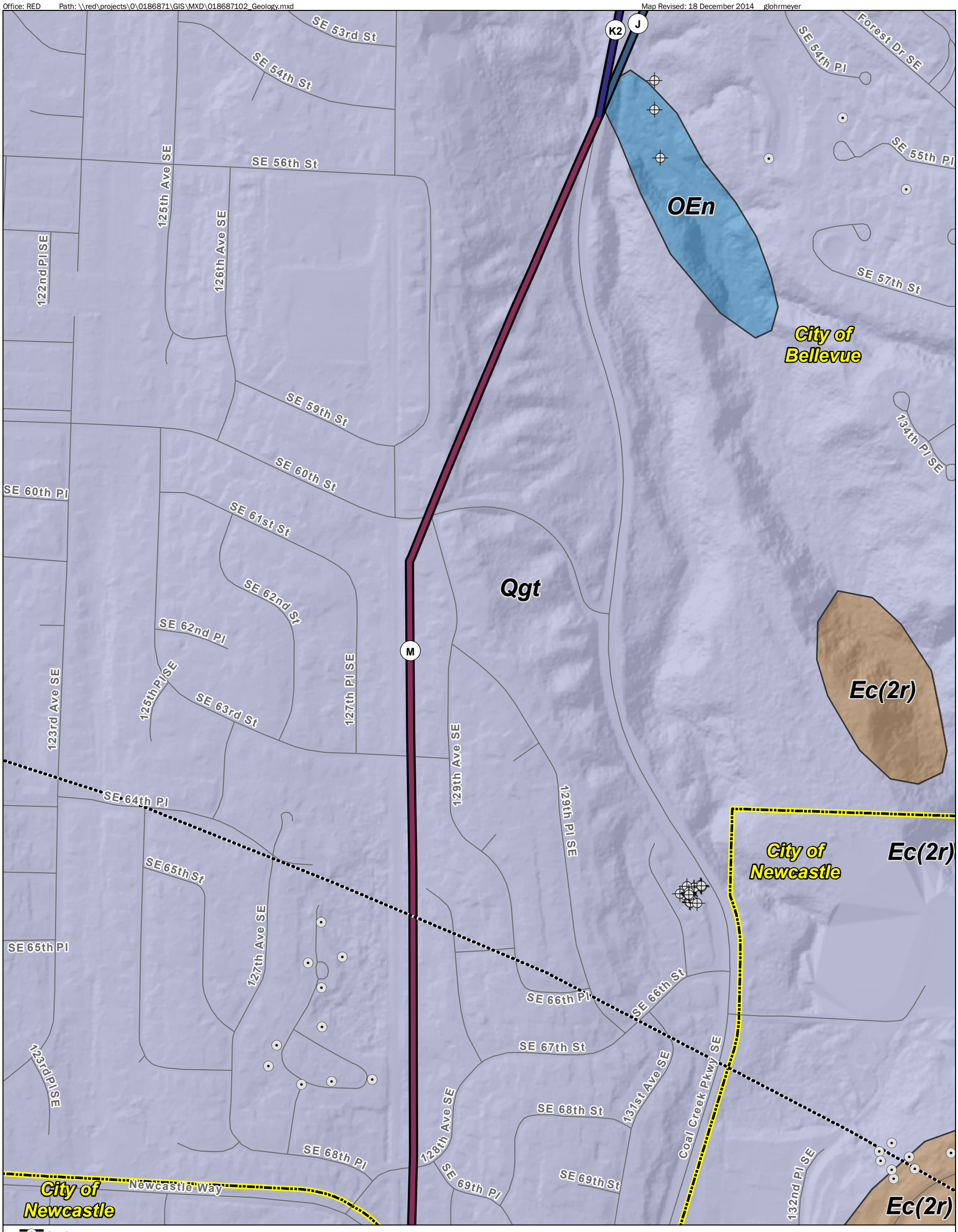
PSE Energize Eastside Project
Geohazards Evaluation
King County, Washington

GeoEngineers

Figure 39

DSD 001269

Office: RED Path: \\red\projects\0\0186871\GIS\MXD\018687102_Geology.mxd Map Revised: 18 December 2014 glohrmeyer



Route Segment
Substation
Seattle Fault Zone
City Boundary
GeoEngineers Geotechnical Project Location

DNR Geotechnical Borings within 150 Foot Buffer

Geotechnical
Test pit

DNR Geotechnical Borings within Project Extent

Geotechnical
Test pit

Geologic Unit (DNR 100k)
Youngest → Oldest

- Qls: mass-wasting deposits, mostly landslides
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- Qp: peat deposits
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- Water

Data Source: ESRI Street Map data. Geology data from Washington DNR. Topography from King County LiDAR.

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Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet

N W E S

400 0 400
Feet

Geologic Units
Segment M

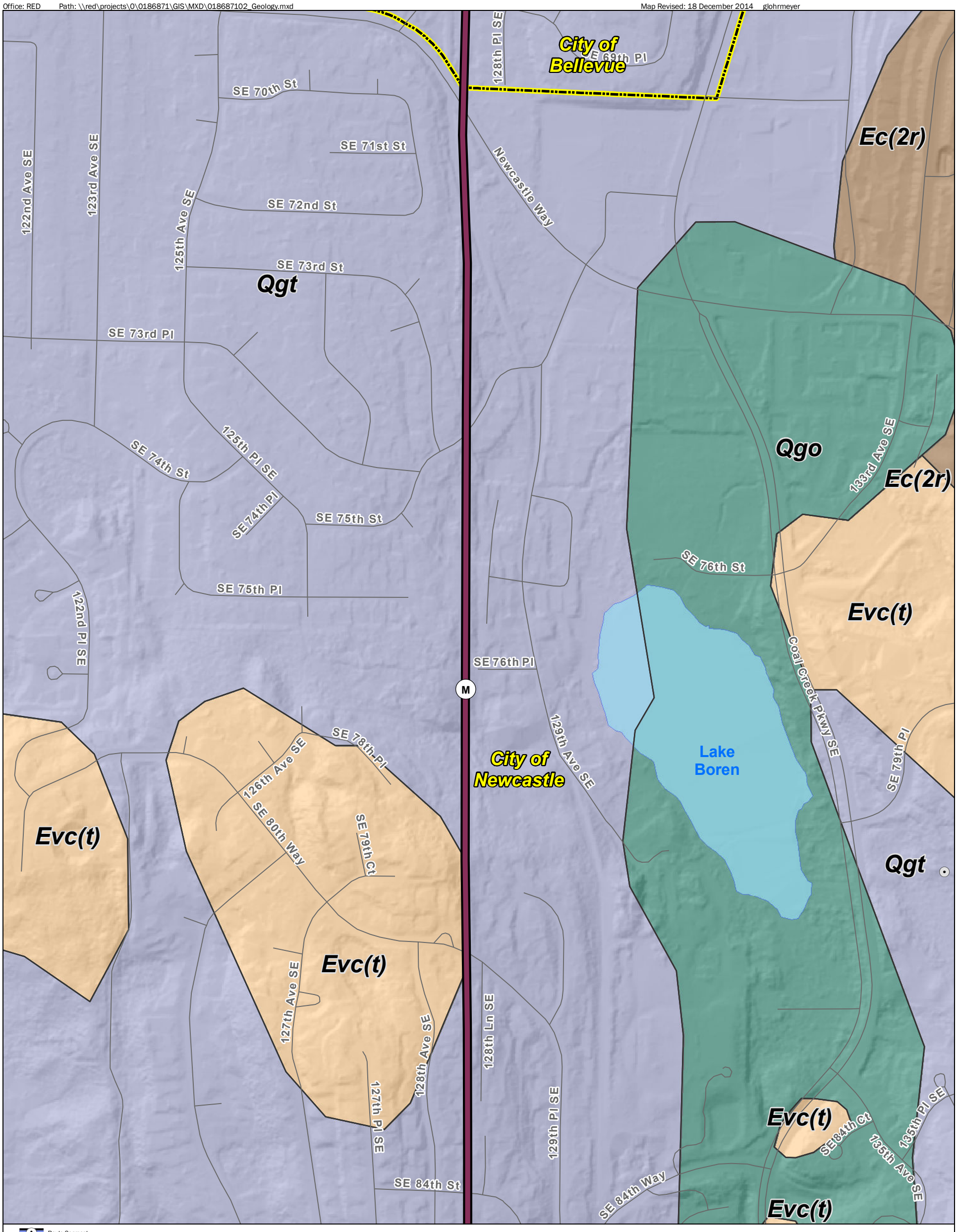
PSE Energize Eastside Project
Geohazards Evaluation
King County, Washington

GeoEngineers

Figure 40

DSD 001270

Office: RED Path: \\red\projects\0\0186871\GIS\MXD\018687102_Geology.mxd Map Revised: 18 December 2014 glohrmeyer



Route Segment
Substation
Seattle Fault Zone
City Boundary
GeoEngineers Geotechnical Project Location

DNR Geotechnical Borings within 150 Foot Buffer
Geotechnical
Test pit

DNR Geotechnical Borings within Project Extent
Geotechnical
Test pit

Geologic Unit (DNR 100k)
Youngest ⟶ Oldest
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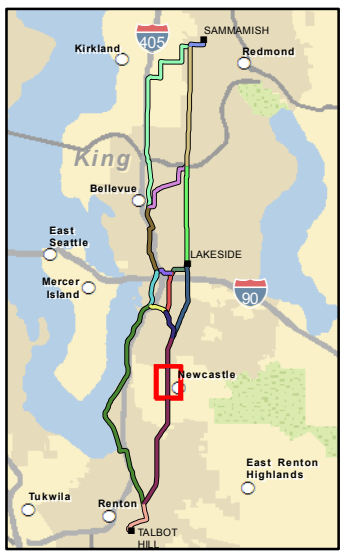
- Ec(2r): continental sedimentary deposits or rocks
- Ec(2t) - continental sedimentary deposits or rocks
- Evc(t) - volcaniclastic deposits or rocks
- Water



N W E S

400 0 400
Feet

Data Source: ESRI Street Map data. Geology data from Washington DNR. Topography from King County LiDAR.

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Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet

Geologic Units
Segment M

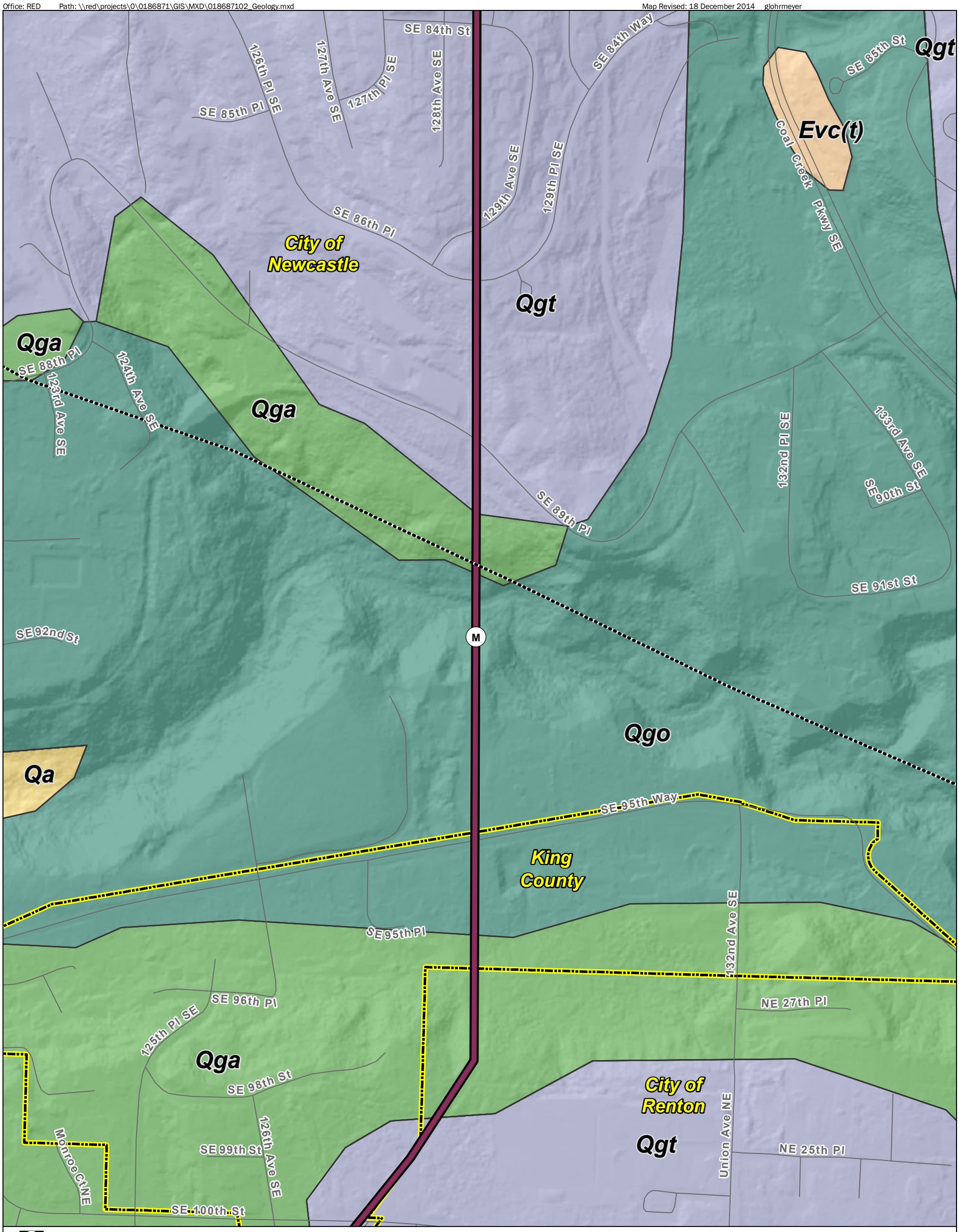
PSE Energize Eastside Project
Geohazards Evaluation
King County, Washington

GeoEngineers

Figure 41

DSD 001271

Office: RED Path: \\red\projects\0\0186871\GIS\MXD\018687102_Geology.mxd Map Revised: 18 December 2014 glohrmeyer



Route Segment
Substation
Seattle Fault Zone
City Boundary
GeoEngineers Geotechnical Project Location

DNR Geotechnical Borings within 150 Foot Buffer

Geotechnical
Test pit

DNR Geotechnical Borings within Project Extent

Geotechnical
Test pit

Geologic Unit (DNR 100k)

Youngest → Oldest

- Qls: mass-wasting deposits, mostly landslides
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- Qp: peat deposits
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Data Source: ESRI Street Map data. Geology data from Washington DNR. Topography from King County LiDAR.

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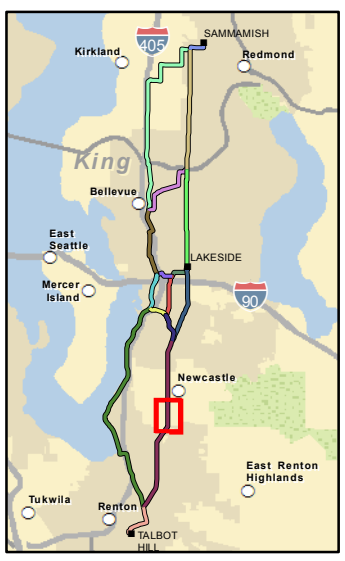
Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet



N W E S

400 0 400
Feet

Geologic Units
Segment M

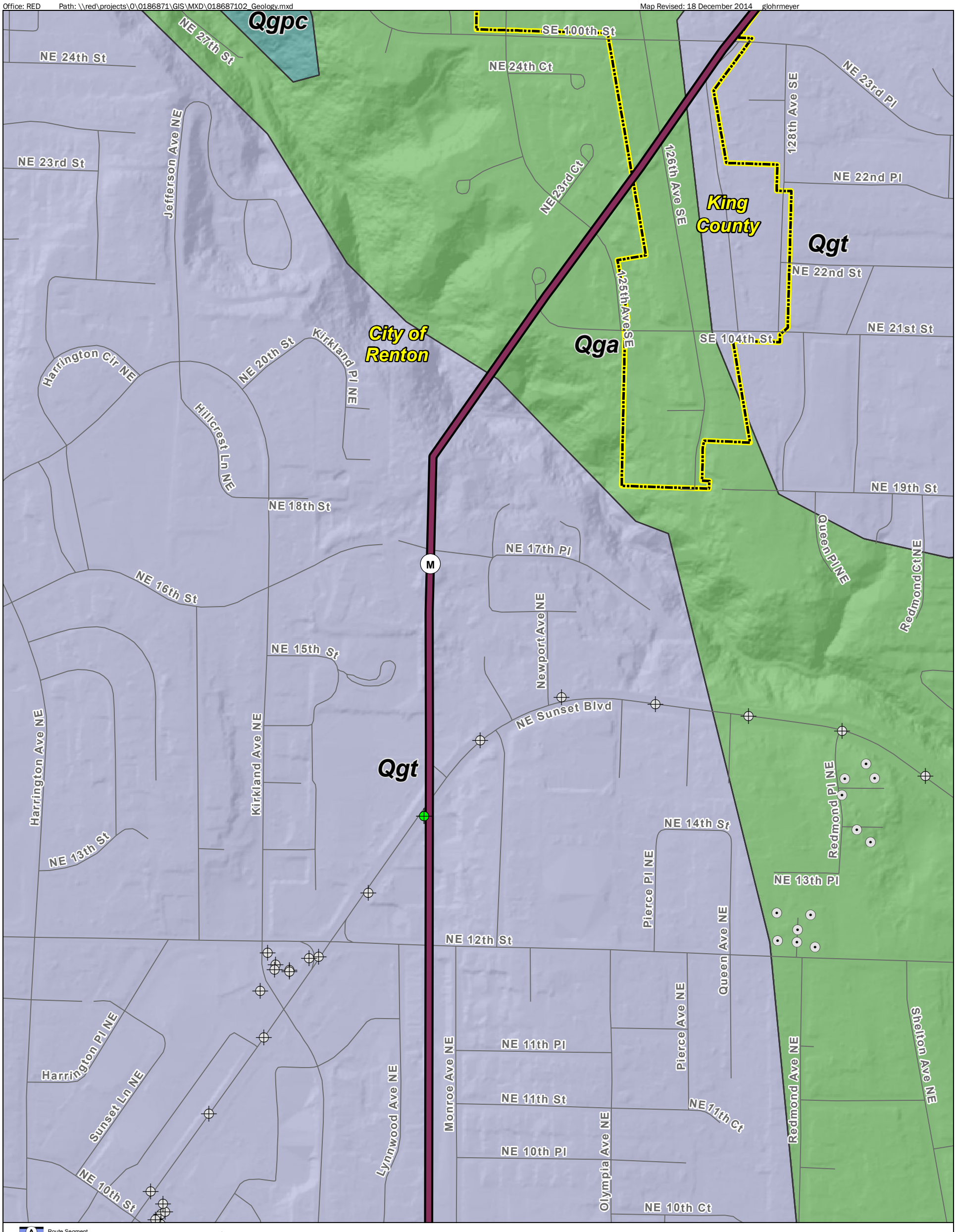
PSE Energize Eastside Project
Geohazards Evaluation
King County, Washington

GeoEngineers

Figure 42

DSD 001272

Office: RED Path: \\red\projects\0\0186871\GIS\MXD\018687102_Geology.mxd Map Revised: 18 December 2014 glohrmeyer



Route Segment
Substation
Seattle Fault Zone
City Boundary
GeoEngineers Geotechnical Project Location

DNR Geotechnical Borings within 150 Foot Buffer

Geotechnical
Test pit

DNR Geotechnical Borings within Project Extent

Geotechnical
Test pit

Geologic Unit (DNR 100k)

Youngest → Oldest

- Qls: mass-wasting deposits, mostly landslides
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- Qp: peat deposits
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- Qgt: continental glacial till
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- Ec(2r): continental sedimentary deposits or rocks
- Ec(2t) - continental sedimentary deposits or rocks
- Evc(t) - volcaniclastic deposits or rocks
- Water

Data Source: ESRI Street Map data. Geology data from Washington DNR. Topography from King County LiDAR.

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Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet

N
W E
S

400 0 400
Feet

Geologic Units
Segment M

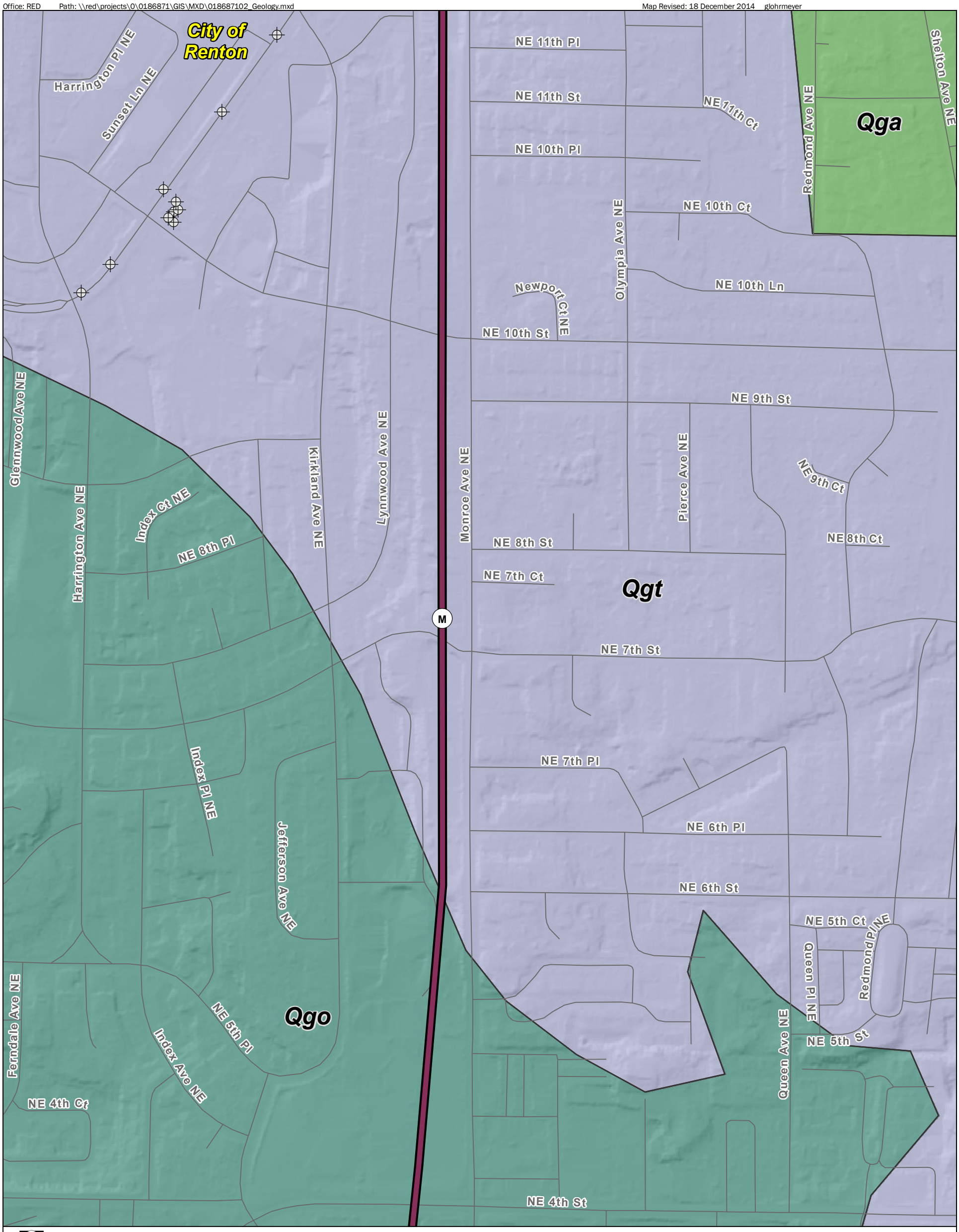
PSE Energize Eastside Project
Geohazards Evaluation
King County, Washington

GeoEngineers

Figure 43

DSD 001273

Office: RED Path: \\red\projects\0\0186871\GIS\MXD\018687102_Geology.mxd Map Revised: 18 December 2014 glohrmeyer



Route Segment
Substation
Seattle Fault Zone
City Boundary
GeoEngineers Geotechnical Project Location

DNR Geotechnical Borings within 150 Foot Buffer

Geotechnical
Test pit

DNR Geotechnical Borings within Project Extent

Geotechnical
Test pit

Geologic Unit (DNR 100k)

Youngest ⟶ Oldest

- Qls: mass-wasting deposits, mostly landslides
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- Qp: peat deposits
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- Qgt: continental glacial till
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- Water

Data Source: ESRI Street Map data. Geology data from Washington DNR. Topography from King County LiDAR.

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Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet

N W E S

400 0 400
Feet

Geologic Units
Segment M

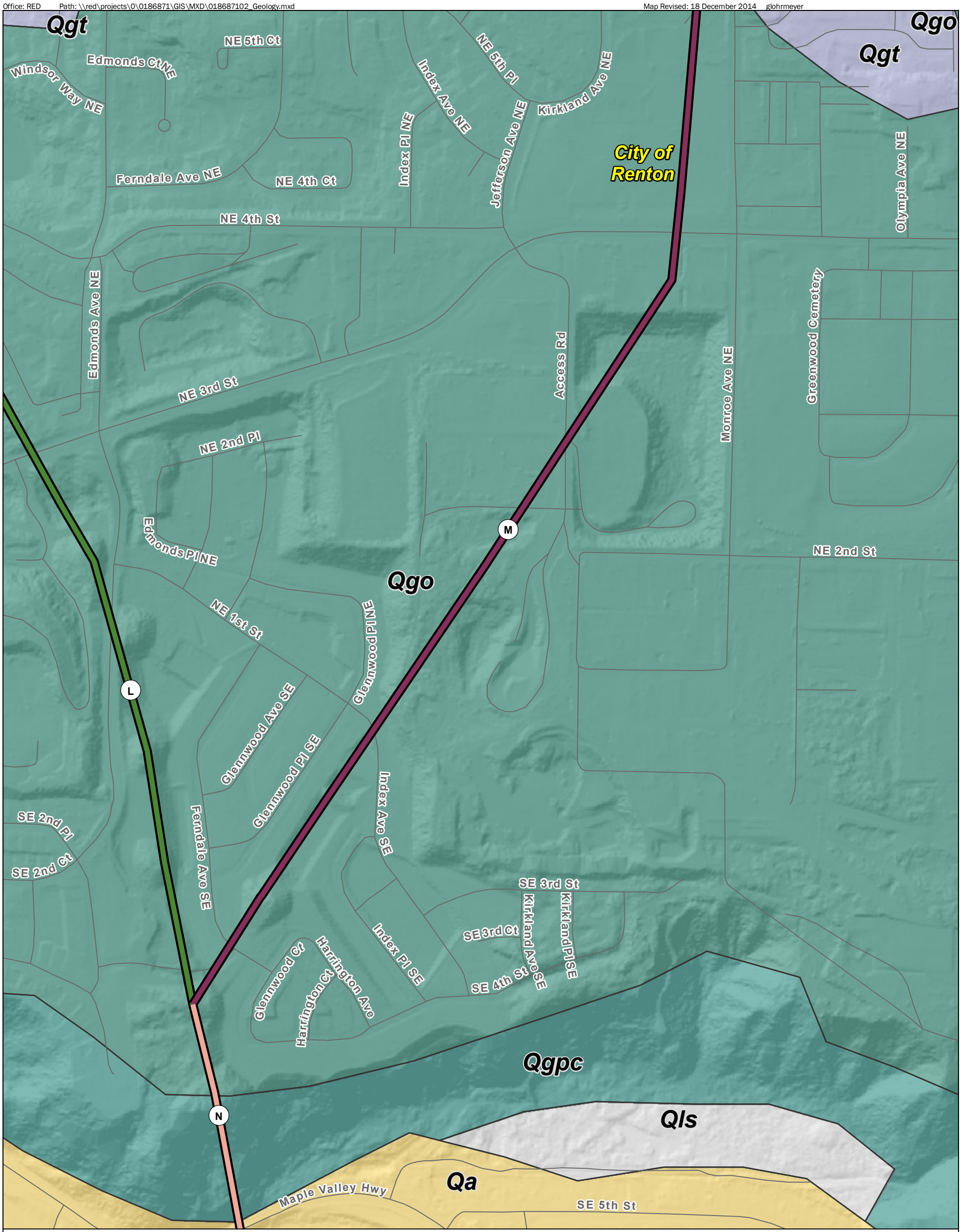
PSE Energize Eastside Project
Geohazards Evaluation
King County, Washington

GeoEngineers

Figure 44

DSD 001274

Office: RED Path: \\red\projects\0\0186871\GIS\MXD\018687102_Geology.mxd Map Revised: 18 December 2014 glohrmeyer



Route Segment
Substation
Seattle Fault Zone
City Boundary
GeoEngineers Geotechnical Project Location

DNR Geotechnical Borings within 150 Foot Buffer

Geotechnical
Test pit

DNR Geotechnical Borings within Project Extent

Geotechnical
Test pit

Geologic Unit (DNR 100k)
Youngest ⟶ Oldest

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- Ec(2t) - continental sedimentary deposits or rocks
- Evc(t) - volcaniclastic deposits or rocks
- Water

N W E S

400 0 400
Feet

Data Source: ESRI Street Map data. Geology data from Washington DNR. Topography from King County LiDAR.

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Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet

Geologic Units
Segment M

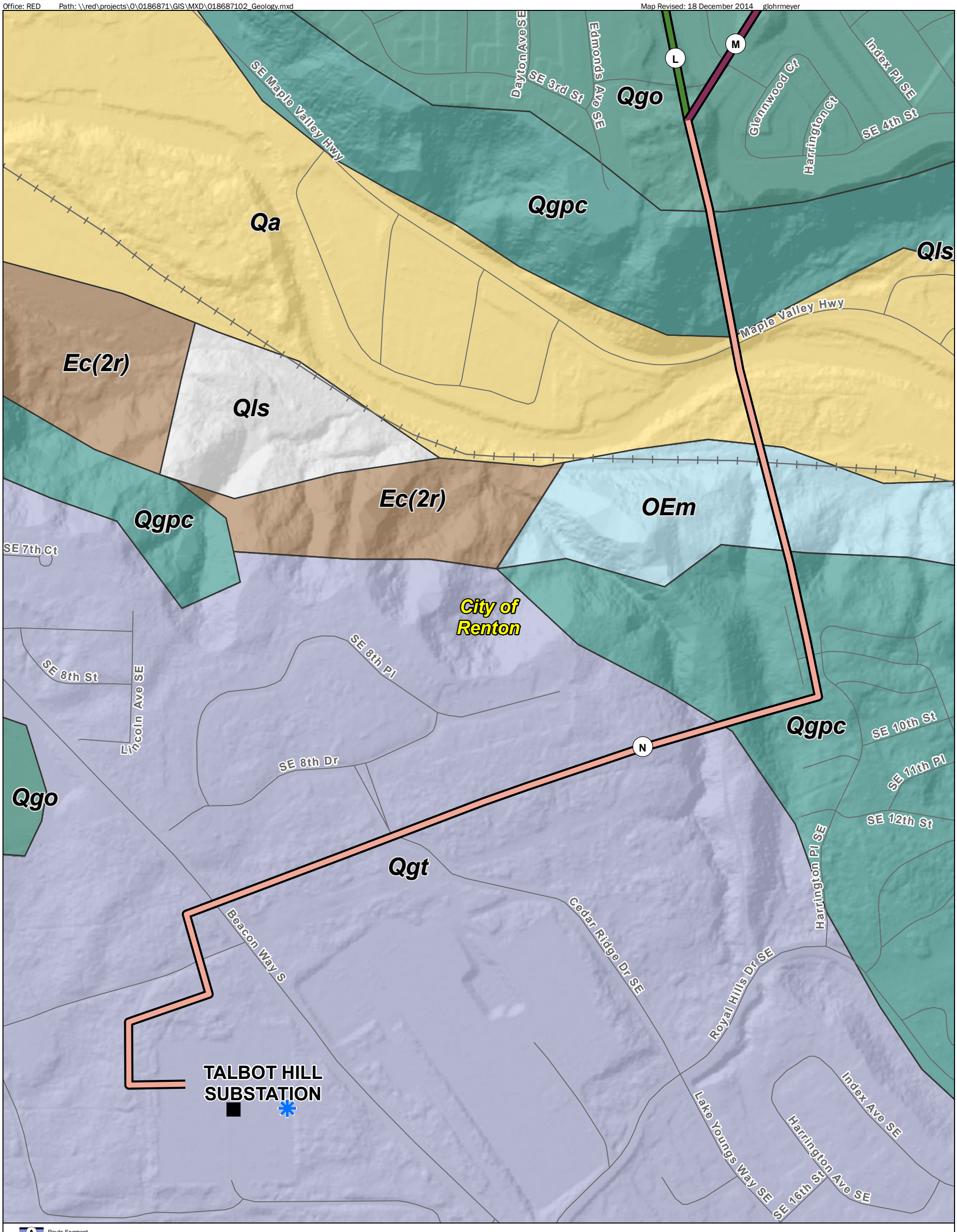
PSE Energize Eastside Project
Geohazards Evaluation
King County, Washington

GeoEngineers

Figure 45

DSD 001275

Office: RED Path: \\red\projects\0\0186871\GIS\MXD\018687102_Geology.mxd Map Revised: 18 December 2014 glohrmeyer



Route Segment
Substation
Seattle Fault Zone
City Boundary
GeoEngineers Geotechnical Project Location

DNR Geotechnical Borings within 150 Foot Buffer

Geotechnical
Test pit

DNR Geotechnical Borings within Project Extent

Geotechnical
Test pit

Data Source: ESRI Street Map data. Geology data from Washington DNR. Topography from King County LiDAR.

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Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet

Geologic Unit (DNR 100k)
Youngest ⟶ Oldest

- Qls: mass-wasting deposits, mostly landslides
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- Ec(2t) - continental sedimentary deposits or rocks
- Evc(t) - volcaniclastic deposits or rocks
- Water

N
W E
S

400 0 400
Feet

Geologic Units
Segment N

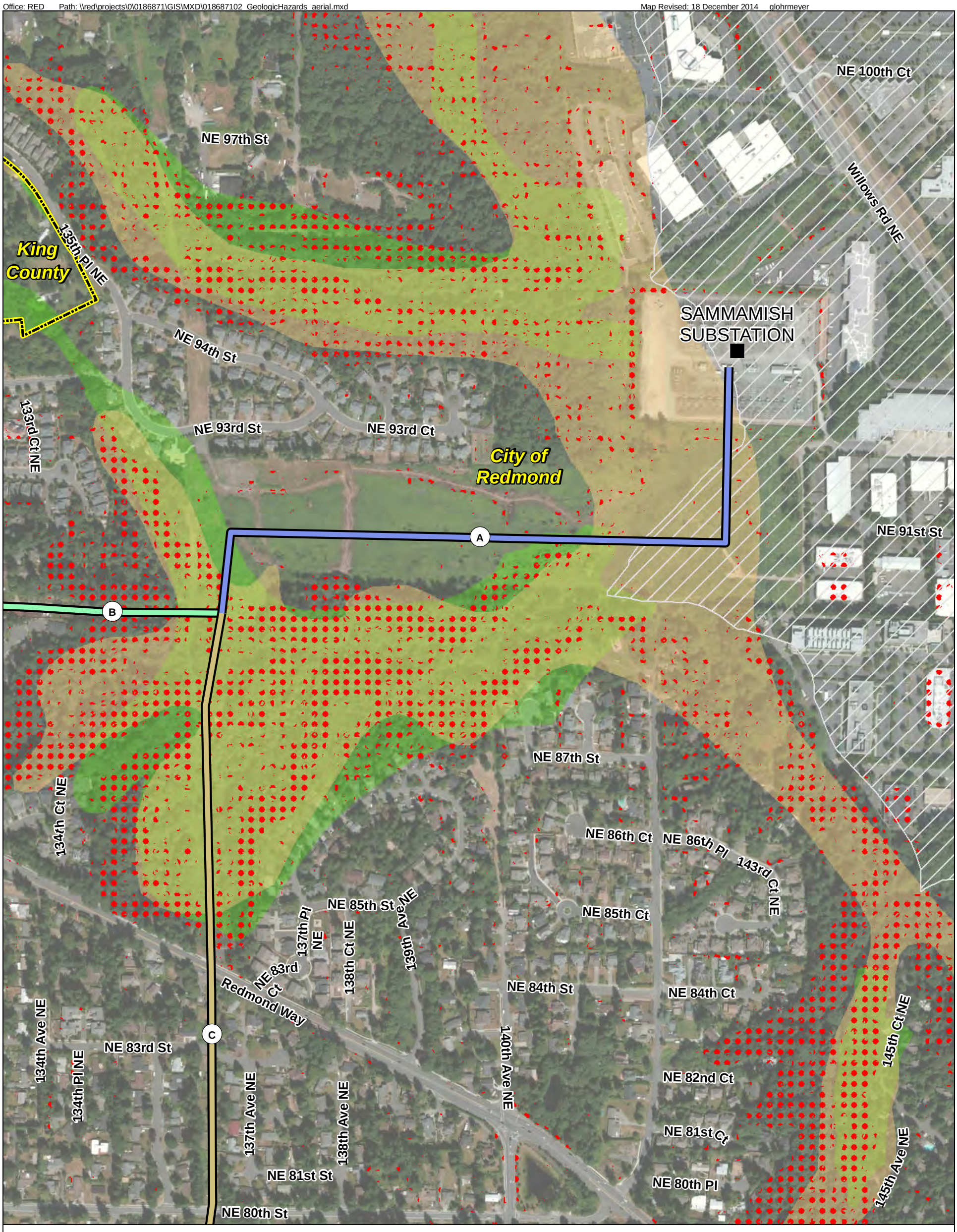
PSE Energize Eastside Project
Geohazards Evaluation
King County, Washington

GeoEngineers

Figure 46

DSD 001276

Office: RED Path: \\red\projects\0\0186871\GIS\MXD\018687102_GeologicHazards_aerial.mxd Map Revised: 18 December 2014 glohrmeyer



A Route Segment

Substation

City Boundary

Potential Steep Slopes

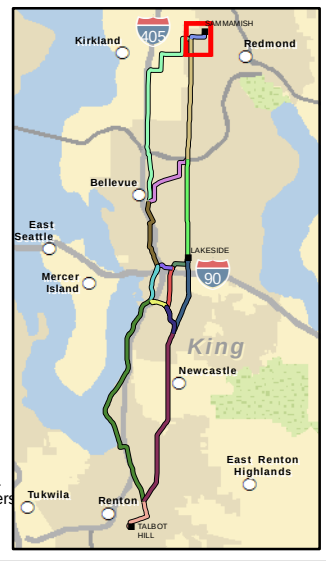
Potential Seismic Hazard Areas

Coal Mine Hazard Areas

Potential Landslide Hazard Areas

Erosion Hazard Areas

Potential Erosion and Landslide Hazard Areas



N W E S

400 0 400

Feet

Data Source: ESRI Street Map data. Washington DNR, King County, City of Redmond, City of Kirkland, City of Renton, City of Bellevue

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Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet

Geologic Hazards
Segment A

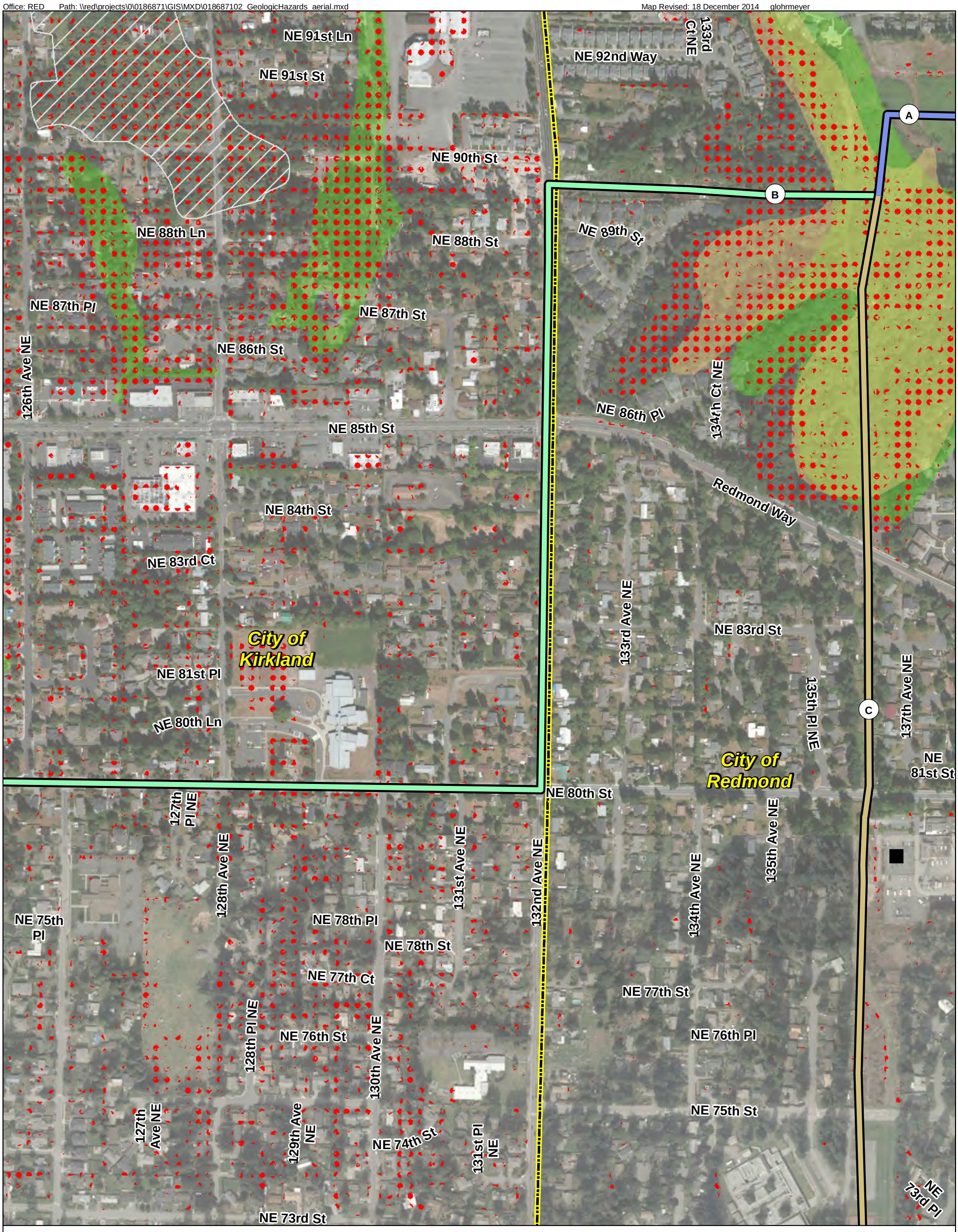
PSE Energize Eastside Project
Geohazards Evaluation
King County, Washington

GeoEngineers

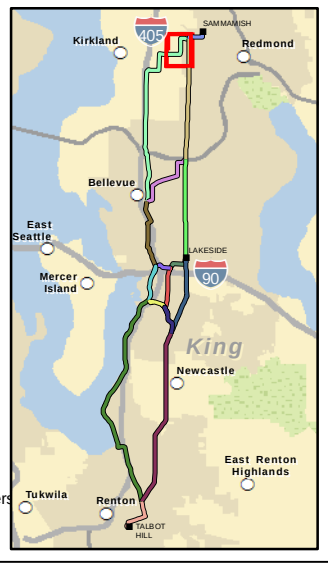
Figure 47

DSD 001277

Office: RED Path: \\red\projects\0\0186871\GIS\MXD\018687102_GeologicHazards_aerial.mxd Map Revised: 18 December 2014 glohrmeyer



- Route Segment
- Substation
- City Boundary
- Potential Steep Slopes
- Potential Seismic Hazard Areas
- Coal Mine Hazard Areas
- Potential Landslide Hazard Areas
- Erosion Hazard Areas
- Potential Erosion and Landslide Hazard Areas



N W E S

400 0 400
Feet

Data Source: ESRI Street Map data. Washington DNR, King County, City of Redmond, City of Kirkland, City of Renton, City of Bellevue

Notes:
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Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet

Geologic Hazards
Segment B

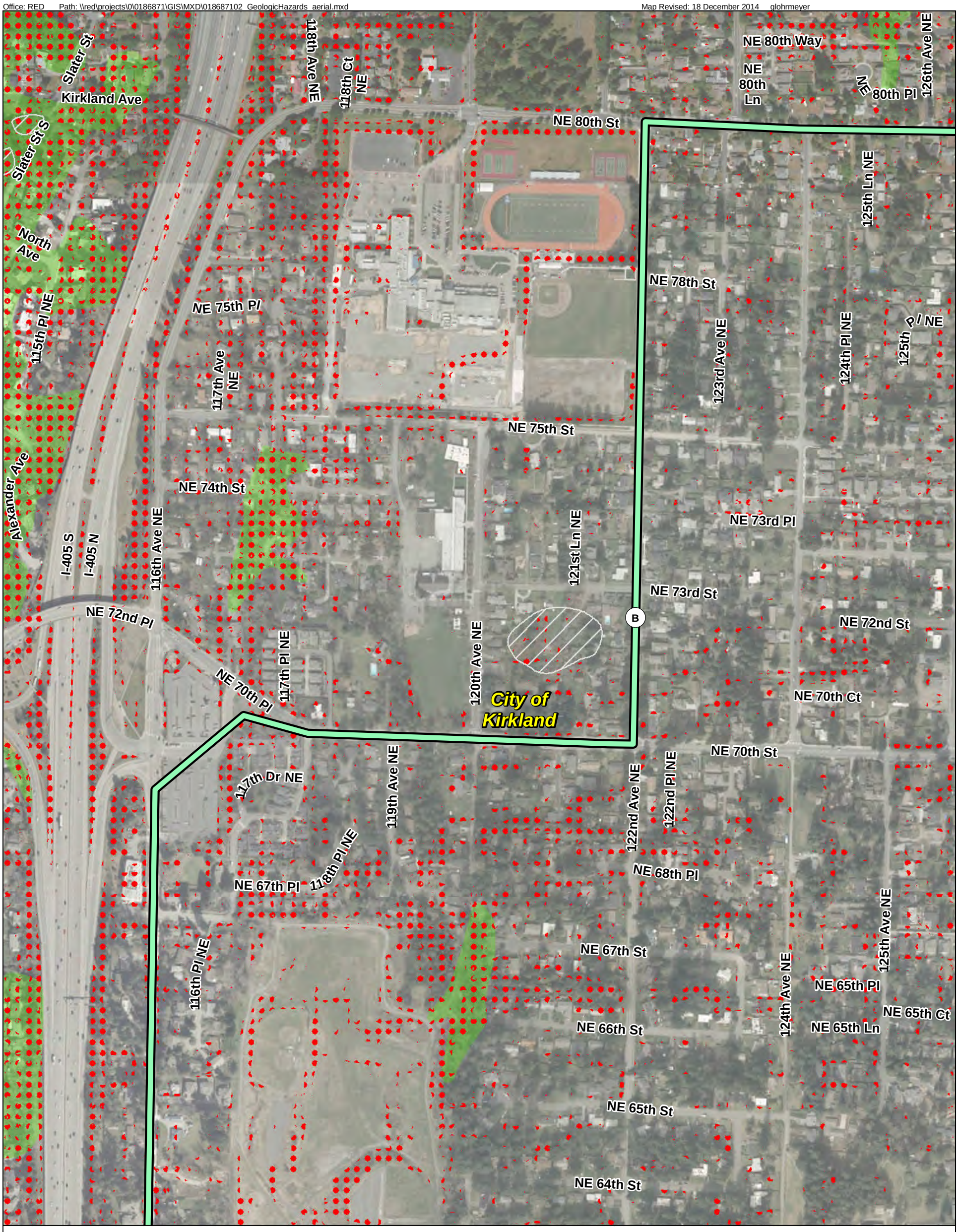
PSE Energize Eastside Project
Geohazards Evaluation
King County, Washington

GeoEngineers

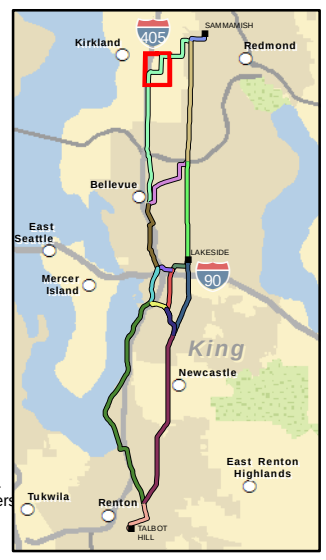
Figure 48

DSD 001278

Office: RED Path: \\red\projects\0\0186871\GIS\MXD\018687102_GeologicHazards_aerial.mxd Map Revised: 18 December 2014 glohrmeyer



- Route Segment
- Substation
- City Boundary
- Potential Steep Slopes
- Potential Seismic Hazard Areas
- Coal Mine Hazard Areas
- Potential Landslide Hazard Areas
- Erosion Hazard Areas
- Potential Erosion and Landslide Hazard Areas



N W E S

400 0 400

Feet

Data Source: ESRI Street Map data. Washington DNR, King County, City of Redmond, City of Kirkland, City of Renton, City of Bellevue

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Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet

Geologic Hazards
Segment B

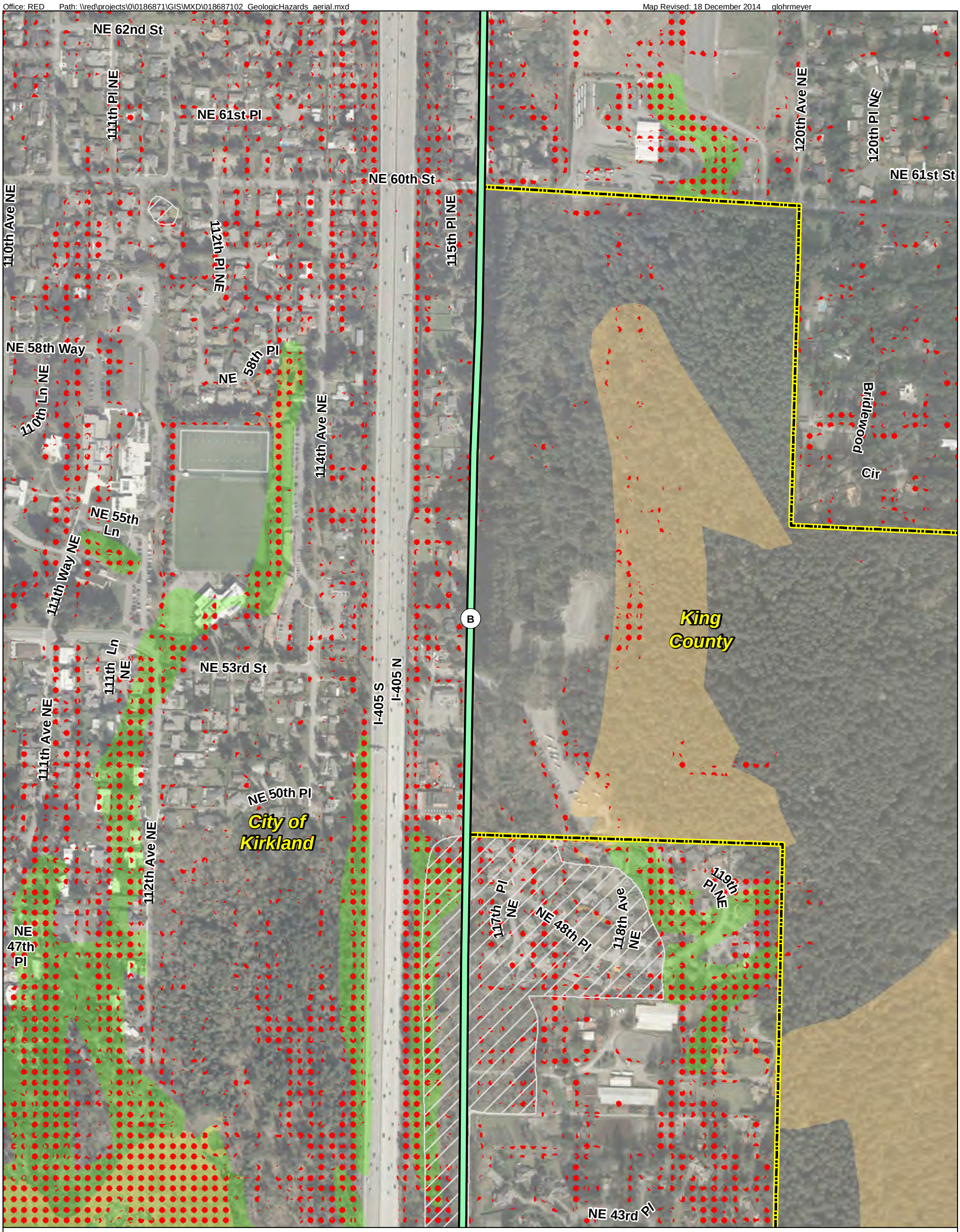
PSE Energize Eastside Project
Geohazards Evaluation
King County, Washington

GeoEngineers

Figure 49

DSD 001279

Office: RED Path: \\red\projects\0\0186871\GIS\MXD\018687102_GeologicHazards_aerial.mxd Map Revised: 18 December 2014 glohrmeyer



A Route Segment

Substation

City Boundary

Potential Steep Slopes

Potential Seismic Hazard Areas

Coal Mine Hazard Areas

Potential Landslide Hazard Areas

Erosion Hazard Areas

Potential Erosion and Landslide Hazard Areas

N W E S

400 0 400

Feet

Data Source: ESRI Street Map data. Washington DNR, King County, City of Redmond, City of Kirkland, City of Renton, City of Bellevue

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Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet

Geologic Hazards
Segment B

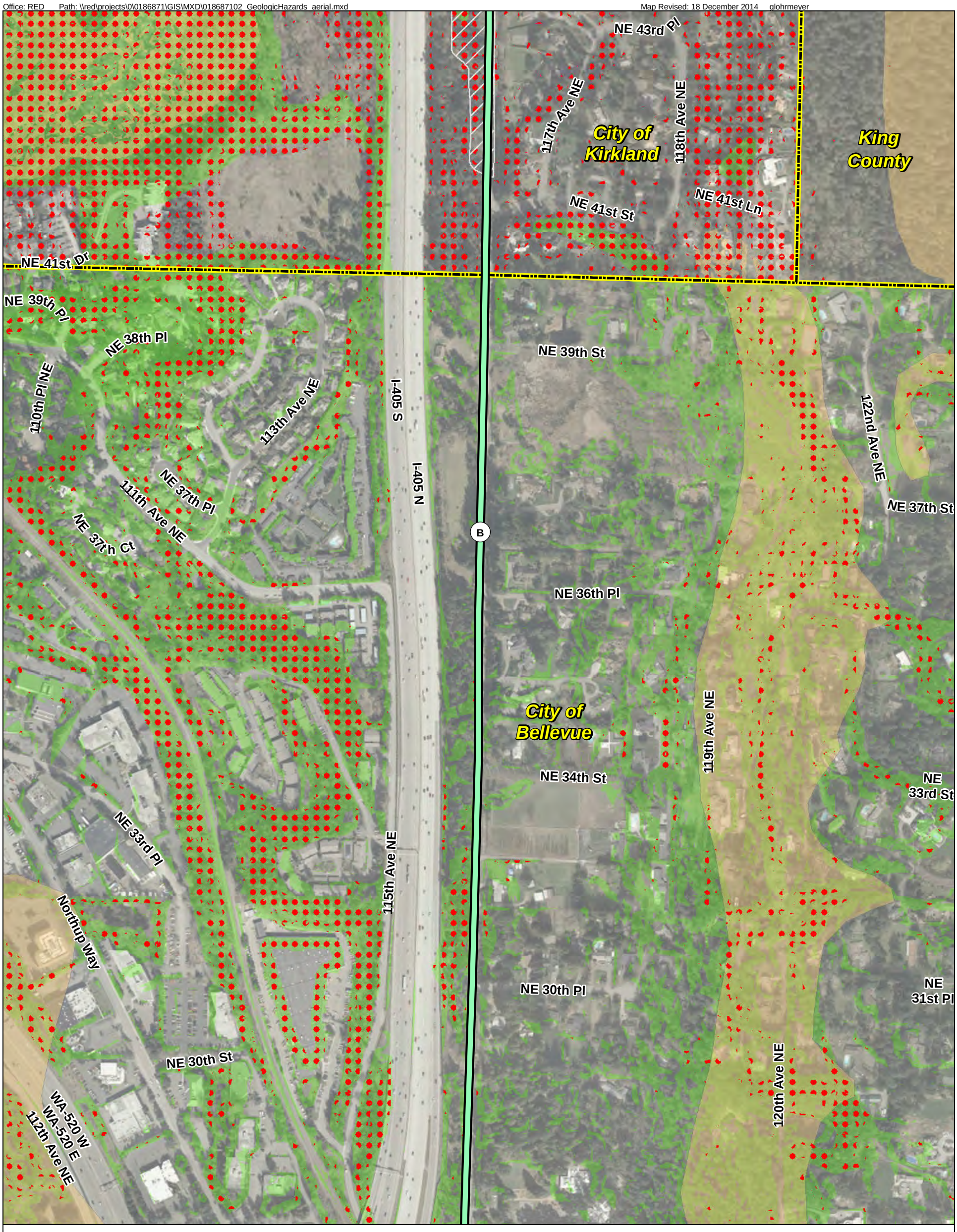
PSE Energize Eastside Project
Geohazards Evaluation
King County, Washington

GeoEngineers

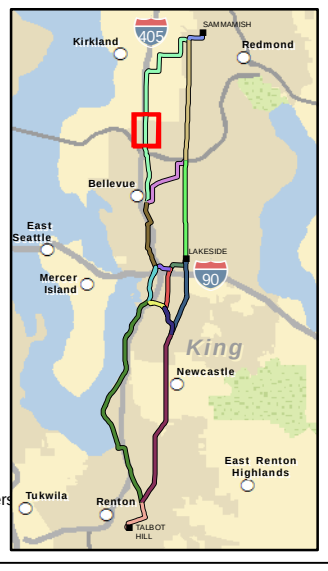
Figure 50

DSD 001280

Office: RED Path: \\red\projects\0\0186871\GIS\MXD\018687102_GeologicHazards_aerial.mxd Map Revised: 18 December 2014 glohrmeyer



- Route Segment
- Substation
- City Boundary
- Potential Steep Slopes
- Potential Seismic Hazard Areas
- Coal Mine Hazard Areas
- Potential Landslide Hazard Areas
- Erosion Hazard Areas
- Potential Erosion and Landslide Hazard Areas



N W E S

400 0 400
Feet

Data Source: ESRI Street Map data. Washington DNR, King County, City of Redmond, City of Kirkland, City of Renton, City of Bellevue

Notes:
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Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet

Geologic Hazards
Segment B

PSE Energize Eastside Project
Geohazards Evaluation
King County, Washington

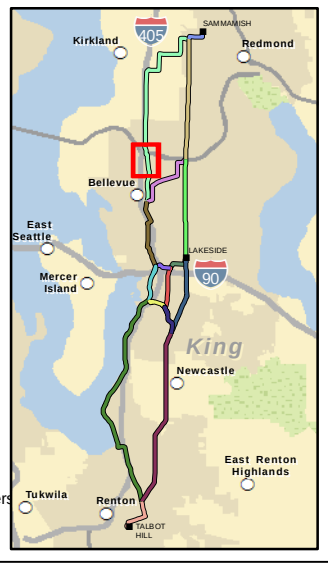
GeoEngineers

Figure 51

DSD 001281

Office: RED Path: \\red\projects\0\0186871\GIS\MXD\018687102_GeologicHazards_aerial.mxd Map Revised: 18 December 2014 glohrmeyer

- Route Segment
- Substation
- City Boundary
- Potential Steep Slopes
- Potential Seismic Hazard Areas
- Coal Mine Hazard Areas
- Potential Landslide Hazard Areas
- Erosion Hazard Areas
- Potential Erosion and Landslide Hazard Areas



N W E S

400 0 400

Feet

Data Source: ESRI Street Map data. Washington DNR, King County, City of Redmond, City of Kirkland, City of Renton, City of Bellevue

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Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet

Geologic Hazards
Segment B

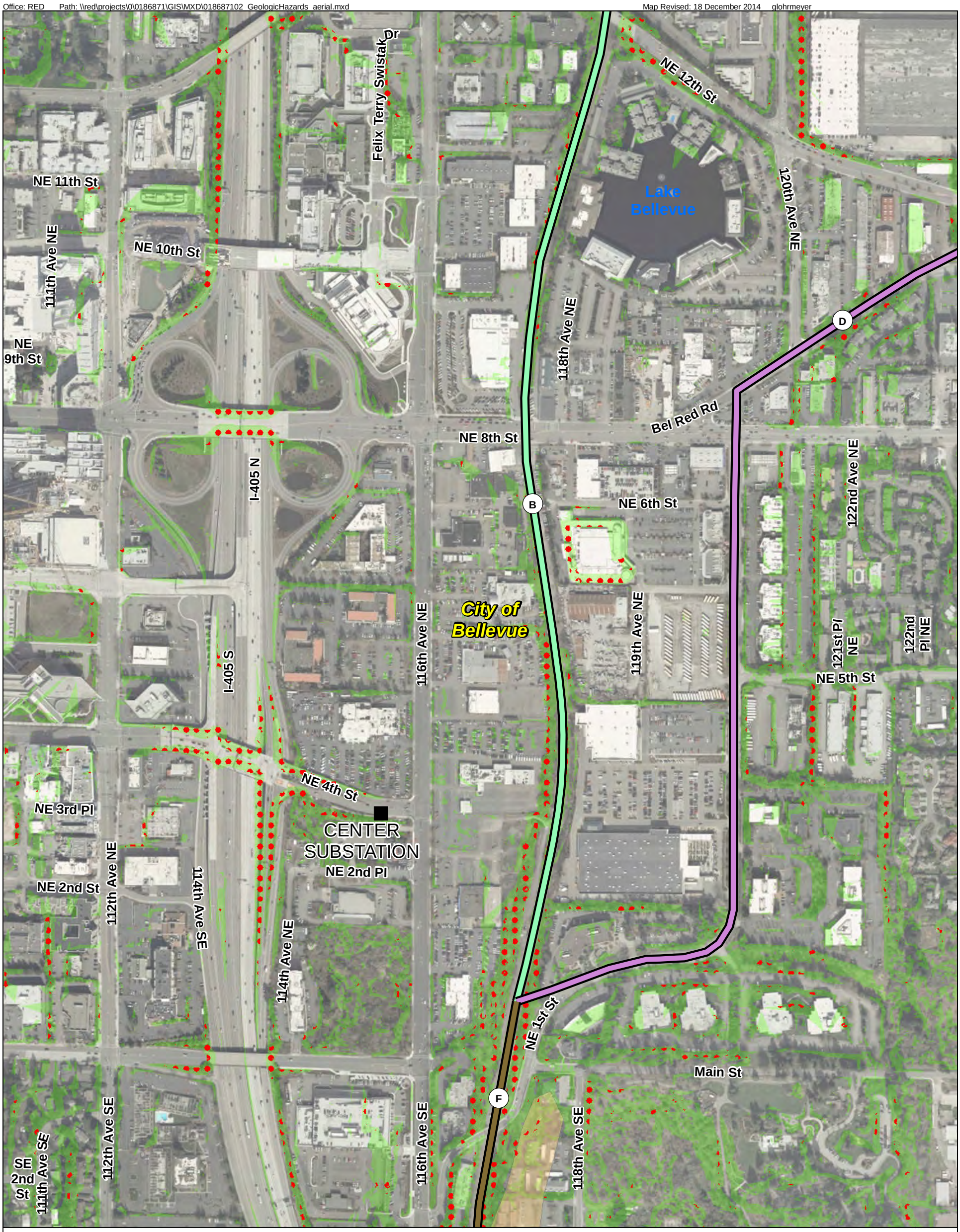
PSE Energize Eastside Project
Geohazards Evaluation
King County, Washington

GeoEngineers

Figure 52

DSD 001282

Office: RED Path: \\red\projects\0\0186871\GIS\MXD\018687102_GeologicHazards_aerial.mxd Map Revised: 18 December 2014 glohrmeyer



A Route Segment

Substation

City Boundary

Potential Steep Slopes

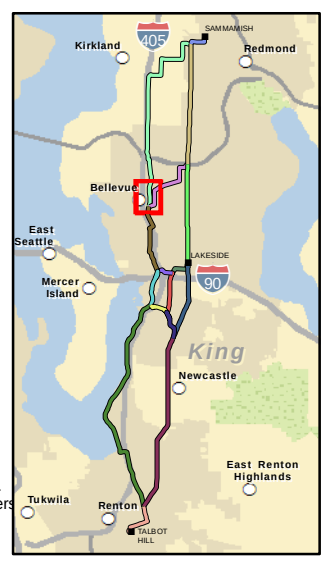
Potential Seismic Hazard Areas

Coal Mine Hazard Areas

Potential Landslide Hazard Areas

Erosion Hazard Areas

Potential Erosion and Landslide Hazard Areas



N W E S

400 0 400

Feet

Data Source: ESRI Street Map data. Washington DNR, King County, City of Redmond, City of Kirkland, City of Renton, City of Bellevue

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Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet

Geologic Hazards
Segment B

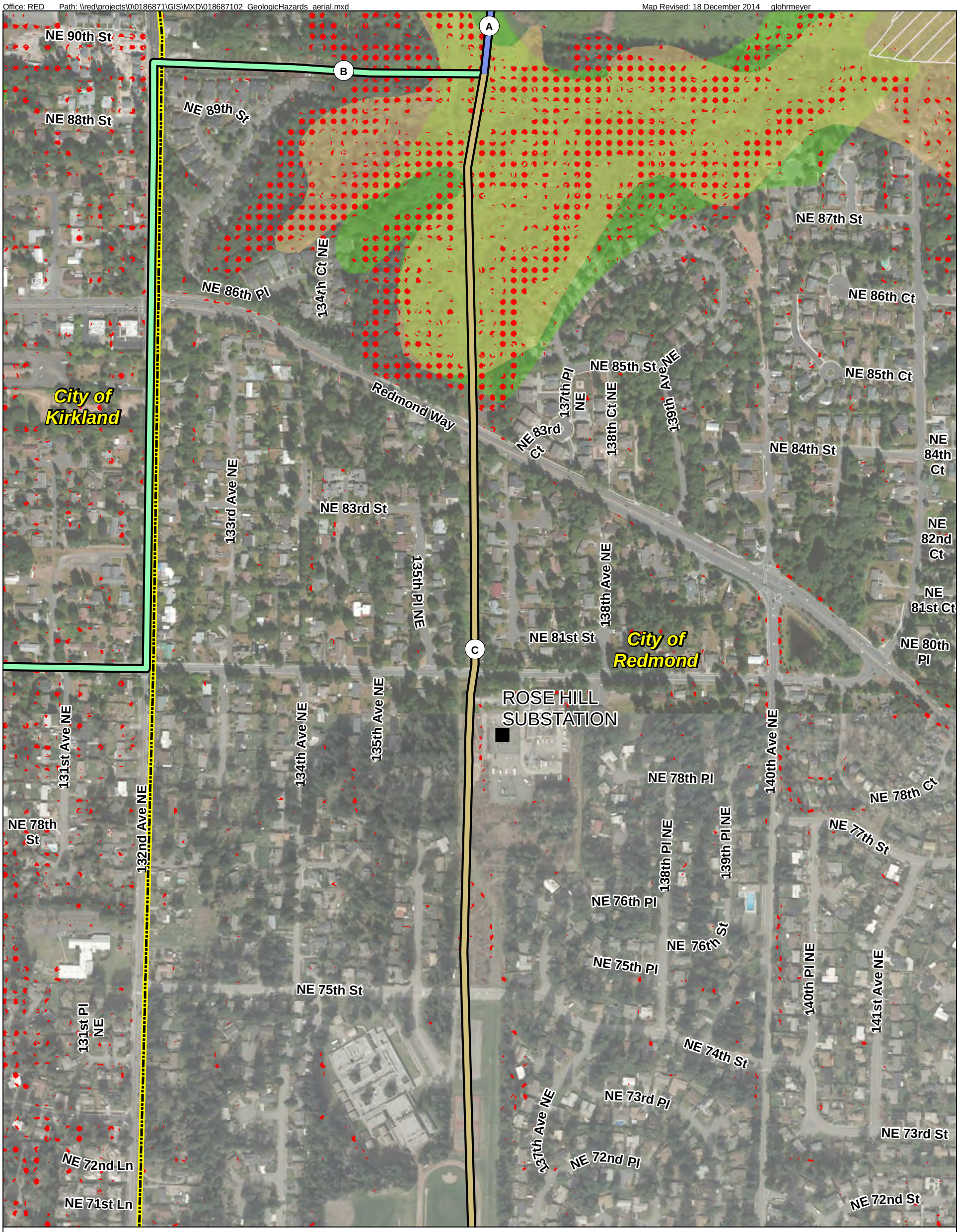
PSE Energize Eastside Project
Geohazards Evaluation
King County, Washington

GeoEngineers

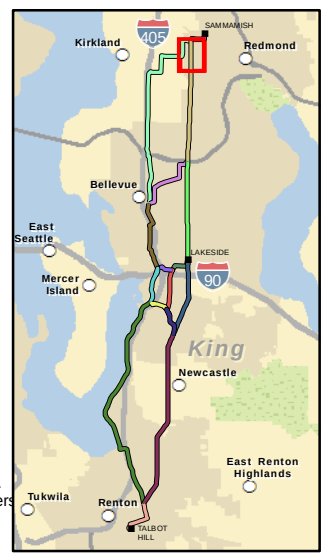
Figure 53

DSD 001283

Office: RED Path: \\red\projects\0\0186871\GIS\MXD\018687102_GeologicHazards_aerial.mxd Map Revised: 18 December 2014 glohrmeyer



- Route Segment
- Substation
- City Boundary
- Potential Steep Slopes
- Potential Seismic Hazard Areas
- Coal Mine Hazard Areas
- Potential Landslide Hazard Areas
- Erosion Hazard Areas
- Potential Erosion and Landslide Hazard Areas



N W E S

400 0 400

Feet

Data Source: ESRI Street Map data. Washington DNR, King County, City of Redmond, City of Kirkland, City of Renton, City of Bellevue

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Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet

Geologic Hazards
Segment C

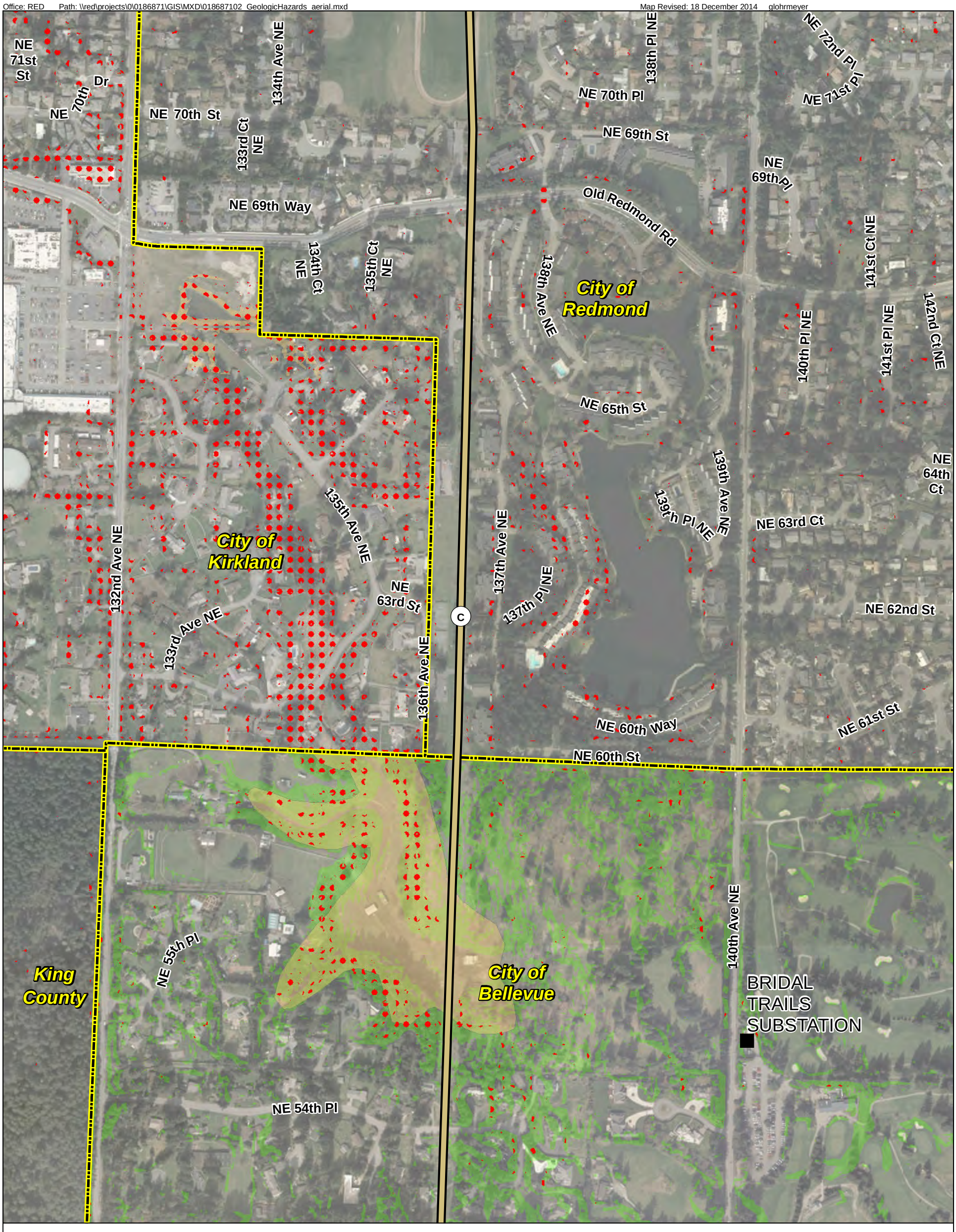
PSE Energize Eastside Project
Geohazards Evaluation
King County, Washington

GeoEngineers

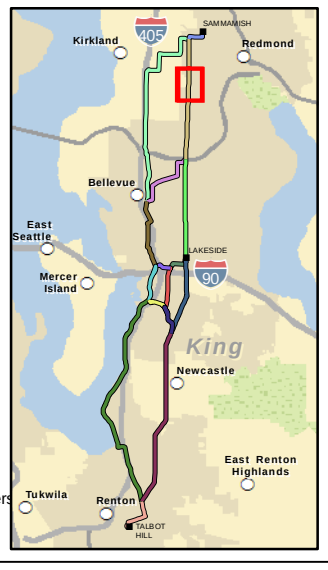
Figure 54

DSD 001284

Office: RED Path: \\red\projects\0\0186871\GIS\MXD\018687102_GeologicHazards_aerial.mxd Map Revised: 18 December 2014 glohrmeyer



Route Segment
Substation
City Boundary
Potential Steep Slopes
Potential Seismic Hazard Areas
Coal Mine Hazard Areas
Potential Landslide Hazard Areas
Erosion Hazard Areas
Potential Erosion and Landslide Hazard Areas



N W E S

400 0 400
Feet

Data Source: ESRI Street Map data. Washington DNR, King County, City of Redmond, City of Kirkland, City of Renton, City of Bellevue

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Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet

Geologic Hazards
Segment C

PSE Energize Eastside Project
Geohazards Evaluation
King County, Washington

GeoEngineers

Figure 55

DSD 001285

Office: RED Path: \\red\projects\0\0186871\GIS\MXD\018687102_GeologicHazards_aerial.mxd Map Revised: 18 December 2014 glohrmeyer

NE 51st Ln
NE 51st Pl
134th Pl NE
NE 50th St
NE 48th Pl
NE 48th St
King County
NE 47th St
NE 45th St
137th Ave NE
NE 44th Pl
132nd Ave NE
C
City of Bellevue
140th Ave NE
NE 42nd Pl
Kanter Ln
NE 42nd St
NE 40th Pl
136th Ave NE
138th Ave NE
NE 40th St
NE 38th Pl
134th Ave NE
NE 37th Pl
142nd Pl NE
NE 36th Pl
NE 36th St
131st Ave NE

- Route Segment
- Substation
- City Boundary
- Potential Steep Slopes
- Potential Seismic Hazard Areas
- Coal Mine Hazard Areas
- Potential Landslide Hazard Areas
- Erosion Hazard Areas
- Potential Erosion and Landslide Hazard Areas

N W E S

400 0 400
Feet

Data Source: ESRI Street Map data. Washington DNR, King County, City of Redmond, City of Kirkland, City of Renton, City of Bellevue

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Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet

Geologic Hazards
Segment C

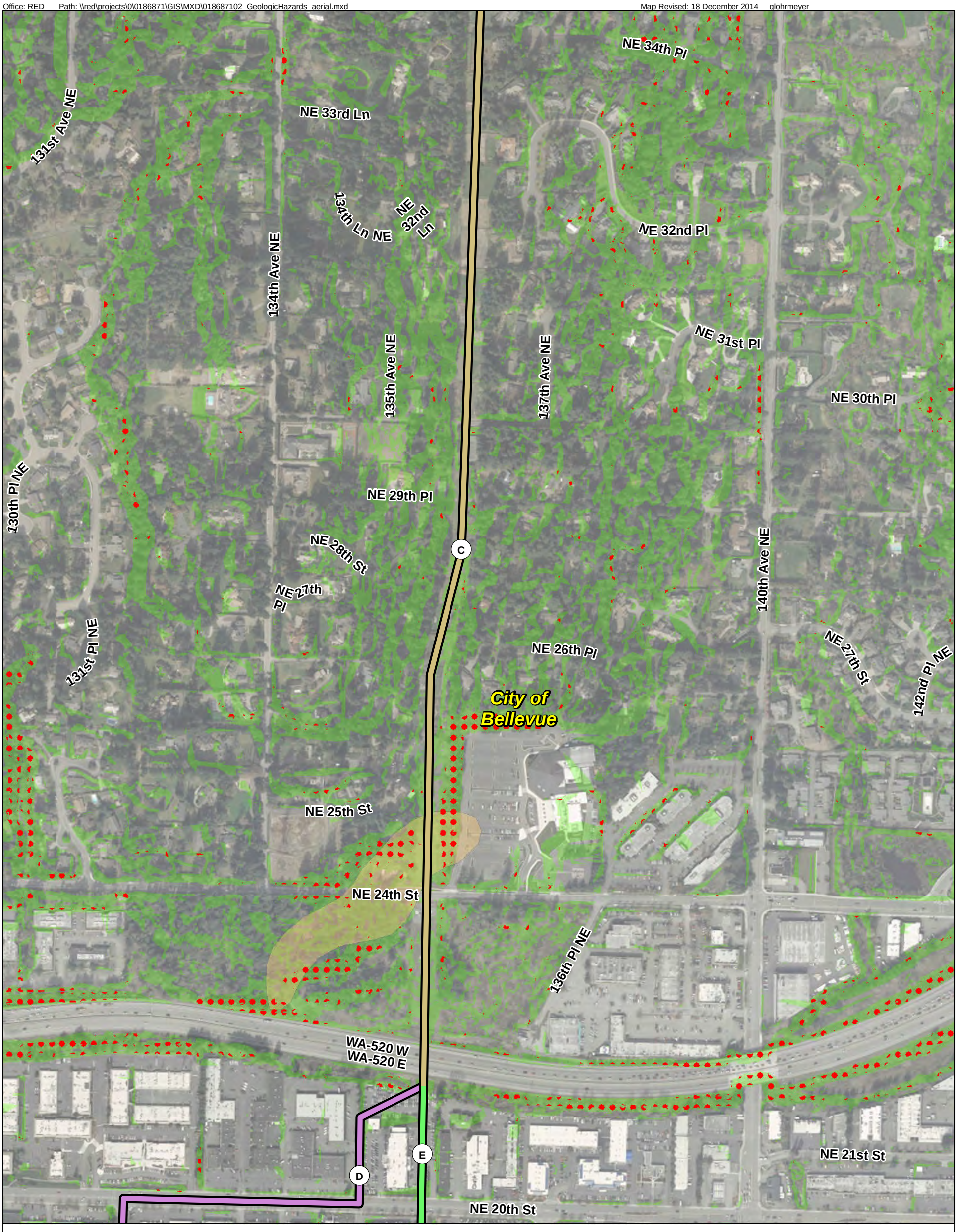
PSE Energize Eastside Project
Geohazards Evaluation
King County, Washington

GeoEngineers

Figure 56

DSD 001286

Office: RED Path: \\red\projects\0\0186871\GIS\MXD\018687102_GeologicHazards_aerial.mxd Map Revised: 18 December 2014 glohrmeyer



A Route Segment

Substation

City Boundary

Potential Steep Slopes

Potential Seismic Hazard Areas

Coal Mine Hazard Areas

Potential Landslide Hazard Areas

Erosion Hazard Areas

Potential Erosion and Landslide Hazard Areas

N W E S

400 0 400

Feet

Data Source: ESRI Street Map data. Washington DNR, King County, City of Redmond, City of Kirkland, City of Renton, City of Bellevue

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Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet

Geologic Hazards
Segment C

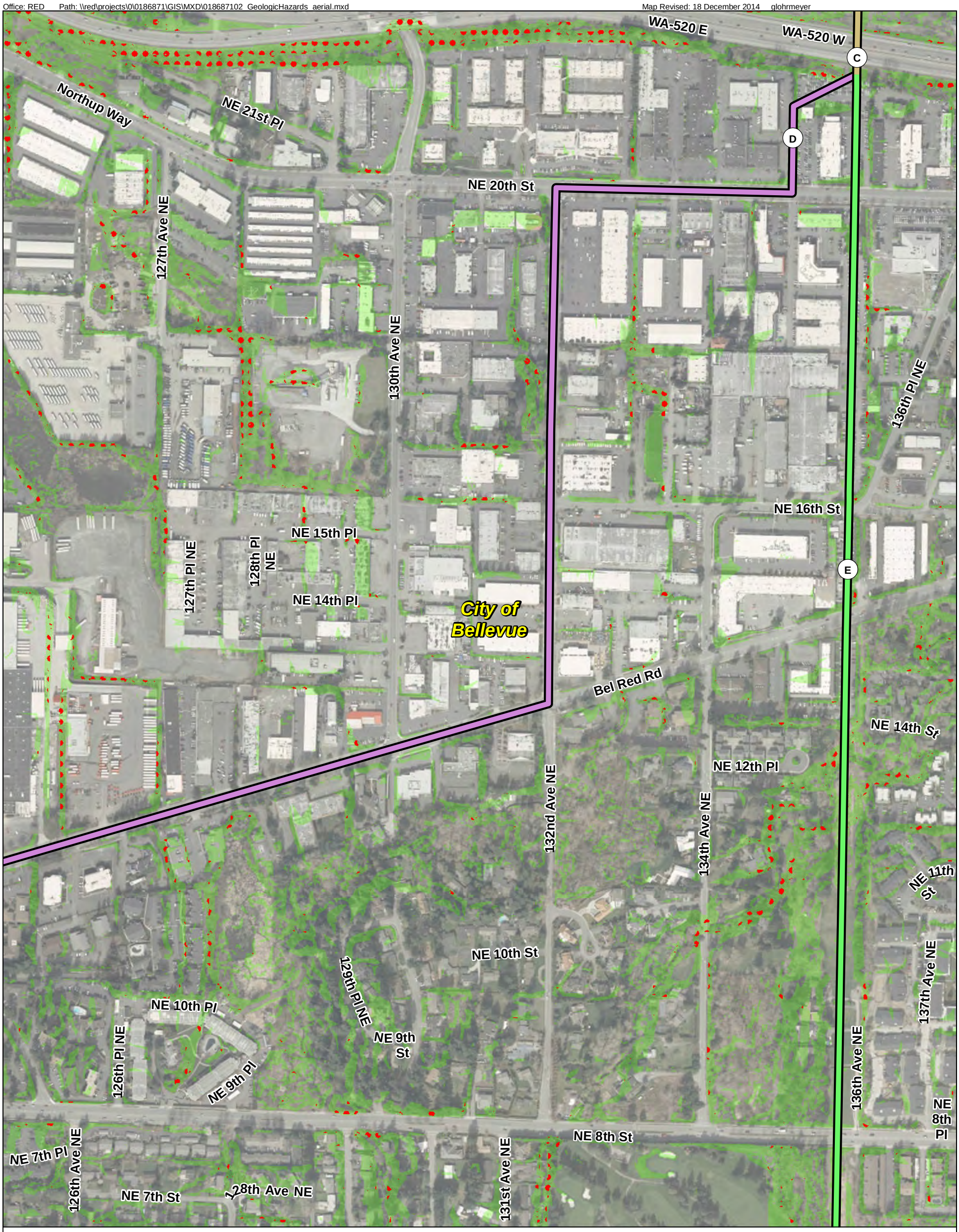
PSE Energize Eastside Project
Geohazards Evaluation
King County, Washington

GeoEngineers

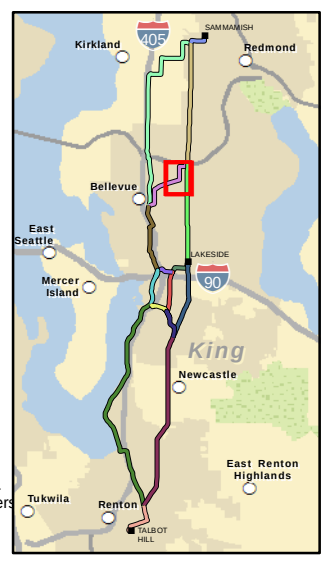
Figure 57

DSD 001287

Office: RED Path: \\red\projects\0\0186871\GIS\MXD\018687102_GeologicHazards_aerial.mxd Map Revised: 18 December 2014 glohrmeyer



- Route Segment
- Substation
- City Boundary
- Potential Steep Slopes
- Potential Seismic Hazard Areas
- Coal Mine Hazard Areas
- Potential Landslide Hazard Areas
- Erosion Hazard Areas
- Potential Erosion and Landslide Hazard Areas



N W E S

400 0 400
Feet

Data Source: ESRI Street Map data. Washington DNR, King County, City of Redmond, City of Kirkland, City of Renton, City of Bellevue

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Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet

Geologic Hazards
Segment D

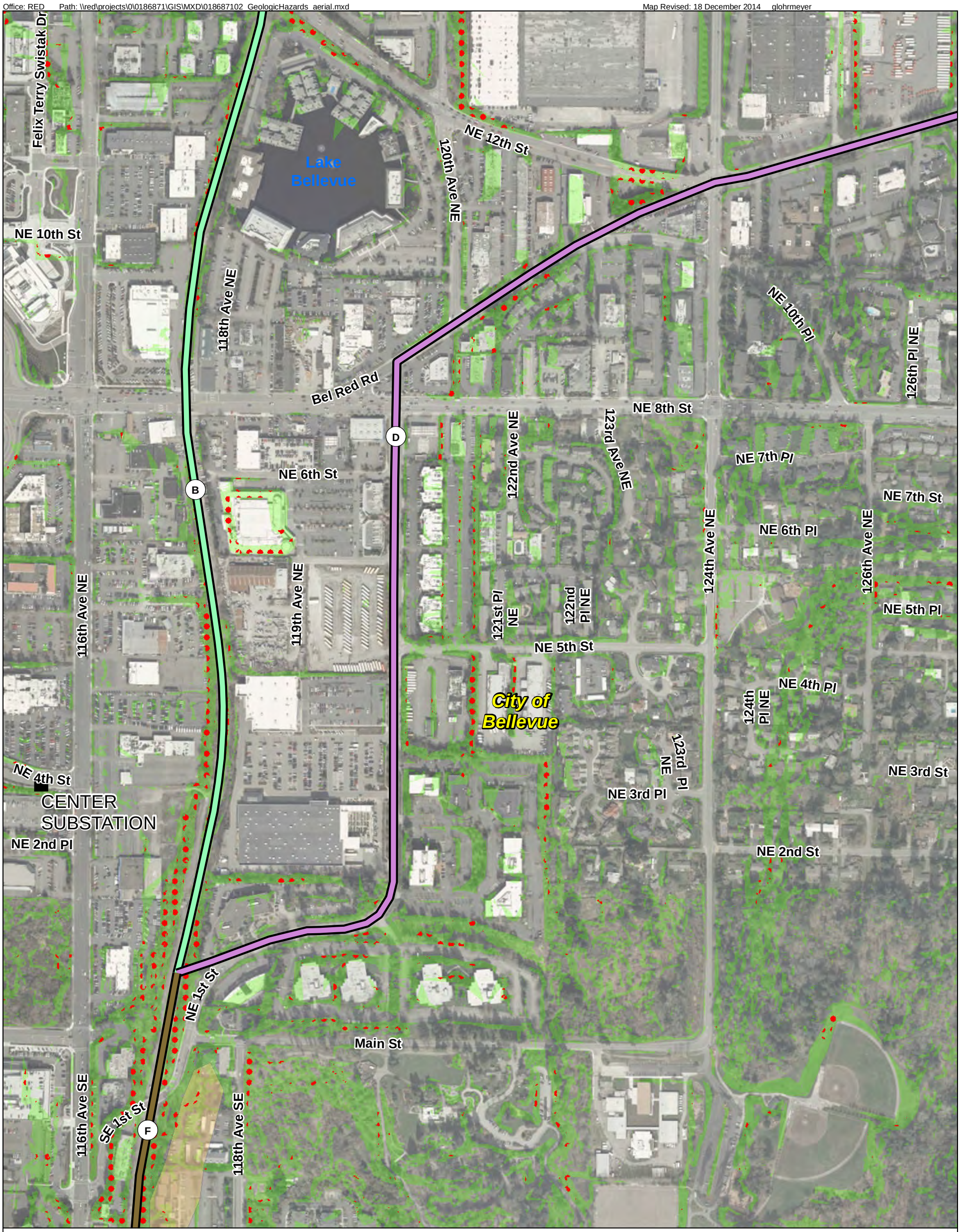
PSE Energize Eastside Project
Geohazards Evaluation
King County, Washington

GeoEngineers

Figure 58

DSD 001288

Office: RED Path: \\red\projects\0\0186871\GIS\MXD\018687102_GeologicHazards_aerial.mxd Map Revised: 18 December 2014 glohrmeyer



- Route Segment
- Substation
- City Boundary
- Potential Steep Slopes
- Potential Seismic Hazard Areas
- Coal Mine Hazard Areas
- Potential Landslide Hazard Areas
- Erosion Hazard Areas
- Potential Erosion and Landslide Hazard Areas

N W E S

400 0 400

Feet

Data Source: ESRI Street Map data. Washington DNR, King County, City of Redmond, City of Kirkland, City of Renton, City of Bellevue

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Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet

Geologic Hazards
Segment D

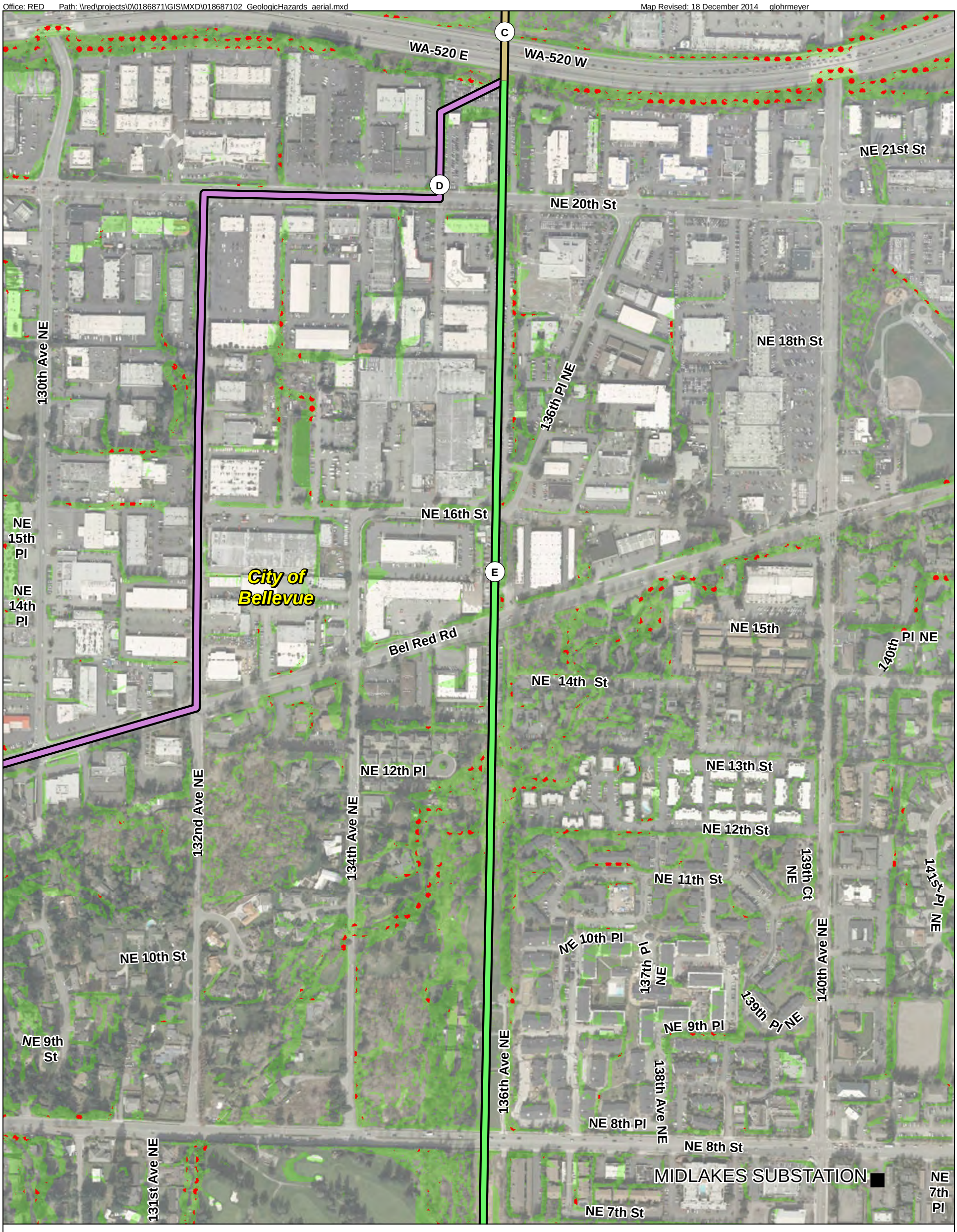
PSE Energize Eastside Project
Geohazards Evaluation
King County, Washington

GeoEngineers

Figure 59

DSD 001289

Office: RED Path: \\red\projects\0\0186871\GIS\MXD\018687102_GeologicHazards_aerial.mxd Map Revised: 18 December 2014 glohrmeyer



Route Segment

Substation

City Boundary

Potential Steep Slopes

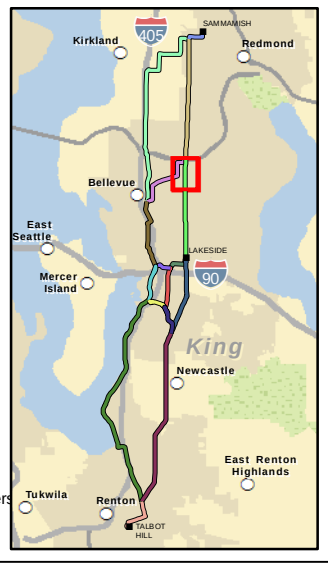
Potential Seismic Hazard Areas

Coal Mine Hazard Areas

Potential Landslide Hazard Areas

Erosion Hazard Areas

Potential Erosion and Landslide Hazard Areas



N
W E
S

400 0 400
Feet

Data Source: ESRI Street Map data. Washington DNR, King County, City of Redmond, City of Kirkland, City of Renton, City of Bellevue

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Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet

Geologic Hazards
Segment E

PSE Energize Eastside Project
Geohazards Evaluation
King County, Washington

GeoEngineers

Figure 60

DSD 001290

Office: RED Path: \\red\projects\0\0186871\GIS\MXD\018687102_GeologicHazards_aerial.mxd Map Revised: 18 December 2014 glohrmeyer

NE 7th St
NE 6th Pl
NE 6th St
130th Ave NE
NE 5th St
NE 3rd St
NE 4th St
Glenridge Ln
130th Pl NE
131st Pl NE
131st Ave NE
NE 2nd Pl
141st Ave NE
142nd Ave NE
140th Ave NE
NE 2nd St
NE 1st Pl
140th Pl NE
NE 1st St
141st Pl NE
136th Ave NE
NE 1st Ln
Main St
E
SE 1st St
136th Ave SE
City of Bellevue
SE 2nd St
SE 3rd Pl
SE 4th St
140th Ave SE
SE 5th St
141st Ave SE
142nd Ave SE
SE 6th St
140th Ct SE
SE 7th St
141st Ln SE
142nd Pl SE
Lake Hills Connector Rd

Route Segment
Substation
City Boundary
Potential Steep Slopes
Potential Seismic Hazard Areas
Coal Mine Hazard Areas
Potential Landslide Hazard Areas
Erosion Hazard Areas
Potential Erosion and Landslide Hazard Areas

N W E S

400 0 400
Feet

Data Source: ESRI Street Map data. Washington DNR, King County, City of Redmond, City of Kirkland, City of Renton, City of Bellevue

Notes:
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Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet

Geologic Hazards
Segment E

PSE Energize Eastside Project
Geohazards Evaluation
King County, Washington

GeoEngineers

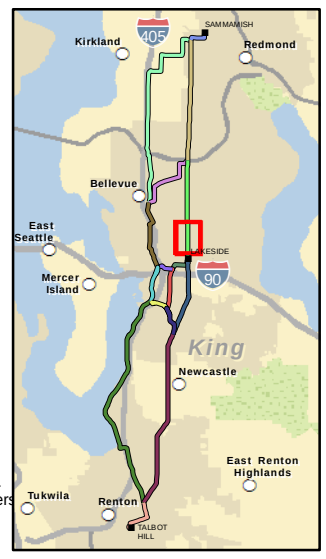
Figure 61

DSD 001291

Office: RED Path: \\red\projects\0\0186871\GIS\MXD\018687102_GeologicHazards_aerial.mxd Map Revised: 18 December 2014 glohrmeyer

Lake Hills Connector Rd
SE 10th St
141st Pl SE
142nd Pl SE
SE 8th St
142nd Ave SE
140th Ct SE
140th Pl SE
SE 14th Pl
145th Pl SE
Sunset Hills Memorial Park
134th Ave SE
E
SE 17th Pl
SE 17th St
SE 18th Pl
SE 18th St
City of Bellevue
136th Pl SE
138th Pl SE
140th Ave SE
SE 20th St
SE 21st Pl
Richards Rd
SE 21st St
139th Pl SE
Kamber Rd
SE 22nd St
SE 22nd Pl
137th Pl SE
SE 23rd Ln
138th Ave SE
SE 23rd St
135th Pl SE
SE 24th St
140th Way SE

- Route Segment
- Substation
- City Boundary
- Potential Steep Slopes
- Potential Seismic Hazard Areas
- Coal Mine Hazard Areas
- Potential Landslide Hazard Areas
- Erosion Hazard Areas
- Potential Erosion and Landslide Hazard Areas



N W E S

400 0 400
Feet

Data Source: ESRI Street Map data. Washington DNR, King County, City of Redmond, City of Kirkland, City of Renton, City of Bellevue

Notes:
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Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet

Geologic Hazards
Segment E

PSE Energize Eastside Project
Geohazards Evaluation
King County, Washington

GeoEngineers

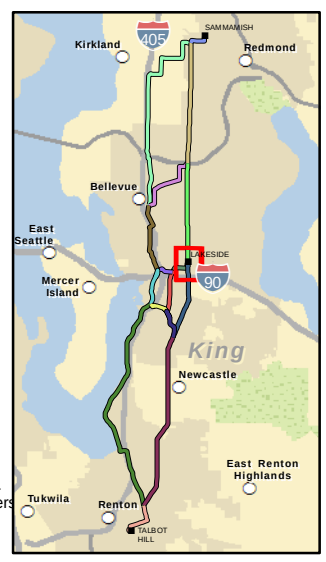
Figure 62

DSD 001292

Office: RED Path: \\red\projects\0\0186871\GIS\MXD\018687102_GeologicHazards_aerial.mxd Map Revised: 18 December 2014 glohrmeyer

SE 21st Pl
Richards Rd
135th Pl SE
134th Ave SE
SE 20th St
SE 21st St
139th Pl SE
137th Pl SE
SE 22nd St
SE 23rd Ln
138th Ave SE
SE 23rd St
Kamber Rd
140th Way SE
142nd Ave SE
E
SE 24th St
137th Ave SE
SE 26th St
136th Ave SE
SE 27th Pl
LAKESIDE SUBSTATION
SE 28th Pl
City of Bellevue
142nd Pl SE
G2
J
139th Ave SE
SE 32nd St
SE Eastgate Way
I-90 W
I-90 E
SE 36th St
132nd Ave SE
140th Ave SE
136th Pl SE

Route Segment
Substation
City Boundary
Potential Steep Slopes
Potential Seismic Hazard Areas
Coal Mine Hazard Areas
Potential Landslide Hazard Areas
Erosion Hazard Areas
Potential Erosion and Landslide Hazard Areas



N W E S

400 0 400
Feet

Data Source: ESRI Street Map data. Washington DNR, King County, City of Redmond, City of Kirkland, City of Renton, City of Bellevue

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Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet

Geologic Hazards
Segment E

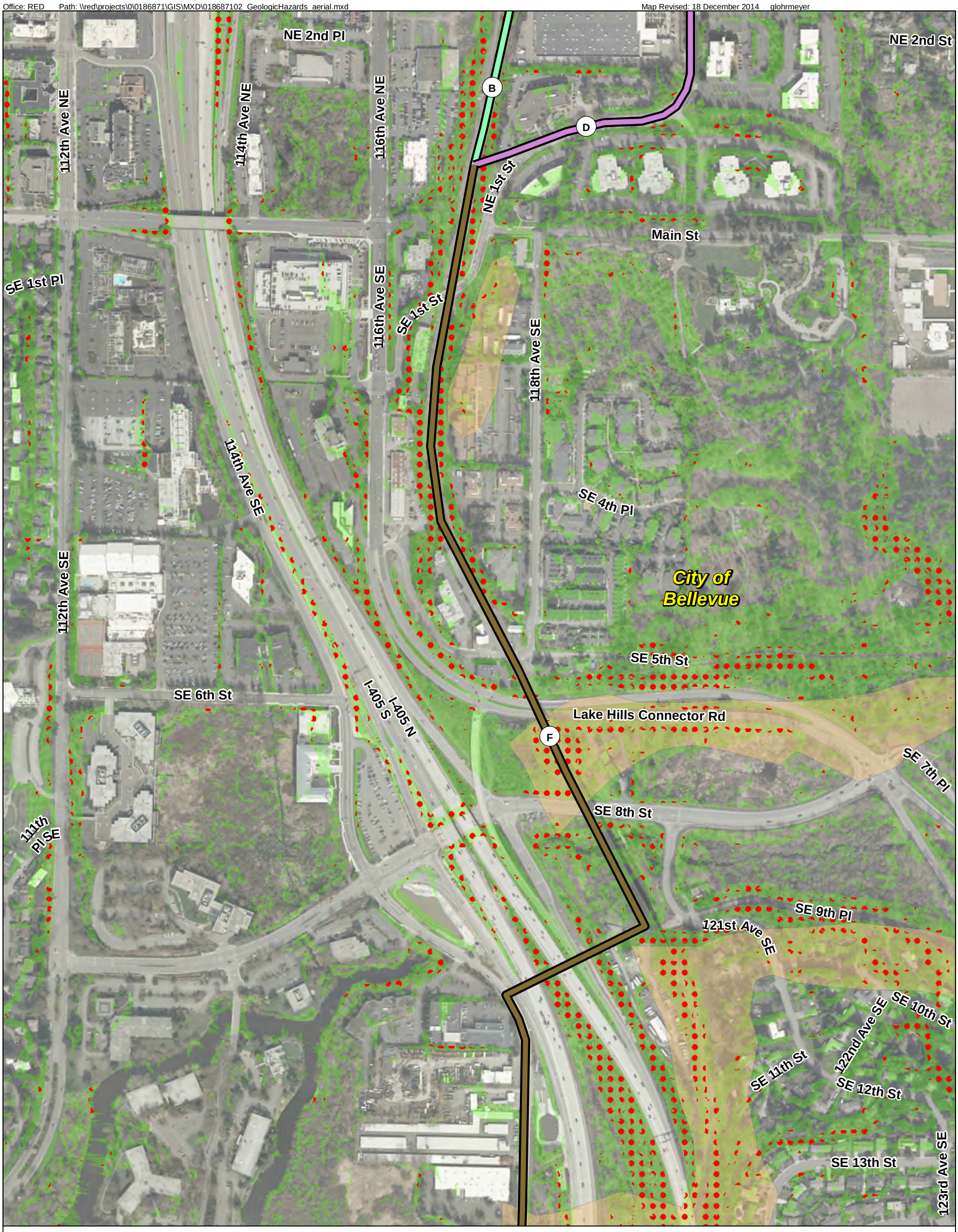
PSE Energize Eastside Project
Geohazards Evaluation
King County, Washington

GeoEngineers

Figure 63

DSD 001293

Office: RED Path: \\red\projects\0\0186871\GIS\MXD\018687102_GeologicHazards_aerial.mxd Map Revised: 18 December 2014 glohrmeyer



A Route Segment

Substation

City Boundary

Potential Steep Slopes

Potential Seismic Hazard Areas

Coal Mine Hazard Areas

Potential Landslide Hazard Areas

Erosion Hazard Areas

Potential Erosion and Landslide Hazard Areas

N W E S

400 0 400

Feet

Data Source: ESRI Street Map data. Washington DNR, King County, City of Redmond, City of Kirkland, City of Renton, City of Bellevue

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Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet

Geologic Hazards
Segment F

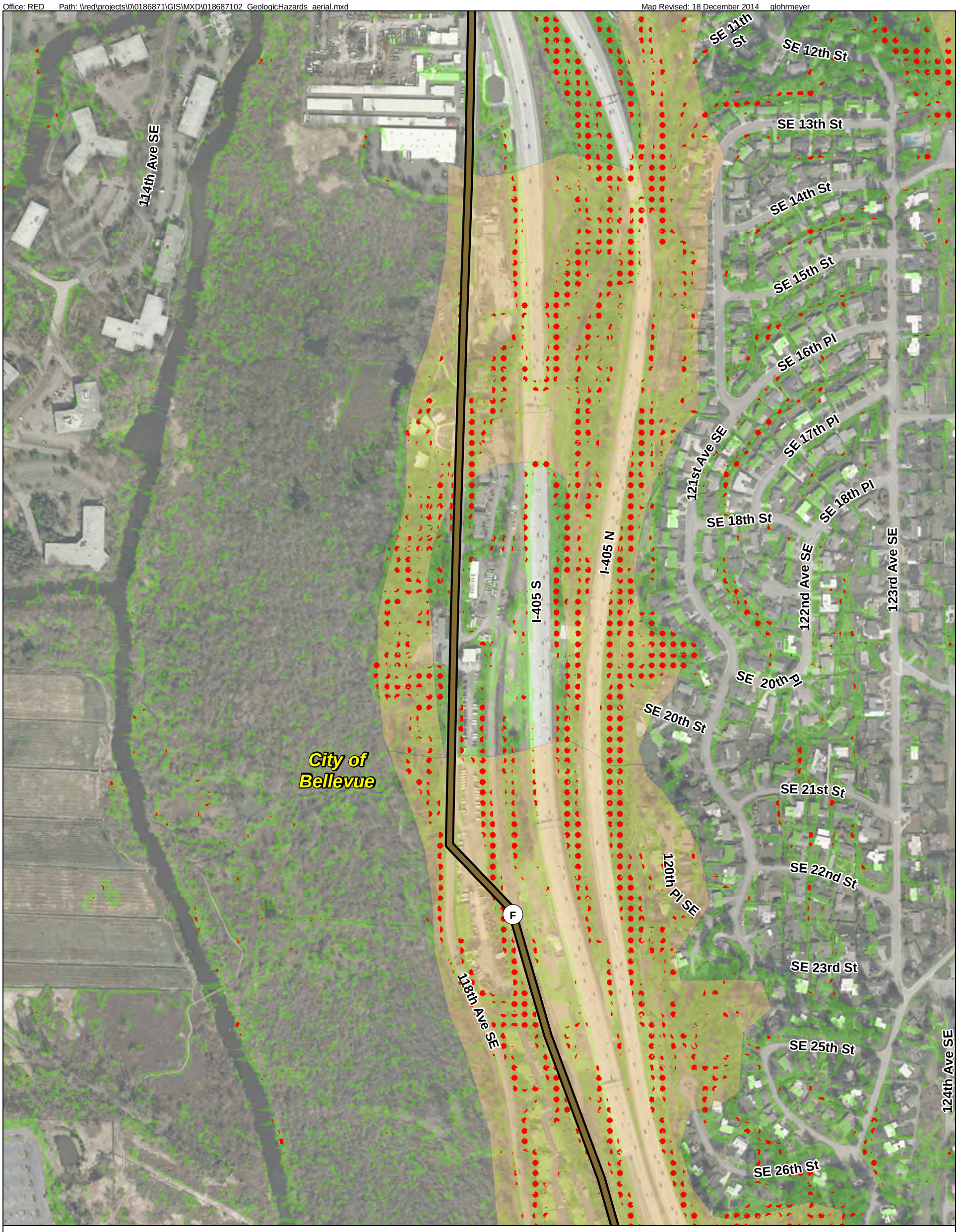
PSE Energize Eastside Project
Geohazards Evaluation
King County, Washington

GeoEngineers

Figure 64

DSD 001294

Office: RED Path: \\red\projects\0\0186871\GIS\MXD\018687102_GeologicHazards_aerial.mxd Map Revised: 18 December 2014 glohrmeyer



- Route Segment
- Substation
- City Boundary
- Potential Steep Slopes
- Potential Seismic Hazard Areas
- Coal Mine Hazard Areas
- Potential Landslide Hazard Areas
- Erosion Hazard Areas
- Potential Erosion and Landslide Hazard Areas

N W E S

400 0 400
Feet

Data Source: ESRI Street Map data. Washington DNR, King County, City of Redmond, City of Kirkland, City of Renton, City of Bellevue

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Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet

Geologic Hazards
Segment F

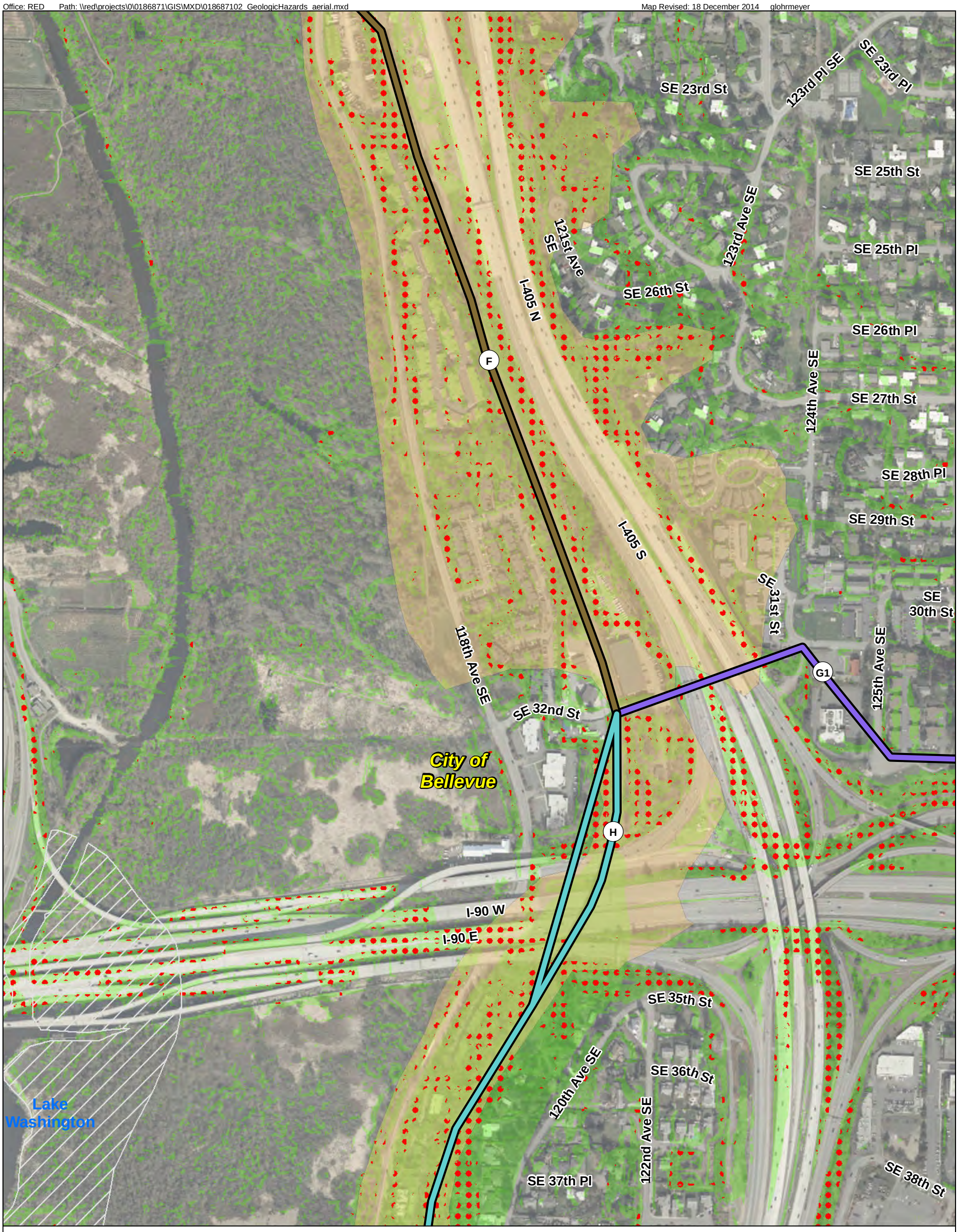
PSE Energize Eastside Project
Geohazards Evaluation
King County, Washington

GeoEngineers

Figure 65

DSD 001295

Office: RED Path: \\red\projects\0\0186871\GIS\MXD\018687102_GeologicHazards_aerial.mxd Map Revised: 18 December 2014 glohrmeyer



- Route Segment
- Substation
- City Boundary
- Potential Steep Slopes
- Potential Seismic Hazard Areas
- Coal Mine Hazard Areas
- Potential Landslide Hazard Areas
- Erosion Hazard Areas
- Potential Erosion and Landslide Hazard Areas

N W E S

400 0 400

Feet

Data Source: ESRI Street Map data. Washington DNR, King County, City of Redmond, City of Kirkland, City of Renton, City of Bellevue

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Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet

Geologic Hazards
Segment F

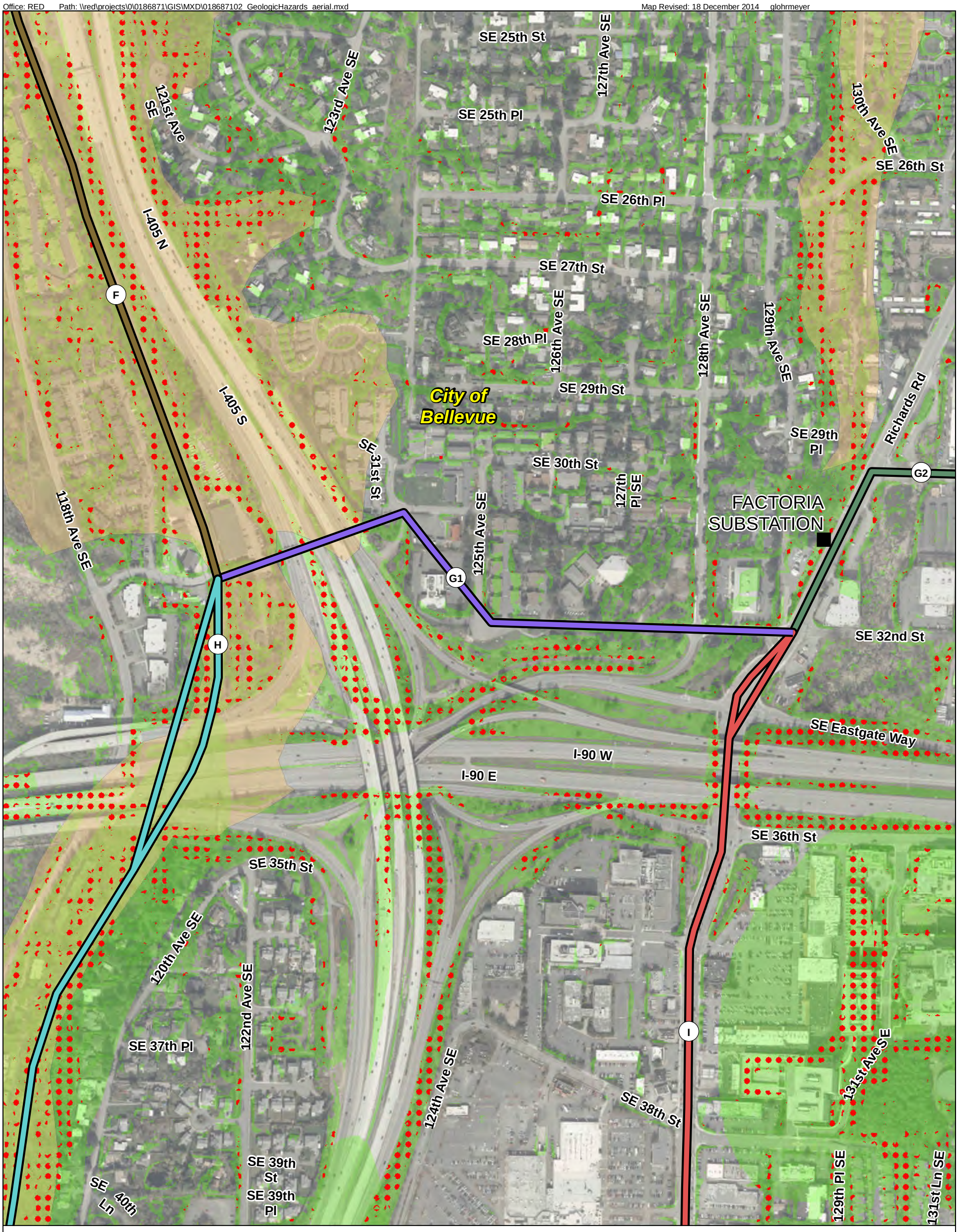
PSE Energize Eastside Project
Geohazards Evaluation
King County, Washington

GeoEngineers

Figure 66

DSD 001296

Office: RED Path: \\red\projects\0\0186871\GIS\MXD\018687102_GeologicHazards_aerial.mxd Map Revised: 18 December 2014 glohrmeyer



Route Segment

Substation

City Boundary

Potential Steep Slopes

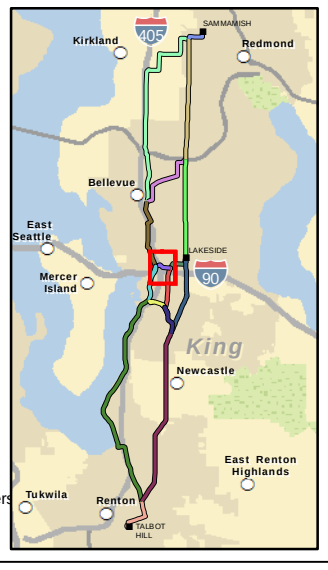
Potential Seismic Hazard Areas

Coal Mine Hazard Areas

Potential Landslide Hazard Areas

Erosion Hazard Areas

Potential Erosion and Landslide Hazard Areas



N W E S

400 0 400

Feet

Data Source: ESRI Street Map data. Washington DNR, King County, City of Redmond, City of Kirkland, City of Renton, City of Bellevue

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Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet

Geologic Hazards
Segment G1

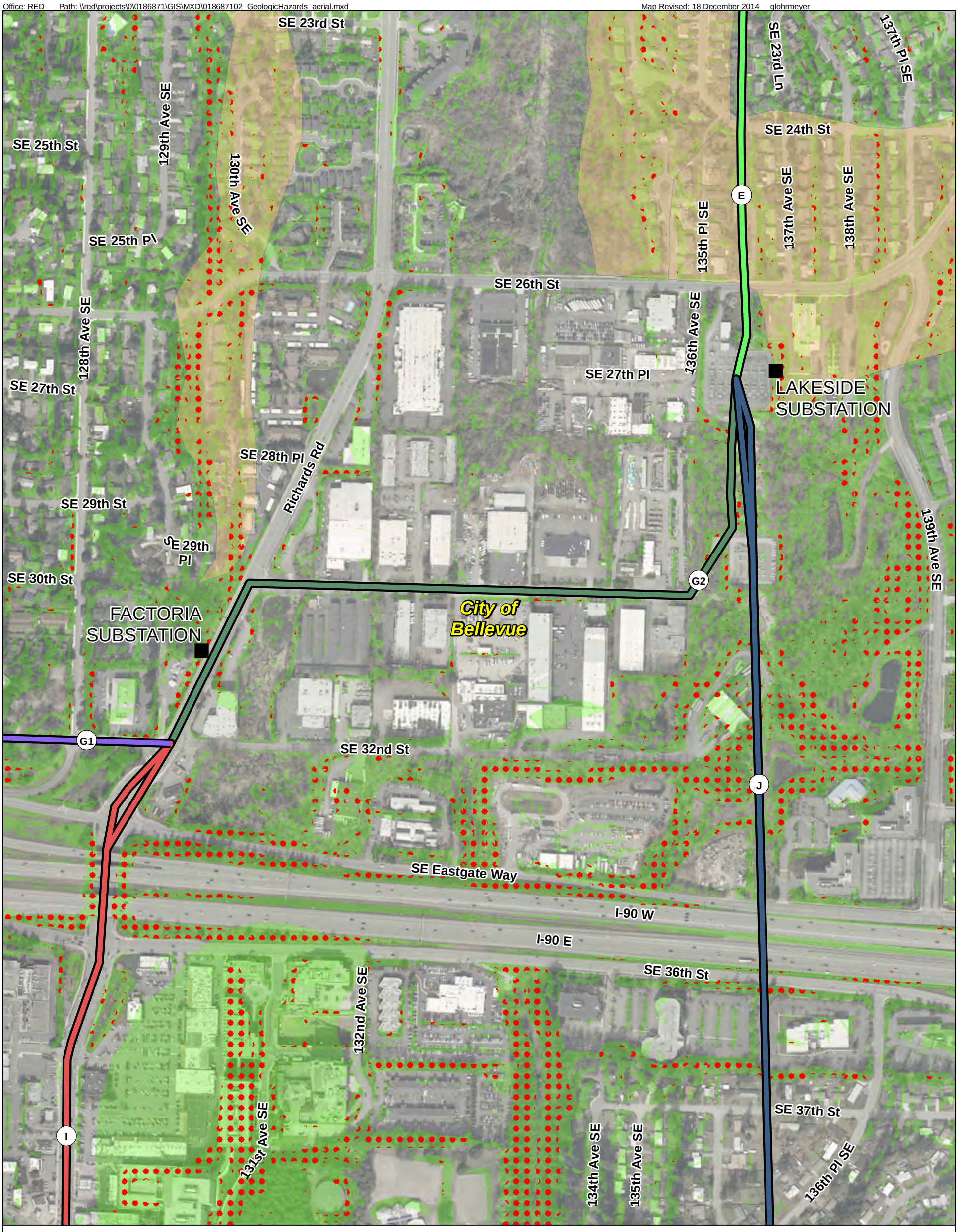
PSE Energize Eastside Project
Geohazards Evaluation
King County, Washington

GeoEngineers

Figure 67

DSD 001297

Office: RED Path: \\red\projects\0\0186871\GIS\MXD\018687102_GeologicHazards_aerial.mxd Map Revised: 18 December 2014 glohrmeyer



A Route Segment

Substation

City Boundary

Potential Steep Slopes

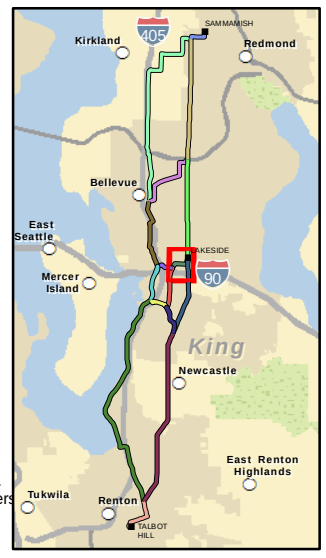
Potential Seismic Hazard Areas

Coal Mine Hazard Areas

Potential Landslide Hazard Areas

Erosion Hazard Areas

Potential Erosion and Landslide Hazard Areas



N W E S

400 0 400

Feet

Data Source: ESRI Street Map data. Washington DNR, King County, City of Redmond, City of Kirkland, City of Renton, City of Bellevue

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Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet

Geologic Hazards
Segment G2

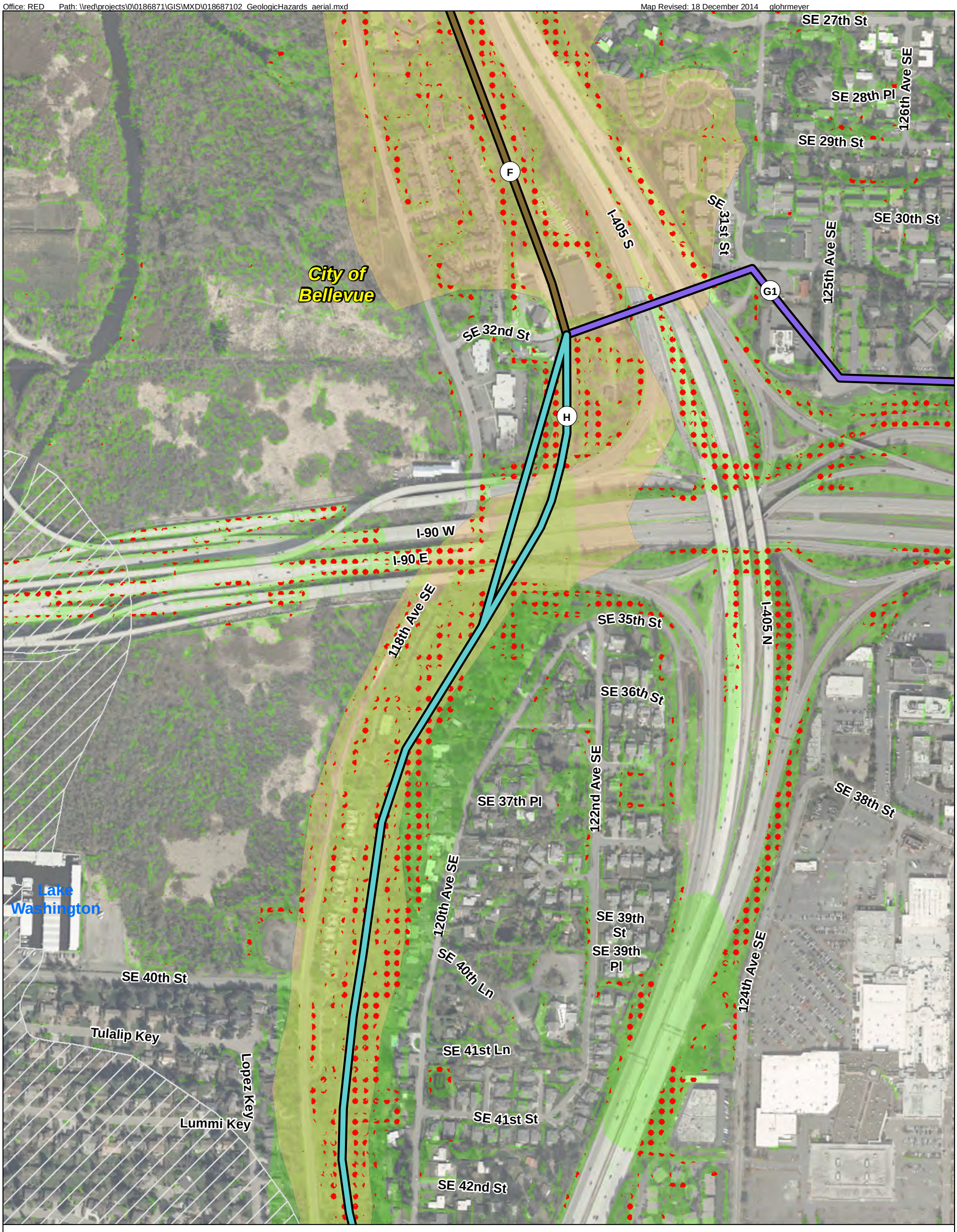
PSE Energize Eastside Project
Geohazards Evaluation
King County, Washington

GeoEngineers

Figure 68

DSD 001298

Office: RED Path: \\red\projects\0\0186871\GIS\MXD\018687102_GeologicHazards_aerial.mxd Map Revised: 18 December 2014 glohrmeyer



- Route Segment
- Substation
- City Boundary
- Potential Steep Slopes
- Potential Seismic Hazard Areas
- Coal Mine Hazard Areas
- Potential Landslide Hazard Areas
- Erosion Hazard Areas
- Potential Erosion and Landslide Hazard Areas

N W E S

400 0 400
Feet

Data Source: ESRI Street Map data. Washington DNR, King County, City of Redmond, City of Kirkland, City of Renton, City of Bellevue

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Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet

Geologic Hazards
Segment H

PSE Energize Eastside Project
Geohazards Evaluation
King County, Washington

GeoEngineers

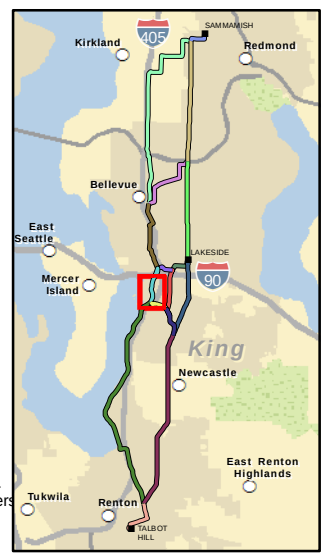
Figure 69

DSD 001299

Office: RED Path: \\red\projects\0\0186871\GIS\MXD\018687102_GeologicHazards_aerial.mxd Map Revised: 18 December 2014 glohrmeyer

Lake Washington
City of Bellevue
118th Ave SE
SE 36th St
122nd Ave SE
SE 37th Pl
SE 38th St
SE 39th St
SE 39th Pl
SE 40th St
SE 40th Ln
120th Ave SE
Tulalip Key
Lopez Key
Lummi Key
SE 41st St
Orcas Key
Newport Key
Sucia Key
I-405 N
SE 41st Pl
SE 42nd Ct
SE 41st Ln
124th Ave SE
Glacier Key
Tatoosh Key
Vashon Key
SE 42nd St
I-405 S
Skagit Key
Chelan Key
Columbia Key
SE 43rd St
123rd Ave SE
121st Ave SE
SE 44th Pl
Coal Creek Pkwy SE
SE 45th Pl
SE 44th St
Cascade Key
Decatur Key
Lake Washington Blvd SE
Lake Heights St
H
L
K1

A Route Segment
Substation
City Boundary
Potential Steep Slopes
Potential Seismic Hazard Areas
Coal Mine Hazard Areas
Potential Landslide Hazard Areas
Erosion Hazard Areas
Potential Erosion and Landslide Hazard Areas



N W E S

400 0 400
Feet

Data Source: ESRI Street Map data. Washington DNR, King County, City of Redmond, City of Kirkland, City of Renton, City of Bellevue

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Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet

Geologic Hazards
Segment H

PSE Energize Eastside Project
Geohazards Evaluation
King County, Washington

GeoEngineers

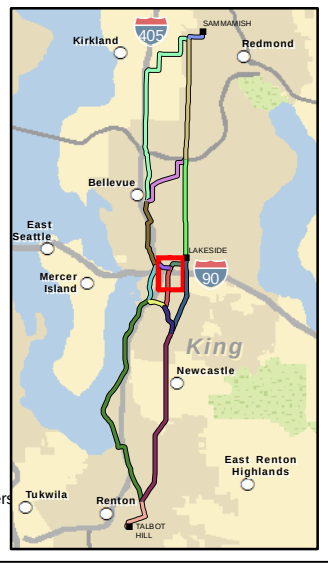
Figure 70

DSD 001300

Office: RED Path: \\red\projects\0\0186871\GIS\MXD\018687102_GeologicHazards_aerial.mxd Map Revised: 18 December 2014 glohrmeyer

123rd Ave SE
SE 27th St
SE 27th Pl
126th Ave SE
SE 28th Pl
129th Ave SE
130th Ave SE
Richards Rd
SE 29th St
SE 29th Pl
SE 31st St
SE 30th St
127th Pl SE
128th Ave SE
125th Ave SE
FACTORIA SUBSTATION
G1
G2
City of Bellevue
SE 32nd St
I-90 W
I-90 E
SE Eastgate Way
SE 36th St
132nd Ave SE
I-405 S
I-405 N
SE 38th St
131st Ave SE
134th Ave SE
124th Ave SE
129th Pl SE
130th Ln SE
131st Ln SE
SE 40th Ct
SE 40th Ln
SE 40th Pl
SE 41st St
133rd Ave SE
SE 41st Pl

- Route Segment
- Substation
- City Boundary
- Potential Steep Slopes
- Potential Seismic Hazard Areas
- Coal Mine Hazard Areas
- Potential Landslide Hazard Areas
- Erosion Hazard Areas
- Potential Erosion and Landslide Hazard Areas



N W E S

400 0 400
Feet

Data Source: ESRI Street Map data. Washington DNR, King County, City of Redmond, City of Kirkland, City of Renton, City of Bellevue

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Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet

Geologic Hazards
Segment I

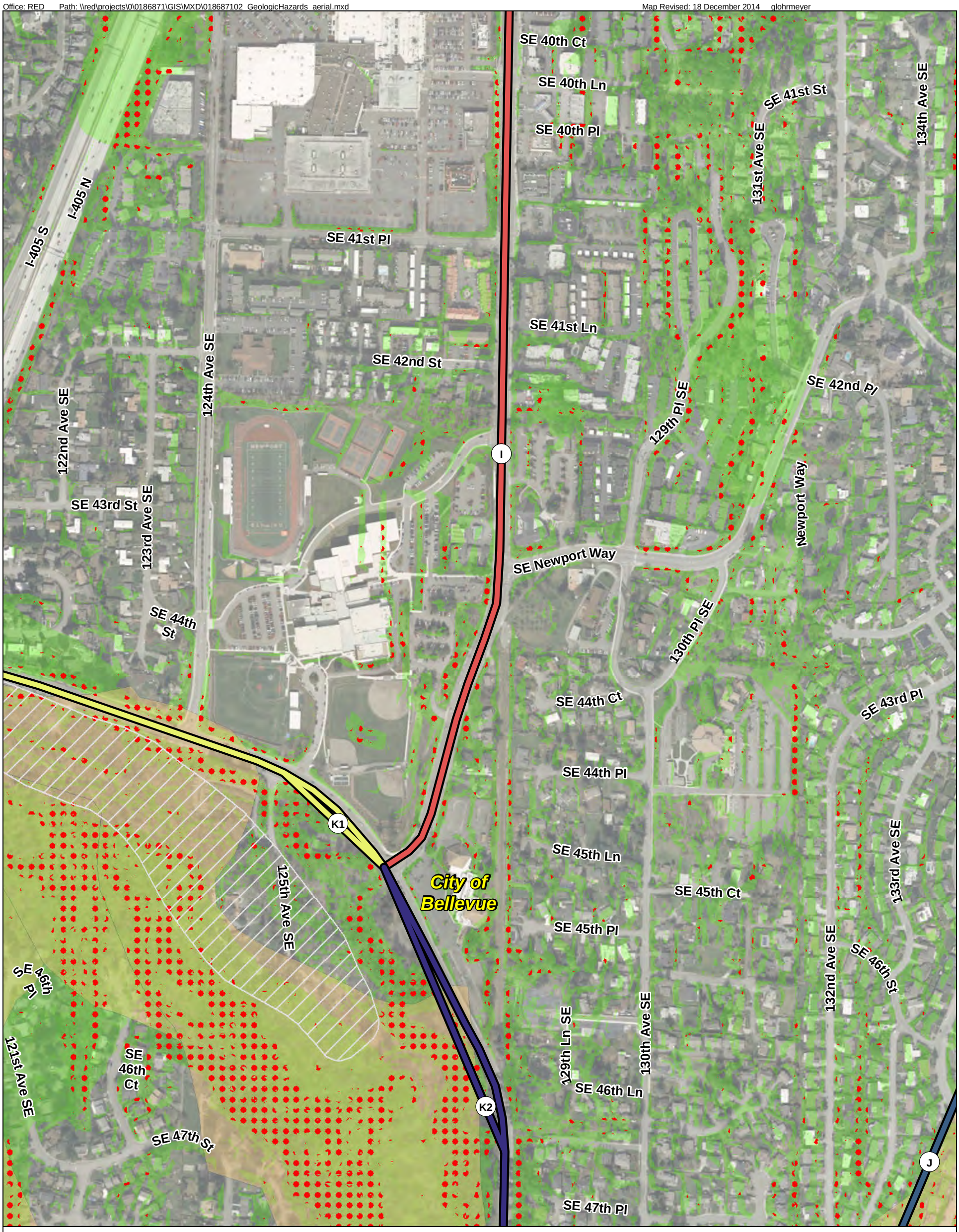
PSE Energize Eastside Project
Geohazards Evaluation
King County, Washington

GeoEngineers

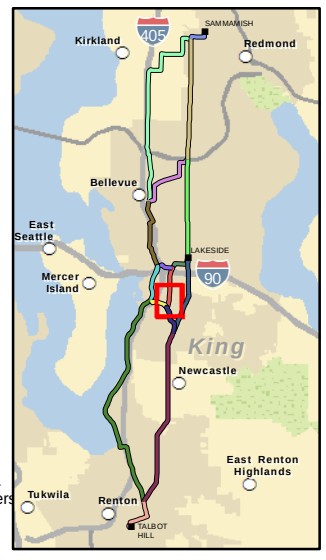
Figure 71

DSD 001301

Office: RED Path: \\red\projects\0\0186871\GIS\MXD\018687102_GeologicHazards_aerial.mxd Map Revised: 18 December 2014 glohrmeyer



- Route Segment
- Substation
- City Boundary
- Potential Steep Slopes
- Potential Seismic Hazard Areas
- Coal Mine Hazard Areas
- Potential Landslide Hazard Areas
- Erosion Hazard Areas
- Potential Erosion and Landslide Hazard Areas



N W E S

400 0 400
Feet

Data Source: ESRI Street Map data. Washington DNR, King County, City of Redmond, City of Kirkland, City of Renton, City of Bellevue

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Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet

Geologic Hazards
Segment I

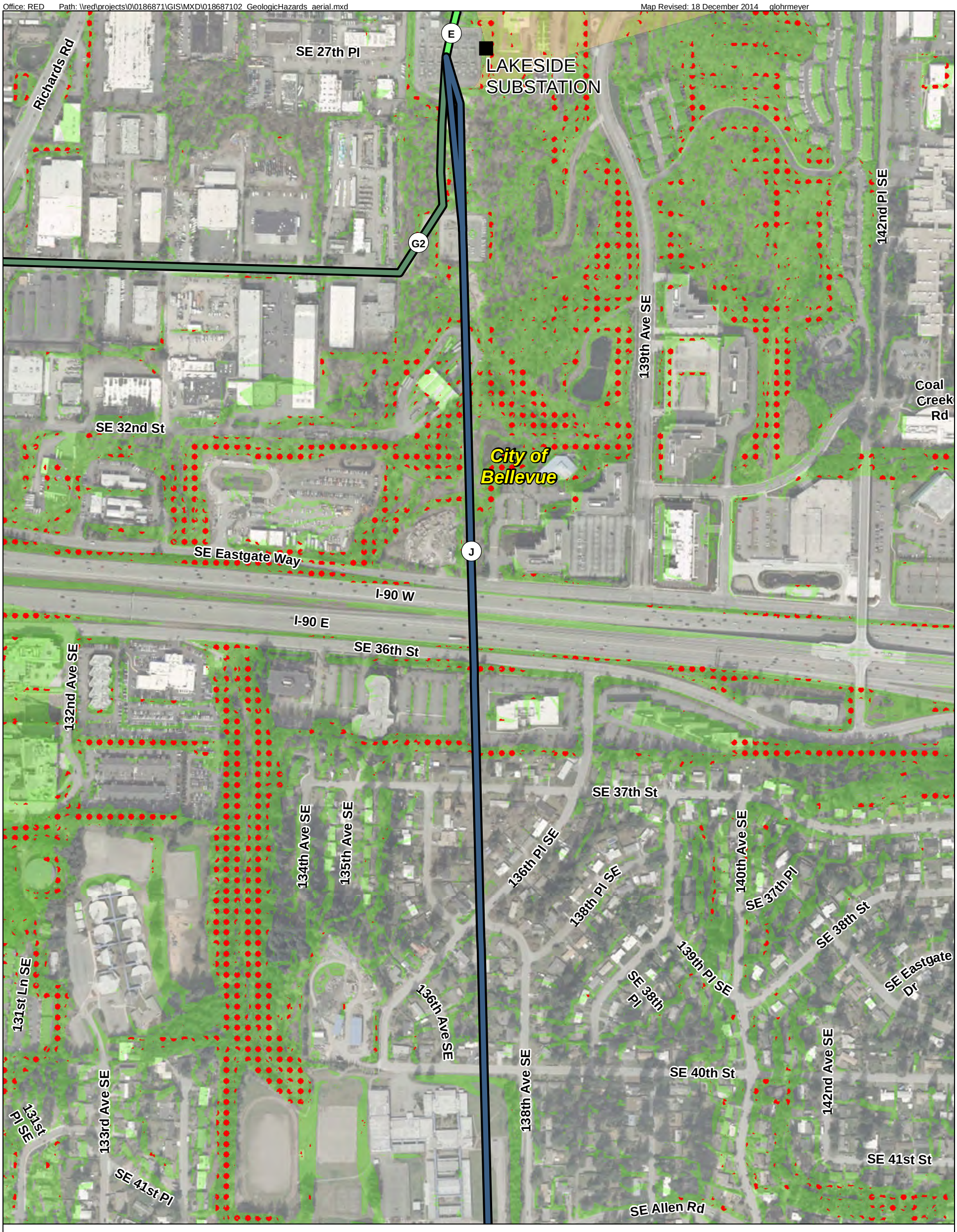
PSE Energize Eastside Project
Geohazards Evaluation
King County, Washington

GeoEngineers

Figure 72

DSD 001302

Office: RED Path: \\red\projects\0\0186871\GIS\MXD\018687102_GeologicHazards_aerial.mxd Map Revised: 18 December 2014 glohrmeyer



Route Segment
Substation
City Boundary
Potential Steep Slopes
Potential Seismic Hazard Areas
Coal Mine Hazard Areas
Potential Landslide Hazard Areas
Erosion Hazard Areas
Potential Erosion and Landslide Hazard Areas

N
W E
S

400 0 400
Feet

Data Source: ESRI Street Map data. Washington DNR, King County, City of Redmond, City of Kirkland, City of Renton, City of Bellevue

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Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet

Geologic Hazards
Segment J

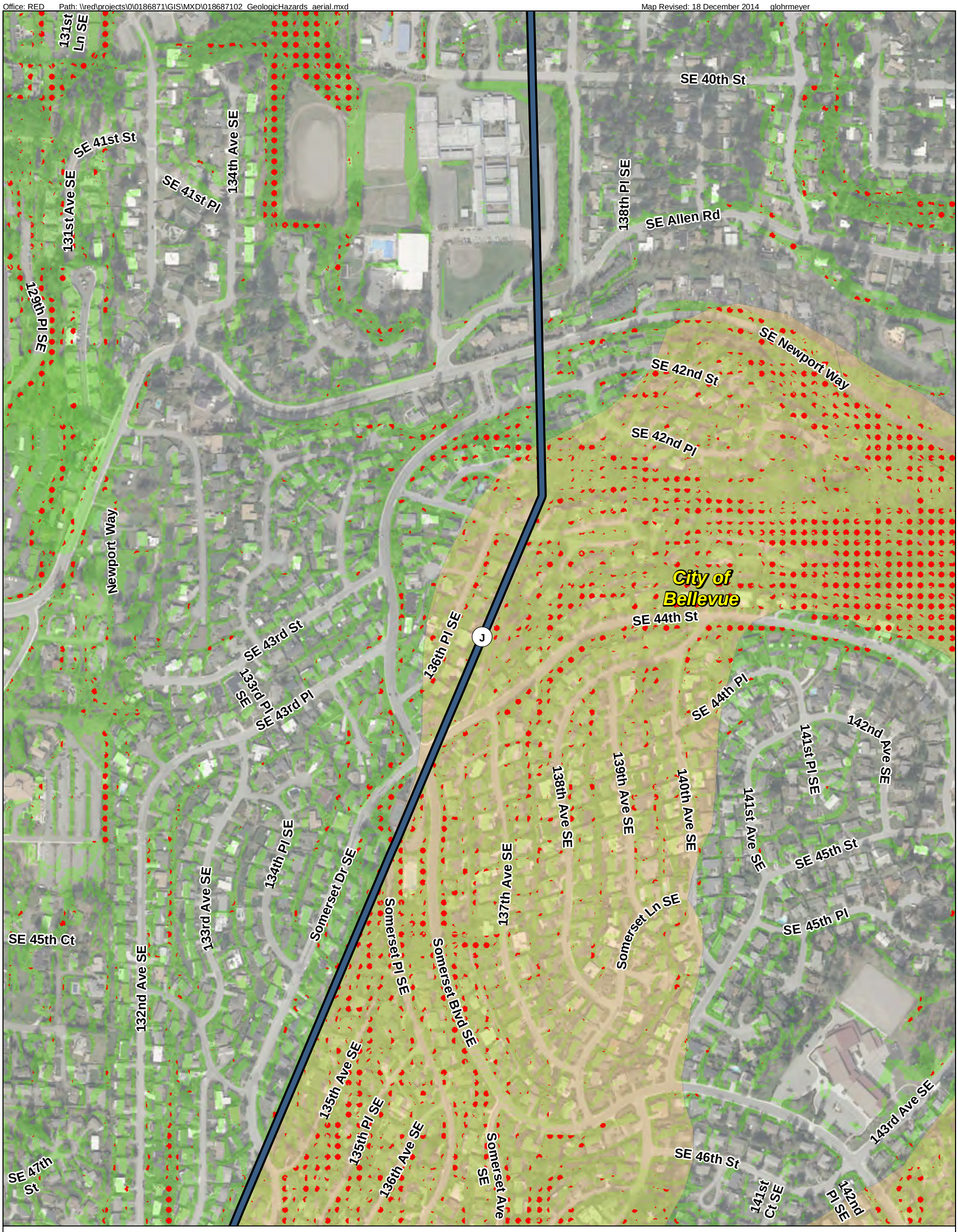
PSE Energize Eastside Project
Geohazards Evaluation
King County, Washington

GeoEngineers

Figure 73

DSD 001303

Office: RED Path: \\red\projects\0\0186871\GIS\MXD\018687102_GeologicHazards_aerial.mxd Map Revised: 18 December 2014 glohrmeyer



- Route Segment
- Substation
- City Boundary
- Potential Steep Slopes
- Potential Seismic Hazard Areas
- Coal Mine Hazard Areas
- Potential Landslide Hazard Areas
- Erosion Hazard Areas
- Potential Erosion and Landslide Hazard Areas

N W E S

400 0 400

Feet

Data Source: ESRI Street Map data. Washington DNR, King County, City of Redmond, City of Kirkland, City of Renton, City of Bellevue

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Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet

Geologic Hazards
Segment J

PSE Energize Eastside Project
Geohazards Evaluation
King County, Washington

GeoEngineers

Figure 74

DSD 001304

Office: RED Path: \\red\projects\0\0186871\GIS\MXD\018687102_GeologicHazards_aerial.mxd Map Revised: 18 December 2014 glohrmeyer

SE 45th Ct
SE 45th Pl
SE 46th St
129th Ln SE
130th Ave SE
132nd Ave SE
133rd Ave SE
135th Ave SE
Somerset Pl SE
Somerset Blvd SE
137th Ave SE
SE 46th Ln
SE 47th St
135th Pl SE
136th Ave SE
Somerset Ave SE
138th Ave SE
139th Ave SE
SE 47th Pl
Somerset Dr SE
K2
SE 48th Pl
131st Ave SE
SE 49th St
131st Pl SE
J
Forest Ridge School
City of Bellevue
127th Pl SE
SE 50th Pl
136th Pl SE
SE 51st St
SE 51st Pl
SE 52nd St
137th Pl SE
SE 53rd Pl
SE 53rd St
Forest Dr SE
SE 54th Pl
134th Ave SE
128th Ave SE
SE 55th Pl
Highland Dr
M
129th Ave SE
SE 57th St
SE 58th Pl

Route Segment
Substation
City Boundary
Potential Steep Slopes
Potential Seismic Hazard Areas
Coal Mine Hazard Areas
Potential Landslide Hazard Areas
Erosion Hazard Areas
Potential Erosion and Landslide Hazard Areas

N W E S

400 0 400
Feet

Data Source: ESRI Street Map data. Washington DNR, King County, City of Redmond, City of Kirkland, City of Renton, City of Bellevue

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Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet

Geologic Hazards
Segment J

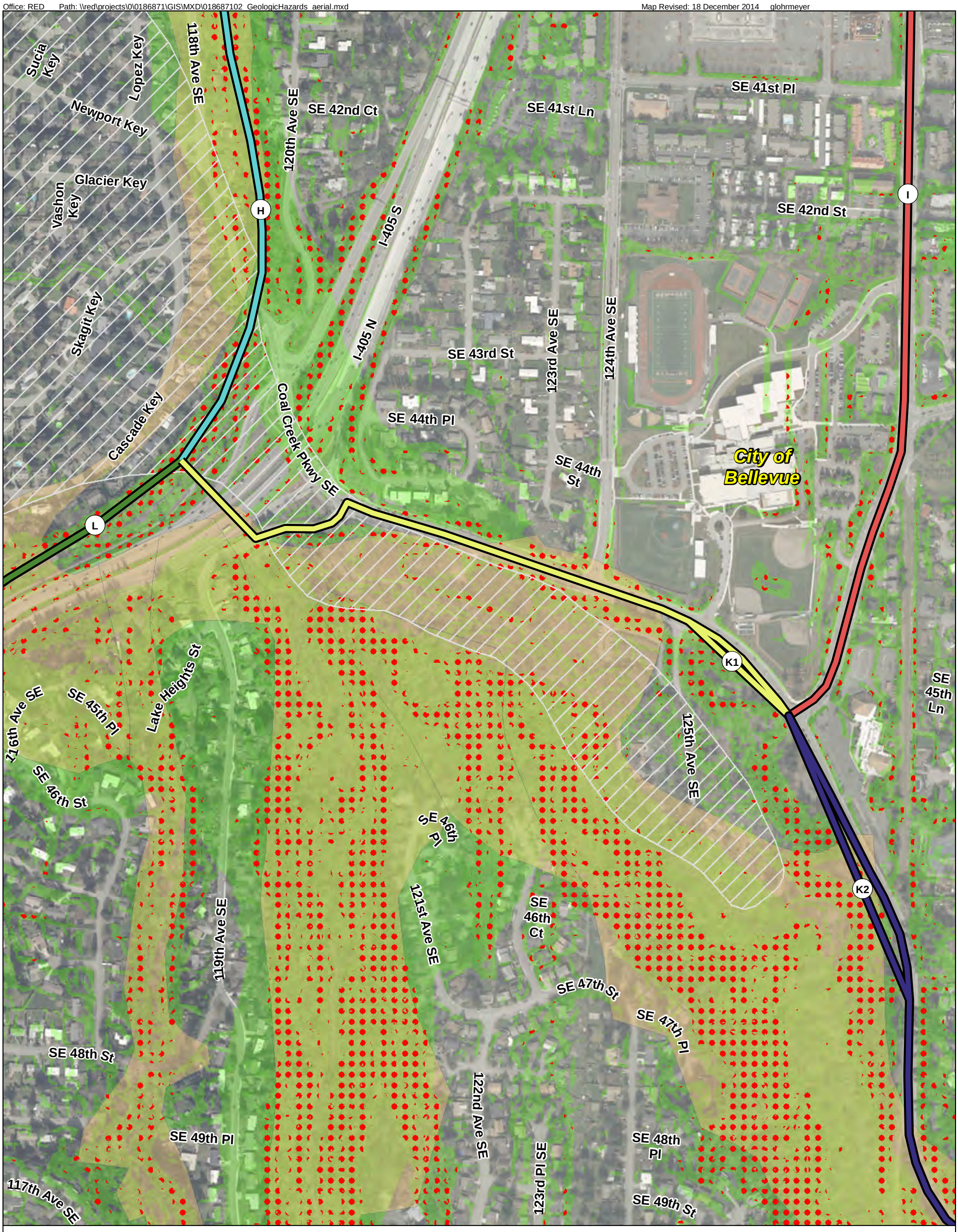
PSE Energize Eastside Project
Geohazards Evaluation
King County, Washington

GeoEngineers

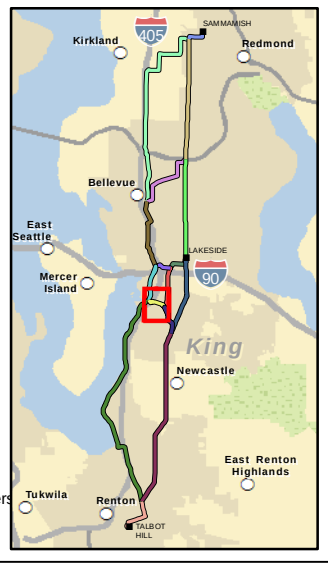
Figure 75

DSD 001305

Office: RED Path: \\red\projects\0\0186871\GIS\MXD\018687102_GeologicHazards_aerial.mxd Map Revised: 18 December 2014 glohrmeyer



- Route Segment
- Substation
- City Boundary
- Potential Steep Slopes
- Potential Seismic Hazard Areas
- Coal Mine Hazard Areas
- Potential Landslide Hazard Areas
- Erosion Hazard Areas
- Potential Erosion and Landslide Hazard Areas



N W E S

400 0 400
Feet

Data Source: ESRI Street Map data. Washington DNR, King County, City of Redmond, City of Kirkland, City of Renton, City of Bellevue

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Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet

Geologic Hazards
Segment K1

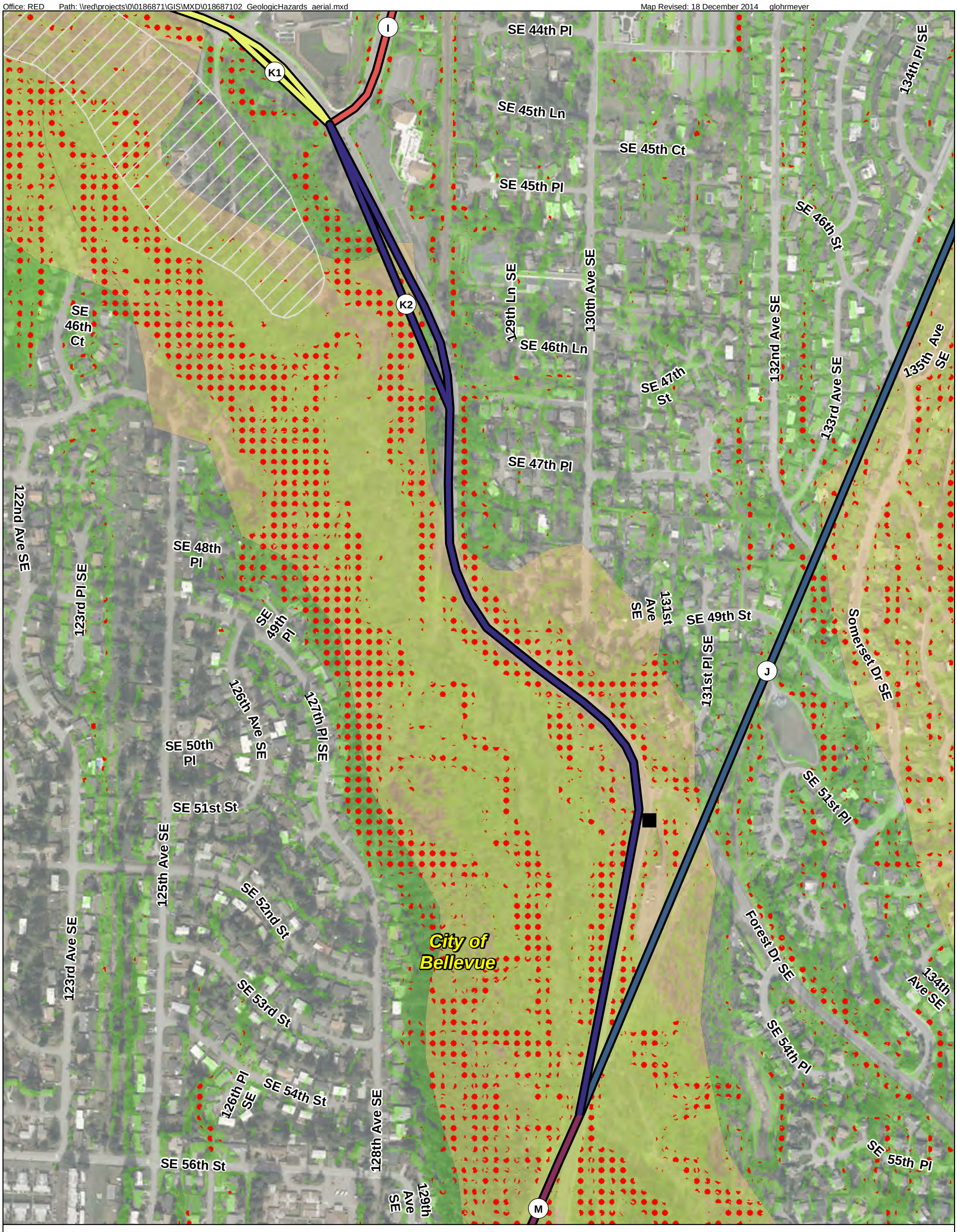
PSE Energize Eastside Project
Geohazards Evaluation
King County, Washington

GeoEngineers

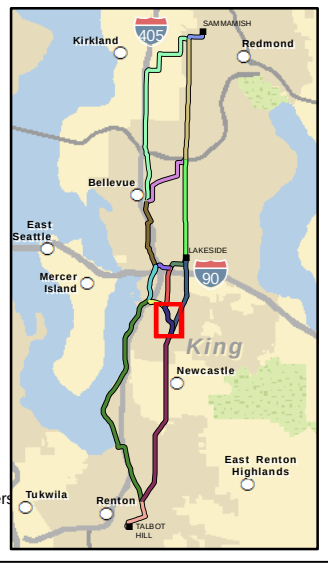
Figure 76

DSD 001306

Office: RED Path: \\red\projects\0\0186871\GIS\MXD\018687102_GeologicHazards_aerial.mxd Map Revised: 18 December 2014 glohrmeyer



Route Segment
Substation
City Boundary
Potential Steep Slopes
Potential Seismic Hazard Areas
Coal Mine Hazard Areas
Potential Landslide Hazard Areas
Erosion Hazard Areas
Potential Erosion and Landslide Hazard Areas



N W E S

400 0 400
Feet

Data Source: ESRI Street Map data. Washington DNR, King County, City of Redmond, City of Kirkland, City of Renton, City of Bellevue

Notes:
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers Inc. and will serve as the official record of this communication.

Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet

Geologic Hazards
Segment K2

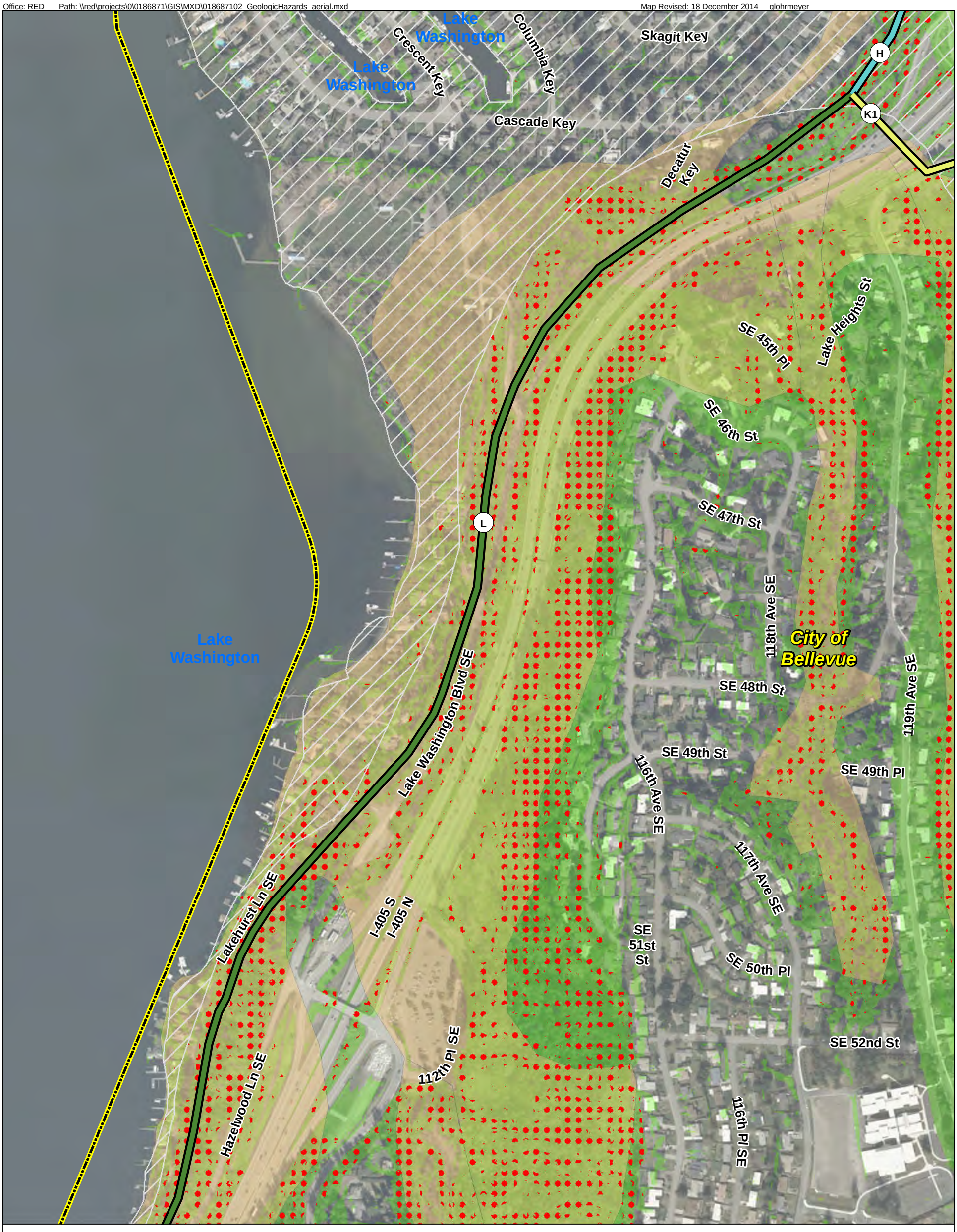
PSE Energize Eastside Project
Geohazards Evaluation
King County, Washington

GeoEngineers

Figure 77

DSD 001307

Office: RED Path: \\red\projects\0\0186871\GIS\MXD\018687102_GeologicHazards_aerial.mxd Map Revised: 18 December 2014 glohrmeyer



Route Segment
Substation
City Boundary
Potential Steep Slopes
Potential Seismic Hazard Areas
Coal Mine Hazard Areas
Potential Landslide Hazard Areas
Erosion Hazard Areas
Potential Erosion and Landslide Hazard Areas

N W E S

400 0 400
Feet

Data Source: ESRI Street Map data. Washington DNR, King County, City of Redmond, City of Kirkland, City of Renton, City of Bellevue

Notes:
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Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet

Geologic Hazards
Segment L

PSE Energize Eastside Project
Geohazards Evaluation
King County, Washington

GeoEngineers

Figure 78

DSD 001308

Office: RED Path: \\red\projects\0\0186871\GIS\MXD\018687102_GeologicHazards_aerial.mxd Map Revised: 18 December 2014 glohrmeyer

Route Segment

Substation

City Boundary

Potential Steep Slopes

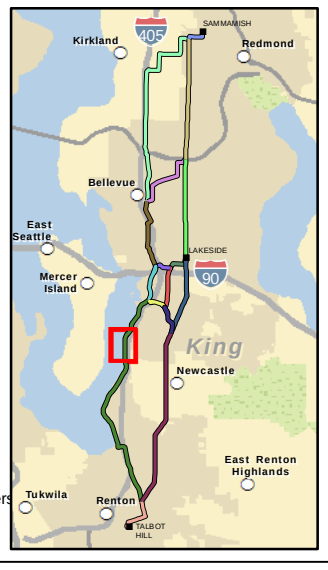
Potential Seismic Hazard Areas

Coal Mine Hazard Areas

Potential Landslide Hazard Areas

Erosion Hazard Areas

Potential Erosion and Landslide Hazard Areas



N W E S

400 0 400

Feet

Data Source: ESRI Street Map data. Washington DNR, King County, City of Redmond, City of Kirkland, City of Renton, City of Bellevue

Notes:
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Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet

Geologic Hazards
Segment L

PSE Energize Eastside Project
Geohazards Evaluation
King County, Washington

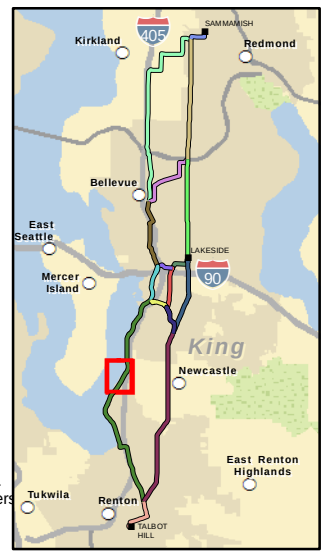
GeoEngineers

Figure 79

DSD 001309

Office: RED Path: \\red\projects\0\0186871\GIS\MXD\018687102_GeologicHazards_aerial.mxd Map Revised: 18 December 2014 glohrmeyer

- Route Segment
- Substation
- City Boundary
- Potential Steep Slopes
- Potential Seismic Hazard Areas
- Coal Mine Hazard Areas
- Potential Landslide Hazard Areas
- Erosion Hazard Areas
- Potential Erosion and Landslide Hazard Areas



N W E S

400 0 400
Feet

Data Source: ESRI Street Map data. Washington DNR, King County, City of Redmond, City of Kirkland, City of Renton, City of Bellevue

Notes:
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Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet

Geologic Hazards
Segment L

PSE Energize Eastside Project
Geohazards Evaluation
King County, Washington

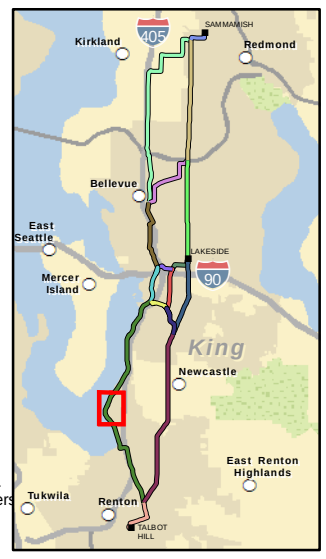
GeoEngineers

Figure 80

DSD 001310

Office: RED Path: \\red\projects\0\0186871\GIS\MXD\018687102_GeologicHazards_aerial.mxd Map Revised: 18 December 2014 glohrmeyer

- Route Segment
- Substation
- City Boundary
- Potential Steep Slopes
- Potential Seismic Hazard Areas
- Coal Mine Hazard Areas
- Potential Landslide Hazard Areas
- Erosion Hazard Areas
- Potential Erosion and Landslide Hazard Areas



N W E S

400 0 400

Feet

Data Source: ESRI Street Map data. Washington DNR, King County, City of Redmond, City of Kirkland, City of Renton, City of Bellevue

Notes:
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Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet

Geologic Hazards
Segment L

PSE Energize Eastside Project
Geohazards Evaluation
King County, Washington

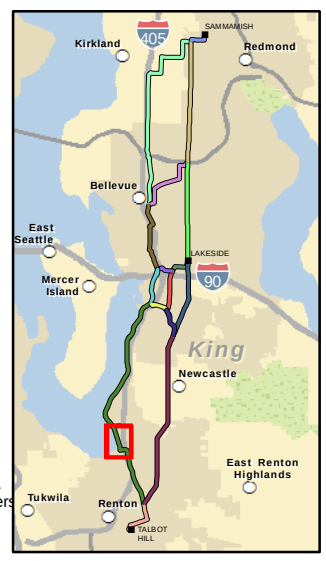
GeoEngineers

Figure 81

DSD 001311

Office: RED Path: \\red\projects\0\0186871\GIS\MXD\018687102_GeologicHazards_aerial.mxd Map Revised: 18 December 2014 glohrmeyer

- Route Segment
- Substation
- City Boundary
- Potential Steep Slopes
- Potential Seismic Hazard Areas
- Coal Mine Hazard Areas
- Potential Landslide Hazard Areas
- Erosion Hazard Areas
- Potential Erosion and Landslide Hazard Areas



N W E S

400 0 400

Feet

Data Source: ESRI Street Map data. Washington DNR, King County, City of Redmond, City of Kirkland, City of Renton, City of Bellevue

Notes:
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Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet

Geologic Hazards
Segment L

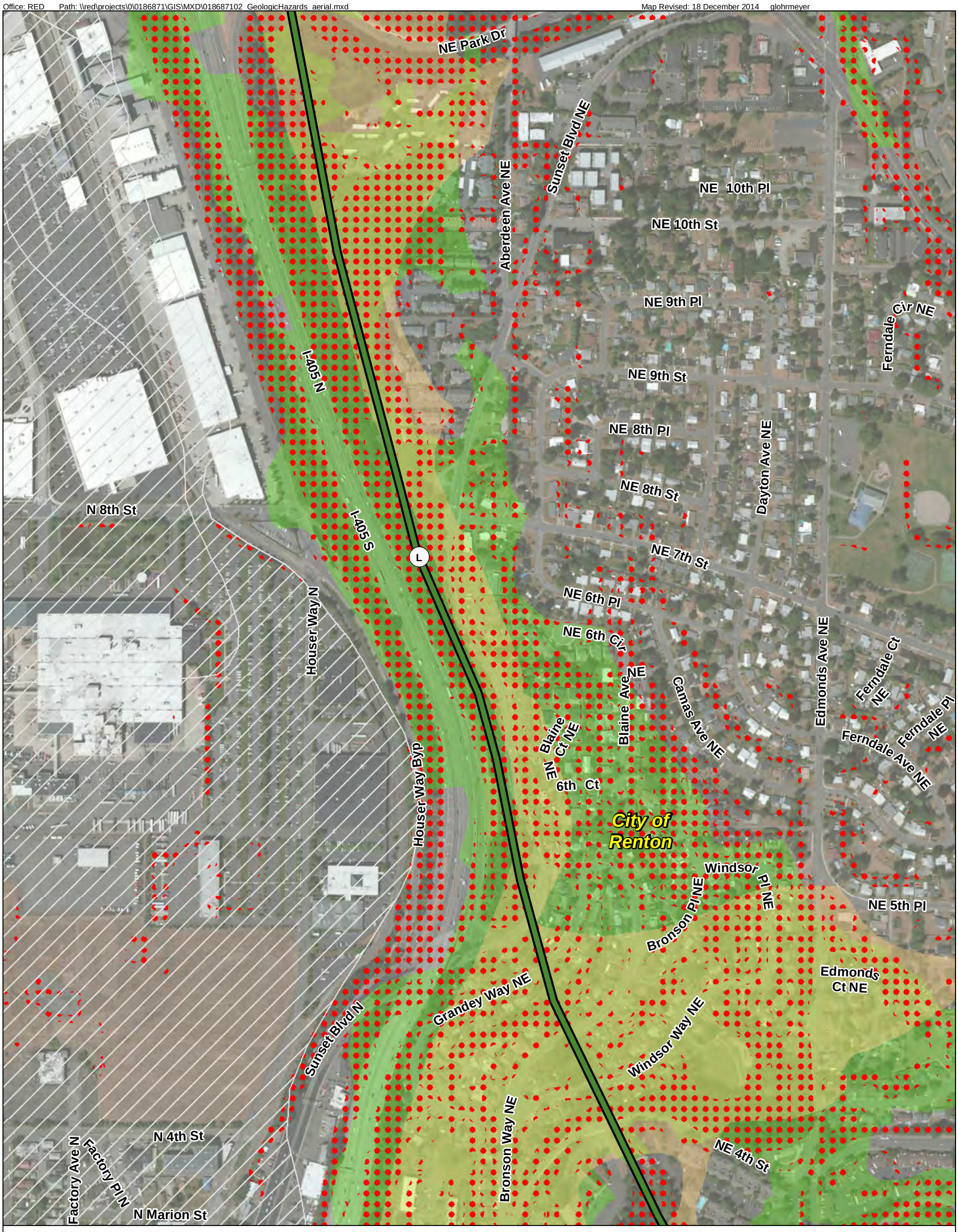
PSE Energize Eastside Project
Geohazards Evaluation
King County, Washington

GeoEngineers

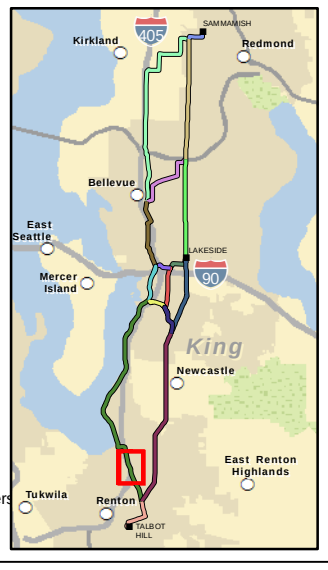
Figure 82

DSD 001312

Office: RED Path: \\red\projects\0\0186871\GIS\MXD\018687102_GeologicHazards_aerial.mxd Map Revised: 18 December 2014 glohrmeyer



Route Segment
Substation
City Boundary
Potential Steep Slopes
Potential Seismic Hazard Areas
Coal Mine Hazard Areas
Potential Landslide Hazard Areas
Erosion Hazard Areas
Potential Erosion and Landslide Hazard Areas



N W E S

400 0 400
Feet

Data Source: ESRI Street Map data. Washington DNR, King County, City of Redmond, City of Kirkland, City of Renton, City of Bellevue

Notes:
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Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet

Geologic Hazards
Segment L

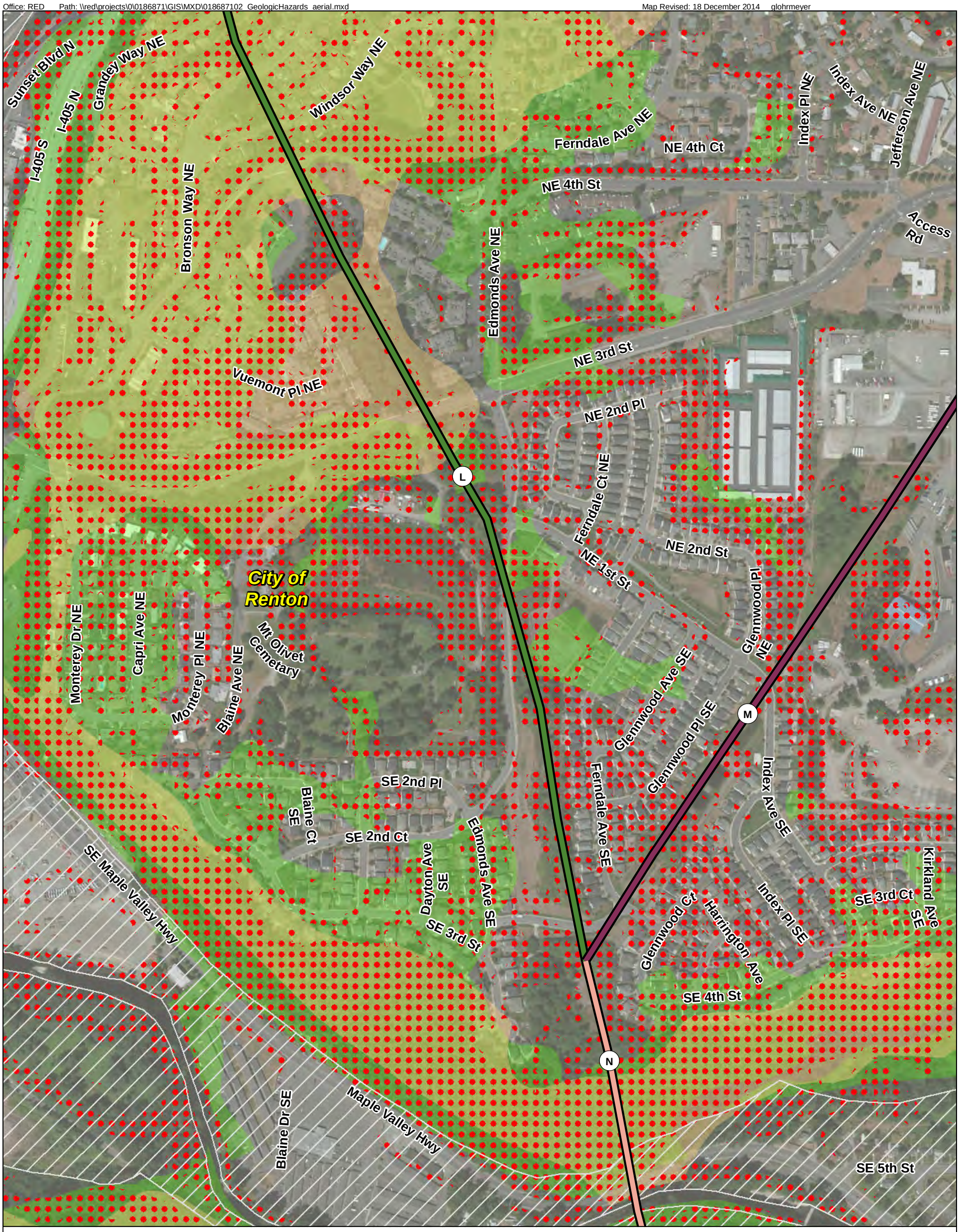
PSE Energize Eastside Project
Geohazards Evaluation
King County, Washington

GeoEngineers

Figure 83

DSD 001313

Office: RED Path: \\red\projects\0\0186871\GIS\MXD\018687102_GeologicHazards_aerial.mxd Map Revised: 18 December 2014 glohrmeyer



Route Segment

Substation

City Boundary

Potential Steep Slopes

Potential Seismic Hazard Areas

Coal Mine Hazard Areas

Potential Landslide Hazard Areas

Erosion Hazard Areas

Potential Erosion and Landslide Hazard Areas

N
W E
S

400 0 400
Feet

Data Source: ESRI Street Map data. Washington DNR, King County, City of Redmond, City of Kirkland, City of Renton, City of Bellevue

Notes:
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Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet

Geologic Hazards
Segment L

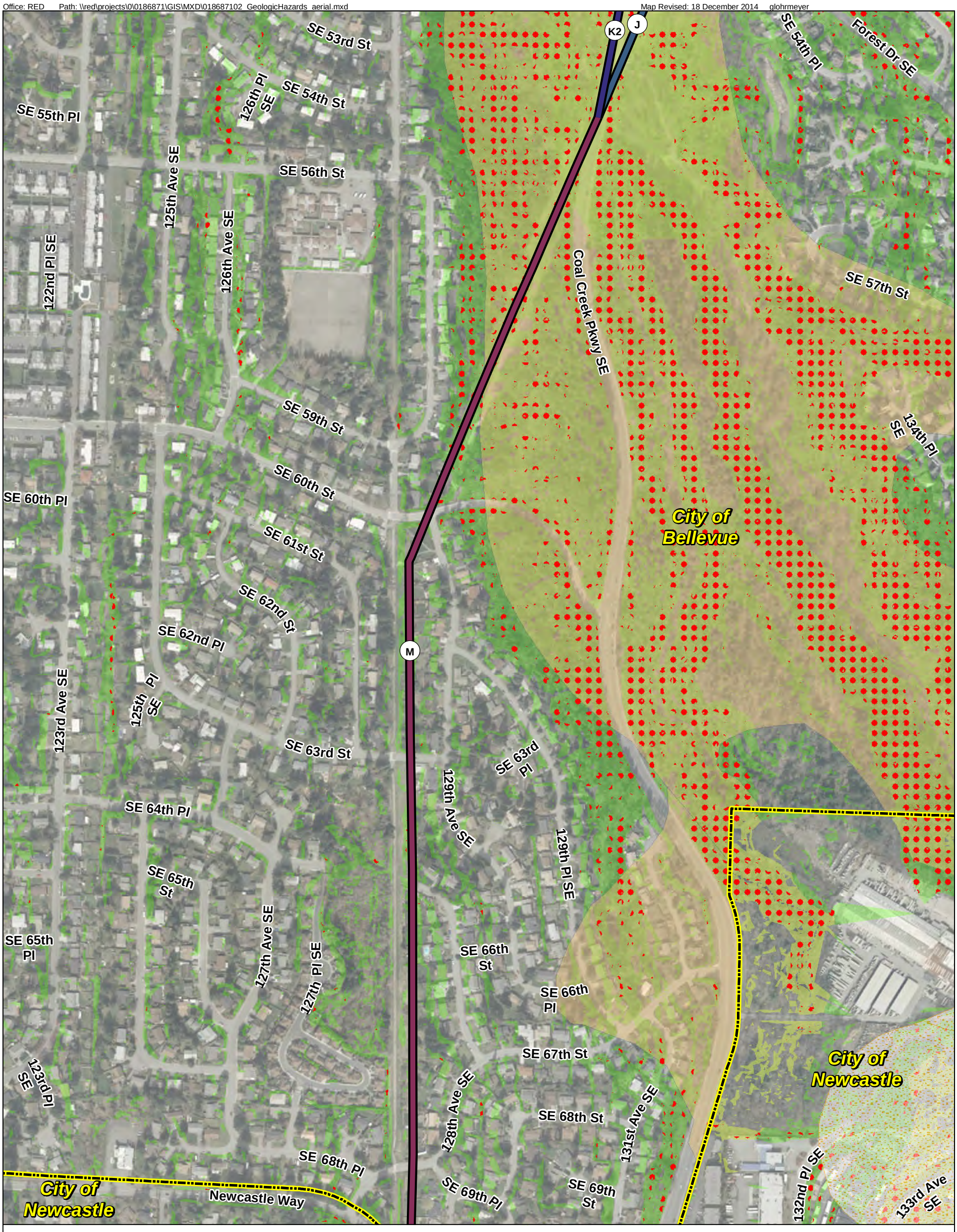
PSE Energize Eastside Project
Geohazards Evaluation
King County, Washington

GeoEngineers

Figure 84

DSD 001314

Office: RED Path: \\red\projects\0\0186871\GIS\MXD\018687102_GeologicHazards_aerial.mxd Map Revised: 18 December 2014 glohrmeyer



- Route Segment
- Substation
- City Boundary
- Potential Steep Slopes
- Potential Seismic Hazard Areas
- Coal Mine Hazard Areas
- Potential Landslide Hazard Areas
- Erosion Hazard Areas
- Potential Erosion and Landslide Hazard Areas

N W E S

400 0 400

Feet

Data Source: ESRI Street Map data. Washington DNR, King County, City of Redmond, City of Kirkland, City of Renton, City of Bellevue

Notes:
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Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet

Geologic Hazards
Segment M

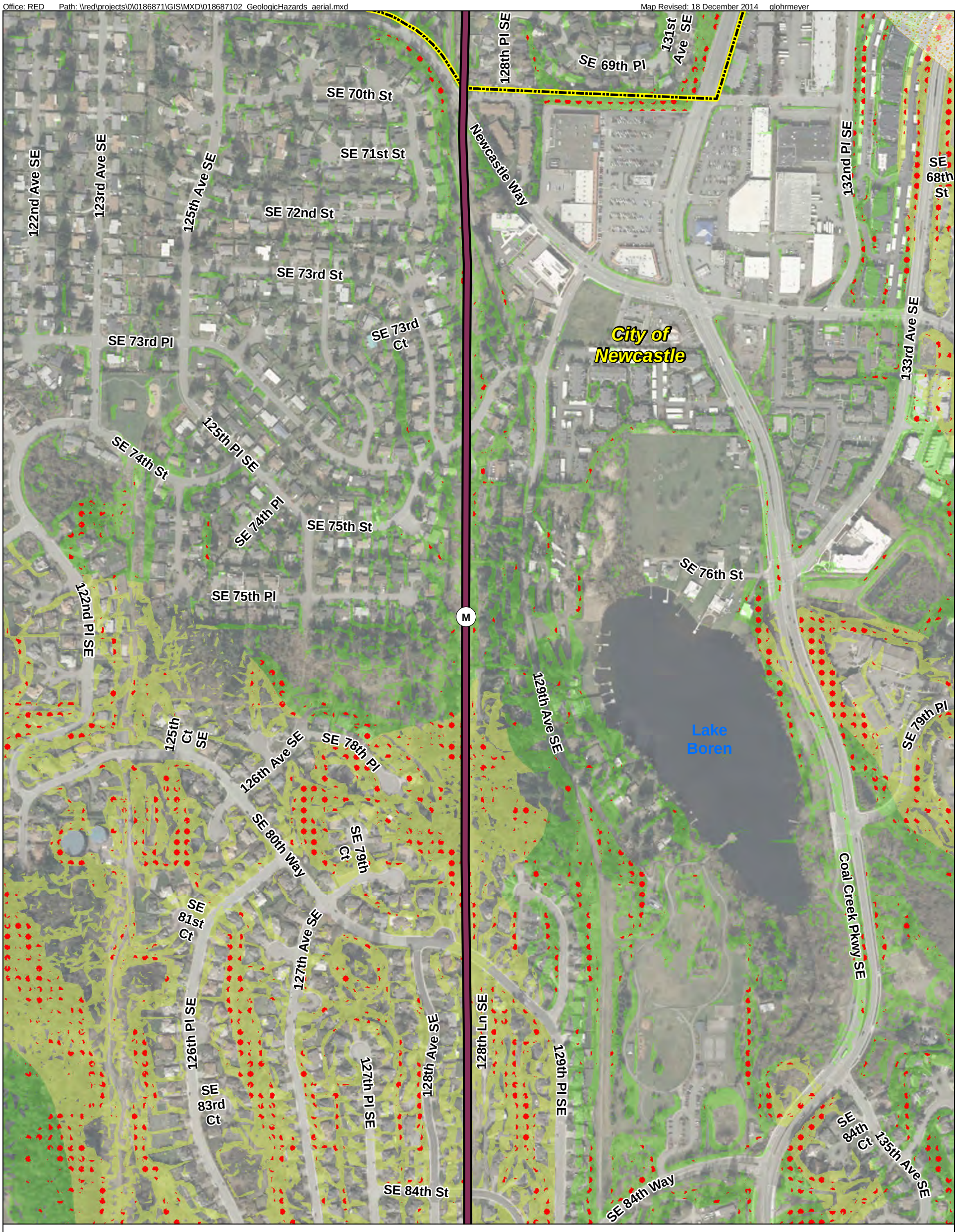
PSE Energize Eastside Project
Geohazards Evaluation
King County, Washington

GeoEngineers

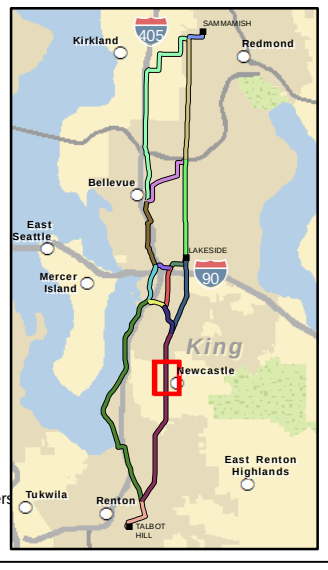
Figure 85

DSD 001315

Office: RED Path: \\red\projects\0\0186871\GIS\MXD\018687102_GeologicHazards_aerial.mxd Map Revised: 18 December 2014 glohrmeyer



- Route Segment
- Substation
- City Boundary
- Potential Steep Slopes
- Potential Seismic Hazard Areas
- Coal Mine Hazard Areas
- Potential Landslide Hazard Areas
- Erosion Hazard Areas
- Potential Erosion and Landslide Hazard Areas



N W E S

400 0 400

Feet

Data Source: ESRI Street Map data. Washington DNR, King County, City of Redmond, City of Kirkland, City of Renton, City of Bellevue

Notes:
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Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet

Geologic Hazards
Segment M

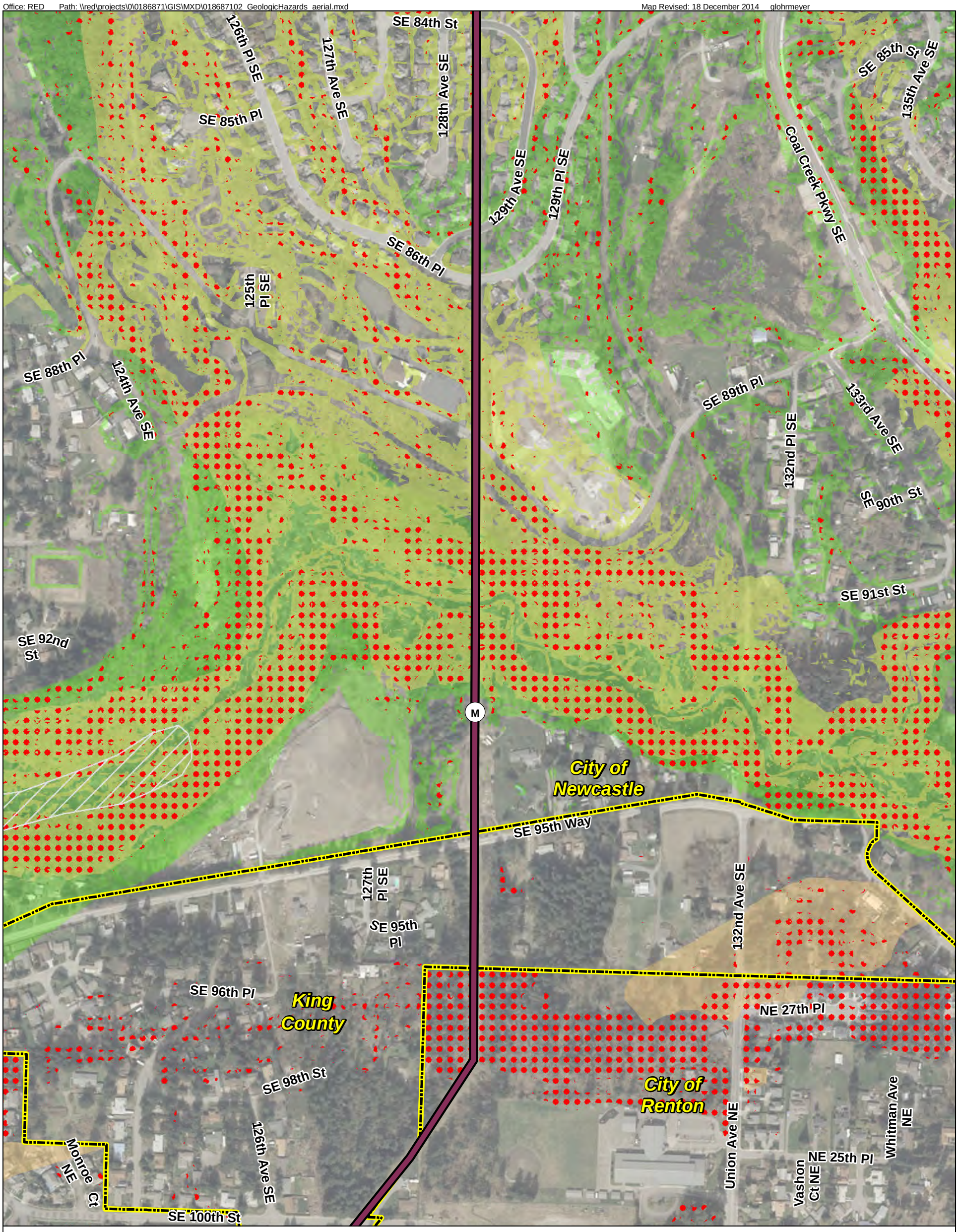
PSE Energize Eastside Project
Geohazards Evaluation
King County, Washington

GeoEngineers

Figure 86

DSD 001316

Office: RED Path: \\red\projects\0\0186871\GIS\MXD\018687102_GeologicHazards_aerial.mxd Map Revised: 18 December 2014 glohrmeyer



A Route Segment

Substation

City Boundary

Potential Steep Slopes

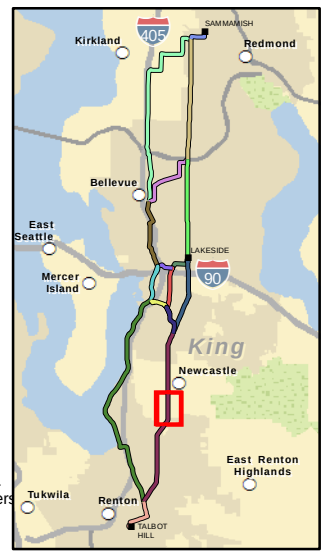
Potential Seismic Hazard Areas

Coal Mine Hazard Areas

Potential Landslide Hazard Areas

Erosion Hazard Areas

Potential Erosion and Landslide Hazard Areas



N W E S

400 0 400

Feet

Data Source: ESRI Street Map data. Washington DNR, King County, City of Redmond, City of Kirkland, City of Renton, City of Bellevue

Notes:
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Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet

Geologic Hazards
Segment M

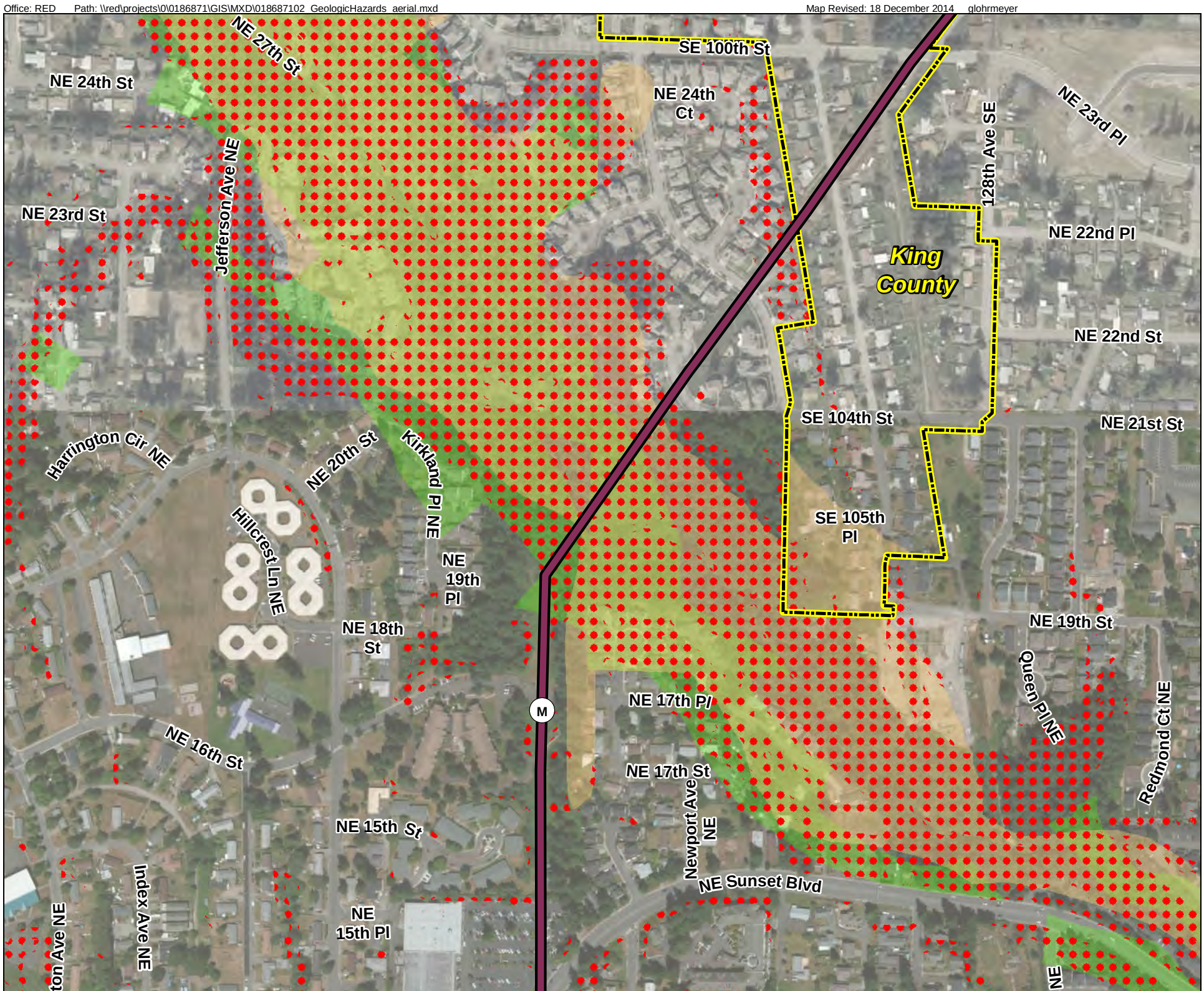
PSE Energize Eastside Project
Geohazards Evaluation
King County, Washington

GeoEngineers

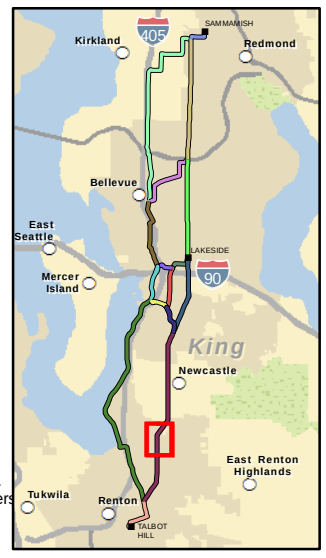
Figure 87

DSD 001317

Office: RED Path: \\red\projects\0\0186871\GIS\MXD\018687102_GeologicHazards_aerial.mxd Map Revised: 18 December 2014 glohrmeyer



- Route Segment
- Substation
- City Boundary
- Potential Steep Slopes
- Potential Seismic Hazard Areas
- Coal Mine Hazard Areas
- Potential Landslide Hazard Areas
- Erosion Hazard Areas
- Potential Erosion and Landslide Hazard Areas



N W E S

400 0 400
Feet

Data Source: ESRI Street Map data. Washington DNR, King County, City of Redmond, City of Kirkland, City of Renton, City of Bellevue

Notes:
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Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet

Geologic Hazards
Segment M

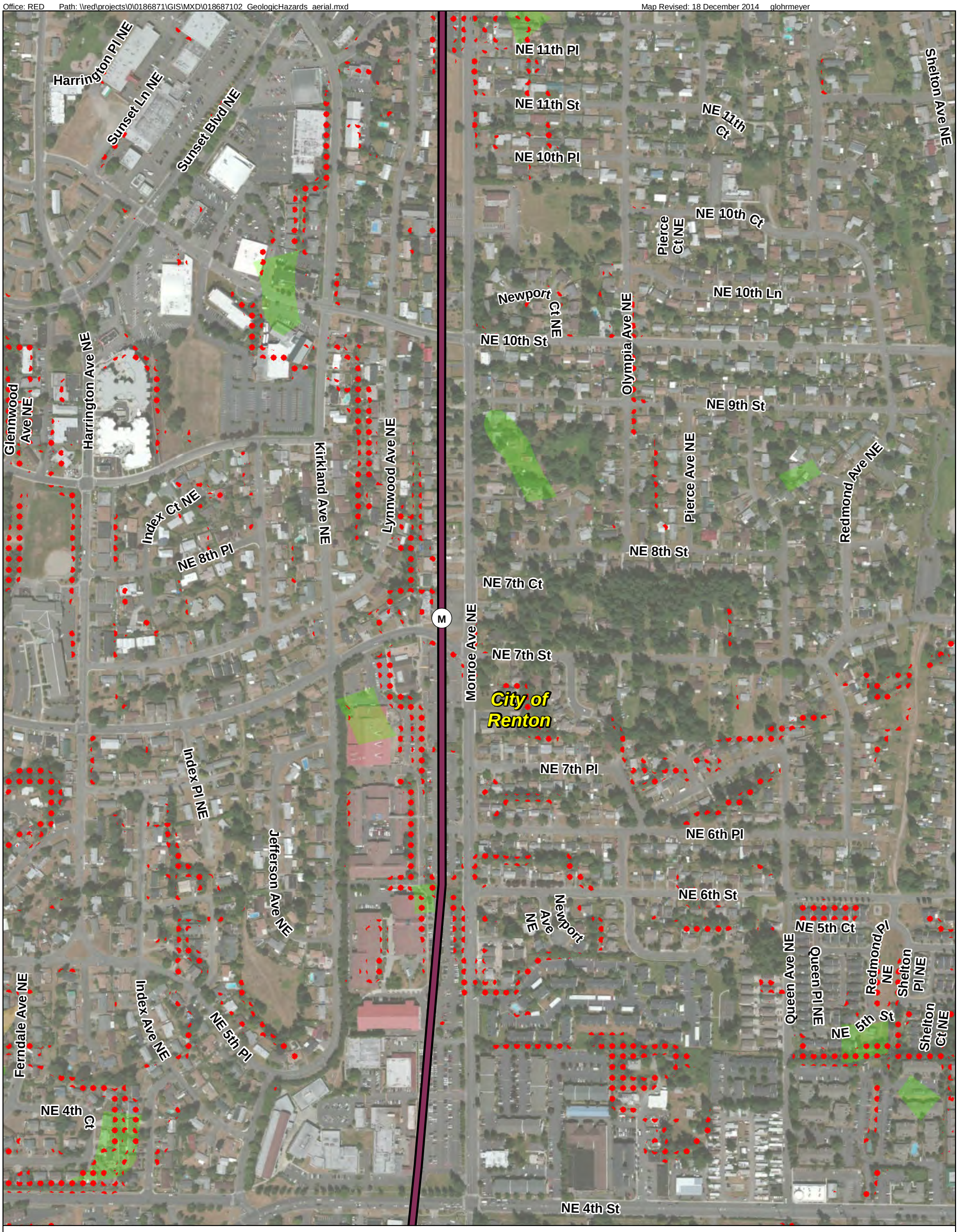
PSE Energize Eastside Project
Geohazards Evaluation
King County, Washington

GeoEngineers

Figure 88

DSD 001318

Office: RED Path: \\red\projects\0\0186871\GIS\MXD\018687102_GeologicHazards_aerial.mxd Map Revised: 18 December 2014 glohrmeyer



Route Segment
Substation
City Boundary
Potential Steep Slopes
Potential Seismic Hazard Areas
Coal Mine Hazard Areas
Potential Landslide Hazard Areas
Erosion Hazard Areas
Potential Erosion and Landslide Hazard Areas

N
W E
S

400 0 400
Feet

Data Source: ESRI Street Map data. Washington DNR, King County, City of Redmond, City of Kirkland, City of Renton, City of Bellevue

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Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet

Geologic Hazards
Segment M

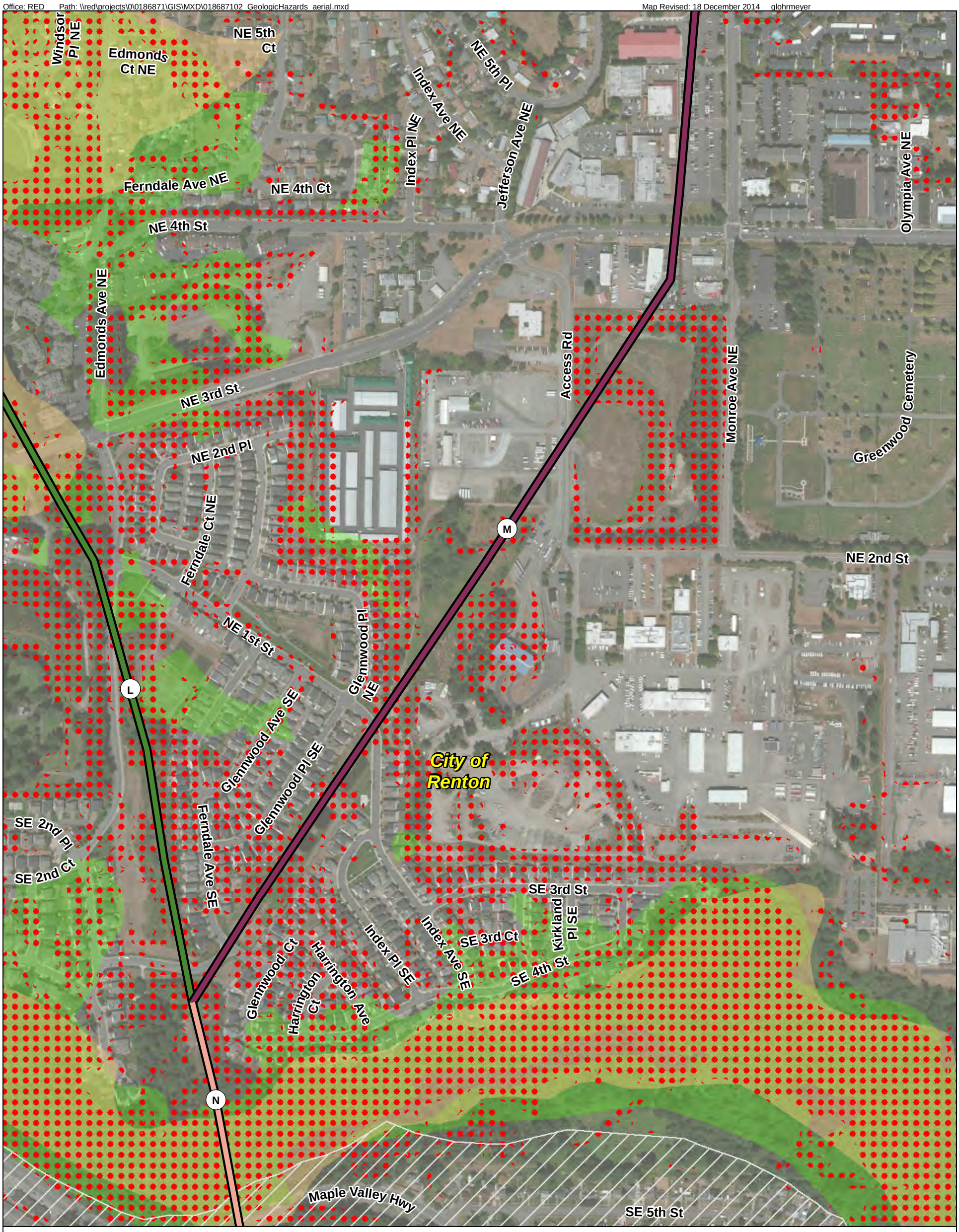
PSE Energize Eastside Project
Geohazards Evaluation
King County, Washington

GeoEngineers

Figure 89

DSD 001319

Office: RED Path: \\red\projects\0\0186871\GIS\MXD\018687102_GeologicHazards_aerial.mxd Map Revised: 18 December 2014 glohrmeyer



- Route Segment
- Substation
- City Boundary
- Potential Steep Slopes
- Potential Seismic Hazard Areas
- Coal Mine Hazard Areas
- Potential Landslide Hazard Areas
- Erosion Hazard Areas
- Potential Erosion and Landslide Hazard Areas

N W E S

400 0 400

Feet

Data Source: ESRI Street Map data. Washington DNR, King County, City of Redmond, City of Kirkland, City of Renton, City of Bellevue

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Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet

Geologic Hazards
Segment M

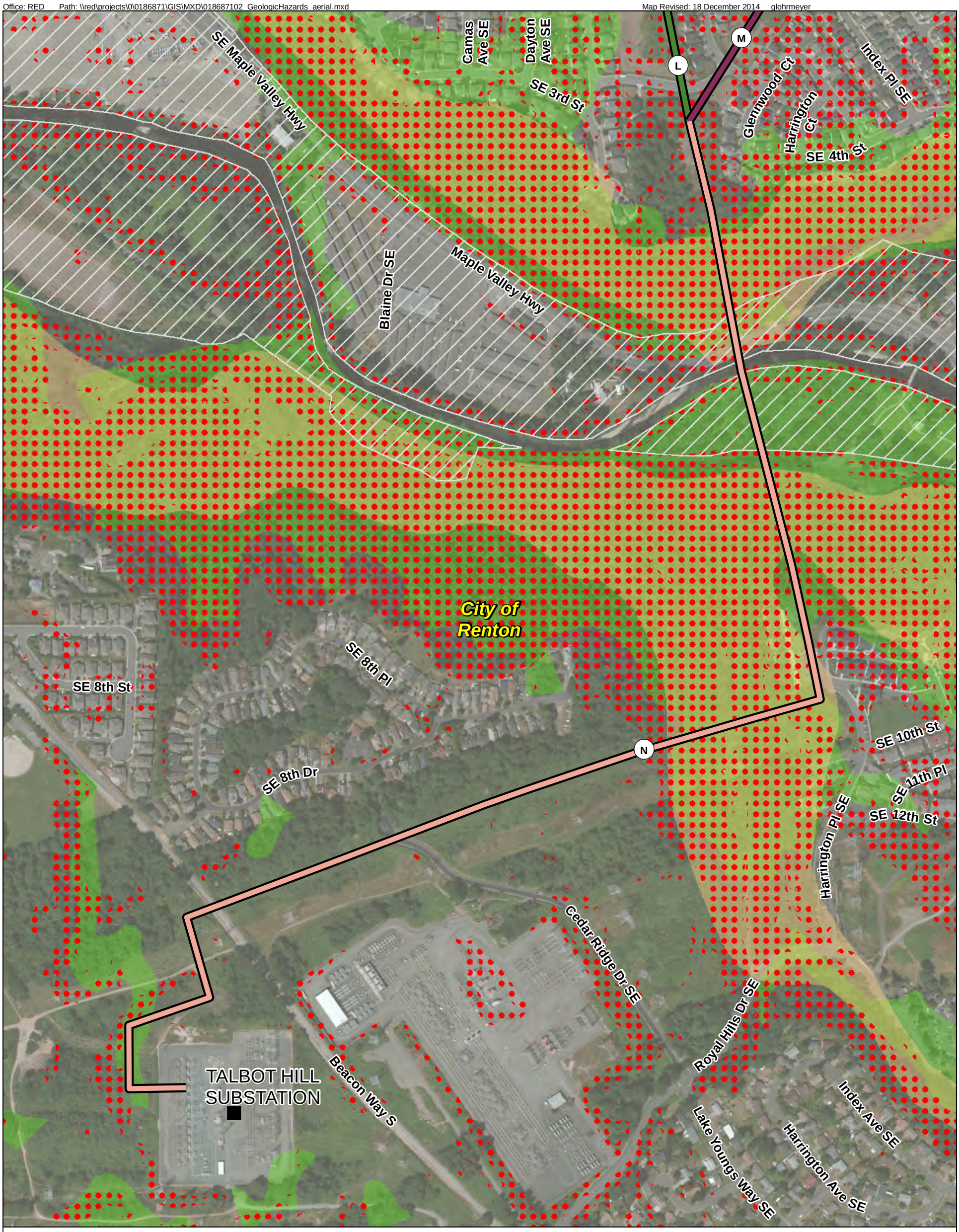
PSE Energize Eastside Project
Geohazards Evaluation
King County, Washington

GeoEngineers

Figure 90

DSD 001320

Office: RED Path: \\red\projects\0\0186871\GIS\MXD\018687102_GeologicHazards_aerial.mxd Map Revised: 18 December 2014 glohrmeyer



- Route Segment
- Substation
- City Boundary
- Potential Steep Slopes
- Potential Seismic Hazard Areas
- Coal Mine Hazard Areas
- Potential Landslide Hazard Areas
- Erosion Hazard Areas
- Potential Erosion and Landslide Hazard Areas

N W E S

400 0 400

Feet

Data Source: ESRI Street Map data. Washington DNR, King County, City of Redmond, City of Kirkland, City of Renton, City of Bellevue

Notes:
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Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet

Geologic Hazards
Segment N

PSE Energize Eastside Project
Geohazards Evaluation
King County, Washington

GeoEngineers

Figure 91

DSD 001321

APPENDICES

GeoEngineers

DSD 001322

APPENDIX A
Geologic Hazards Definitions by Jurisdiction

APPENDIX A
GEOLOGIC HAZARDS DEFINITIONS BY JURISDICTION

Overview

GeoEngineers combined readily available hazard maps from applicable jurisdictions to develop combined geologic hazards maps, spanning from Redmond to Renton. Criteria presumably used to develop jurisdictional maps are outlined in each jurisdiction's municipal or land use code. These criteria vary across jurisdictional boundaries. For this reason, we have included excerpts from jurisdictional codes which define and describe hazards and designation criteria below.

Redmond (RCZ Article IV 21.64.060)

Potential landslide hazard areas are "areas potentially subject to significant or severe risk of landslides based on a combination of geologic, topographic, and hydrogeologic factors. They include areas susceptible because of any combination of bedrock, soil, slope, slope aspect, structure, hydrology, or other factors. They are areas of the landscape that are at a high risk of failure or that presently exhibit downslope movement of soil and/or rocks and that are separated from the underlying stationary part of the slope by a definite plane of separation. The plane of separation may be thick or thin and may be composed of multiple failure zones depending on local conditions, including soil type, slope gradient, and groundwater regime."

Potential landslide hazard areas include:

1. Areas of historic failures, such as:
    - Areas designated as quaternary slumps or landslides on maps published by the United States Geologic Survey (USGS); or
    - Those areas designated by the United States Department of Agriculture (USDA) Soil Conservation Service (SCS) as having a "severe" limitation for building site development.
2. Areas containing a combination of slopes steeper than 15 percent, springs or groundwater seepage, and hillsides intersecting geologic contacts with a relatively permeable sediment overlying a relatively impermeable sediment or bedrock;
3. Areas that have shown movement during the Holocene epoch (from 10,000 years ago to the present) or which are underlain or covered by mass wastage debris of that epoch;
4. Slopes that are parallel or subparallel to planes of weakness in subsurface materials;
5. Slopes having gradients steeper than 80 percent subject to rockfall during seismic shaking;
6. Areas potentially unstable as a result of rapid stream incision, stream bank erosion, and undercutting by wave action; or
7. Any area with a slope 40 percent or steeper with a vertical relief of 10 feet or more."

Erosion hazard areas are defined as "lands or areas underlain by soils identified by the USDA SCS as having "severe" or "very severe" rill and inter-rill erosion hazards. This includes, but is not limited to, the following group of soils when they occur on slopes of 15 percent or greater: Alderwood-Kitsap (AkF), Alderwood gravelly sandy loam (AgD), Kitsap silt loam (KpD), Everett (EvD), and Indianola (InD)."

Potential seismic hazard areas are defined as "lands or areas subject to severe risk of damage as a result of earthquake-induced ground shaking, slope failure, settlement, or soil liquefaction."

Mine hazard areas are not delineated by the city of Redmond.

A **steep slope** is "an area which is equal to or in excess of forty percent slope."

Kirkland (KZC 85.13)

Moderate potential landslide hazard areas are "areas sloping between 15 and 40 percent and underlain by relatively permeable soils consisting largely of sand and gravel or highly competent glacial till."

High potential landslide hazard areas are "areas sloping 40 percent or greater, areas subject to previous landslide activities and areas sloping between 15 percent and 40 percent with zones of emergent groundwater or underlain by or embedded with impermeable silts or clays."

Erosion hazard areas are defined as "areas containing soils which, according to the USDA SCS King County Soil Survey dated 1973, may experience severe to very severe erosion hazard. This group of soils includes, but is not limited to, the following when they occur on slopes of 15 percent or greater: Alderwood gravelly sandy loam (AgD), Kitsap silt loam (KpD), Ragnar Indianola Association (RdE) and portions of the Everett gravelly sand loams (EvD) and Indianola Loamy fine sands (InD)."

Potential seismic hazard areas are defined as "Those areas subject to severe risk of earthquake damage as a result of seismically induced settlement or soil liquefaction, which conditions occur in areas underlain by cohesionless soils of low density usually in association with a shallow groundwater table."

Mine hazard areas are not delineated by the city of Kirkland.

A **steep slope** is "an area which has a grade over 15 percent" (KZC 115.20).

Bellevue (Land Use Code 20.25H. 120)

Potential landslide hazard areas are "areas of slopes of 15 percent or more with more than 10 feet of rise, which also display any of the following characteristics:

- Areas of historic failures, including those areas designated as Quaternary slumps, earthflows, mudflows, or landslides.
- Areas that have shown movement during the Holocene Epoch (past 13,500 years) or that are underlain by landslide deposits.
- Slopes that are parallel or subparallel to planes of weakness in subsurface materials.
- Slopes exhibiting geomorphological features indicative of past failures, such as hummocky ground and back-rotated benches on slopes.
- Areas with seeps indicating a shallow ground water table on or adjacent to the slope face.
- Areas of potential instability because of rapid stream incision, stream bank erosion, and undercutting by wave action."

Erosion is defined as "wearing away of the land surface by running water, wind, ice, or other geological agents, including such processes as gravitational creep" (Bellevue City Code 9.13.020). The phrase "erosion hazard" is not defined in the Bellevue land use and zoning code. However, an erosion hazard map is available through their website.

Potential seismic hazard areas are not defined in the Bellevue land use and zoning code. A potential seismic hazard map, however, is available through their website.

Coal mine hazard areas are "areas designated on the Coal Mine Areas maps or in the City's Coal Mine Areas Regulations, LUC 20.25.130, as potentially affected by abandoned coal mines."

A **steep slope**s are "slopes of 40 percent or more that have a rise of at least 10 feet and exceed 1,000 square feet in area."

Newcastle (Newcastle Municipal Code 18.06.215, 353, 535, 628)

Potential landslide hazard areas are "areas in the city subject to severe risks of landslides, including the following:

1. Any area with a combination of:
    - Slopes steeper than 15 percent;
    - Impermeable soils, such as silt and clay, frequently interbedded with granular soils, such as sand and gravel; and
    - Springs or groundwater seepage;
2. Any area which has shown movement during the Holocene epoch, from 10,000 years ago to the present, or which is underlain by mass wastage debris from that epoch;
3. Any area potentially unstable as a result of rapid stream incision, stream bank erosion or undercutting by wave action;
4. Any area which shows evidence of or is at risk from snow avalanches; or
5. Any area located on an alluvial fan, presently subject to or potentially subject to inundation by debris flows or deposition of stream-transported sediments."

Erosion hazard areas (18.06.215) are "areas in the city of Newcastle underlain by soils which are subject to severe erosion when disturbed. Such soils include but are not limited to those classified as having a severe to very severe erosion hazard according to the USDA Soil Conservation Service, the 1973 King County Soils Survey or any subsequent revisions or addition by or to these sources. These soils include, but are not limited to:

1. Any occurrence of River Wash ("Rh") and any of the following when they occur on slopes 15 percent or steeper:
    - The Alderwood gravelly sandy loam (AgD)
    - The Alderwood and Kitsap soils (AkF);
    - The Beausite gravelly sandy loam (BeD and BeF);
    - The Kitsap silt loam (KpD);

- The Ovall gravelly loam (OvD and OvF);
- The Ragnar fine sandy loam (RaD); and
- The Ragnar-Indianola Association (RdE).

2. Those (areas) which represent significant risk to sensitive receiving waters due to the proximity to those receiving waters and the size of the disturbed area."

Potential seismic hazard areas (18.06.536) are defined as "areas in the city of Newcastle subject to severe risk of earthquake damage as a result of soil liquefaction in areas underlain by cohesionless soils of low density and usually in association with a shallow groundwater table or of other seismically induced settlement."

Coal mine hazard areas are not delineated by the city of Newcastle.

A **steep slope** (18.06.628) is "an area which is equal to or in excess of 40 percent slope."

Renton (Renton Ordinance 5137, Section II.J)

Potential landslide hazard areas are defined by the city of Renton in four categories:

1. "Low Potential landslide hazard (LL): Areas with slopes less than 15 percent."
2. "Medium Potential landslide hazard (LM): Areas with slopes between 15 and 40 percent and underlain by soils that consist largely of sand, gravel or glacial till."
3. "High Potential landslide hazards (LH): Areas with slopes greater than 40 percent, and areas with slopes between 15 and 40 percent and underlain by soils consisting largely of silt and clay."
4. "Very High Potential landslide hazards (LV): Areas of known mappable landslide deposits."

Erosion hazard areas are categorized according to the following criteria:

1. "Low Erosion Hazard (EL): Areas with soils characterized by the Natural Resource Conservation Service (formerly U.S. SCS) as having slight or moderate erosion potential, and that slope less than 15 percent."
2. "High Erosion Hazard (EH): Areas with soils characterized by the Natural Resource Conservation Service (formerly U.S. SCS) as having severe or very severe erosion potential, and that slope more steeply than 15 percent."

Potential seismic hazard areas are categorized according to the following criteria:

1. Low Potential seismic hazard (SL): Areas underlain by dense soils or bedrock. These soils generally have site coefficients of types S1 or S2, as defined in the Uniform Building Code.
2. High Potential seismic hazard (SH): Areas underlain by soft or loose, saturated soils. These soils generally have site coefficients of types S3 or S4, as defined in the Uniform Building Code.

Mine hazard areas are defined by the city of Renton in three categories:

3. "Low Coal Mine Hazards (CL): Areas with no known mine workings and no predicted subsidence. While no mines are known in these areas, undocumented mining is known to have occurred."

4. "Medium Coal Mine Hazards (CM): Areas where mine workings are deeper than 200 feet for steeply dipping seams, or deeper than 15 times the thickness of the seam or workings for gently dipping seams. These areas may be affected by subsidence."
5. "High Coal Mine Hazard (CH): Areas with abandoned and improperly sealed mine openings and areas underlain by mine workings shallower than 200 feet in depth for steeply dipping seams, or shallower than 15 times the thickness of the seam or workings for gently dipping seams. These areas may be affected by collapse or other subsidence."

Steep slopes are not defined by the city of Renton, but are included on a "Sensitive Areas" map.

King County (CAO, Part Two)

Potential landslide hazard areas are defined by King County as including "a variety of geologic features that together present hazards to development both above and below the landslide. Such hazards include slope failures, large-scale block failures, debris flows, rock falls, rapid undercutting by stream erosion or wave action, and snow avalanches. Potential landslide hazard areas may be separated into two varieties for the purposes of considering the applicable development restrictions:

1. Potential landslide hazard areas that are also steep slopes (> 40percent grade); and
2. Potential landslide hazard areas that are on slopes of less than 40percent grade."

Erosion hazard areas are those areas thought to be underlain by soils that are subject to severe erosion when exposed. The definition for erosion hazard areas includes, but is not limited to, several particular soil types that commonly erode rapidly because of the nature of their constituents and the engineering properties of the soil.

Potential seismic hazard areas in King County are those areas where the foundation soils may be subject to liquefaction (loss of strength and bearing capacity) or lateral spreading during an earthquake.

Coal mine hazard areas are classified into three categories by King County:

1. "'Declassified' coal mine hazard areas are those areas where the risk of catastrophic collapse is not significant and that the hazard assessment report has determined do not require any special engineering or hazard mitigation. These areas typically include sites not underlain by underground workings and sites underlain by underground workings that are in excess of 300 feet below the surface."
2. "'Moderate' coal mine hazard areas are those areas that pose significant risk of property damage because of coal mine subsidence, but that can be mitigated through special engineering or architectural recommendations. These areas often include areas underlain or directly affected by abandoned underground workings that are less than 300 feet deep or with overburden cover-to-seam thickness ratios of less than 10 to one, depending on the inclination of the seam.
3. "'Significant' coal mine hazard areas include those sites that pose a significant risk of catastrophic surface collapse, such as unmitigated openings (portals, adits, mine shafts, sinkholes, improperly filled mine openings) and other areas of past or probable surface collapse, including shallow subsurface workings extending to a depth of 100 feet."

A **steep slope** is defined as "greater than 40percent grade and greater than 10 feet tall."

APPENDIX B
Report Limitations and Guidelines for Use

APPENDIX B
REPORT LIMITATIONS AND GUIDELINES FOR USE[1]

This appendix provides information to help you manage your risks with respect to the use of this report.

Geological Services Are Performed for Specific Purposes, Persons and Projects

This report has been prepared for the exclusive use of Puget Sound Energy (PSE) and their authorized agents. This report may be made available to the local governmental agencies for review. This report is not intended for use by others, and the information contained herein is not applicable to other sites.

GeoEngineers structures our services to meet the specific needs of our clients. For example, a geologic study conducted for a civil engineer or architect may not fulfill the needs of a construction contractor or even another civil engineer or architect that are involved in the same project. Because each geologic study is unique, each geologic report is unique, prepared solely for the specific client and project site. Our report is prepared for the exclusive use of our Client. No other party may rely on the product of our services unless we agree in advance to such reliance in writing. This is to provide our firm with reasonable protection against open-ended liability claims by third parties with whom there would otherwise be no contractual limits to their actions. Within the limitations of scope, schedule and budget, our services have been executed in accordance with our Agreement with the Client and generally accepted geological practices in this area at the time this report was prepared. This report should not be applied for any purpose or project except the one originally contemplated.

A Geologic Report Is Based on a Unique Set of Project-Specific Factors

This report has been prepared for the PSE Energize Eastside project as described in this report. GeoEngineers considered a number of unique, project-specific factors when establishing the scope of services for this project and report. Unless GeoEngineers specifically indicates otherwise, do not rely on this report if it was:

- not prepared for you,
- not prepared for your project,
- not prepared for the specific site explored, or
- completed before important project changes were made.

For example, changes that can affect the applicability of this report include those that affect:

- the function of the proposed structure;
- elevation, configuration, location, orientation or weight of the proposed structure;
- composition of the design team; or
- project ownership.

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[1] Developed based on material provided by ASFE, Professional Firms Practicing in the Geosciences; www.asfe.org.

If important changes are made after the date of this report, GeoEngineers should be given the opportunity to review our interpretations and recommendations and provide written modifications or confirmation, as appropriate.

Subsurface Conditions Can Change

This geologic report is based on conditions that existed at the time the study was performed. The findings and conclusions of this report may be affected by the passage of time, by manmade events such as construction on or adjacent to the site, or by natural events such as floods, earthquakes, slope instability or groundwater fluctuations. Always contact GeoEngineers before applying a report to determine if it remains applicable.

Read These Provisions Closely

Some clients, design professionals and contractors may not recognize that the geoscience practices (geotechnical engineering or geology) are far less exact than other engineering and natural science disciplines. This lack of understanding can create unrealistic expectations that could lead to disappointments, claims and disputes. GeoEngineers includes these explanatory "limitations" provisions in our reports to help reduce such risks. Please confer with GeoEngineers if you are unclear how these "Report Limitations and Guidelines for Use" apply to your project or site.

Geotechnical, Geologic and Environmental Reports Should Not Be Interchanged

The equipment, techniques and personnel used to perform an environmental study differ significantly from those used to perform a geotechnical or geologic study and vice versa. For that reason, a geotechnical engineering or geologic report does not usually relate any environmental findings, conclusions or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. Similarly, environmental reports are not used to address geotechnical or geologic concerns regarding a specific project.

Biological Pollutants

GeoEngineers' Scope of Work specifically excludes the investigation, detection, prevention or assessment of the presence of Biological Pollutants. Accordingly, this report does not include any interpretations, recommendations, findings, or conclusions regarding the detecting, assessing, preventing or abating of Biological Pollutants and no conclusions or inferences should be drawn regarding Biological Pollutants, as they may relate to this project. The term "Biological Pollutants" includes, but is not limited to, molds, fungi, spores, bacteria, and viruses, and/or any of their byproducts.

If Client desires these specialized services, they should be obtained from a consultant who offers services in this specialized field.

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DSD 001332

Geotechnical Engineering Services

Energize Eastside Project
Redmond to Renton, Washington

for
Puget Sound Energy

June 8, 2016

GeoEngineers
Earth Science + Technology

DSD 001333

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Redmond to Renton, Washington

for
Puget Sound Energy

June 8, 2016

GeoEngineers

8410 154th Avenue NE
Redmond, Washington 98052
425.861.6000

Geotechnical Engineering Services

Energize Eastside Project
Redmond to Renton, Washington

File No. 0186-871-05

June 8, 2016

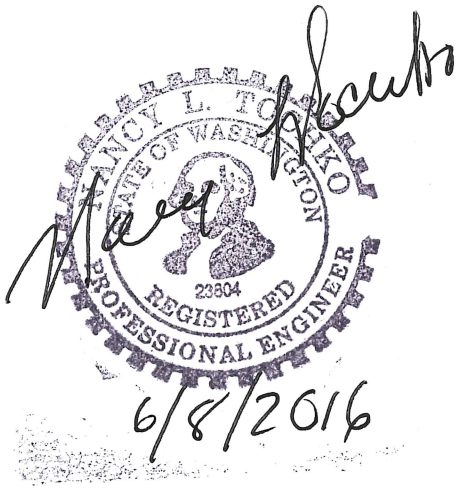
Prepared for:

Puget Sound Energy
P.O. Box 90868, EST 05E
Bellevue, Washington 98009-9734

Attention: Victoria Wilson and Andrew Lightfoot, PE

Prepared by:

GeoEngineers, Inc.
8410 154th Avenue NE
Redmond, Washington 98052
425.861.6000



Nancy L Tochko, PE
Senior Geotechnical Engineer

David S. Phelps, PE
Principal

NLT:DSP:nld:cam

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INTRODUCTION

This report presents the results of our geotechnical engineering services for design of deep foundation support for the proposed Energize Eastside Transmission Line project located between Redmond and Renton in King County, Washington. The project includes upgrading the existing 115kV service to 230kV and replacing existing transmission poles with new pole poles. The general alignment of the transmission line is shown on the Vicinity Map, Figure 1. The alignment is shown in relation to surrounding physical features on the Site Plans, Figures 2 through 19.

These services are a continuation of our involvement on the project. We previously completed a Geologic Hazards Evaluation and Preliminary Geotechnical Engineering Services study for the project that was summarized in our report dated December 19, 2014. In addition, we completed a soil characterization report for the pole yard located immediately south of the Lakeside substation, dated August 16, 2012. We have also previously completed geotechnical studies for Puget Sound Energy's (PSE) Sammamish, Lakeside, Richards Creek (proposed), and Talbot substations.

PROJECT UNDERSTANDING

Our understanding of the project is based on conversations and meetings with representatives of PSE. At this time, the intended final route for the project has been selected and consists of Segments A, C, E, J, M, and N which follow existing PSE easements through Redmond, Bellevue, Newcastle, Renton and King County. The proposed 230 kv service will be supported on a series of new monopoles (poles). The project begins at the Sammamish substation and heads south along the existing easement, passing the Rosehill Substation in Redmond and the Lakeside substation in Bellevue, terminating at the Talbot substation in Renton. The project alignment will include a number of running-angle poles, and a few dead-angle poles, with the remaining poles being tangent poles.

We understand the structural foundation design will be completed by Power Engineers using soil and other input parameters that we provide. The design loads had not been finalized at the time this report was prepared. Based on similar 230 kV projects we have recently completed for PSE, we anticipate that the preliminary downward axial loads on the pole foundations will be in the range of 10 to 50 kips, and that preliminary lateral loads on these foundations might range between 10 to 90 kips in shear, and between 600 and 7,000 kip-feet of applied bending moment. We understand that drilled shafts will likely be necessary for all angle and dead-end structures, but that direct embedment might be possible for some of the tangent poles where the loading is less.

At this time the study was completed, final new pole locations had not yet been selected. Thus, the explorations were completed at locations selected by PSE and supplemented with additional boring locations recommended by GeoEngineers. One boring planned along a portion of Segment J (boring J4) had not yet been completed at the time this report was prepared.

SCOPE OF SERVICES

The purposes of our services were to: (1) complete subsurface explorations at selected locations along the proposed route, and (2) provide geotechnical engineering input to support design and construction of the

pole foundations for the proposed transmission line. Our specific scope of services included the following tasks:

1. Reviewing available published geologic data and our files for existing information on subsurface conditions in the vicinity of the proposed transmission line alignment.
2. Providing input as to the recommended boring locations and spacing.
3. Providing input as to access and clearing requirements for the proposed boring locations. Clearing was completed by PSE.
4. Preparing an exploration plan and job hazard analysis. We assessed access to complete borings as close to each proposed pole location as practical. We coordinated subcontracted drilling services to use drilling equipment suited for each location.
5. Coordinating location and clearance of existing utilities. We contacted the "One-Call Underground Utility Locate Service" prior to beginning explorations as required by Washington State law. We also arranged to have a private locator clear each location. We met with BP/Olympic Pipe Line Company (BP/Olympic) representatives prior to drilling and followed any BP safety requirements.
6. Exploring subsurface conditions along the alignment by completing 40 borings to depths of 38 to 71.5 feet, with most completed to depths of 50 to 60 feet.
7. Evaluating the presence of contaminates in the obtained soil samples by field screening for sheen and using a photoionization detector (PID) to evaluate the possible presence of volatile contaminates.
8. Performing laboratory tests on selected soil samples obtained from the explorations to evaluate pertinent engineering characteristics. This testing program included moisture content determinations, grain-size analyses, Atterberg limits, direct shear tests, and tests for resistivity and pH.
9. Characterizing the subsurface conditions encountered in the explorations, including depth and thickness of various soil units, index properties, strength parameters and corrosion potential.
10. Providing design recommendations for the selected foundation type(s) including tabulated axial capacities recommendations and LPILE input parameters to be used in the lateral foundation analyses and structural design.
11. Commenting on considerations for direct embedment techniques. We understand that others will likely evaluate whether direct embedment is appropriate after the loads are finalized.
12. Addressing seismic considerations including providing seismic design criteria consistent with the 2012 International Building Code (IBC) and our evaluation of the liquefaction and lateral spreading potential of site soils.
13. Providing recommendations for site preparation, access road construction and earthwork, as appropriate, including clearing and stripping, temporary and permanent cut and fill slopes, suitability of on-site soils for use as structural fill, criteria for imported fill, fill placement and compaction requirements, and wet weather considerations.
14. Providing a discussion of anticipated construction issues including drilling below the groundwater table, possible soft soils, boulders, cobbles, or other challenging soil or rock conditions. We also discuss options for drilling shafts near adjacent BP lines.

15. Attending meetings with PSE to develop the exploration plans and related logistics, reviewing the subsurface information obtained, and discussing foundation options for pole support.
16. Preparing a draft geotechnical report presenting our conclusions and recommendations along with supporting field and laboratory data and submitting the draft report to PSE and Power Engineers for review and comment.
17. Preparing a final version of the geotechnical report incorporating the review comments from PSE and Power Engineers.

SITE DESCRIPTION

Geologic Setting

A more detailed description of geologic conditions is presented in our Geologic Hazards Evaluation and Preliminary Geotechnical Engineering Services report dated December 19, 2014. A summary is presented below.

Our understanding of geology in the Energize Eastside project vicinity and along the potential PSE segments and routes is based on review of 1:100,000 scale geologic maps published by the DNR and on a review of geologic maps published by King County.

The native soils in the vicinity of the site are the result of glacial and post glacial processes. The glacial deposits are derived from several regional glaciations. The most recent, the Fraser glaciation included three phases (stades) with the last phase, called the Vashon glaciation, occurring from about 13,500 to 15,000 years ago. Based on our review, surface geology along the project segments can be grouped into two primary categories: glacial and recent alluvial deposits. Bedrock is also present, but only across limited portions of the project segments.

In general, segments in the northern part of the project area cross deposits of the most recent glacial period (Fraser age) and include glacial till (Qgt), advance continental glacial outwash (Qga(t)), and minor amounts of glacial drift (Qgu) and alluvium (Qa). Proposed segments in the central region of the project area cross similar deposits including glacial till (Qgt), continental and advance glacial outwash (Qga and Qgat), and minor exposures of alluvium (Qa), and isolated areas of Eocene nearshore sedimentary rocks (OEn). Segments in the southern region of the PSE project area also cross glacial till (Qgt), continental glacial outwash (Qgo), and lesser amounts of alluvium (Qa), and advance continental outwash (Qga), and pre-Fraser continental glacial drift and nonglacial deposits (Qgpc), and Eocne marine sedimentary rocks (OEm).

Glacial till was deposited after being transported and dropped by a glacier, and typically consists of dense, unsorted and unstratified deposits of silt, clay, sand, gravel, cobbles, and occasional boulders. Glacial outwash consists of fluvially-deposited sediments sourced from the front of glaciers, and is typically comprised of poorly sorted, well rounded gravel with sand. Advance glacial outwash is outwash which was overridden by the advancing glacier; recessional outwash was deposited as the glaciers retreated. The peat deposits included on the map are the organic and organic-rich sediments deposited in closed depressions in and adjacent to wetlands. Alluvium typically consists of medium stiff or medium dense silt, sand, or gravel deposited through fluvial processes. Eocene units are comprised of bedrock and other deposits that were present prior to glacial activity in the area.

Surface Conditions

In broad terms, the project alignment crosses mainly upland areas and small lowland areas, ravines and valleys, with the exception of the north end, which starts in a wetland area adjacent to the Sammamish substation, and the south end where the alignment crosses the Cedar River Valley. The majority of the alignment is within an existing PSE easement which typically consists of cleared areas with grass or existing residential yards, with some areas traversing developed properties. Geologic hazards along the alignment including mapped erosion, steep slope, landslide, seismic and volcanic hazards are addressed in our Geologic Hazards Evaluation and Preliminary Geotechnical Engineering Services report. This geotechnical report addresses liquefaction and lateral spreading potential.

Based on elevations shown on Google Earth which uses the NAVD88 datum, elevations across the project range from a low of about Elevation 60 feet to a high of about Elevation 525 feet. Elevations shown on the boring logs were obtained from Google Earth and should be considered approximate. A summary of the surface conditions along each segment is summarized as follows:

Segment A

Segment A begins at the Sammamish substation in Redmond, heads south across a wetland for approximately 800 feet, west to the west edge of the wetland and up a moderate slope along a greenbelt for a distance of approximately 0.5 mile, then south for approximately 400 feet. The terrain along Segment A is relatively level from the substation to the west edge of the wetland where the ground surface slopes moderately upward to the upland area. After the turn to the south, the terrain slopes moderately to steeply downslope to the south into the Willows Creek drainage area, and then slopes upward steeply toward the top of another ridge for the last 50 to 100 feet of this segment.

The portion of the segment from Sammamish substation to the turn to the west and the area about 250 feet to the west is an existing wetland which is vegetated with tall grass and scattered areas of shrubs and small trees. Portions of the wetland had surface water present at the time the explorations were completed. We understand that most of the wetland has surface water during the winter months. Across the remainder of this segment the vegetation mainly consists of grass, scotch broom and shrubs.

Segment C

Segment C begins at the southern terminus of Segment A in Redmond, and heads directly south to the south side of State Route (SR) 520 in Bellevue, for a total distance of approximately 3.7 miles. Segment C begins on the lower slope of the Willows Creek drainage then immediately heads steeply upslope to the south to the top of a ridge, then descends steeply to another ravine and upward onto relatively flat and developed upland terrain which extends from Redmond Way to the south side of SR 520. Terrain along the remainder of the segment remains mostly flat and gently sloping, passing in and out of developed residential and undeveloped areas, often following a narrow cleared path currently used by both PSE and BP/Olympic.

Vegetation along Segment C mainly consists of grass, shrubs, blackberry bushes, landscaped backyards, and asphaltic concrete where crossing parking lots and streets. Conifer and deciduous trees are present along the edges of the current transmission line corridor.

Segment E

Segment E begins in Bellevue just south of SR 520 and heads directly south to the Lakeside substation, for a total of about 3 miles. Segment C begins in a developed commercial portion of Bellevue and continues south of Bel-Red Road through residential areas and the Bellevue Golf Course to the south, continues along a green belt and more residential areas to terminate at Lakeside substation. The alignment is relatively level except where crossing the Lake Hills Connector, which is depressed relative to the adjacent hillsides, then descends gradually in elevation to the substation.

Surface conditions along Segment E vary from asphaltic concrete where in parking lots of developed areas and streets, to grass, shrubs, and blackberry bushes, to landscaped backyards and areas along the golf course. A pedestrian gravel trail follows most of the alignment through the green belt areas south of the golf course.

Segment J

Segment J begins at the Lakeside substation, follows the existing transmission line corridor south to SE Newport Way, then southwest to the intersection with Coal Creek Parkway SE just south of Forest Drive SE, for a total of approximately 2.4 miles. Topographically, the alignment climbs moderately to the south from the substation to SE Eastgate Way, crosses the I-90 corridor where it is relatively level through the Eastgate neighborhoods, then climbs up along the west slope of Somerset hill and then descends downward to the Coal Creek drainage basin, terminating near Coal Creek Parkway.

Surface conditions along Segment J vary from a wetland with tall grass between the Lakeside substation and PSE's pole yard situated about 300 feet to the south, gravel surfaced areas at the pole yard and another construction yard north of SE Eastgate Way, to grass and shrubs along undeveloped cleared portions of the easement, to landscaped backyards, to asphaltic concrete across parking lots, streets and interstates.

Segment M

Segment M begins at the south end of Segment J by Coal Creek Parkway SE, continues southwest and west through Newcastle, continues south through the east portion of Renton, and terminates in the Renton Highland area near the north valley wall of the Cedar River Valley. Segment M covers a total distance of about 5.3 miles. Topographically, the alignment traverses the east side of Newport Hills, and ascends hills and descends into valleys or lower lying areas and has long stretches of relatively level terrain south of NE 23rd Place in Renton.

North of NE Sunset Boulevard, the easement mainly crosses residential areas and open space. South of NE Sunset Boulevard, the easement crosses a combination of residential and commercial properties. Surface conditions along Segment M vary from grass, shrubs, blackberry bushes, and landscaped backyards to asphaltic concrete where crossing parking lots and streets.

Segment N

Segment N begins in the Renton Highland area at the end of Segment M, just south of SE 3rd Street. The segment heads southeast across the Cedar River valley, up the valley wall to the vicinity of SE 8th Street and Harrington Place SE, then turns west to the Talbot Hill substation, for a total of about 1.3 miles.

Topographically, the alignment is relatively level except for where it crosses the Cedar River Valley, which is about 200 to 300 feet lower in elevation that the upland areas to the north and south.

Most of this segment crosses green belt or undeveloped areas, with the exception of a condominium development along the south side of the valley. The segment terminates in the Talbot substation.

Subsurface Explorations and Laboratory Testing

Field Explorations

The subsurface conditions along Segments A, C, E, J, M, and N were explored by drilling 40 borings completed between August 18 and September 9, 2015. In addition, we reviewed available published geologic maps and subsurface exploration logs completed by GeoEngineers and others for previous projects near the alignment. The borings were completed to depths of 38 to 71.5 feet using equipment under subcontract to GeoEngineers. Details of our exploration program, including boring logs and sampling methods are included in Appendix A.

We installed monitoring wells in several of the borings to allow for subsequent measurements of groundwater levels following drilling. The monitoring wells are the property of PSE. The wells should be decommissioned by a licensed well driller in accordance with Chapter 173-160 of the Washington Administrative Code (WAC) when they are no longer needed for data collection. Alternatively, the wells could be kept intact for use during project bidding and then be decommissioned under the construction contract.

Laboratory Testing

Soil samples were obtained during drilling and taken to our Redmond geotechnical laboratory for further evaluation and testing. Selected samples were tested for moisture content, percent fines content (particles passing the U.S. No. 200 sieve), grain size distribution, plasticity characteristics (Atterberg limits), strength parameters using the direct shear test (completed by another lab under subcontract to GeoEngineers), and corrosivity tests. Appendix B presents a discussion of the laboratory testing procedures and test results.

Previous Studies

We reviewed the logs of explorations completed as part of previous studies for the Sammamish, Lakeside, Richards Creek, and Talbot substations. The location of borings in the vicinity of the project limits are shown on the site plans and the exploration logs are presented in Appendix D.

Subsurface Conditions

Subsurface conditions encountered in our recent explorations along the alignment are consistent with published geologic information and with previous explorations we and others have completed for nearby projects.

In general, the subsurface conditions encountered across most of the project limits consist of glacially consolidated deposits, mainly very dense glacial till and advance outwash. Many areas encountered surficial deposits of recessional outwash, alluvium, or fill overlying the glacially consolidated deposits. The soil conditions have been divided into four generalized profiles as follows:

Soil Profile 1

Soil profile 1 consists of 15 feet of alluvial or outwash deposits consisting of loose to medium dense sand with occasional layers of medium stiff silt, underlain to a depth of about 45 feet by medium dense alluvial or outwash deposits consisting of sand with variable amounts of silt, which in turn is underlain by glacially consolidated deposits. This soil profile was only encountered in the wetland area along the northern portion of Segment A.

Soil Profile 2

Soil profile 2 consists of about 5 to 10 feet of weathered glacial till underlain by very dense glacial till and advance outwash. Some of the borings with this soil profile were terminated in the glacial till, while others advanced through the glacial till and terminated in the underlying advance outwash. The till typically consists of dense to very dense silty sand with gravel and cobbles and silty gravel with sand and cobbles. The advance outwash varied from very dense sand with varying amounts of silt to very stiff to hard silt with varying amounts of sand. Occasionally the advance outwash consisted of very dense gravels with varying amounts of silt. Our borings encountered some boulders within the till. Rough and hard drilling typically occurred in the till because of the presence of the density of the till and the presence of cobbles and boulders, and drilling progress was very slow in several instances (see boring logs for notes on the depths at which rough and hard drilling, and slow drilling progress occurred). Soil profile 2 was encountered along portions of Segment A, most of Segment C and M, and portions of Segment J.

Soil Profile 3

Soil profile 3 is similar to soil profile 2 but consists of a thicker upper zone of weathered glacial deposits, recessional outwash, alluvium or fill extending to a depth of 10 to 15 feet overlying glacially consolidated deposits. The upper soils typically consist of medium dense silty sand or stiff to very stiff silt or clay. Soil profile 3 was encountered along most of Segment E, along the south end of Segment N, and at isolated areas along the other segments.

Soil Profile 4

At the north end of Segment J, soil profile 4 consists of about 5 to 10 feet of dense fill (in the pole yard) or loose recessional sand (in the wetland area between the Lakeside substation and the pole yard). This upper zone is underlain by loose to medium dense recessional sand and gravel. The depth of the recessional deposits varies significantly, from a depth of about 15 feet at boring J1 to more than 35 feet across portions of the pole yard. Based on boring J1, the recessional deposits are underlain by glacial till.

For the middle portion of Segment N, soil profile 4 consists of about 20 to 35 feet of recessional deposits overlying ice-contact deposits. The recessional deposits varied from loose to medium dense sand to medium dense gravel. Boring N4 encountered gravel which was difficult to drill and pushed the auger out of alignment. The ice contact deposits vary from very stiff silt to medium dense sand and extended to a depth of 60 feet in boring N3.

Table 1 below summarizes each segment and the soil profile encountered, along with additional subsurface and groundwater information.

TABLE 1. SUMMARY OF SUBSURFACE CONDITIONS

Segment	Area	Soil Profile	Approximate Depth to Dense Soils (feet)
A	Center portion of wetland by borings A1 and A3	1	40 to 50
A	West side of Sammamish substation extending to the south in line with boring A2	3	15 to 20
A	Remainder of segment	2	5
C	Entire Segment except between Old Redmond Road and NE 50th Street	2	5
C	Between Old Redmond Road and NE 50th Street	3	15
E	Entire Segment	3	15
J	From Lakeside substation to about 1,000 to the south	4	15 to 40?
J	From area described above to SE Newport Way	3	15 to 20
J	SE Newport Way to Forest Drive	2[1]	5 to 10
J	South of Forest Drive	3	15 to 25
M	Coal Creek Parkway to Newcastle Way	2	5
M	Newcastle Way to SE 95th Way	3[2]	10
M	SE 95th Way to NE 17th Place	2	5
M	NE 17th Place to south end of segment	3	10 to 15
N	North end to north side of Cedar Valley Slope	2	5 to 10
N	South side of Cedar Valley Slope to Beacon Way South	4[3]	35 to 60?
N	Beacon Way South to end of segment (Talbot substation)	3	5 to 15

Notes:

[1] Outcrops of Bedrock might be encountered at isolated portions of this section. Boring J4 not yet completed.

[2] Outcrops of weathered bedrock might be encountered between SE 80th Way to south of SE 84th Street.

[3] Recommend completing another boring between borings N4 and N5 to verify subsurface conditions between boring N4 and Beacon Way South.

Field Screening Results

The soil samples in the upper 15 feet of each boring were field screened for indications of evidence of petroleum hydrocarbons using visual and water sheen screening. Screening of two samples from borings N-1 and N-2 detected a slight to moderate sheen. One sample from boring N1 (previously label as B-10) was sent to a laboratory for analyses of hydrocarbons. The result was “Not Detected.” None of the other screened samples detected any sheen. The results of the analytical testing are presented in Appendix C.

Groundwater

Groundwater level observations were made during drilling and measured subsequent to drilling in monitoring wells installed in borings A2, C3, C4, J1, M3, M8, M10, and N6. Groundwater seepage was encountered during drilling in about one-third of the borings at depths ranging from about 14 to 55 feet. Some of the observed groundwater seepage is attributable to zones of perched water within or on top of the glacial till or weathered bedrock.

We measured groundwater levels in the monitoring wells on September 16, 2015 and February 9, 2016. Table 2 below summarizes the measured groundwater depths and estimated elevations.

We expect that the presence of groundwater seepage and groundwater levels within the glacial till will fluctuate seasonally and will change due to precipitation. Groundwater encountered or present within deeper advance outwash deposits may not fluctuate significantly. Across the two wetland areas (south of the Sammamish substation and between the Lakeside substation and the pole yard) we anticipate that groundwater is at or near the ground surface during much of the year.

TABLE 2. GROUNDWATER LEVEL MONITORING DATA

Monitoring Well No.	Groundwater Depth[1]/Elevation (feet) September 16, 2015	Groundwater Depth[1]/Elevation (feet) February 9, 2016
A2	20/55	16/59
C3	Not encountered	Not Encountered
C4	38/403	35/406
J1	0 (at surface)/92	0 (at surface)/92
M3	31/379	30/381
M8	Not encountered	46/399
M10	Not encountered	49/324
N6	56/384	54/386

Notes:

[1] Groundwater depths are measured from ground surface. Groundwater elevations are relative to estimated ground surface elevations based on Google Earth (NAVD88).

CONCLUSIONS AND RECOMMENDATIONS

A majority of the alignment is underlain by glacially consolidated deposits. In our opinion, foundation support for the poles may be provided using conventional drilled shafts or direct embedment, where appropriate. Excavation for both drilled shafts and direct embedment will need to address the presence of cobbles and boulders in the glacial soils, drilling in very dense deposits, zones of groundwater seepage, the presence of groundwater and the potential for caving or sloughing soils.

Portions of the alignment are underlain by weathered or unweathered bedrock. The boring in Somerset, where bedrock may be present, has not yet been completed. Explorations completed by others north of Forest Drive in the Somerset area encountered areas of bedrock near the existing alignment. Another boring completed by others near the Somerset Recreation Club encountered glacial till, although the boring did not extend very deep. Therefore, in the Somerset area we anticipate that some pole foundation excavations might encounter bedrock. Weathered bedrock was encountered in boring M4 in the Olympus neighborhood in Newcastle. This material was drillable with the drilling equipment used for the explorations to the depth explored.

The central portion of the wetland area in Segment A contains a high groundwater table and 10 to 15 feet of loose alluvial deposits underlain by medium dense sand to depths of 40 to 45 feet. Recessional outwash consisting of course gravel was encountered along the portion of Segment N immediately south of the

Cedar River valley. Drilling through these deposits will likely require casing to control caving and sloughing. Casing will also likely be necessary for the upper portion of deposits encountered across the north portion of Segment J, and where shafts are located close to existing BP/Olympic pipelines. Casing may be required in other areas where the surficial soils are loose. We do not recommend using direct embedment in these areas.

The following sections of this report present our recommendations for drilled shafts, and micropiles, and considerations for direct embedment foundations. Our report does not include recommendations for design and construction of helical piers, as these are typically completed by the supplier/contractor, if selected for pole support.

Seismic Design Considerations

The project alignment is located in western Washington, which is seismically active. Seismicity in this region is attributed primarily to the interaction between the Pacific, Juan de Fuca and North American plates. The Juan de Fuca plate is subducting beneath the North American plate at the Cascadia Subduction Zone (CSZ). This activity produces both intercrustal (between plates) and intracrustal (within a plate) earthquakes.

Research is ongoing regarding large magnitude CSZ-related intercrustal earthquake activity along the Washington and Oregon coasts. Geologists are reporting evidence that suggests several large magnitude earthquakes (magnitude 8 to 9) have occurred along the CSZ in the last 1,500 years, the most recent of which occurred in January 1700. Five large subduction zone earthquakes have been observed globally since 1960: (1) in 1960, a magnitude 9.5 earthquake occurred in Chile; (2) in 1964, a magnitude 9.2 earthquake occurred in Alaska; (3) in 2006, a magnitude 9.2 earthquake occurred in Indonesia; and (4) in 2010 a magnitude 8.8 earthquake occurred off the coast of Chile; and (5) in 2011 a magnitude 9.0 occurred in Japan. No documented earthquakes of this magnitude have occurred along the CSZ during the recorded history of the Pacific Northwest.

Hundreds of smaller intracrustal earthquakes have been recorded in western Washington. Four of the most recent significant intracrustal earthquakes were: (1) a magnitude 7.2 earthquake that occurred in 1946 in the Vancouver Island, British Columbia area; (2) a magnitude 7.1 earthquake that occurred in 1949 in the Olympia area; (3) a magnitude 6.5 earthquake that occurred in 1965 between Seattle and Tacoma; and (4) a magnitude 6.8 earthquake that occurred on February 28, 2001 at Nisqually near Olympia.

2012 International Building Code Design Considerations

Seismic parameters vary slightly between the north and south ends of the project. Seismic parameters also vary depending on the soil conditions present. Most of the site soils may be characterized as Site Class C, with the exception of a few areas where site class D is appropriate. We recommend the 2012 IBC parameters for short period spectral response acceleration (S_S), 1-second period spectral response acceleration (S_1), and Seismic Coefficients F_A and F_V presented in Table 3.

TABLE 3. IBC SEISMIC PARAMETERS

Segment	Extent	Site Class	Spectral Response Acceleration (percent g)		Seismic Coefficient		Peak Ground Acceleration, PGA_m (percent g)
			S_S	S_1	F_A	F_V	
A	Wetlands Area	D	125.6	48.2	1.0	1.5	51.7
A	Remainder	C	125.6	48.2	1.0	1.3	51.7
C	All	C	126.5	48.5	1.0	1.3	51.5
E	SE 5th Street to Lake Hills Connector Road	D	131.7	50.6	1.0	1.5	54.0
E	Remainder	C	130.1	50.0	1.0	1.3	54.0
J	Northern 1,000 feet	D	134.7	51.6	1.0	1.5	56.9
J	Remainder	C	137.4	52.6	1.0	1.3	57.9
M	North of SE 88th Street	C	141.5	53.8	1.0	1.3	59.1
M	South of SE 88th Street	C	142.3	53.6	1.0	1.3	60.6
M	In the vicinity of boring M11[1]	D	141.4	53.0	1.0	1.5	60.6
N	North Side of Maple Valley Highway	C	141.3	52.8	1.0	1.3	58.5
N	South Side of Maple Valley Highway to Talbot substation	D	140.8	52.6	1.0	1.5	58.0
N	Talbot substation area	C	140.8	52.6	1.0	1.3	58.0

Notes:

[1]Extent of site class D in the vicinity of M11 to be finalized when final design segments are available.

The spectral Response values are based on the 2008 USGS Seismic Hazard Maps available at http://geohazards.usgs.gov/deaggint/2008.php.

Surface Fault Rupture

A portion of the alignment immediately north and south of I-90, is mapped within the Seattle Fault Zone, which is thought to have a recurrence interval on the order of 1,000 years. However, based on the long recurrence interval of the fault, it is our opinion there is a low risk of fault rupture over the design life of the poles. The remainder of the alignment is sufficiently distant from the Seattle fault and overlain with a substantial thickness of glacial sediments such that we conclude that the potential for surface fault rupture is remote.

Liquefaction Potential

Liquefaction refers to a condition where vibration or shaking of the ground, usually during earthquakes, causes development of excess pore water pressures in saturated soils and subsequent loss of strength in a soil unit so affected. In general, soils that are susceptible to liquefaction include loose to medium dense sand to silty sand and soft to stiff sandy silt, which are below the groundwater level.

Most of the soils along the alignment are typically in a dense to very dense condition, and/or are above the anticipated normal groundwater level and are not considered liquefiable. The portions of the alignment

which have liquefiable soils include the upper 10 to 50 feet across the Redmond wetland, and the small area between the Lakeside substation and the south side of the pole yard.

We evaluated the liquefaction potential of the site soils based on the information from the borings using the Simplified Procedure (Youd and Idriss, 2001). The Simplified Procedure is based on comparing the cyclic resistance ratio (CRR) of a soil layer (the cyclic shear stress required to cause liquefaction) to the cyclic stress ratio (CSR) induced by an earthquake. The factor of safety against liquefaction is determined by dividing the CRR by the CSR. Liquefaction hazards, including settlement and related effects, were evaluated when the factor of safety against liquefaction was calculated as less than 1.0.

Estimated ground settlement resulting from earthquake-induced liquefaction was analyzed using empirical procedures by Tokimatsu and Seed (1987) that relate settlement to the boring data. Liquefaction potential of the site soils was evaluated using the peak ground acceleration listed in the table above.

Estimated ground settlement resulting from earthquake-induced liquefaction was analyzed using empirical procedures by Tokimatsu and Seed (1987) that relate settlement to the boring data. Liquefaction potential of the site soils was evaluated using the peak ground acceleration listed in the table above.

Analysis of the boring data indicates that there is a potential for liquefaction within the saturated alluvium encountered in the wetland area of Segment A and the north portion of Segment J from the Lakeside substation to the southern extent of the pole yard. We estimate that the factor of safety is less than 1 during the design-level earthquake for the loose to medium dense alluvial/recessional deposits encountered in these areas. For the wetland portion of Segment A, the depth of liquefiable deposits varies from about 15 feet on the west edge of the wetland to about 50 to 60 feet across the center of the wetland. For this area, liquefaction-induced ground settlement of the potentially liquefiable zones is estimated to be on the order of 2 to 4 inches along the west edge and up to 6 to 8 inches in the center of the wetland. For the north portion of Segment J across the small wetland and the pole yard (which encompasses the area of the proposed Richards Creek substation), the depth of liquefiable deposits varies from about 10 to 30 feet, based on boring J1 and on the borings completed for the proposed Richards Creek substation. For this area, liquefaction-induced ground settlement of the potentially liquefiable zones is estimated to be on the order of 1 to 4 inches for a design-level earthquake. Lesser amounts of settlement from liquefaction could be experienced after an earthquake with a magnitude less than the design-level earthquake. The magnitude of liquefaction-induced ground settlement will vary as a function of the characteristics of the earthquake (earthquake magnitude, location, duration and intensity) and the soil and groundwater conditions.

Our recommended soil input parameters for lateral load design included in Appendix E consider the effects of liquefaction through the application of p-multipliers for LPILE parameters.

Lateral Spreading

Lateral spreading involves lateral displacements of large volumes of liquefied soil. Lateral spreading can occur on near-level-ground as blocks of surface soils are displaced toward a nearby slope or free-face such as a riverbank by movement of the underlying liquefied soil. Flow failures occur when soil liquefies and flows by gravity without further seismic input. Lateral spreading also occurs as blocks of surface soils are displaced toward a nearby slope or free-face such as a nearby waterfront or stream bank by movement of the underlying liquefied soil.

Due to the distance to the Sammamish River and the relatively flat grade, it is our opinion the risk of lateral spreading is low for the wetland portion of Segment A. For the north portion of Segment J in the vicinity of the proposed Richards Creek substation, in our study for that substation we concluded that there is a risk for lateral spreading along the west edge where the topography slopes downward to the west. We should reevaluate the risk to the proposed poles in this area once their final location has been determined.

Drilled Shafts

Based on recent 230 kV projects we have completed for PSE, we anticipate that the preliminary downward axial loads on the pole foundations will be in the range of 10 to 50 kips. The lateral loads on these foundations typically range between 10 and 90 kips of shear force, and between 600 kip-feet and 7,000 kip-feet of applied bending moment. We also understand the foundations will be roughly 6 to 8 feet in diameter and embedded to depths of typically at least 40 feet, although some of the tangent pole foundations might only require embedment depths as shallow as 15 to 20 feet. For the pole foundation design, the depth of embedment is typically governed by lateral loading conditions.

Where liquefiable deposits are present, we recommend that foundations extend below the loose to medium dense liquefiable deposits into underlying dense, non-liquefiable soils.

Lateral Load Response

Lateral load design and analysis will be performed by the project structural engineer, Power Engineers. Soil input parameters for the LPILE program are provided in Appendix E. We also provide p-multipliers for strength loss under seismic loading conditions based on Brandenberg, et al (2007) for foundations where liquefiable deposits are present.

As mentioned above, the foundations for poles near the proposed Richards Creek substation could be subjected to additional lateral loads imposed by lateral spreading resulting from the design earthquake, depending on the location of the poles relative to the slope to the west. We recommend that we reevaluate the potential impacts once the location of the poles in this area has been finalized.

Axial Capacity

The applied axial loads on the pole foundations are generally very small in comparison to the applied overturning moments resulting from the tension in the wires along with ice and wind loads. The axial capacity of the foundations will be developed primarily from friction in the dense glacially consolidated soils. The results of our analyses of axial capacities for drilled shafts are presented in Table 4. These allowable capacities include a factor of safety of about 2 for skin friction and about 3 for end bearing.

TABLE 4. AXIAL CAPACITY OF DRILLED SHAFTS

Soil Profile	Diameter (feet)	Minimum Embedment[1] (feet)	Allowable End Bearing (ksf)	Allowable Skin Friction[2, 3] (kips/ft)
1	6	25 or 10 feet into dense deposits	15	5
	8	30 or 10 feet into dense deposits	28	9
2	6	25	50	12
	8	30	80	20

Soil Profile	Diameter (feet)	Minimum Embedment[1] (feet)	Allowable End Bearing (ksf)	Allowable Skin Friction[2, 3] (kips/ft)
3	6	25	45	10
	8	30	80	18
4	6	40	28	15
	8	40	28	23

Notes:

[1] Might need to extend deeper where liquefiable deposits present (soil profile 1 and soil profile 4 for north end of Segment J).

[2] Presented skin friction is averaged from the ground surface to the minimum embedment.

[3] Recommend excluding skin friction through liquefiable layers. See discussion in the Liquefaction Potential section of this report.

ksf – kips per square foot

The subsurface conditions vary across the north end of Segment J (proposed Richards Creek substation area). We recommend that we reevaluate the axial capacity of the pole foundations once the final locations are selected.

The total allowable downward capacity of the pole foundations is based on the strength of the supporting soils and interaction between the foundation and the soil. The structural characteristics of the pole foundation materials and other structural considerations may impose more stringent limitations and should be evaluated by the structural engineer. Foundation settlement is anticipated to be less than ½ inch and essentially elastic in nature; we expect they will occur as axial loads are applied.

Downdrag

Liquefaction-induced settlement could also apply a downdrag force on these foundations. The downdrag force is a function of the liquefiable soils (thickness and density) and foundation diameter. We estimate the downdrag forces could be on the order of 100 to 200 kips for pole foundation diameters of about 6 to 8 feet for profiles 1 and 4 across the north end of Segment J and should be considered when estimating the axial capacity of the foundations where liquefiable soils are present. We recommend that we reevaluate potential downdrag effects once the pole locations are finalized.

Corrosion Evaluation

GeoEngineers completed limited laboratory testing on soil samples along the alignment to evaluate factors related to corrosion, as described in Appendix B. The test results indicate that all of the samples tested had a resistivity greater than 6,000 ohm-centimeters and pH greater than 6.4. These values indicate a low to moderate potential for corrosion. GeoEngineers does not provide corrosion engineering services and if further evaluation of corrosion is required, we recommend engaging a corrosion engineer.

Construction Considerations

The project alignment presents several potential difficulties for construction activities posed by surface and subsurface conditions, including temporary access, existing overhead power lines, the presence of the BP/Olympic natural gas pipelines and other utilities, very dense glacial till, occurrence of cobbles, boulders and logs in the subsurface deposits, and groundwater. Access will also be difficult in places due to steep slopes or the presence of residential and commercial buildings. Access through the wetlands should be limited to reduce the potential impacts to wetland areas and should be conducted in accordance with regulatory permits approved for the project.

We anticipate that drilled shafts will be used for a majority of the poles, although direct embedment might be used for tangent poles in some areas. In the wetland portion of Segment A, options which might be appropriate to consider to reduce impacts to the wetland include micropiles or helical anchors. These options have not been discussed with the design team but general guidelines are presented in this section of the report for micropiles. Micropiles might also be required if bedrock is encountered at portions of the alignment in Segment J in the Somerset area.

These and other construction considerations are discussed in the following sections.

Temporary Construction Access

We anticipate earthwork activities will be related primarily to temporary construction access and support and not a significant part of permanent structures.

Access conditions vary significantly along the alignment, with some areas accessible by existing paved parking lots or roads, some accessible by existing dirt roads in cleared right-of-way (ROW), to ROW which will require additional clearing, to ROW which traverses slopes and will require some localized grading to create level surfaces for equipment and for staging areas may require grading for access, to ROW with nearby residential or commercial properties which will limit access. The recessional and glacial till soils may be used for construction of temporary access roads if this work takes place during the normally dry months of the year. In wet weather, it may be necessary to use imported sand and gravel or quarry spalls to construct these roads (see discussion below under Fill Materials).

In general, most of the near-surface soils along most of the segments will likely provide adequate support for construction equipment. Soft, loose and/or wet areas are present across the wetland in Segment A, where Segment A traverses Willow Creek drainage, and the small wetland area between Lakeside substation and the pole yard; these areas will not provide adequate support for construction equipment.

Access through or around wetlands should be limited to reduce the potential impacts and should be conducted in accordance with regulatory requirements and permits approved for the project. We expect that staging areas will include placement of timber mats to protect the native soils and vegetation and that all temporary works will be removed and the areas mitigated prior to project completion.

The particular requirements of temporary access roads and staging areas will depend on the construction equipment selected. We anticipate that construction work pads at the pole locations, access routes and staging areas will be removed and mitigated prior to project completion.

Drilled Shaft Excavations

We recommend the contractor submit a detailed drilled shaft installation plan describing casing and drilled shaft construction methods for review and comment by the engineer before construction. A similar plan should also be submitted for drilled holes for direct embedment pole foundation installation including both uncased and temporary casing methods. The submittal should include a narrative describing the contractor's understanding of the anticipated subsurface conditions, the overall construction sequence, access to the pole locations, and the proposed pole foundation installation equipment.

Cobbles and boulders and difficult drilling were encountered at many of the locations explored. One of the drillers wore out a total of five drill bits and sheared a bolt to completing a boring in the dense glacial till.

The selected foundation contractor should be prepared to deal with cobbles and boulders and very dense soils during drilled shaft construction.

Based on the subsurface conditions encountered in our explorations, we anticipate that some caving could occur, especially within the upper 5 to 15 feet where weathered or less dense deposits or fill are present and that casing for at least a portion of the hole may be needed. Casing will also likely be required where gravel deposits are present, mainly along a portion of Segment N.

Once the design bottom elevation of the shafts is reached, the bottom of the drilled holes should be cleaned of loose or disturbed soil before placing concrete. Loose, disturbed soils left in the bottom of shaft foundation excavations may result in additional settlement. We encountered heaving conditions in several of the borings within the advance outwash deposits. Heaving could also occur if the bottoms of the holes encounter artesian groundwater. Drilling fluids may be required to control heave of the excavation base before placing grout if groundwater is encountered during drilling.

If drilled shafts are used where groundwater is present, we recommend that the concrete for drilled shafts be placed using the tremie method. Temporary casing should be pulled back as the shaft concrete is poured from the bottom up. Care should be taken to ensure a positive head of concrete is maintained at all times above the bottom of the temporary casing during casing removal. We recommend that a positive concrete head of at least 5 feet be maintained inside the casing during removal.

Because of the methods used to install drilled shafts, no direct information regarding the capacity (e.g., driving resistance data) is obtained. It is, therefore, our recommendation that we monitor the installation of the drilled shafts. This will allow us to observe and confirm that soil conditions are as anticipated and that the shafts are installed in accordance with our recommendations and project plans and specifications, or to document variations in the field if necessary, and to provide consultation as required should conditions vary from those anticipated.

Direct Embedment Excavations

We recommend that direct embedment only be considered where the bottom of the excavation will be in dense to very dense glacial till or advance outwash. Where the upper soils consist of loose to medium dense deposits, or where cobble and boulders are encountered, we anticipate that casing will be necessary. Casing will also likely be required if foundations are constructed close to existing BP/Olympic pipelines or other underground utilities.

Similar to the drilled shafts, we recommend the contractor submit a detailed direct embedment pole installation plan describing including both uncased and temporary casing methods. Direct embedment poles can be backfilled with a variety of materials, including crushed rock, controlled density fill (CDF), or normal strength concrete. We recommend the crushed rock, if used, consist of 1¼-inch minus material conforming to Crushed Surfacing Base Course, Section 9-03.9(3) of the 2014 Washington State Department of Transportation (WSDOT) Standard Specifications for Road, Bridge and Municipal Construction.

The placement of the backfill will need to be carefully coordinated with removal of temporary casing so that the potential for creating voids around the embedded portion of the poles is reduced. The backfill should be placed evenly around the pole and compacted to the extent possible with mechanical or hand operated

equipment. Depending on the groundwater level in the drilled hole, it may be necessary to place CDF or normal concrete using the tremie method.

Micropiles

Micropiles are small- to moderate-diameter (typically less than 12 inches) drilled piles. Micropiles are constructed by drilling a hole with a permanent casing, placing reinforcement, grouting the hole, and then removing the portion of the casing within the load-bearing soils. The grouting operations impact micropile capacity. Micropiles installed by gravity grouting have lower capacities, and micropiles installed by pressure grouting or post-grouting (two-stage grouting process) have higher capacities. Mircropiles might be appropriate in the central portion of the Segment A wetland to reduce impacts to the wetland, or where bedrock is encountered preventing the installation of drilled shafts.

The size of the micropiles will depend on the capacities required. For cased, pressure-grouted micropiles, we anticipate that an allowable bond stress 2 to 4 kips per square foot (ksf) of pile may be developed within the glacially consolidated soils, and about half that in the upper non-consolidated soils. Therefore, a 50-foot-long micropile which extends into the glacially consolidated soils 15 feet will have an allowable micropile capacity on the order of 80 to 200 kips, depending on the diameter of the micropile and grouting techniques used. Capacities for micropiles into bedrock would likely be higher, most likely on the order of five to 10 times higher than that for glacial till. Higher anchorage capacity values may be developed using post-grouting installation techniques. However, the final design capacities for the micropiles should be determined by a specialty contractor installing the foundation elements. The specialty contractor should be given the opportunity to use higher anchorage capacities by conducting load tests (discussed below) prior to the start of installation of the production micropiles. Micropile capacities can be better defined once loading information is available.

We recommend the contractor submit a detailed micropile installation plan for review by the engineer before construction. The submittal should include a narrative describing the contractor's understanding of the anticipated surface conditions, the overall construction sequence, access to the pole location and proposed micropile installation equipment.

Once the design tip elevation for the micropile is established, the bottom of the drilled hole should be cleaned of loose or disturbed soil before placing grout. Care must be taken to ensure a positive head of concrete is maintained at all times above the bottom of the temporary casing during removal of the casing. We recommend a minimum 5-foot head of grout be maintained inside the casing during removal.

Because of the methods used to install micropiles, no direct information regarding the capacity (e.g., driving resistance data) is obtained. It is, therefore, our recommendation that we monitor the installation of the micropiles. This will allow us to observe and confirm that soil conditions are as anticipated and that the micropiles are installed in accordance with our recommendations, or to document variations in the field if necessary, and to provide consultation as required should conditions vary from those anticipated.

We recommend axial capacity of installed micropiles be confirmed through a testing program. The testing program should be designed to demonstrate that the required axial resistance is achieved. The Federal Highway Administration (FHWA) publication No. FHWA-SA-97-070, dated June 2000 provides guidelines for development of a load test program. We recommend this publication be consulted for development of the load testing program. A minimum of two micropiles at each pole location should be tested. These may be

production piles provided they meet the performance requirements of the testing program. The testing should occur prior to proceeding with installation of additional micropiles to confirm the design capacities.

If the micropiles are used for developing lateral capacity, we recommend performing a lateral load test program. We recommend installing two test piles and applying a tension force between the piles. The micropiles used in the axial testing program may be used for the lateral testing program. Elements of a lateral tensioning devise are chains, a come-along, a manually operated hydraulic actuator, and digital dynamometer to measure the applied force. The tensioning devise should be constructed to allow for total movement on the order of 24 inches between the piles (about 12 inches of deflection each).

Casing Foundations

Casing foundations consist of a large diameter steel casing driven into the soil using a vibratory hammer or oscillator. Once the casing has reached the design tip elevation, soil inside the upper portion of the casing is partially removed and a concrete plug/top cap poured to provide anchorage and form a base for connection to the above-ground pole.

Some obstructions such as cobbles, boulders and logs could be encountered during installation. It may be necessary to remove obstructions using auger drilling or coring techniques to advance the casing. Also, shallow groundwater levels should be expected during foundation installation. It might be necessary to maintain a positive head of water inside the casing to reduce the potential for heave at the level to which the soil is removed. Concrete for the plug and top cap may need to be poured using the tremie method.

Vibrations from installation of the casings will be transmitted some distance away from the pole foundation locations. These vibrations could potentially affect nearby structures, and will likely be noticed by people within a limited area at and near the pole locations. Based on information provided in the FHWA document, Drilled Shafts Construction Procedures and LRFD Design Methods (2010), the attenuation of the vibrations with distance is affected by the size of the vibratory hammer and casing, operating frequency of the hammer, soil properties and stratigraphy, groundwater and other factors. The document further notes that, “in most cases, vibrations from casing installation are extremely small at distances of 50 to 70 feet from the source.”

Where sensitive structures may be present within about 100 feet of the work area, we recommend that vibration monitoring be performed to help avoid potential damage and to provide documentation in the event of claims of damage caused by the vibratory casing installation.

Access Road Fill Materials

Material used for temporary road fill should be free of debris, organic and man-made contaminants, and rock fragments larger than 6 inches. The suitability of material for use as fill will depend on the gradation and moisture content of the soil. As the amount of fines (particles passing the No. 200 sieve) increases, soil becomes increasingly sensitive to small changes in moisture content and adequate compaction and trafficability become more difficult to achieve.

The on-site soils contain a significant percentage of fines and may be suitable for use as fill during extended dry weather conditions (such as typically occurs from May to October), provided that the soils can be properly moisture conditioned for compaction. Alternatively, fill soil used for extended dry weather

conditions can consist of Gravel Borrow conforming to Section 9-03.14(1) of the 2014 WSDOT Standard Specifications.

During the months of October through May and during other periods of extended wet weather, we recommend that road fill consist of soil conforming to Gravel Backfill for Walls, Section 9-03.12(2) of the 2014 WSDOT Standard Specifications.

Quarry spalls conforming to Section 9-13.6 of the 2014 WSDOT Standard Specifications may be used for construction entrances and as the initial layer of fill over soft or wet subgrade soils.

Excavation Cut and Fill Slopes

Based on our explorations, shallow excavations for temporary access road construction may experience caving. Excavations deeper than 4 feet should be shored or their cut slopes laid back at a stable slope if workers are required to enter them.

Shoring and temporary slope inclinations must conform to the provisions of Title 296 WAC, Part N, "Excavation, Trenching and Shoring." Regardless of the soil type encountered in the excavation, shoring, trench boxes or sloped sidewalls will be required under the Washington Industrial Safety and Health Act (WISHA). The contract documents should specify that the contractor be responsible for selecting excavation and dewatering methods, monitoring the excavations for safety and providing shoring, as required, to protect personnel and structures.

In general, temporary cut slopes should be inclined no steeper than about 1½H:1V (horizontal to vertical). Slopes excavated below groundwater should be inclined no steeper than about 2H:1V. This guideline assumes that all surface loads are kept at a minimum distance of at least one half the depth of the cut away from the top of the slope and that significant seepage is not present on the slope face. Flatter cut slopes will be necessary where significant seepage occurs or if large voids are created during excavation. Some sloughing and raveling of the cut slopes should be expected. Temporary covering with heavy plastic sheeting should be used to protect slopes during periods of wet weather.

If temporary fill slopes are to be constructed we recommend a maximum inclination of 1½H:1V. Temporary protection should be used while slopes are in use.

We recommend that permanent cut and fill slopes be inclined at 2H:1V or flatter.

Erosion Control

Based on existing site grades and the anticipated temporary access road configurations, we anticipate that erosion control measures such as silt fences, straw bales, wattles and sand bags will generally be adequate for project construction. However, if construction and grading is staged, slopes may be created and additional erosion control measures may have to be implemented. Pole locations within or near slopes, such as Poles 0/4 through 0/9, 3/8 and 3/9, may require additional erosion control.

Temporary erosion control should be provided during construction activities and until permanent erosion control measures are functional. Surface water runoff should be properly contained and channeled using drainage ditches, berms and swales.

Permanent site grading should be accomplished in such a manner that stormwater runoff is not concentrated and surface water is not directed to excavated areas of the alignment or over steep slopes. This can be accomplished by grading to direct the flow to appropriate collection points away from the excavations and steep slope areas.

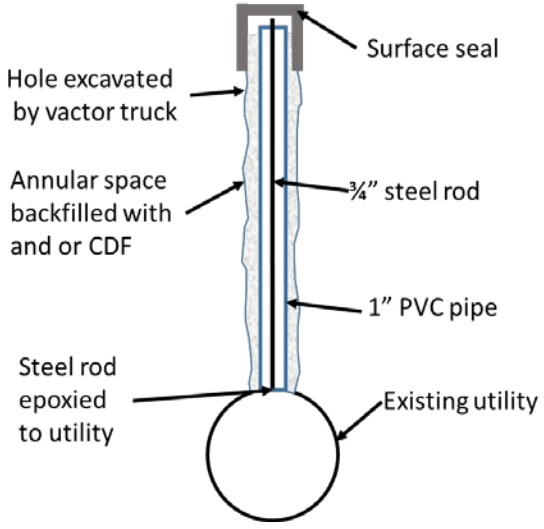
Specific requirements for erosion control within and near the wetlands will be addressed in a separate wetlands report and permit.

Considerations for BP/Olympic Pipelines

We understand that the BP/Olympic natural gas pipelines consist of a 16- and 20-inch pipelines which are typically embedded 3 to 6 feet below grade. In general, the subsurface soils in the upper 10 feet across most of the alignment ranged from loose to dense silty sand. Although the ground surface generally appeared fairly dense and hard along most of the alignment, we recommend that provisions such as steel plates or mats be placed over the pipelines to distribute vehicle loads where construction equipment needs to cross over the pipelines. BP (which now owns the Olympic pipelines) may have stricter requirements.

Where excavations will be within 10 to 20 feet of a BP/Olympic pipeline, temporary casing in the upper 10 to 15 feet should be considered to reduce the risk of sloughing under the pipeline. The need for casing can be better evaluated once the pole locations are finalized.

Utility settlement monitoring points, similar to that shown below, could also be established on the BP/Olympic pipelines where drilled shafts will be within 15 feet if requested by BP, to monitor settlement during installation of the drilled shafts. In this case, the settlement monitoring points should be installed so that base-line readings of the settlement monitoring points may be completed prior to the contractor mobilizing to the site. Monitoring should continue during construction on a daily basis and twice a week in the 3 weeks following construction. The monitoring readings should be reviewed by the Engineer on a daily basis. If measured settlement exceeds 1 inch, or the amount specified by the utility owner, the integrity of the utility should be tested and the contractor should be required to repair any damage to the utilities as a result of construction. A schematic for a typical utility settlement monitoring point is provided below.



Utility Settlement Monitoring Point

LIMITATIONS

We have prepared this report for PSE for the Energize Eastside 230 kV Transmission Line project in Redmond, Bellevue, Newcastle, Renton and King County, Washington. PSE may distribute copies of this report to their authorized agents and regulatory agencies as may be required for the project.

Within the limitations of scope, schedule and budget, our services have been executed in accordance with generally accepted practices in the field of geotechnical engineering in this area at the time this report was prepared. The conclusions, recommendations and opinions presented in this report are based on our professional knowledge, judgment and experience. No warranty or other conditions, express or implied, should be understood.

Any electronic form, facsimile or hard copy of the original document (email, text, table, and/or figure), if provided, and any attachments should be considered a copy of the original document. The original document is stored by GeoEngineers, Inc. and will serve as the official document of record.

Please refer to Appendix F titled "Report Limitations and Guidelines for Use" for additional information pertaining to use of this report.

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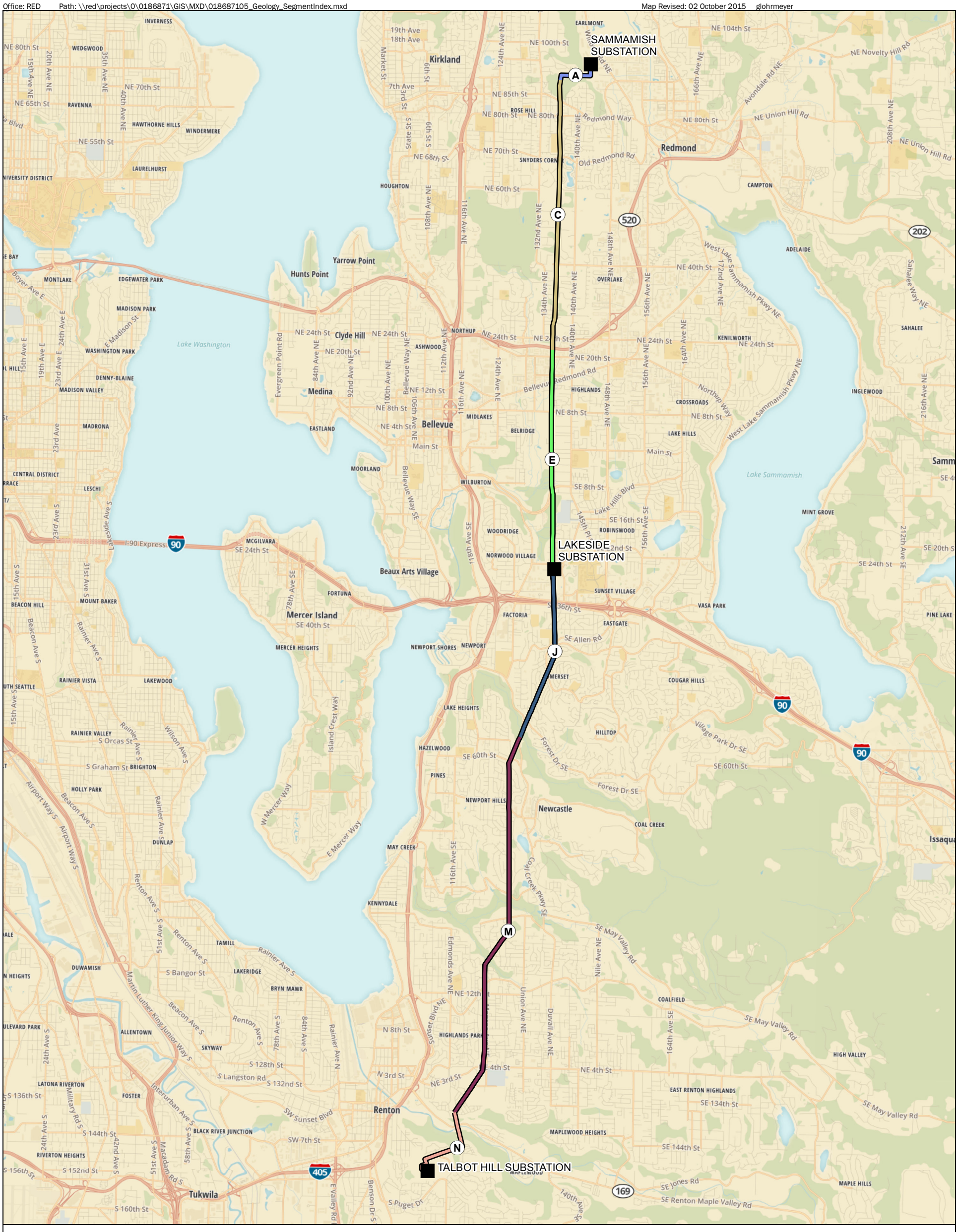
FIGURES

GeoEngineers

DSD 001360



Data Source: ESRI Street Map data.
Geology data from Washington DNR.

Notes:
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Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet

N W E S

1 0 1
Miles

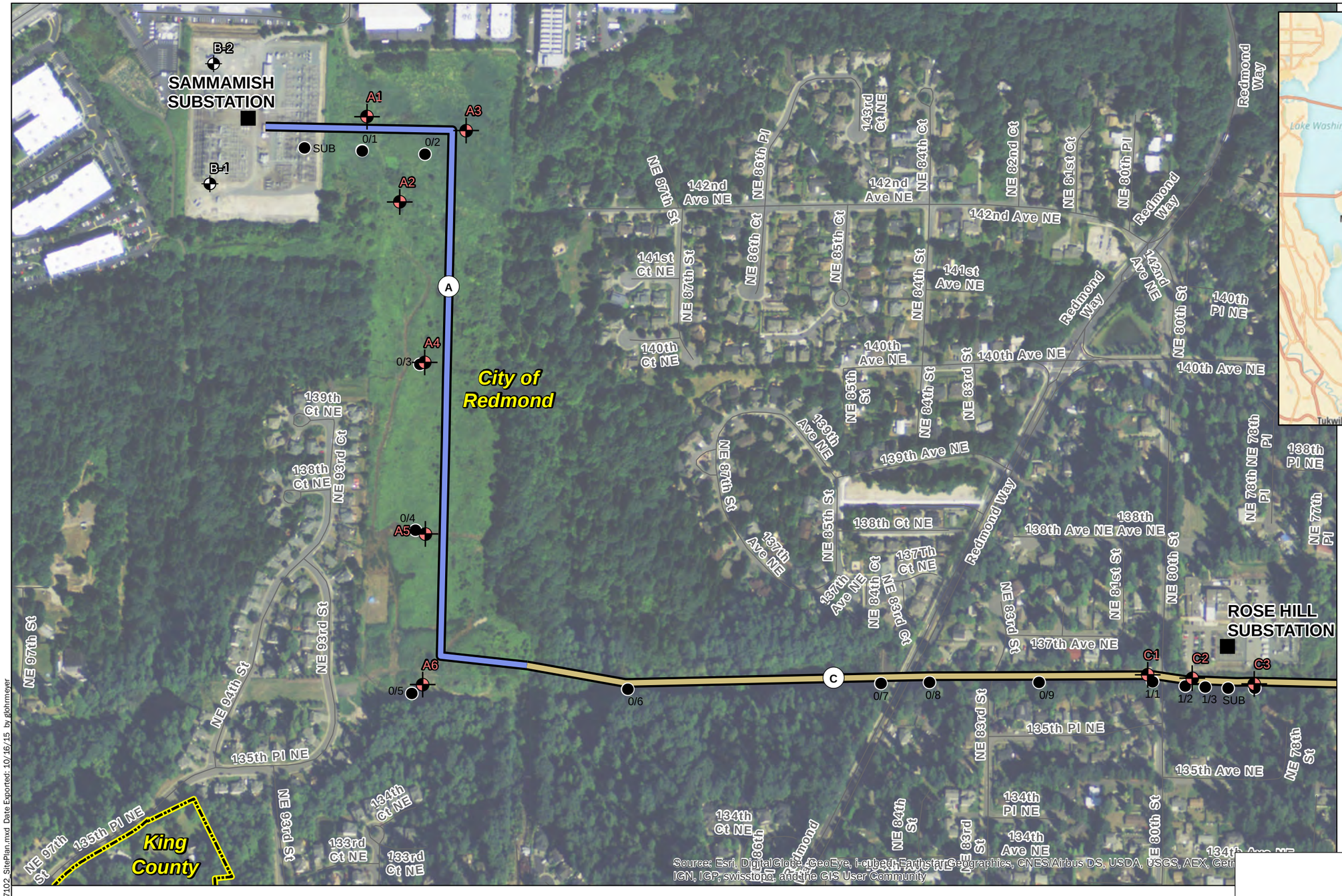
Vicinity Map and Segment Index

PSE Energize Eastside Project
Design Phase
King County, Washington

GeoEngineers

Figure 1

DSD 001361



Legend

- 0/1 Pole
- A1 Current GeoEngineers Boring
- B-1 Previous GeoEngineers Boring
- Substation
- A Route Segment
- City Boundary

Notes:

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Projection: NAD 1983 HARN StatePlane Washington North FIPS 4601 Feet

N W E S

400 0 400

Feet

Site Plan
Segment A and C

PSE Energize Eastside Project
Design Phase
Redmond, Washington

GeoEngineers

Figure 2

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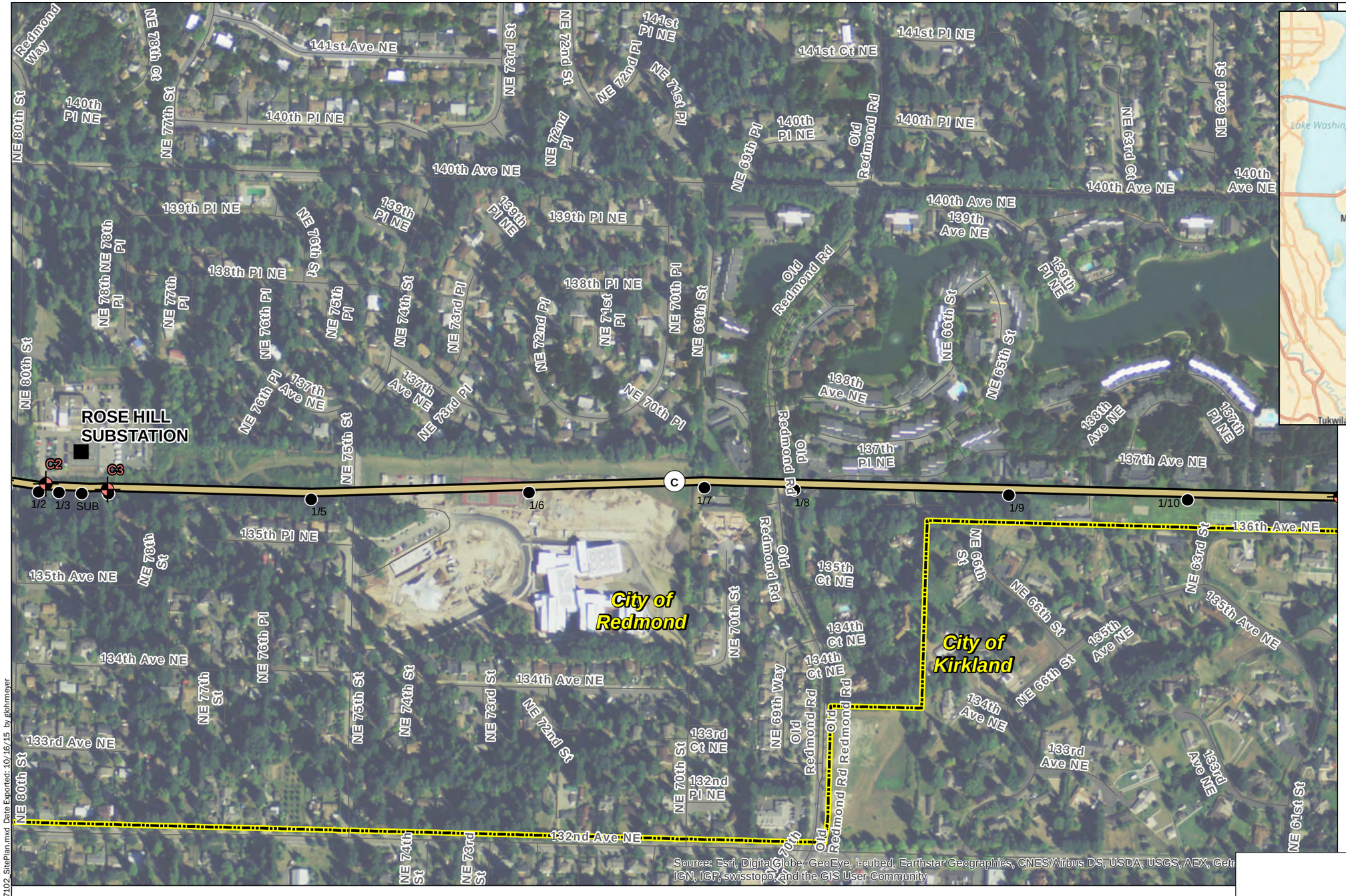

Source: Esri, DigitalGlobe, GeoEye, i-cubed, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getr
IGN, IGP, swisstopo, and the GIS User Community

Legend

0/1 Pole

A1 Current GeoEngineers Boring

B-1 Previous GeoEngineers Boring

Substation

A Route Segment

City Boundary

Notes:

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Projection: NAD 1983 HARN StatePlane Washington North FIPS 4601 Feet

N W E S

400 0 400

Feet

Site Plan
Segment C

PSE Energize Eastside Project
Design Phase
Redmond, Washington

GeoEngineers

Figure 3

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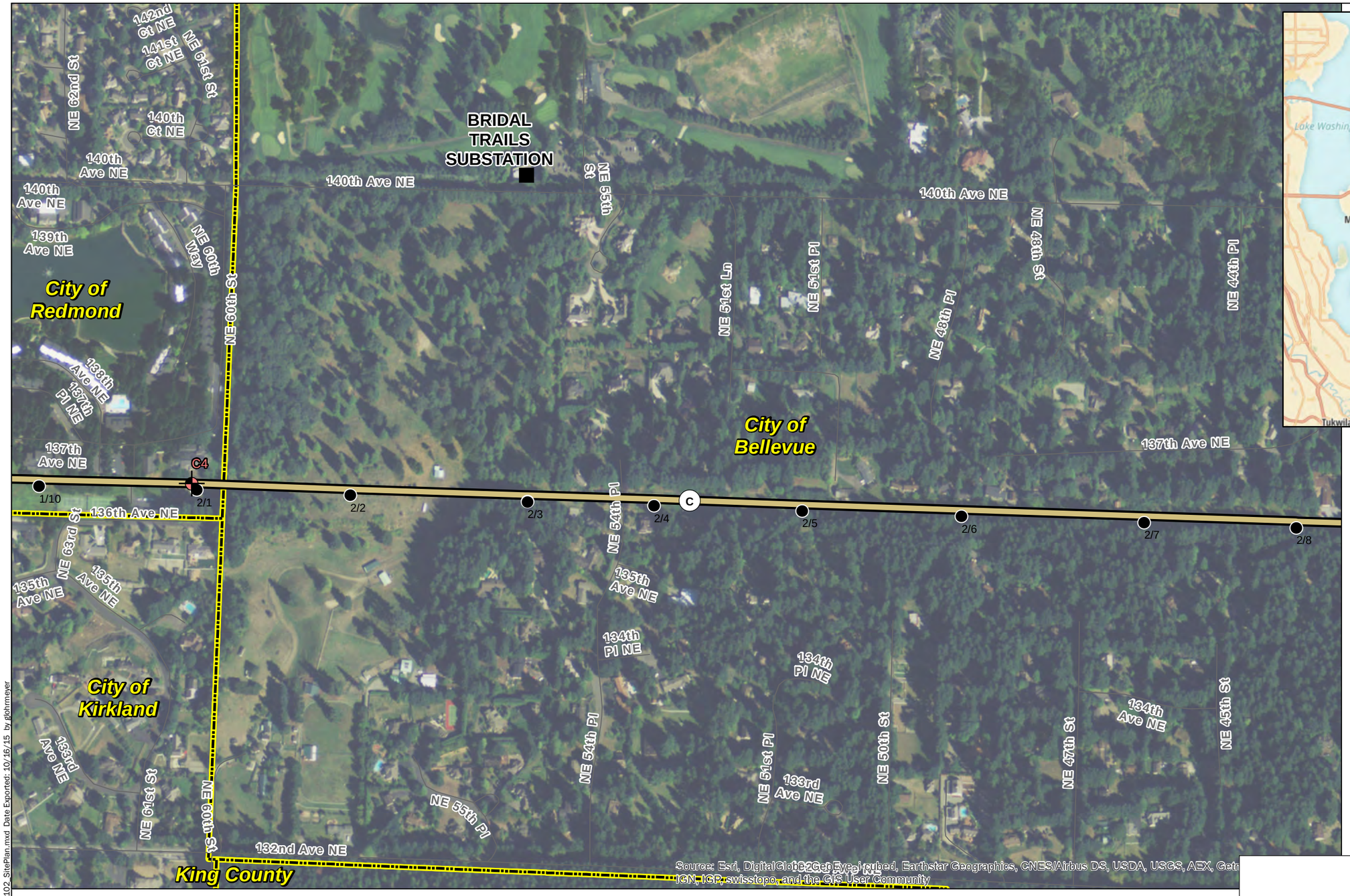

Legend

- 0/1 Pole
- A1 Current GeoEngineers Boring
- B-1 Previous GeoEngineers Boring
- Substation
- Route Segment
- City Boundary

Source: Esri, DigitalGlobe, GeoEye, i-cubed, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, GeoMapping, IGN, IGP, swisstopo, and the GIS User Community

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Projection: NAD 1983 HARN StatePlane Washington North FIPS 4601 Feet

N W E S

400 0 400
Feet

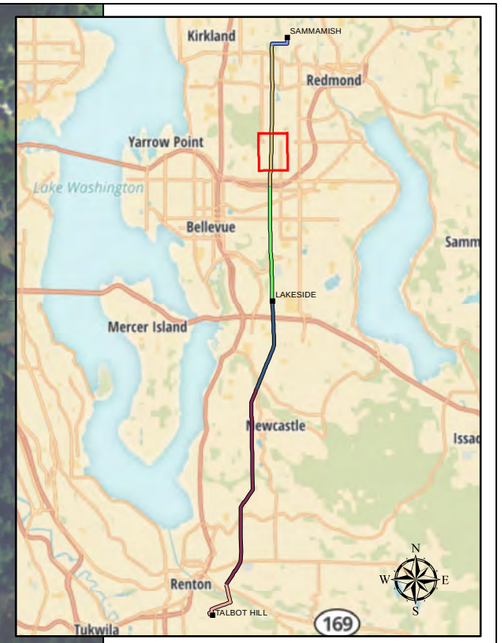
Site Plan
Segment C

PSE Energize Eastside Project
Design Phase
Redmond and Bellevue, Washington

GeoEngineers

Figure 4

DSD 001364



Legend

- 0/1 Pole
- A1 Current GeoEngineers Boring
- B-1 Previous GeoEngineers Boring
- Substation
- Route Segment
- City Boundary

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Projection: NAD 1983 HARN StatePlane Washington North FIPS 4601 Feet

N W E S

400 0 400

Feet

Site Plan
Segment C

PSE Energize Eastside Project
Design Phase
Bellevue, Washington

GeoEngineers

Figure 5

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DSD 001365

Legend

- 0/1 Pole
- A1 Current GeoEngineers Boring
- B-1 Previous GeoEngineers Boring
- Substation
- Route Segment
- City Boundary

Source: Esri, DigitalGlobe, GeoEye, i-cubed, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getm IGN, IGP, swisstopo, and the GIS User Community

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Projection: NAD 1983 HARN StatePlane Washington North FIPS 4601 Feet

400 0 400
Feet

Site Plan
Segment C and E

PSE Energize Eastside Project
Design Phase
Bellevue, Washington

GeoEngineers

Figure 6

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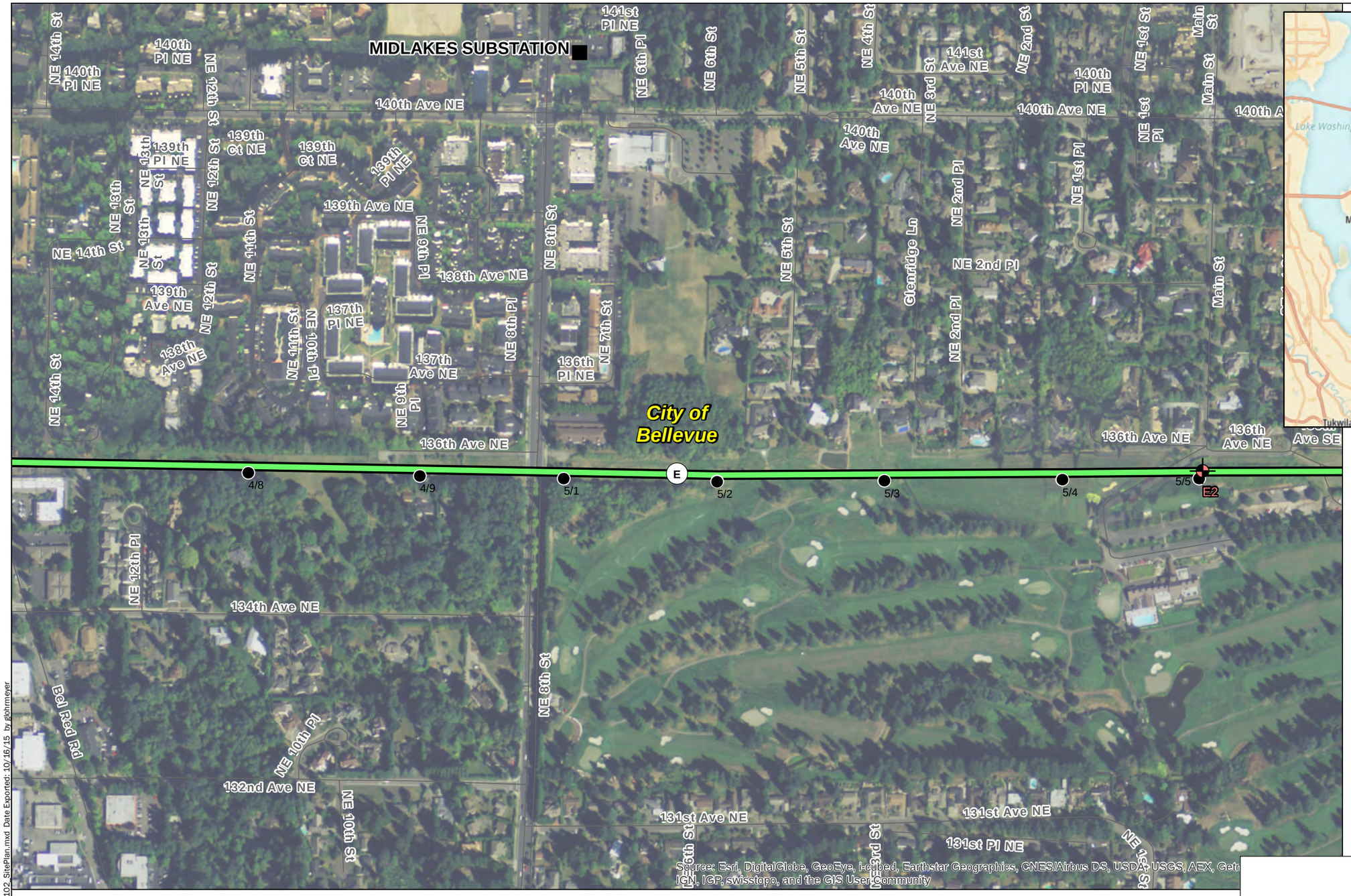

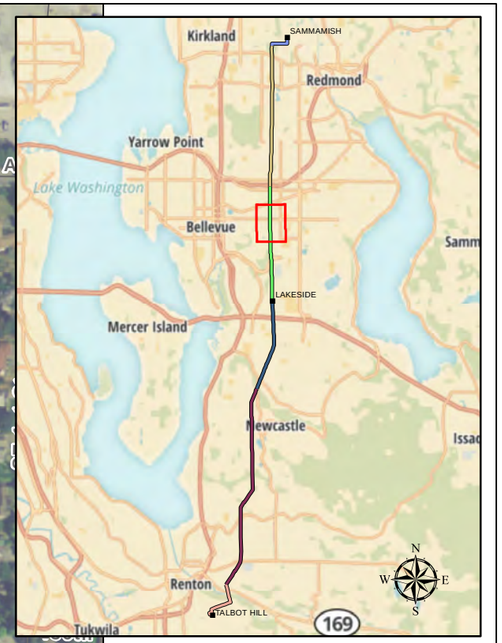

Legend

- 0/1 — Pole
- A1 — Current GeoEngineers Boring
- B-1 — Previous GeoEngineers Boring
- Substation
- Route Segment
- City Boundary

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Projection: NAD 1983 HARN StatePlane Washington North FIPS 4601 Feet

N W E S

400 0 400

Feet

Site Plan
Segment E

PSE Energize Eastside Project
Design Phase
Bellevue, Washington

GeoEngineers

Figure 7

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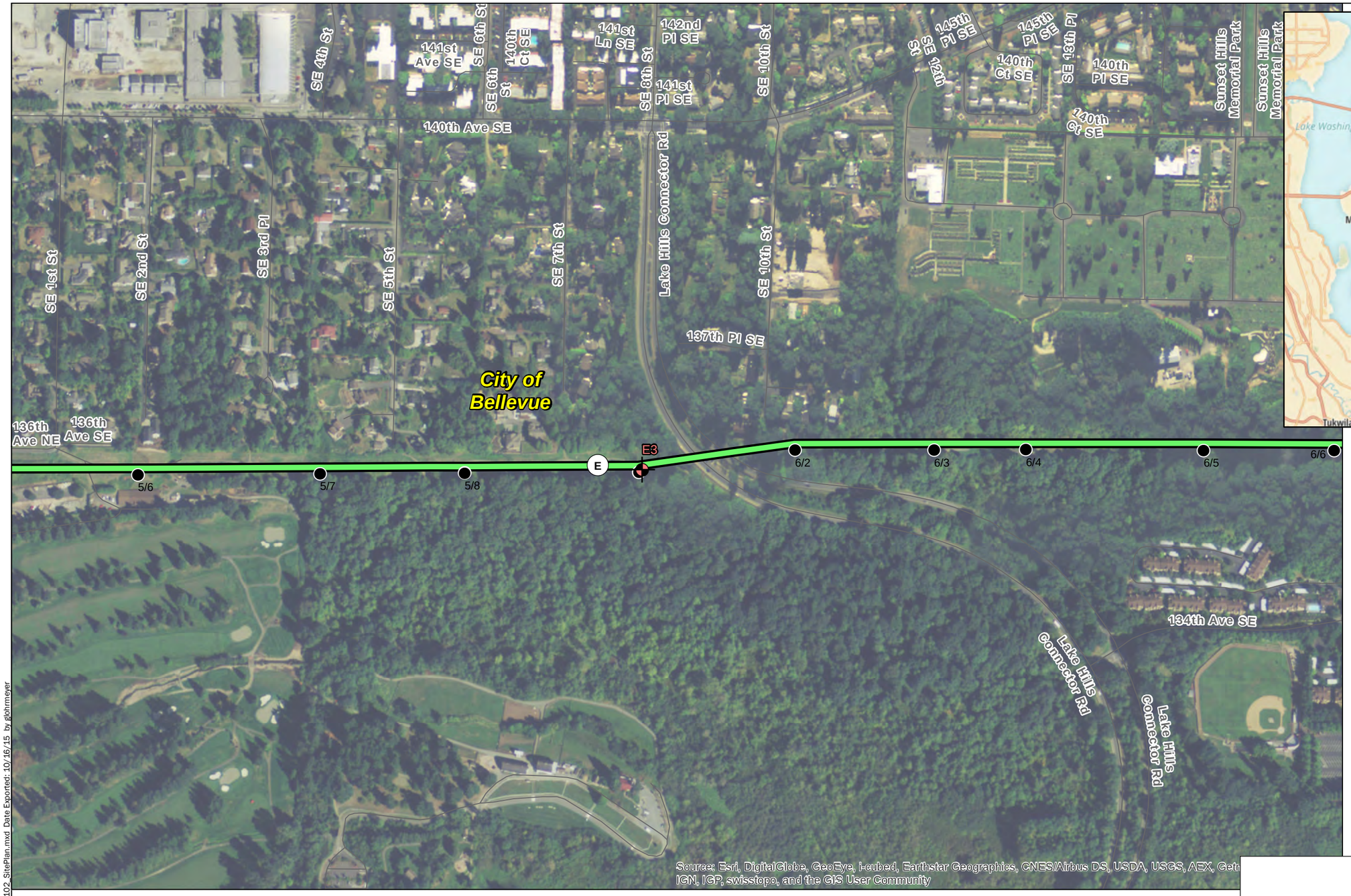

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Legend

- 0/1 Pole
- A1 Current GeoEngineers Boring
- B-1 Previous GeoEngineers Boring
- Substation
- Route Segment
- City Boundary

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Projection: NAD 1983 HARN StatePlane Washington North FIPS 4601 Feet

N W E S

400 0 400
Feet

Site Plan
Segment E

PSE Energize Eastside Project
Design Phase
Bellevue, Washington

GeoEngineers

Figure 8

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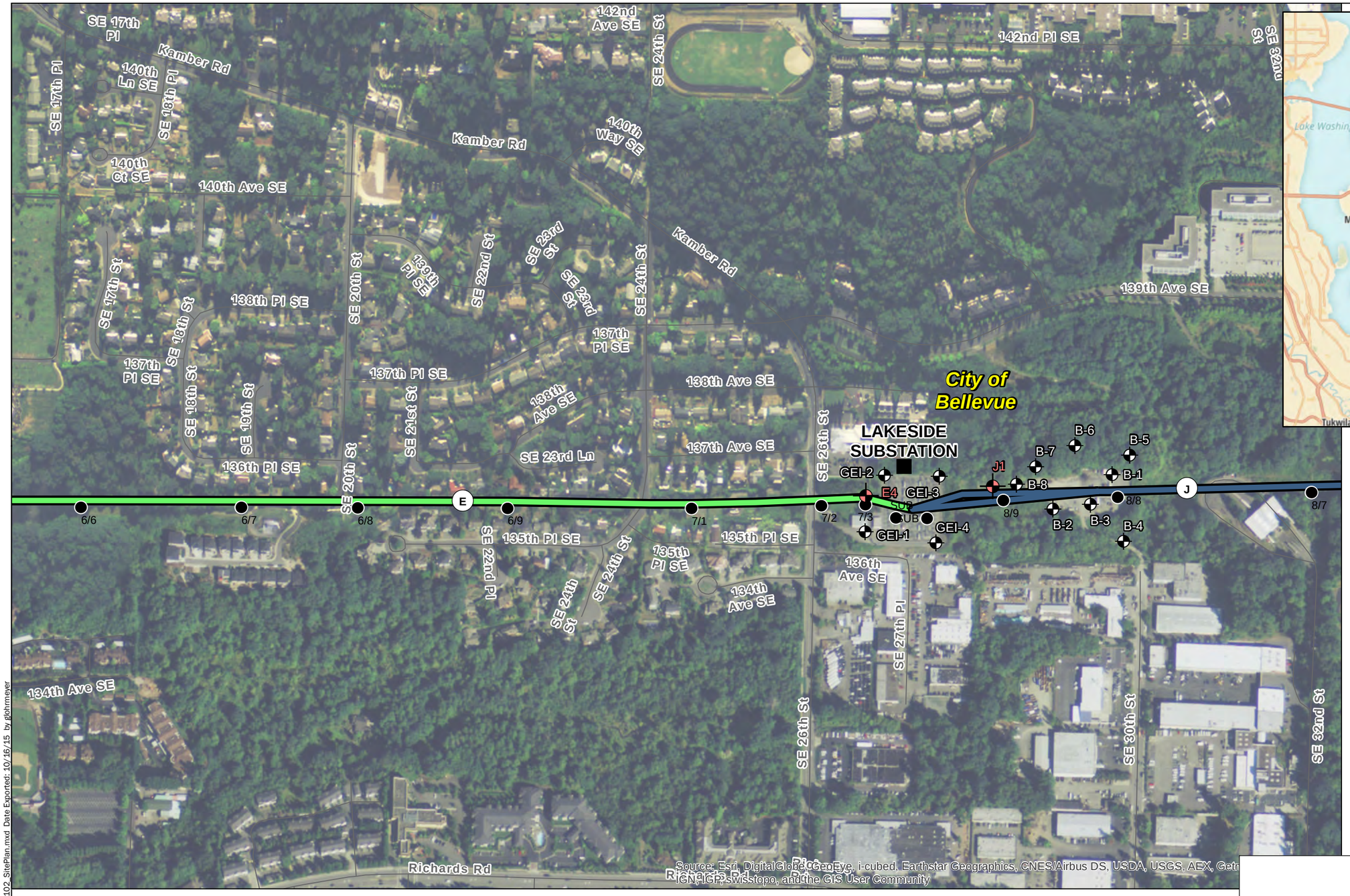

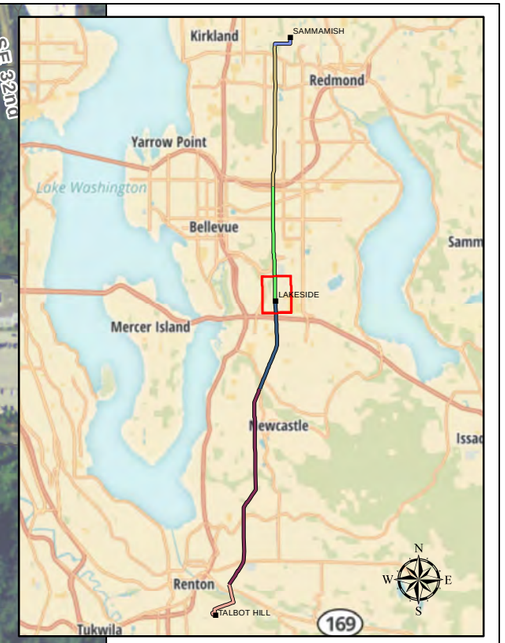

Legend

- 0/1 Pole
- A1 Current GeoEngineers Boring
- B-1 Previous GeoEngineers Boring
- Substation
- Route Segment
- City Boundary

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Projection: NAD 1983 HARN StatePlane Washington North FIPS 4601 Feet

N W E S

400 0 400

Feet

Site Plan
Segment E and J

PSE Energize Eastside Project
Design Phase
Bellevue, Washington

GeoEngineers

Figure 9

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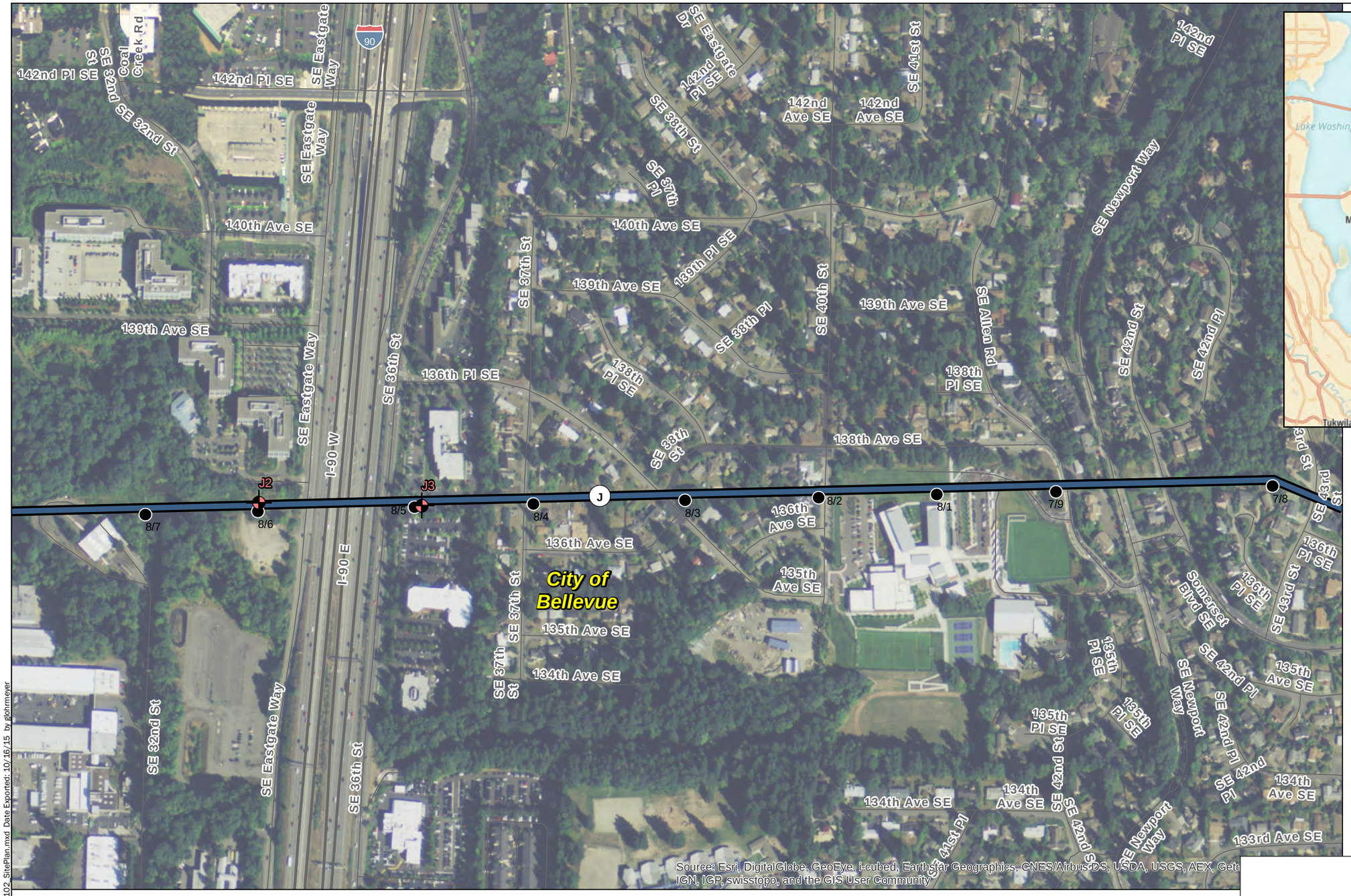

Legend

- 0/1 Pole
- A1 Current GeoEngineers Boring
- B-1 Previous GeoEngineers Boring
- Substation
- Route Segment
- City Boundary

Source: Esri, DigitalGlobe, GeoEye, i-cubed, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, IGN, IGP, swisstopo, and the GIS User Community

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Projection: NAD 1983 HARN StatePlane Washington North FIPS 4601 Feet

400 0 400
Feet

Site Plan
Segment J

PSE Energize Eastside Project
Design Phase
Bellevue, Washington

GeoEngineers

Figure 10

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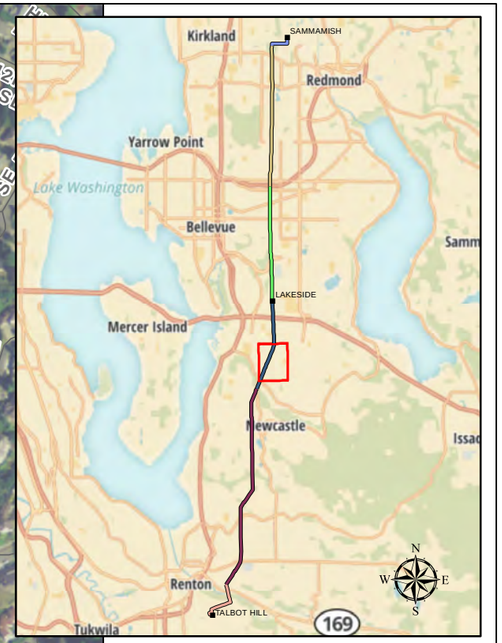
DSD 001370



Legend

0/1 Pole

A1 Current GeoEngineers Boring

B-1 Previous GeoEngineers Boring

Substation

A Route Segment

City Boundary

Notes:

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Projection: NAD 1983 HARN StatePlane Washington North FIPS 4601 Feet

N W E S

400 0 400

Feet

Site Plan
Segment J

PSE Energize Eastside Project
Design Phase
Bellevue, Washington

GeoEngineers

Figure 11

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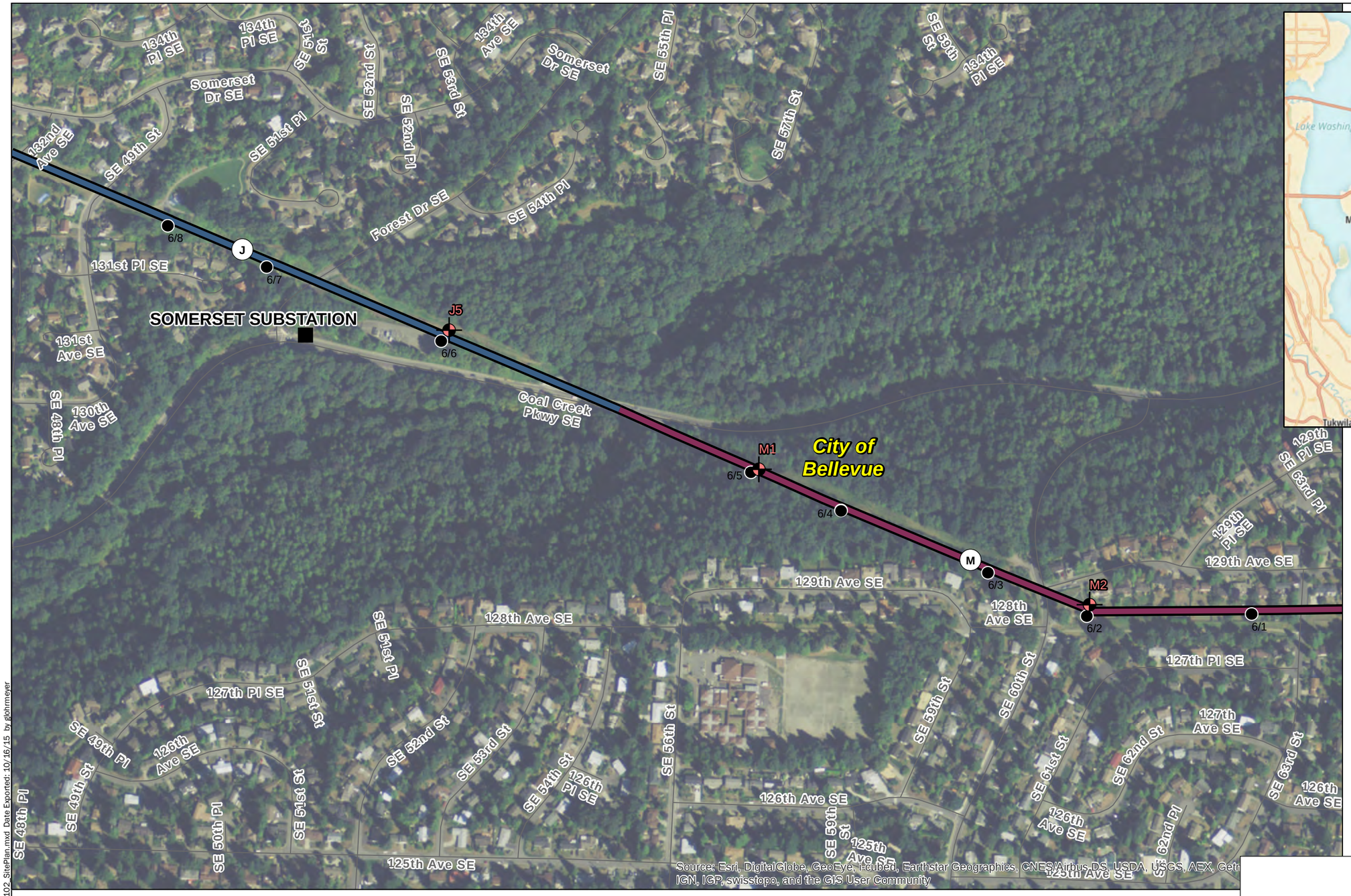
DSD 001371



Legend

- 0/1 Pole
- A1 Current GeoEngineers Boring
- B-1 Previous GeoEngineers Boring
- Substation
- Route Segment
- City Boundary

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Projection: NAD 1983 HARN StatePlane Washington North FIPS 4601 Feet

400 0 400
Feet

Site Plan
Segment J and M

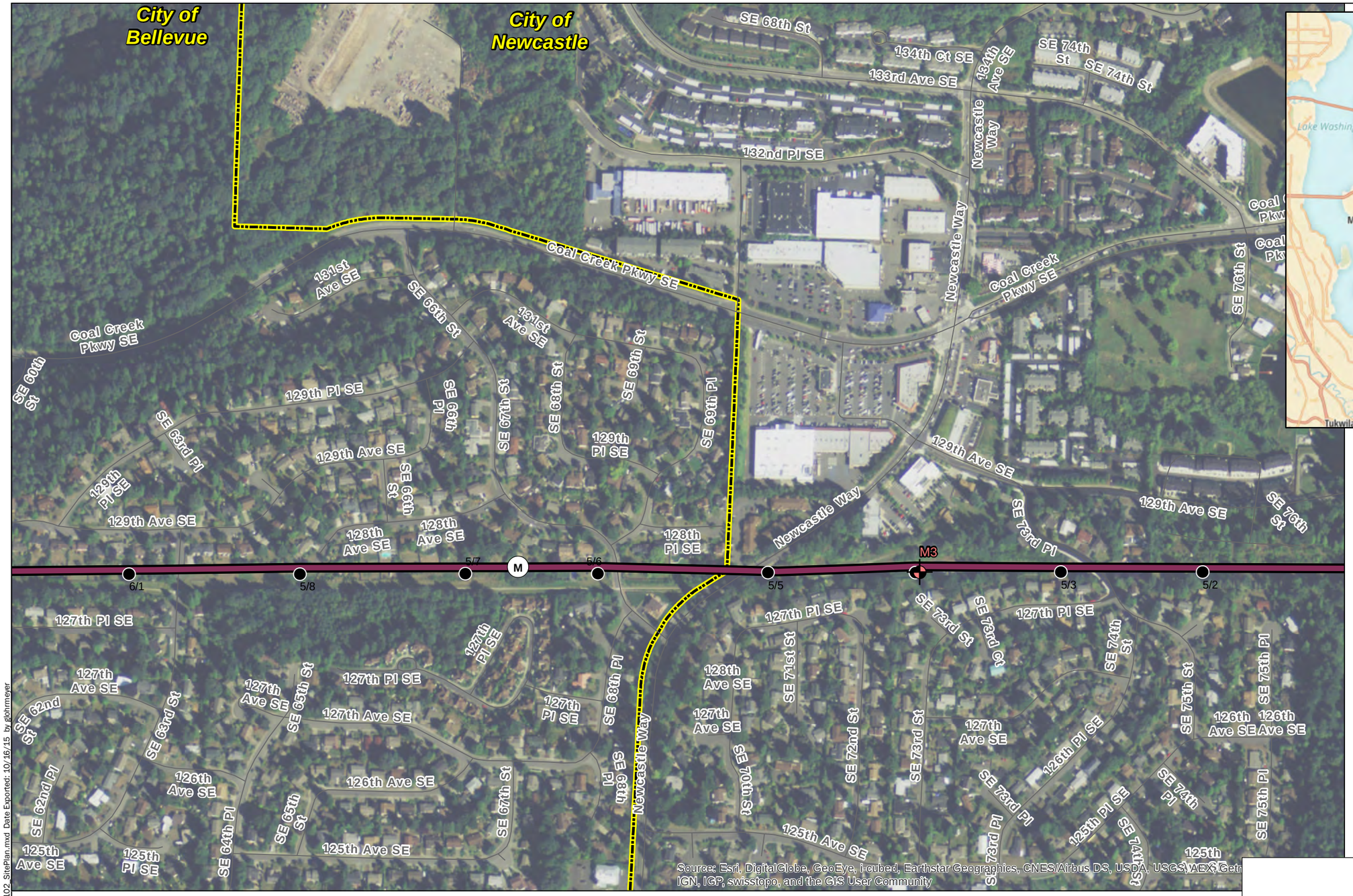
PSE Energize Eastside Project
Design Phase
Bellevue, Washington

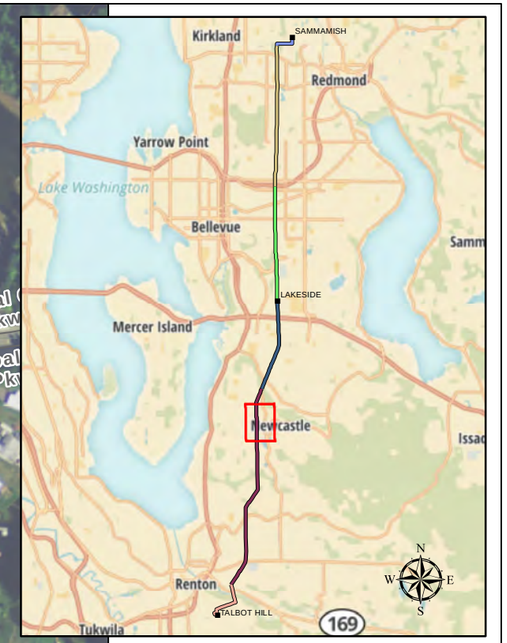
GeoEngineers

Figure 12

P:\0\0186871\GIS\MXD\0186871102_SitePlan.mxd Date Exported: 10/16/15 by rkhrmeyer

DSD 001372





Legend

0/1 Pole

A1 Current GeoEngineers Boring

B-1 Previous GeoEngineers Boring

Substation

Route Segment

City Boundary

Notes:

1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Projection: NAD 1983 HARN StatePlane Washington North FIPS 4601 Feet

400 0 400

Feet

Site Plan
Segment M

PSE Energize Eastside Project
Design Phase
Bellevue and Newcastle, Washington

GeoEngineers

Figure 13

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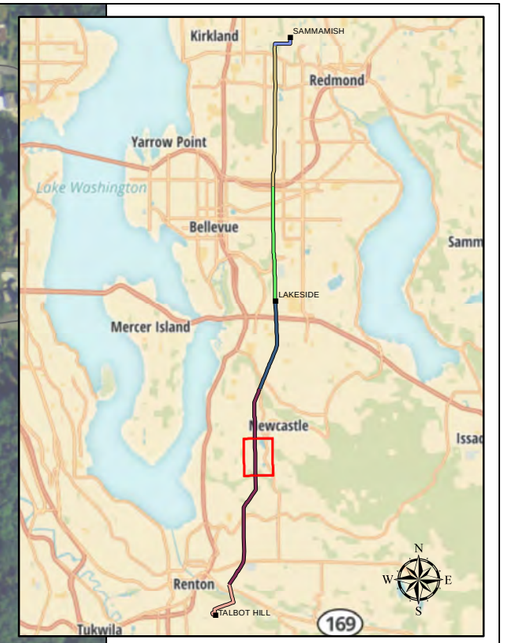
DSD 001373



Legend

- 0/1 Pole
- A1 Current GeoEngineers Boring
- B-1 Previous GeoEngineers Boring
- Substation
- Route Segment
- City Boundary

Notes:

1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Projection: NAD 1983 HARN StatePlane Washington North FIPS 4601 Feet

N W E S

400 0 400
Feet

Site Plan
Segment M

PSE Energize Eastside Project
Design Phase
Newcastle, Washington

GeoEngineers

Figure 14

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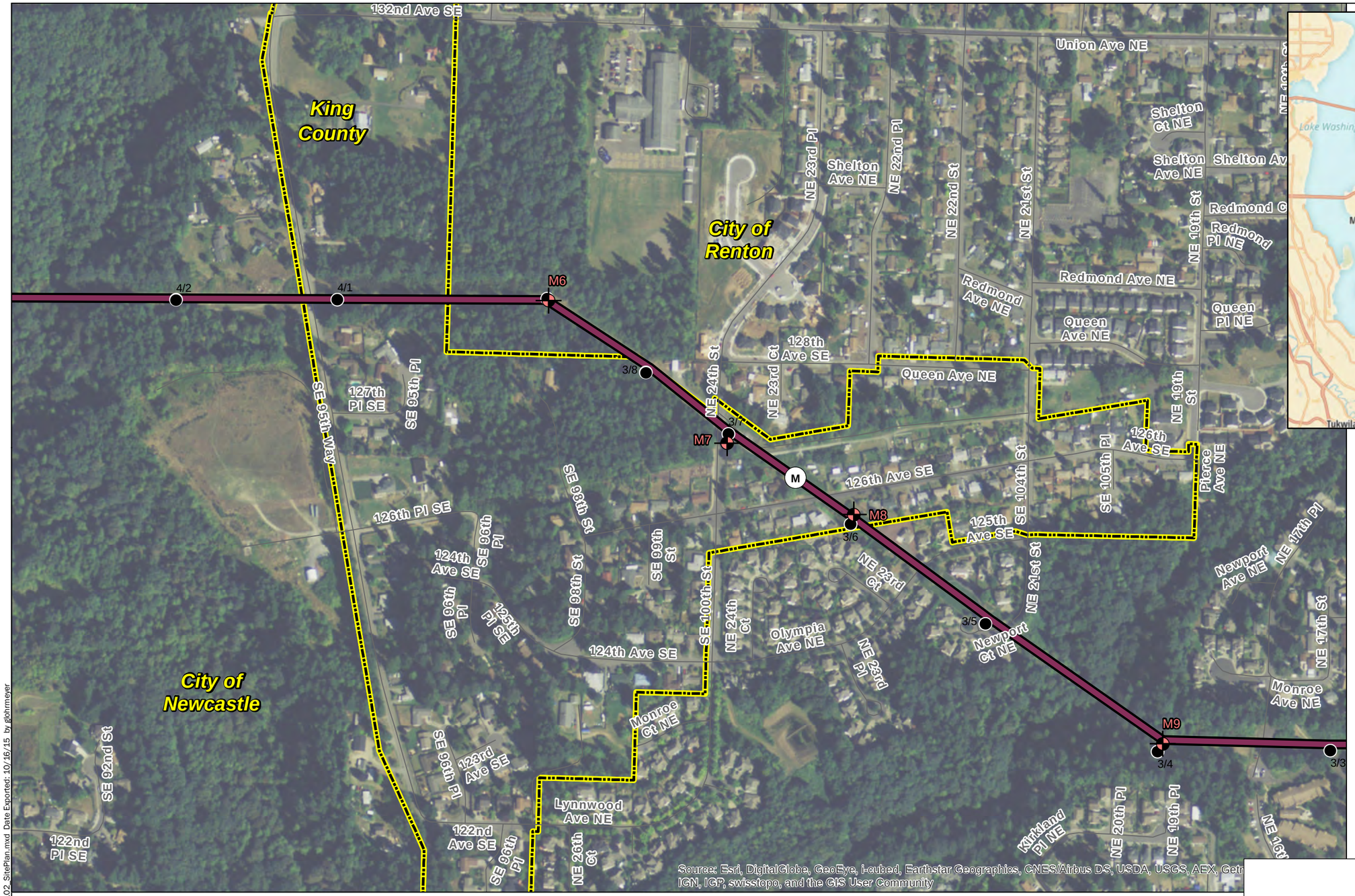
DSD 001374



Legend

- 0/1 Pole
- A1 Current GeoEngineers Boring
- B-1 Previous GeoEngineers Boring
- Substation
- Route Segment
- City Boundary

Notes:

1. The locations of all features shown are approximate.
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Projection: NAD 1983 HARN StatePlane Washington North FIPS 4601 Feet

N W E S

400 0 400

Feet

Site Plan
Segment M

PSE Energize Eastside Project
Design Phase
Newcastle, Renton and King County, Washington

GeoEngineers

Figure 15

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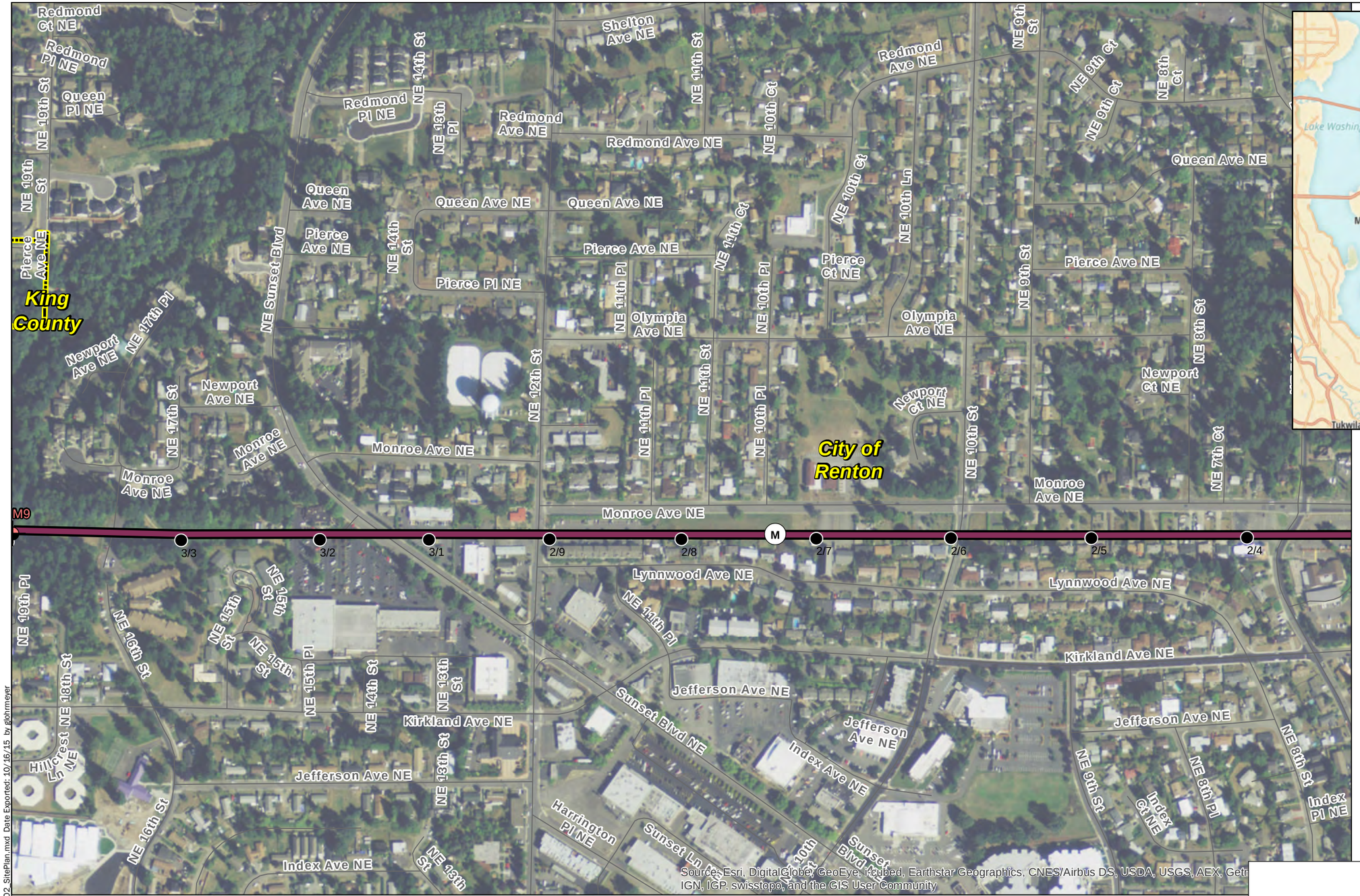
DSD 001375



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Notes:

1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Projection: NAD 1983 HARN StatePlane Washington North FIPS 4601 Feet

N W E S

400 0 400

Feet

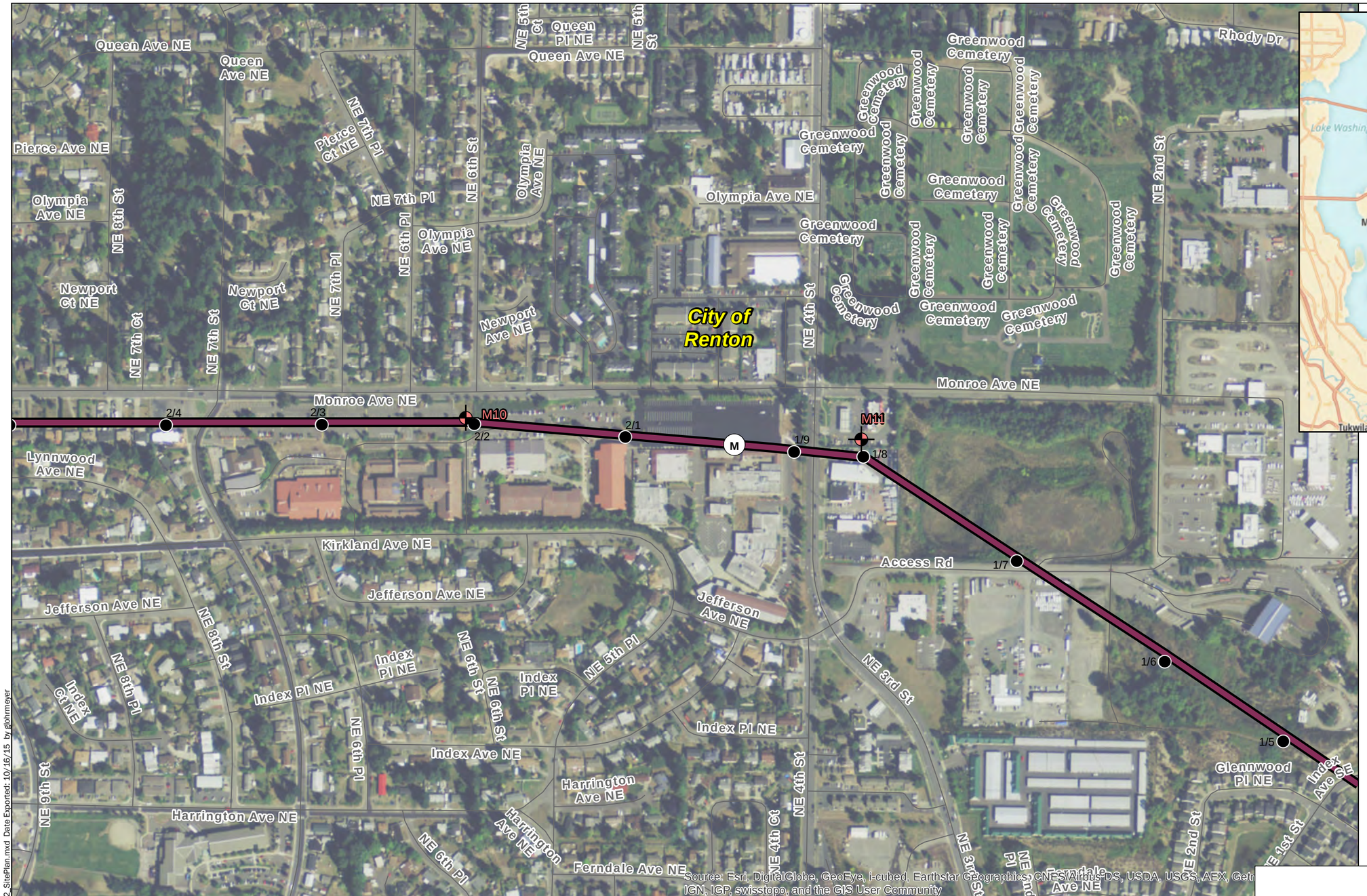
Site Plan
Segment M

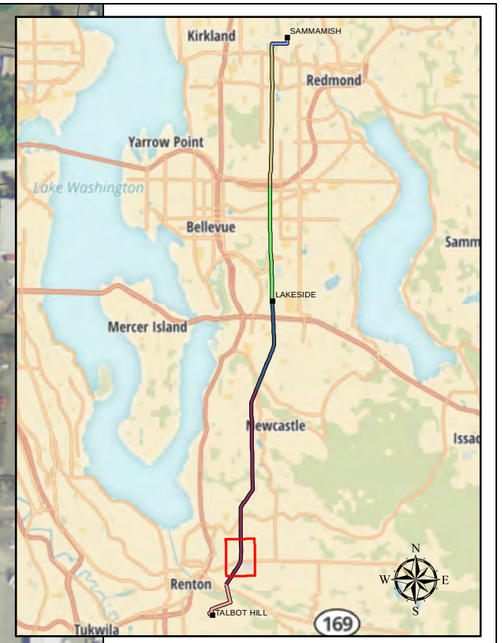
PSE Energize Eastside Project
Design Phase
Renton, Washington

GeoEngineers

Figure 16

DSD 001376





Legend

- 0/1 Pole
- A1 Current GeoEngineers Boring
- B-1 Previous GeoEngineers Boring
- Substation
- A Route Segment
- City Boundary

Notes:

1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Projection: NAD 1983 HARN StatePlane Washington North FIPS 4601 Feet

N W E S

400 0 400

Feet

Site Plan
Segment M

PSE Energize Eastside Project
Design Phase
Renton, Washington

GeoEngineers

Figure 17

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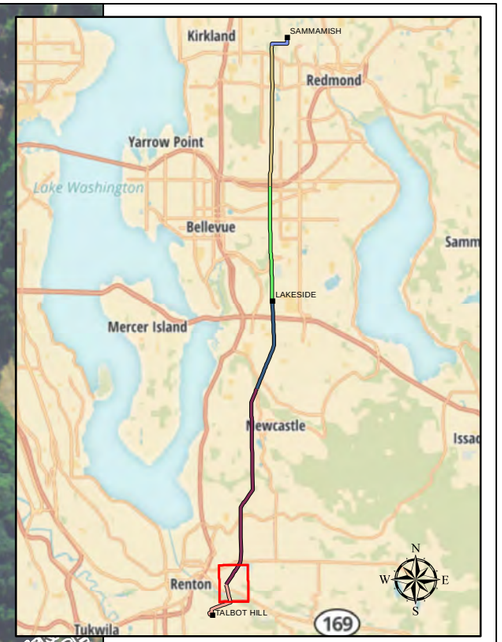
DSD 001377



Legend

- 0/1 Pole
- A1 Current GeoEngineers Boring
- B-1 Previous GeoEngineers Boring
- Substation
- Route Segment
- City Boundary

Notes:

1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Projection: NAD 1983 HARN StatePlane Washington North FIPS 4601 Feet

400 0 400
Feet

Site Plan
Segment M and N

PSE Energize Eastside Project
Design Phase
Renton, Washington

GeoEngineers

Figure 18

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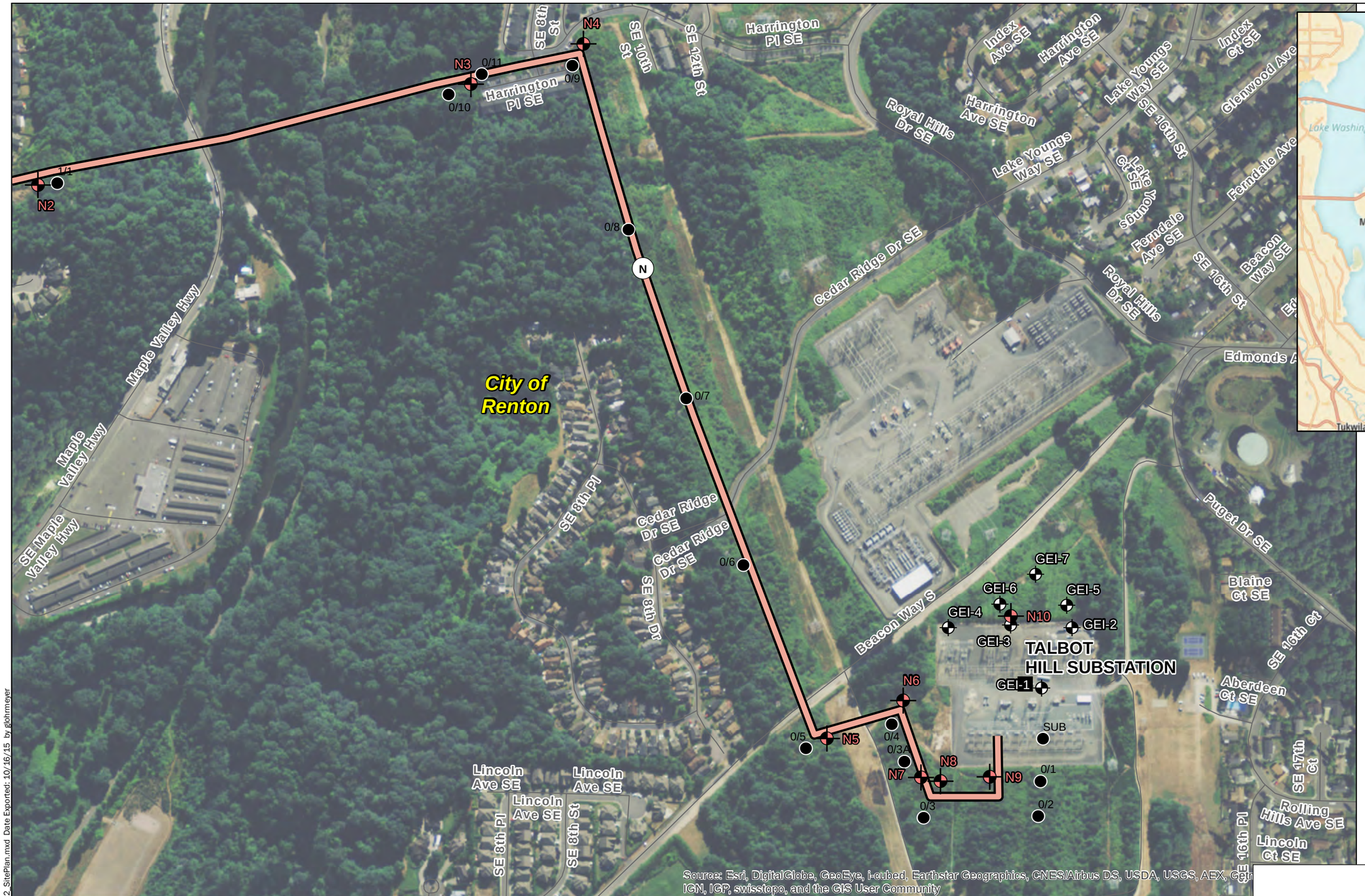
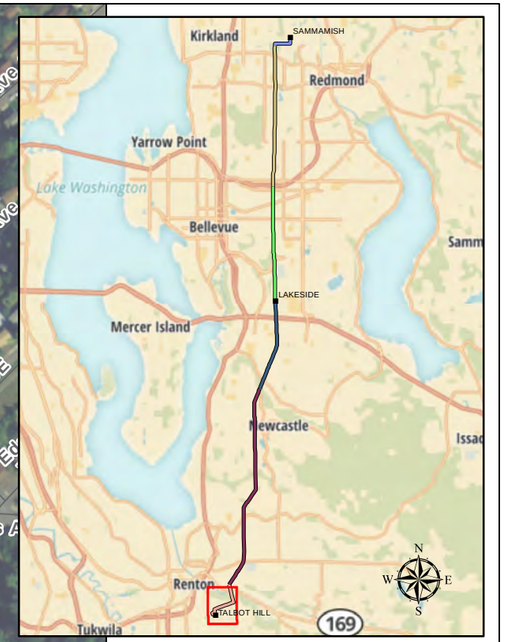
DSD 001378





Legend

- 0/1 Pole
- A1 Current GeoEngineers Boring
- B-1 Previous GeoEngineers Boring
- Substation
- Route Segment
- City Boundary

Notes:

1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Projection: NAD 1983 HARN StatePlane Washington North FIPS 4601 Feet

N W E S

400 0 400
Feet

Site Plan
Segment N

PSE Energize Eastside Project
Design Phase
Renton, Washington

GeoEngineers

Figure 19

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DSD 001379

APPENDICES

GeoEngineers

DSD 001380

APPENDIX A
Field Explorations

See File #17-120557-LO

APPENDIX A
FIELD EXPLORATIONS

We explored subsurface conditions along the project alignment by completing 40 borings between August 18 and September 9, 2015 to depths ranging from 38 to 71½ feet below the existing ground surface. The borings were completed by two drilling contractors, Geologic Drill Explorations, Inc. and Holt Services, Inc. under subcontract to GeoEngineers.

As the locations for the new poles have not yet been finalized, exploration locations were typically within up to 50 horizontal feet of existing the proposed pole locations to maintain clearances from overhead power lines, other surface features, and underground utilities. The locations of the explorations were determined by pacing and measuring from existing poles and other existing features. GPS coordinates (latitude and longitude) were collected by GeoEngineers at the actual drilled location for each of the 40 explorations using a GPS tool in a GeoEngineers mobile application titled GISPro. The surface elevation of each exploration are based on Google Earth (NAVD88); exploration locations and elevations should be considered accurate only to the degree implied by the methods used.

Borings

The borings were completed using both track-mounted and truck-mounted drill rigs. Each boring was advanced using hollow-stem auger methods. Our field representatives located the borings, classified the soils encountered, observed and recorded groundwater seepage conditions, obtained disturbed and undisturbed samples of the soils, and prepared a detailed field log of each boring. Our representative also assisted in the installation of groundwater monitoring wells in several of the borings.

Samples of the subsurface soils were typically obtained in the borings at 5-foot intervals by driving a 1.4-inch inside-diameter standard penetration test (SPT) split-barrel sampler (ASTM D 1586). A 2.4-inch inside-diameter California sample was typically obtained at 15 feet below existing grades. GeoEngineers selected several California samples to be submitted for density and direct shear tests. The boring logs include a notation of where a California sample was obtained.

The SPT and California samples were obtained using a 140-pound hammer falling approximately 30 inches. The number of blows required to drive the sampler the final 12 inches or other specified distance is recorded on the boring logs.

We visually classified the soils using the system described in Figure A-1. Figure A-1 also includes a key to the boring log symbols. The logs of our borings are presented in Figures A-2 through A-41. The logs reflect our interpretation of the field conditions and the results of laboratory evaluation and testing of soil samples. They also indicate the depths at which the soil types or their characteristics change, although the change might actually be gradual. If the change occurred between samples, it was interpreted. The densities noted on the boring logs are based on moisture-density laboratory tests and our judgment based on the conditions encountered.

Because of the gravel, cobbles, and boulders encountered in some of the borings, the soil classifications indicated on the logs are based on our observation of the soil recovered in the samplers, soil observed coming up the surface around the augers, drilling action, and laboratory tests conducted on the samples

obtained. It is important to note that the laboratory tests were typically conducted on only the portion of the soil smaller than the sampler diameters.

The borings were subsequently backfilled or completed as groundwater monitoring wells (see below) in accordance with Washington Department of Ecology regulations. Holes made in pavement core holes were patched with quick setting concrete.

Groundwater Level Observations and Measurements

We made observations of groundwater conditions as the borings were completed. These observations represent a short-term condition and may not be representative of the long-term groundwater conditions at the pole locations. Groundwater conditions observed during drilling should be considered approximate.

Two-inch-diameter monitoring wells were installed in eight borings to allow measurement of groundwater levels after drilling. Well screen elevations were installed with GeoEngineers' assistance based on observations during drilling.

We measured groundwater levels in the monitoring wells on September 16, 2015. These measurements are summarized in Table 2 in the main text of this report. Some of the measurements are also noted on the respective boring logs.

The monitoring wells are the property of Puget Sound Energy (PSE). The wells should be decommissioned by a licensed well driller in accordance with Chapter 173-160 of the Washington Administrative Code (WAC) when they are no longer needed for data collection. Alternatively, the wells could be kept intact for use during project bidding and then be decommissioned under the construction contract.

Environmental Field Screening of Soil Samples

Soil samples obtained in the upper 15 feet of the explorations for this project were typically screened in the field for evidence of contamination using: (1) visual examination and (2) sheen screening. The results of sheen screening are included in the notes section of the boring logs.

Visual screening consists of observing the soil for stains indicative of petroleum-related contamination. Visual screening is generally more effective when contamination is related to heavy petroleum hydrocarbons, such as motor oil or hydraulic oil, or when hydrocarbon concentrations are high.

Sheen screening and headspace vapor screening are more sensitive methods that have been effective in detecting contamination at concentrations less than regulatory cleanup guidelines. Sheen screening involves placing soil in a pan of water and observing the water surface for signs of sheen. Sheen classifications are as follows:

No Sheen (NS)	No visible sheen on water surface.
Slight Sheen (SS)	Light, colorless, dull sheen; spread is irregular, not rapid; sheen dissipates rapidly.
Moderate Sheen (MS)	Light to heavy sheen, may have some color/iridescence; spread is irregular to flowing; few remaining areas of no sheen on water surface.
Heavy Sheen (HS)	Heavy sheen with color/iridescence; spread is rapid; entire water surface may be covered with sheen.

No sheen was observed in any of the samples except for borings N1 and N2, where slight and moderate sheen was observed.

Environmental Soil Sampling Procedures

Soil samples intended for chemical analysis were placed in 4-ounce laboratory prepared jars, filled and packed to minimize headspace. Equipment used to obtain soil samples was decontaminated prior to each use using a Liqui-Nox® solution and a distilled water rinse. All soil samples for analytical testing were placed in an iced cooler pending transport to the analytical laboratory.

Soil sampled at 10 feet in boring N1 (previously label as B-10) was selected for chemical analysis. Chemical analysis results were reported as Not Detected (ND) for all contaminants tested.

APPENDIX B
Geotechnical Laboratory Testing

See File #17-120557-LO

APPENDIX B
GEOTECHNICAL LABORATORY TESTING

Soil samples obtained from the borings were transported to our Redmond geotechnical laboratory and evaluated to confirm or modify field classifications, as well as to evaluate engineering and index properties of the soil samples. Representative samples were selected for laboratory testing consisting of moisture content tests, percent fines tests, grain size distribution (sieve analyses), and plasticity tests. Direst shear tests were completed at another laboratory under subcontract to GeoEngineers. We also conducted tests on selected soil samples to assist in the evaluation of corrosion potential. This testing program included resistivity, pH, redox potential, and sulfide tests.

We performed the tests using methods of the American Society for Testing and Materials (ASTM) or other applicable procedures.

Soil Classification

Soil samples obtained from the borings were visually classified in the field and in our laboratory using a system based on the Unified Soil Classification System (USCS) and ASTM classification methods. ASTM Test Method D 2488 was used to visually classify the soil samples, while ASTM D 2487 was used to classify the soils based on laboratory tests results. These classification procedures are incorporated in the boring logs presented in Figures A-2 through A-41.

Moisture Content Testing

Moisture content tests were completed for representative samples obtained from the borings using the ASTM D 2216 test method. The results of these tests are presented on the boring logs at the depths at which the samples were obtained.

Percent Fines Testing

Tests to evaluate the percent fines (particles passing the No. 200 sieve) were completed on several samples using ASTM D 1140. The wet sieve method was used to determine the percentage of soil particles larger than the U.S. No. 200 sieve. The results of the percent fines tests are presented on the boring logs at the depths at which the samples were obtained.

Sieve Analyses

Sieve analyses were completed on several samples using the ASTM D 422 test method to determine the sample grain size distribution. The wet sieve analysis method was used to determine the percentage of soil particles larger than the U.S. No. 200 mesh sieve. The results of the sieve analyses were plotted and classified using the USCS, and are presented in Figures B-1 through B-12.

Plasticity Characteristics

Plasticity characteristics of several soil samples were evaluated by conducting Atterberg limits tests using the ASTM D 4318 test method. This test method evaluates the liquid limit, plastic limit and plasticity index of the portion of the sample finer than the No. 40 sieve. The results of the Atterberg limits tests are presented in Figure B-13.

Direct Shear Tests

Direct shear tests were conducted on selected soil samples by an outside laboratory using the ASTM D 3080 test method. This test method evaluates the friction angle and cohesion intercept under consolidated drained conditions. The direct shear tests are presented in the back of this appendix.

Corrosion Evaluation Tests

Soil properties related to corrosivity were evaluated using Ductile Iron Pipe Research Association (DIPRA) tests performed on selected samples. DIPRA testing consisted of resistivity, pH, redox potential, and sulfides. The results of the DIPRA testing are presented in Table B-1. In addition, pH and resistivity tests were performed on selected samples, the results of which are also presented in Table B-1.

TABLE B-1. CORROSION EVALUATION TEST DATA

Boring	Sample	Depth (feet)	Resistivity (Ohm-cm)	pH	Redox Potential (millivolts)	Sulfides
A1	2	10	15,000	6.4	235	Negative
A2	2	10	20,000	6.8	-	-
A3	4	15	17,000	7.1	284	Negative
C6	1	5	15,000	7.5	315	Negative
M3	3	10	25,000	7.5	325	Negative
M5	2	10	8,200	7.5	225	Negative
M8	1	5	35,000	-	-	-
M11	1	5	6,800	6.6	360	Negative
N6	1	2.5	68,000	-	-	-
N9	1	5	35,000	6.9	302	Negative

APPENDIX C
Chemical Analytical Testing Program

See File #17-120557-LO

APPENDIX C
CHEMICAL ANALYTICAL TESTING PROGRAM

Analytical Methods

Chain-of-custody procedures were followed during the transport of the field samples from boring N1 (previously labeled B-10) to the analytical laboratory. The sample was held in cold storage pending extraction and/or analysis. The analytical results, analytical methods reference and laboratory quality control (QC) records are included in this appendix. The analytical results are also summarized in the text of this report.

Analytical Data Review

The laboratory maintains an internal quality assurance program as documented in its laboratory quality assurance manual. The laboratory uses a combination of blanks, surrogate recoveries, duplicates, matrix spike recoveries, matrix spike duplicate recoveries, blank spike recoveries and blank spike duplicate recoveries to evaluate the validity of the analytical results. The laboratory also uses data quality goals for individual chemicals or groups of chemicals based on the long-term performance of the test methods. The data quality goals were included in the laboratory report.

APPENDIX D
Previous Explorations

See File #17-120557-LO

APPENDIX D
PREVIOUS EXPLORATIONS

GeoEngineers reviewed logs of previous explorations completed in the general vicinity of the project, namely in the vicinity of the Sammamish, Lakeside, Richards Creek (proposed), and Talbot Hill substations. The locations of previous explorations are shown on the Site Plan, Figures 2 through 19. The logs of the previous explorations are presented in this appendix and include:

- The logs of two borings (B-1 and B-2) in 2015 by GeoEngineers in the draft report entitled "Geotechnical Engineering Services, Sammamish Substation, Redmond, Washington."
- The logs of four borings (GEI-1 through GEI-4) completed in 2013 by GeoEngineers in the report entitled "Geotechnical Engineering Services, Lakeside Substation Improvements, Bellevue, Washington."
- The logs of seven borings (B-1 through B-7) completed in 2015 by GeoEngineers in the draft report entitled "Geotechnical Engineering Services, Richards Creek Substation, Bellevue, Washington."
- The logs of seven borings (GEI-1 through GEI-7) completed in 2014 by GeoEngineers in the report entitled "Geotechnical Engineering Services, Talbot Substation Improvements, Renton, Washington."

APPENDIX E
Recommended Soil Parameters and LPILE Data

See File #17-120557-LO

APPENDIX E
RECOMMENDED SOIL PARAMETERS AND LPILE INPUT DATA

This appendix presents our recommended soil properties for use in lateral load analyses of deep foundations for support of the proposed transmission line poles. We have provided the soil properties in a format suitable for input into the computer program LPILE. Soil properties selected for LPILE input are based on our subsurface explorations, geotechnical laboratory testing and our experience. Table E-1 provides the LPILE soil input parameters for each proposed pole location.

The soil parameters are appropriate for assessing soil-pile interaction under static loading conditions. To account for liquefied soil conditions for soil profile 1 and 4 (north end of Segment J only) during the design seismic event, we recommend the p-multipliers in Table E-2 be applied to the LPILE generated p-y curves.

TABLE E-1. LPILE INPUT PARAMETERS[1]

Depth (feet)	Soil Unit	USCS Soil Type	Friction Angle (degrees)	Cohesion, c (psf)	LPILE Parameters			
					P-Y Curve Model	Effective Unit Weight (pcf)	Soil Modulus, k (pci)	Strain Factor, ε_{50}
Profile 1 – West Edge[2]								
0 to 15	Loose alluvium	SM/SP-SM	30		Sand	55	25	
15 to 60	Till	SM	40		Sand	62	125	
Profile 1 – Center of Wetland								
0 to 15	Loose alluvium	SM/SP-SM	30		Sand	55	25	
15 to 60	MD alluvium	SM/SP-SM	33		Sand	60	50	
60 to 70	Advance outwash	ML/SP-SM	40		Sand	62	125	
Profile 2								
0 to 10	Weathered/ disturbed till	SM	34		Sand	130	90	
10 to 30	Till	SM	40		Sand	135	225	
30 to 60	Till/advance outwash	SM, SP-SM	40		Sand	73	125	
Profile 3								
0 to 15	Weathered till/recessional outwash	SM/SP-SM	34		Sand	130	90	
15 to 30	Till	SM	40		Sand	135	225	
30 to 60	Till/advance outwash	SM/SP-SM	40		Sand	73	125	

Depth (feet)	Soil Unit	USCS Soil Type	Friction Angle (degrees)	Cohesion, c (psf)	LPILE Parameters			
					P-Y Curve Model	Effective Unit Weight (pcf)	Soil Modulus, k (pci)	Strain Factor, ε_{50}
Profile 4 – North end of Segment J[2] (assumes groundwater at surface)								
0 to 10	Fill/Recessional outwash	SM/SP-SM	30		Sand	58	25	
10 to 40	Recessional outwash	SM/SP-SM	34		Sand	58	60	
40 to 60	Till/advance outwash	SM/SP-SM	40		Sand	73	125	
Profile 4 – Segment N								
0 to 40	Recessional outwash/ice contact	GM, SM	34		Sand	130	60	
40 to 60	Ice Contact	GM, ML, SM	40		Sand	73	90	

Notes:

[1]The design values and depths are based on interpolation between similar borings.

[2]We recommend reevaluating the LPile parameters for each pole once the locations are finalized in this area

psf – pounds per square foot

pcf – pounds per cubic foot

pci – pounds per cubic inch

TABLE E-2. P-MULTIPLIERS FOR SEISMIC LPILE ANALYSIS

Profile	Depth Range (feet below surface)	P-multiplier[1]	Potential for Liquefaction or Strength Loss
1 – West Edge			
Loose alluvium	0 to 10	0.1	Liquefiable
Loose to medium dense alluvium	10 to 15	0.2	Liquefiable
Glacial till/advance outwash	15 to 60	1.0	Non-liquefiable
1 - Center			
Loose alluvium	0 to 15	0.1	Liquefiable
Loose to medium dense alluvium	15 to 45	0.25	Liquefiable
Medium dense alluvium	45 to 60	0.4	Liquefiable
Glacial till/advance outwash	60 to 70	1.0	Non-liquefiable
3 – North End of Segment J			
Fill/recessional	0 to 10	0.1	Liquefiable
Recessional	10 to 40	0.2	Liquefiable
Glacial till	40 to 60	1.0	Non-liquefiable

Notes:

[1] Based on Brandenberg, et al., 2007.

APPENDIX F
Report Limitations and Guidelines for Use

APPENDIX F
REPORT LIMITATIONS AND GUIDELINES FOR USE[1]

This appendix provides information to help you manage your risks with respect to the use of this report.

Read These Provisions Closely

It is important to recognize that the geoscience practices (geotechnical engineering, geology and environmental science) rely on professional judgment and opinion to a greater extent than other engineering and natural science disciplines, where more precise and/or readily observable data may exist. To help clients better understand how this difference pertains to our services, GeoEngineers includes the following explanatory "limitations" provisions in its reports. Please confer with GeoEngineers if you need to know more how these "Report Limitations and Guidelines for Use" apply to your project or site.

Geotechnical Services Are Performed for Specific Purposes, Persons and Projects

This report has been prepared for Puget Sound Energy (PSE) and for the Project specifically identified in the report. The information contained herein is not applicable to other sites or projects.

GeoEngineers structures its services to meet the specific needs of its clients. No party other than the party to whom this report is addressed may rely on the product of our services unless we agree to such reliance in advance and in writing. Within the limitations of the agreed scope of services for the Project, and its schedule and budget, our services have been executed in accordance with Change Order No. 1 to our blanket agreement with PSE (Contract Number 4600007997) dated August 18, 2015, and generally accepted geotechnical practices in this area at the time this report was prepared. We do not authorize, and will not be responsible for, the use of this report for any purposes or projects other than those identified in the report.

A Geotechnical Engineering or Geologic Report Is Based on a Unique Set of Project-Specific Factors

This report has been prepared for the Energize Eastside 230 kV Transmission Line project in Redmond, Bellevue, Newcastle, Renton and King County, Washington. GeoEngineers considered a number of unique, project-specific factors when establishing the scope of services for this project and report. Unless GeoEngineers specifically indicates otherwise, it is important not to rely on this report if it was:

- not prepared for you,
- not prepared for your project,
- not prepared for the specific site explored, or
- completed before important project changes were made.

[2] Developed based on material provided by ASFE, Professional Firms Practicing in the Geosciences; www.asfe.org.

For example, changes that can affect the applicability of this report include those that effect:

- the function of the proposed structures;
- elevation, configuration, location, orientation or loads of the proposed structures;
- composition of the design team;
- project ownership; or
- government agency review and policies

If changes occur after the date of this report, GeoEngineers cannot be responsible for any consequences of such changes in relation to this report unless we have been given the opportunity to review our interpretations and recommendations. Based on that review, we can provide written modifications or confirmation, as appropriate.

Subsurface Conditions Can Change

This geotechnical or geologic report is based on conditions that existed at the time the study was performed. The findings and conclusions of this report may be affected by the passage of time, by man-made events such as construction on or adjacent to the site, new information or technology that becomes available subsequent to the report date, or by natural events such as floods, earthquakes, slope instability or groundwater fluctuations. If more than a few months have passed since issuance of our report or work product, or if any of the described events may have occurred, please contact GeoEngineers before applying this report for its intended purpose so that we may evaluate whether changed conditions affect the continued reliability or applicability of our conclusions and recommendations.

Geotechnical and Geologic Findings Are Professional Opinions

Our interpretations of subsurface conditions are based on field observations from widely spaced sampling locations at the site. Site exploration identifies the specific subsurface conditions only at those points where subsurface tests are conducted or samples are taken. GeoEngineers reviewed field and laboratory data and then applied its professional judgment to render an informed opinion about subsurface conditions at other locations. Actual subsurface conditions may differ, sometimes significantly, from the opinions presented in this report. Our report, conclusions and interpretations are not a warranty of the actual subsurface conditions.

Geotechnical Engineering Report Recommendations Are Not Final

The construction recommendations included in this report are preliminary and should not be considered final. GeoEngineers' recommendations can be finalized only by observing actual subsurface conditions revealed during construction. GeoEngineers cannot assume responsibility or liability for the recommendations in this report if we do not perform construction observation.

We recommend that you allow sufficient monitoring, testing and consultation during construction by GeoEngineers to confirm that the conditions encountered are consistent with those indicated by the explorations, to provide recommendations for design changes if the conditions revealed during the work differ from those anticipated, and to evaluate whether earthwork and foundation installation activities are completed in accordance with our recommendations. Retaining GeoEngineers for construction observation for this project is the most effective means of managing the risks associated with unanticipated conditions.

A Geotechnical Engineering or Geologic Report Could Be Subject to Misinterpretation

Misinterpretation of this report by members of the design team or by contractors can result in costly problems. GeoEngineers can help reduce the risks of misinterpretation by conferring with appropriate members of the design team after submitting the report, reviewing pertinent elements of the design team's plans and specifications, participating in pre-bid and preconstruction conferences, and providing construction observation.

Do Not Redraw the Exploration Logs

Geotechnical engineers and geologists prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. The logs included in a geotechnical engineering or geologic report should never be redrawn for inclusion in architectural or other design drawings. Photographic or electronic reproduction is acceptable, but separating logs from the report can create a risk of misinterpretation.

Give Contractors a Complete Report and Guidance

To help reduce the risk of problems associated with unanticipated subsurface conditions, GeoEngineers recommends giving contractors the complete geotechnical engineering or geologic report, including these "Report Limitations and Guidelines for Use." When providing the report, you should preface it with a clearly written letter of transmittal that:

- advises contractors that the report was not prepared for purposes of bid development and that its accuracy is limited; and
- encourages contractors to confer with GeoEngineers and/or to conduct additional study to obtain the specific types of information they need or prefer.

Contractors Are Responsible for Site Safety on Their Own Construction Projects

Our geotechnical recommendations are not intended to direct the contractor's procedures, methods, schedule or management of the work site. The contractor is solely responsible for job site safety and for managing construction operations to minimize risks to on-site personnel and adjacent properties.

Biological Pollutants

GeoEngineers' Scope of Services specifically excludes the investigation, detection, prevention or assessment of the presence of Biological Pollutants. Accordingly, this report does not include any interpretations, recommendations, findings or conclusions regarding the detecting, assessing, preventing or abating of Biological Pollutants, and no conclusions or inferences should be drawn regarding Biological Pollutants as they may relate to this project. The term "Biological Pollutants" includes, but is not limited to, molds, fungi, spores, bacteria and viruses, and/or any of their byproducts.

A Client that desires these specialized services is advised to obtain them from a consultant who offers services in this specialized field.

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Puget Sound Energy

Avian Protection Plan

PUGET SOUND ENERGY
The Energy To Do Great Things

Guidelines for managing avian interactions with company infrastructure

DSD 001400

AVIAN PROTECTION PLAN

PSE AVIAN PROTECTION PROGRAM

February 2014

PUGET SOUND ENERGY

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Puget Sound Energy's Avian Protection Plan

Bird interactions with power lines may cause bird injuries and mortalities, which may result in outages, violations of bird protection laws, equipment failure, and fires, and may raise concerns by employees, resource agencies, and the public.

This Plan is intended to ensure compliance with legal requirements while improving system reliability. Puget Sound Energy management and personnel are responsible for managing bird interactions with power lines and are committed to reducing the negative effects of these interactions.

To fulfill this commitment, PSE will:

- Implement and comply with this Avian Protection Plan (APP).
- Ensure that our actions comply with applicable state and federal laws, regulations, permits, and APP procedures.
- Document bird mortalities, injuries, and problem nests.
- Construct/rebuild electrical systems to PSE's avian-safe standards in avian habitat areas as directed by the avian program biologists.
- Provide information, resources, and training to improve employee awareness of the APP.
- Retrofit the electrical system in response to avian mortalities consistent with PSE's standards and the procedures described in the APP.
- Facilitate a cooperative relationship with the US Fish and Wildlife Service as described in the APP.

PSE customer service and regulatory compliance will be enhanced and risk to migratory birds will be reduced through the proactive and innovative resolutions of bird/power line interactions guided by this plan.

Signature _____ Date 2/28/2014
Paul Wiegand, Sr. Vice President, Energy Operations

Signature _____ Date 2/28/2014
Booga Gilbertson, Vice President, Operations

Executive Summary

This Avian Protection Plan provides guidelines developed by PSE's Avian Protection Program for minimizing bird interactions with PSE's facilities, primarily electrocutions and collisions with power lines and other electrical equipment. PSE began managing bird/power line interactions as early as 1979, and implemented a formal Avian Protection Program in 2000. This program was developed in coordination with the US Fish and Wildlife Service (USFWS) and the Avian Power Line Interaction Committee (APLIC).

This Avian Protection Plan (APP) summarizes the components of PSE's Avian Protection Program and includes program background, goals and objectives, incident response procedures, roles and responsibilities, reporting, site prioritization and follow-up, long-range planning, training, and resources. This document serves as a reference to assist PSE employees and service providers in managing bird/power line interactions.

PSE maintains an ongoing commitment to investigate avian interactions with company facilities and to work cooperatively with the USFWS and the U.S. Department of Justice in an effort to prevent future bird mortalities. This Avian Protection Plan is designed to serve as a guide to fulfilling this commitment. Implementation of the plan also improves power system reliability and helps maintain compliance with state and federal regulations governing the protection of bird species.

1.0 Introduction

Although PSE began managing bird and power line interactions as early as 1979, the U.S. Fish and Wildlife Service nonetheless informed PSE in March of 2000 that PSE was under investigation for alleged violations of the MBTA, BGEPA, and ESA for electrocution of bald eagles on its distribution system. In response to those inquiries, PSE formalized its Avian Protection Program to consolidate response and reporting efforts under a single entity.

Since its initiation, the Avian Protection Program has grown to address avian issues and concerns company-wide, including electrocutions and collisions, bird nests on utility poles, and avian management at PSE's wind facilities. The program is nationally recognized, and has progressively developed a set of principles and procedures to address avian issues in a manner that is consistent throughout PSE's service territory, and is also consistent with the guidelines established by the Avian Power Line Interaction Committee (APLIC, 2005).

The Avian Protection Program was implemented to address mortalities, injuries, and risk to avian species protected under the Migratory Bird Treaty Act (MBTA), the Bald and Golden Eagle Protection Act (BGEPA), and the Endangered Species Act (ESA).

PSE will review this plan periodically in coordination with federal and state authorities, and will adapt the plan to reflect evolving information, needs, and priorities. As part of continuous improvement efforts, PSE regularly reviews and enhances its maintenance programs; therefore, new maintenance procedures and policies will likely be implemented in the future.

1.1 Corporate Policy

The PSE Corporate Policy Manual (appendix A) states:

> Puget Sound Energy and its employees at all levels will comply with all environmental laws, regulations, and Company environmental policies. The Company encourages environmentally responsible and sustainable behavior, and holds Company employees accountable for environmental performance.

1.2 Corporate Avian Management Policy

The purpose of PSE's avian policy is to ensure compliance with legal requirements while improving distribution system reliability. PSE is responsible for managing avian interactions with power lines, and is committed to reducing the detrimental effects of these interactions.

To fulfill this commitment, PSE will:

- Implement and comply with its comprehensive Avian Protection Plan.
- Ensure that its actions comply with applicable laws, regulations, permit criteria, and company avian protection procedures.
- Document avian mortalities, injuries, problem nests, and problem poles and spans.
- Reduce avian incidents by completing system retrofits at injury/mortality sites as appropriate.

- Report avian incidents and mitigation to the USFWS in consistence with the Special Purpose Utility Permits under which the program operates.
- Implement avian-safe construction standards when building or rebuilding distribution lines in avian habitat outside of urban, commercial, or residential development areas or in areas of high avian use.
- Provide information, resources, and training for PSE employees and contractors to improve knowledge of avian protection policies and procedures.
- Participate in public outreach with organizations, programs, and research to promote awareness of avian power line issues and PSE efforts to reduce risk to avian species.

Table 1. Puget Sound Energy's avian protection contact list[a].

Name	Position	Telephone	E-mail address
Mel Walters	Avian Protection Program Manager, Consulting Resource Scientist	425.785.4963	melvin.walters@pse.com
Haley Edwards	Avian Protection biologist, Resource Scientist	206.419.4919	haley.edwards@pse.com
Roque Bamba	Manager, Resource Sciences and Land Use Planning	425.462.3774	roque.bamba@pse.com
Tony Fuchs	Consulting Resource Scientist , Avian Protection Program supporting biologist	425.462.3553	tony.fuchs@pse.com
Scott Heller	Resource Scientist, Avian Protection Program supporting biologist	425.457.5578	scott.heller@pse.com
Manisa Kung	Enforcement Agent, US Fish and Wildlife Service, Western Washington	425.883.8122	manisa_kung@fws.gov
Corky Roberts	Enforcement Agent, US Fish and Wildlife Service, Eastern Washington	509.546.8344	corky_roberts@fws.gov
Jennifer Miller	US Fish and Wildlife Service Migratory Bird Permit Office	503.872.2715	jennifer_miller@fws.gov
Chris Anderson	Wildlife Biologist, Washington Department of Fish and Wildlife, Mill Creek office (Avian management)	425.775.1311 Ext. 111	christopher.anderson@dfw.wa.gov
Chris Danilson	Wildlife Biologist, Washington Department of Fish and Wildlife, La Connor office (Trumpeter swan project)	360.466.4345 Ext. 280	christopher.danilson@dfw.wa.gov

[a]This contact list is subject to change and should be reviewed and updated on a regular basis, particularly with regards to Agency personnel.

2.0 Program Overview

The following sections provide an overview of the Avian Protection Program, including program background, regulatory statutes driving the program, program goals and objectives, and roles and responsibilities.

The original Avian Protection Plan was developed and implemented in collaboration with the USFWS and the Avian Power Line Interaction Committee (APLIC) in 2005, and was developed to provide guidelines for PSE employees and contractors while managing avian – power line issues and concerns.

PSE has a comprehensive program with diverse components that address a variety of potential interactive conditions. The strength of the program depends on the successful

integration of all the different pieces and consistency throughout the company. The program has several specific goals (section 2.3), which are reached through the cooperation of a network of people both inside and outside of PSE.

2.1 Program Background

While PSE's Avian Protection Program has grown to encompass avian concerns company-wide, it was initially implemented to address avian-power line issues. Interactions between wildlife and electrical systems have been documented since the early years of electrical power distribution. Raptor electrocutions first gained prominence during the 1970s raptor mortality investigations in Idaho. Many raptor carcasses were found in close proximity to power lines and poles. Raptor protection devices were developed as early as 1940, with improved devices becoming available in the 1970s. Since the 1970s, utilities have known how to design effective retrofits for electrical systems to reduce raptor electrocutions. Consequently, enforcement agencies have considered the construction of electrical systems without avian-safe provisions to be negligence.

Birds inevitably come in contact with the power system, sometimes damaging the system as well as the animals. PSE historically responded to these incidents as they were identified. With growing concern about bird mortalities, injuries, problem nests, and electrical system outages, PSE formalized diagnosis and response efforts by introducing the Avian Protection Program in 2000. The purpose of this program was to protect the avian species that interact with PSE's electrical system, to maintain compliance with laws and regulations governing the protection of wildlife, and to improve electrical system reliability. Since its initiation in 2000, the program has grown to include avian interactions company-wide, including at PSE's wind facilities.

2.2 Regulatory Statutes

One aspect of the Avian Protection Program is to maintain up-to-date knowledge regarding current laws and regulations related to bird protection and educate others within PSE of amendments or updates to existing guidelines or enforcement.

The need for an APP has been augmented by enforcement actions undertaken by the US Department of Justice. There have been several notable prosecutions, with resulting fines, expensive settlements, and potential criminal penalties. While actions against utilities are rare, they highlight the importance of proactive responses.

Three main federal statutes address anthropogenic impacts to birds, regardless of intent: the MBTA, the BGEPA, and the ESA. The general purpose of these acts is to address unnecessary injury or mortality to important avian resources that currently may be at risk in the United States.

2.2.1 Migratory Bird Treaty Act

The MBTA offers protection to more than 1,000 species of migratory birds (listed in 50 CFR 10.13), including waterfowl, shorebirds, seabirds, wading birds, raptors, and passerines. Generally speaking, the MBTA protects all birds in the U.S. except gallinaceous birds (upland game birds), rock doves (pigeons), European starlings, and house (English) sparrows. To date, there is no regulatory mechanism for getting an incidental take permit under the MBTA.

2.2.2 Bald and Golden Eagle Protection Act

The BGEPA (16 USC 668-688d**)** affords additional protection to bald and golden eagles. The U.S. Fish and Wildlife Service (USFWS) promulgated regulations regarding bald and golden eagles that are associated with but not the purpose of the activity pursuant to BGEPA. 50 CFR § 22.26. FWS also released Proposed Guidance for Eagle Conservation Plans for public comment and are now in the process of finalizing its guidance.

2.2.3 Endangered Species Act

The purpose of the ESA (16 USC 1531-1543) is to protect federally-listed endangered and threatened species and to provide a means to conserve their habitats. Under the ESA, federal agencies are directed to use their authority to conserve listed species, as well as "candidate" species that may be listed in the near future, and to make sure that federal agencies actions do not jeopardize the continued existence of these species. The USFWS can authorize incidental take of listed species through Sections 7 and 10 of the ESA.

2.3 Program Goals and Objectives

A set of distinct and fundamental goals guide the Avian Protection Program's policies, commitments, and actions.

- Maintain compliance with state and federal wildlife laws.
- Document incidents of bird mortalities, injuries, problem nests, and ensure appropriate notification and coordination with federal and state agencies.
- Systematically reduce the risk of avian electrocution and collision on the electrical system.
- Provide a framework for field personnel to manage bird/power line interactions.
- Improve electrical system reliability and environmental stewardship.
- Establish design standards for new equipment and power line construction to reduce the risk of avian mortalities and injuries.
- Coordinate PSE planning, assessment, and continuous improvement activities that affect avian safety.
- Maintain a positive relationship with regulatory agencies and coordinate PSE's avian protection program activities with the agencies to optimize responsiveness.
- Raise awareness among PSE employees and service providers about avian protection issues and the related company policies and procedures.
- Establish consistency throughout the company in managing avian issues.
- Continually evaluate the effectiveness of the program.

2.4 Program Roles and Responsibilities

PSE's Avian Protection Program biologists are responsible for coordinating the development and implementation of PSE's Avian Protection Program. Currently, there are two avian biologists on staff representing the avian protection program: Mel Walters, who initiated the program; and Haley Edwards, who has supported the program since 2008. Both biologists are available as needed and are able to perform the duties required by the avian protection program. The core duties of the Avian Protection Program include:

- **External relationship management.** Manage the relationship with the U.S. Fish & Wildlife Service (USFWS) and the U.S. Department of Justice. Maintain positive working relationships with USFWS special agents, Washington State Department of Fish and Wildlife (WDFW), local jurisdictions and other non-governmental entities.
- **Permit management.** Manage special purpose utility permits in coordination with the USFWS Regional Migratory Bird Permit Office, complete notifications and reporting as required by the permits, and inform PSE employees and Service Providers of current permit requirements and procedures. Obtain authorization to manage nests and handle birds as needed through the USFWS and other appropriate agencies.
- **Incident response.** Serve as the primary contact for avian incident reporting within PSE. Respond to all avian mortalities and injuries, determine cause, and take appropriate actions to prevent reoccurrence. Provide work plans to electric first response engineers and line crews as needed.
- **Reporting.** Report eagle incidents to the USFWS Office of Law Enforcement (OLE) the next business day, and the USFWS Regional Migratory Bird Permit Office (RMBPO) within 48 hours. Maintain avian mortality reporting system and streamline data management process. Provide mortality data to the USFWS as directed by the OLE and RMBPO for eagles and other large birds. Submit an annual report to the RMBPO. Provide information annually to PSE's reliability report regarding avian-caused outages.
- **Long-range planning.** Prioritize areas of concern and develop actions to proactively prevent electrocutions and improve system reliability. Maintain working relationships with PSE's Standards, Total Energy System Planning, Maintenance Planning, Contract Management, and Electric First Response departments to facilitate implementation of preventative measures.
- **Budget management.** Engage stakeholders (internal and external) to secure cost-effective approaches to avian protection with available resources. Evaluate risk and prioritize sites to complete projects within the specified budget. Track project spending throughout the year to improve accuracy of budgeting forecasts.
- **Company policy management and training.** Develop and communicate company guidelines to employees and other departments to facilitate compliance with federal, state, and local laws and regulations. Provide training to staff and field personnel on regulatory requirements, permit requirements, reporting procedures, the issues associated with avian-power line interactions, and techniques used to prevent electrocution and collision of avian species associated with power lines and electrical equipment.

- **Program maintenance and refinement.** Oversee continual improvement and maintenance of PSE's Avian Protection Program. PSE's Avian Protection Program is an ongoing effort and a long-term commitment to maintain compliance with state and federal laws and be responsive to the investigation by the U.S. Department of Justice.
- **Education and resources.** Provide information to customers and the general public about PSE's Avian Protection Program. Maintain informational materials such as the avian protection program brochure, poster display, and website. Participate in local events such as the Upper Skagit Bald Eagle Festival and Audubon Society meetings.

Figure 1. Bald eagle perched on center phase bird guard

3.0 Avian Protection Program Operating Procedures

3.1 Avian/Power Line Incident Response

3.1.1 Notification and Initial Response Procedures – Servicemen or other employees/contractors

Pursuant to PSE's Avian Incident Response & Reporting Procedures, the discovery of dead or injured eagles or other protected birds (appendix D) by PSE employees and contractors should be immediately reported (appendix E) to the PSE Avian Protection Program biologists or other PSE staff listed in table 1. In addition, **no response actions (e.g., moving, disturbing, or disposing of dead or injured birds or nests) should be taken without authorization from the PSE Avian Protection Program Manager.** Under verbal authorization of an Avian Protection Program biologist, depending on the species involved, personnel may be directed to secure a bird carcass until the biologist arrives at the site.

Dispatchers, system operators, servicemen, operational personnel, and contractors play a key role in making sure that the company is aware of, and properly responds to, avian incidents and problems in a timely manner. Dispatchers and system operators are responsible for fielding calls regarding avian incidents and problem nests from PSE employees and contractors and completing the Avian Incident Report in PSE's outage management system. The dispatchers and system operators are also responsible for notifying an Avian Protection Program biologist immediately if there is an eagle or other state or federal protected species involved, and within 24 hours if the incident involves other MBTA-protected species (appendix D). The following information should be collected at the time of initial notification.

- Species if known, or description of bird(s) (note if the bird has any bands, markers, collar, or tags)
- Date and time of discovery
- Location of the incident (address, intersection, or pole number)
- Names and contact information for incident reporter and witnesses, if applicable
- Type of electrical equipment potentially involved
- Description of any response actions taken (installation of bushing covers, cut out covers, and covered jumpers if the incident occurred on an equipment pole)

It is a violation to take (kill, transport, sell, or possess) protected avian species, regardless of intent, without proper permits or authorization. Therefore, under no circumstances should company personnel remove or have in their possession the carcass of a dead bird unless specifically directed by one of the Avian Protection Program biologists, who are authorized by the USFWS and WDFW as applicable. Violations of take (killing, transporting, selling, or possessing), regardless of intent, could result in criminal prosecution including prison or fines to PSE or the responsible individual.

For avian incidents at PSE's wind facilities, as much as possible of the following information should be collected at the time of discovery:

- Date of discovery
- Species
- Sex and age if known
- Observer name and contact information
- Turbine or pole number
- Distance of carcass from turbine
- Azimuth from turbine/GPS point in decimal degrees
- Type of surrounding habitat
- Condition/description of the carcass with suspected cause of mortality
- Estimated time since death
- Information on carcass disposition

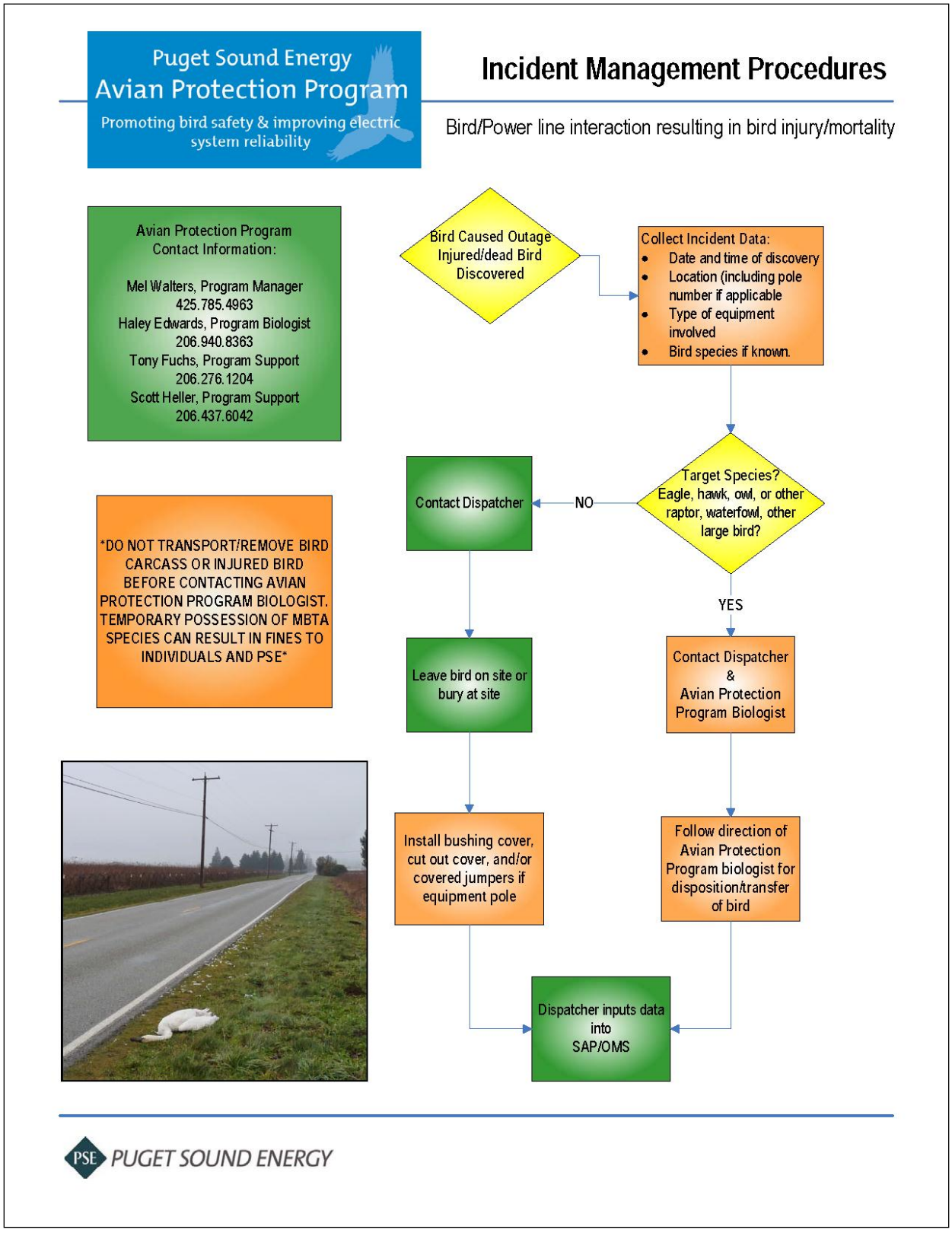


Figure 2. Avian Protection Program injury/mortality response flowchart.

3.1.2 Follow-up Response Procedures – Avian Protection Program biologists

Small bird incidents are typically associated with equipment poles and cause outages. When servicemen respond to small bird-caused outages, they are expected to install bushing covers, cut-out covers, and covered jumpers on the equipment to preclude reoccurrence and mitigate for the small bird mortality. When a larger bird is involved, Avian Protection Program biologists conduct a site visit to gather more information and determine the appropriate response.

During the site visit, program biologists conduct a root cause examination, estimate the relative risk for future avian interaction, and evaluate the most effective method to retrofit the site. Data is recorded for the location of each avian incident, along with the date, type of bird, pole number, cause, circuit number, type of equipment involved, surrounding habitat, weather, and suggested mitigation. An internal database houses this data, photos, avian work plans, and a map of recorded incidents. The data is periodically transferred to the USFWS (section 4.1).

3.2 Disposal of Avian Mortalities

3.2.1 Eagles and ESA-listed species

When an eagle or ESA-listed species is found, the carcass must be left onsite. It may not be moved unless necessary to protect the carcass, in which case it may be moved to a safe place as described in section 5.1. In no case may the carcass be buried or discarded, since the USFWS investigates all eagle and ESA-species mortalities, which often require necropsy to determine the cause of death. It is PSE company policy to cooperate fully in any such investigation.

As indicated in section 3.1.1, the local dispatcher or system operator must be notified of all bird mortalities, including those of eagles or ESA-listed species. The local dispatcher or system operator will contact the Avian Protection Program biologists, who will follow procedures as recommended by the USFWS OLE for transferring eagle or ESA species to the USFWS.

3.2.2 Other Protected Avian Species

Over 1,000 species of owls, hawks, waterfowl, corvids, and small migratory birds are protected under the MBTA only. A list of these species present in PSE's service territory that may interact with the electrical system is located in appendix D of this plan. PSE employees or contractors who discover a mortality of one of these birds must promptly report the incident to an Avian Protection Program biologist or system dispatcher, and may not salvage or dispose of the carcass without authorization. In some cases, PSE may be allowed to dispose of the carcass onsite without transporting it, unless the carcass has a leg band or other marker. Onsite disposal is currently approved for MBTA-protected birds, with the exception of swans, eagles, and ESA-listed species by the WDFW and USFWS. However, this arrangement is subject to change, and should be done only with the prior consent of an Avian Protection Program biologist.

3.3 Site Prioritization and Follow-up

Sites are prioritized by the level of risk for repeat interaction, with consideration given to nearby habitat, avian use (nesting, foraging, perching, and roosting), type of line (transmission vs. distribution, single phase, three phase, etc.), and configuration as described in sections 5.2 and 5.3. An Avian Protection Program biologist evaluates each incident site to develop the most cost-effective and efficient method for remediating segments of the electrical system to reduce the risk of future interactions. Retrofit work plans are developed with provisions for modifying poles and equipment to prevent future electrocutions, marking spans of line to reduce collisions, and sometimes modifying both poles and spans in areas of high swan and eagle use.

The Avian Protection Program biologist coordinates with PSE's first-response engineers to create job notifications for projects, obtain materials which are generally kept in stock, and schedule crews to complete the projects. Public safety as well as the safety of PSE employees and contractors are a high priority, and are considered when designing and implementing avian protection projects. Upon completion, the site is visited to ensure that the devices were installed correctly.

Table 2. Procedures for identifying and responding to avian incidents.

Type of Incident	Initial Response	Program Biologist Procedures	Avian Program Reporting	Avian Program Mitigation	Program Biologist Follow-up
Electrocution Eagle/ESA Species	Contact program biologist Promptly (ASAP) Follow direction of biologist Transfer eagle to biologist	Secure eagle, transfer to USFWS Conduct site visit/cause analysis Assess risk	Notify USFWS OLE next business day & RMBPO within 48 hours of incident Document in PSE avian database Report in USFWS online database/submit in USFWS annual report	Identify nest/roost sites nearby Develop retrofit plan for the site (cover conductors and equipment on poles, re-frame, install perches, etc.)	Inspect retrofits for proper installation and completion of work as specified
Electrocution Other Raptor or Large Bird (Hawks, owls, herons, etc.)	Contact program biologist promptly, follow direction of biologist	Conduct site visit/cause analysis, assess risk, dispose of the bird	Notify USFWS if necessary Document in PSE avian database Report periodically to USFWS online database/submit in USFWS annual report	Develop retrofit plan (Install avian protection devices on pole where incident occurred and adjacent high risk poles if appropriate)	Inspect retrofits for proper installation and completion of work as specified
Electrocution Small birds (Gulls, crows, jays, songbirds, etc.)	Report bird caused outage* to dispatcher Install bushing cover, cut out cover, covered jumpers as appropriate Contact program biologist	Conduct site visit/risk assessment if appropriate Dispose of bird if necessary	Record bird caused outage in database Report periodically to USFWS database Submit information in Annual Report to USFWS Submit to PSE's annual reliability report	Automatically install avian protection devices if incident occurred on an equipment pole (Bushing covers, cut out covers, and covered jumpers.)	Inspect retrofits for proper installation and completion of work as specified
Collision (Swans, geese, herons, etc.)	Contact program biologist promptly (ASAP) Follow direction of biologist Transfer swan to biologist	Secure the bird Transfer swans to WDFW Conduct site visit /cause analysis Assess risk	Notify USFWS if necessary Report periodically to USFWS database Document in PSE database Report to WDFW promptly	Identify roosts, foraging, and flyways areas nearby Develop retrofit plan (Install line markers, tree wire, etc.)	Inspect retrofits for proper installation and completion of work as specified

Type of Incident	Initial Response	Program Biologist Procedures	Avian Program Reporting	Avian Program Mitigation	Program Biologist Follow-up
Collisions Eagle/ESA species	Contact program biologist promptly (ASAP) Follow direction of biologist Transfer eagle to biologist	Secure eagle, transfer to USFWS (ASAP) Conduct site visit/cause analysis Assess risk	Notify USFWS OLE next business day & RMBPO within 48 hours of incident Document in PSE avian database Report in USFWS online database/submit in USFWS annual report	Identify nest/roost sites nearby Develop retrofit plan for the site Install avian protection devices on poles and spans, if appropriate	Inspect retrofits for proper installation and completion of work as specified
Injury Eagles/ESA Species	Contact program promptly (ASAP) Follow direction of biologist Transfer the bird to biologist/rehabber	Contact nearest wildlife rehab center Transfer bird to rehabber Conduct site visit/cause analysis Assess risk	Notify USFWS OLE next business day & RMBPO within 48 hours Document in PSE avian database Report to USFWS database	Identify roost/nest site nearby Develop retrofit plan (cover conductors and equipment on poles, re-frame, install perches, mark spans, tree wire, etc.)	Inspect retrofits for proper installation and completion of work as specified Follow up with rehabber re: status of the bird
Injury Swan or other large bird	Contact program biologist promptly (ASAP) Follow direction of biologist Transfer the bird to biologist/rehabber	Contact nearest wildlife rehab center Transfer bird to rehabber Conduct site visit/cause analysis Assess risk	Notify USFWS within 48 hours Contact WDFW promptly (ASAP) Document in PSE avian database Report to USFWS database	Identify roosts, foraging, and flyways areas nearby Develop retrofit plan (Install line markers, tree wire, etc.)	Inspect retrofits for proper installation and completion of work as specified Follow up with rehabber re: status of the bird
Problem nest	Contact program biologist promptly	Determine level of risk Determine species and active vs. inactive nest	Notify USFWS & WDFW Document in PSE avian database	Schedule relocation or removal of nest as appropriate Monitor crew during possession of nest	Confirm nest is not rebuilt on system Install nest/perch deterrent devices

3.4 Nest Management

Bird nests on PSE facilities can occasionally interfere with PSE operations and equipment, and may need to be relocated. Moving or otherwise disturbing bird nests without government authorization can result in regulatory violations. PSE is committed to minimizing the effects of company activities on sensitive avian species during the nesting season (typically April – July for most species, April – August for osprey, and February – July for eagles) whenever possible. Depending on the species, inactive, active, and occupied nests are protected by the MBTA, BGEPA and ESA. In some cases, PSE may be allowed to move a problem nest, but only after obtaining a permit or other authorization from the USFWS and the WDFW, as applicable.

Figure 3. Osprey nest on a PSE distribution pole in Kittitas County.

3.4.1 Identifying and Reporting Problem Nests

PSE employees can assist PSE's avian protection efforts by proactively reporting bird nests on PSE facilities that have the potential to interfere with electrical system operations. Prompt reporting allows greater flexibility for managing nests in an efficient and cost-effective manner while minimizing the risk of outages, fire, and damage to equipment.

Bird nests should not be moved or disturbed without prior authorization and instruction from a PSE Avian Protection Program biologist, except in the case of imminent danger (see definition in section 3.4.2). Even in the case of imminent danger, every reasonable effort should be made to reach an Avian Protection Program biologist or contact person prior to initiating action, or as soon as possible after the imminent danger is under control. The Avian Protection Program biologists will provide instructions for responding to the situation, and if necessary will secure permits or agency authorization to remove or relocate the nest. If a nest has caused a power outage, then the reporting individual should also contact the local dispatcher or system operator to report the cause of the outage, which will then be entered into the outage management system.

Bird nests that do not interfere with electrical system operations should be left in place. If the nest needs to be evaluated, contact an Avian Protection Program biologist.

3.4.2 Nest Management Requirements

Response actions taken by the Avian Protection Program biologists will vary according to the bird species involved and the status of the nest. Due to the complexity of these requirements, the Avian Protection Program biologists need to determine appropriate response actions. In many cases, trained personnel are needed to properly identify the bird species and determine the status of the nest (e.g., occupied or unoccupied). In addition, removing a nest is not always the best long-term solution. Reoccupation and rebuilding of nests during subsequent breeding seasons is common, especially in the case of osprey. Several options should be considered, depending on the particular situation.

The varying regulatory requirements governing nest management are summarized below. However, PSE personnel and contractors should report all problem nests to one of the Avian Protection Program biologists prior to initiating any action involving the nest.

- **Unoccupied problem nests:** if no adults, eggs, or chicks are present, the nest is considered unoccupied. In the case of eagles and ESA-listed species, even unoccupied nests are protected from disturbance and removal. Nests are typically inactive during the non-breeding season, which varies depending on species. Contact a program biologist to help determine if a nest is inactive, and follow appropriate actions as directed. If there is a significant risk to PSE facilities, it is possible to remove or relocate the nest with proper authorization from state and federal agencies.
- **Occupied problem nests:** If adults, chicks, or eggs are present, the nest is classified as occupied or active. The nesting season varies depending on the species, and should be evaluated by a program biologist. If the nest compromises safety or poses a significant risk of electrical outage, damage to PSE equipment, or fire, the nest may be moved under the direction of the biologist after state and federal agencies authorize the move.
- **Imminent danger:** In the extremely exceptional case of imminent danger, nest material may be trimmed, conductors moved, or other appropriate action taken prior to receiving a permit. Reasonable efforts should be exercised to contact one of the program biologists prior to initiating any management action to control the imminent danger. If the presence of a bird or nest presents an imminent danger and action must be taken immediately, contact one of the program biologists as soon as feasible after the action has been taken so that the necessary permit or other authorization can be obtained.

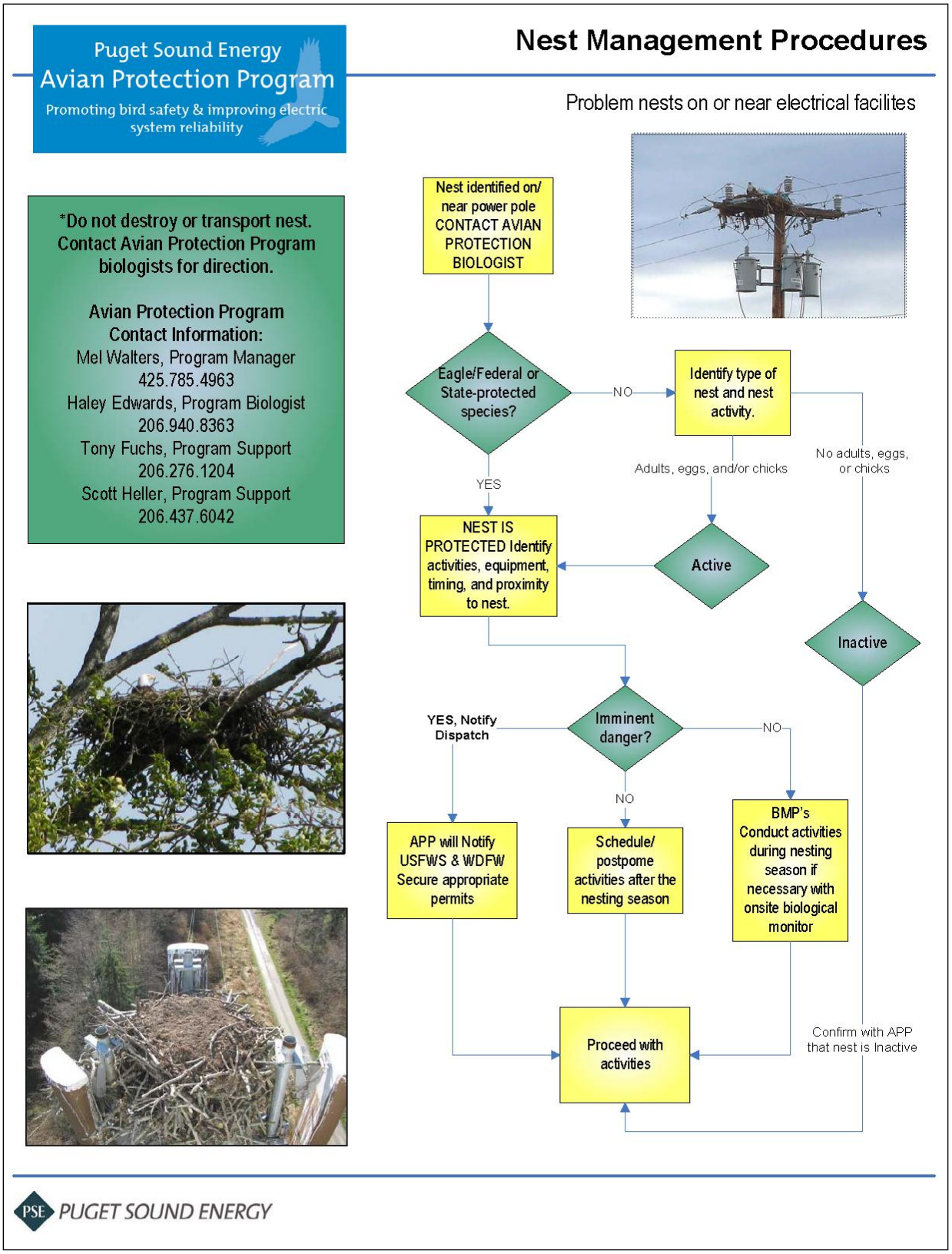


Figure 4. Avian Protection Program problem nest management flowchart.

3.4.3 Nests and Construction/Vegetation Management Activities

When conducting construction or vegetation management activities near active nests, PSE is responsible to employ "best management practices" to avoid take of protected avian species, and to avoid disturbance of active eagle nests. This section outlines the APP process to identify areas of concern, develop site-specific procedures to address concerns and minimize potential impacts to nesting birds, and consult with the agencies.

1. Consult WDFW and the Priority Habitat online database to identify avian nesting or roosting habitat or areas of concern and to identify any required buffers.
2. Document the types of construction/vegetation management activities planned, proximity to avian habitat, scope of work, type of equipment to be used, and timing and duration of activities.
3. Conduct a site visit to confirm location, nesting/roosting activity, proximity to planned area of work, and other site-specific conditions.
4. Develop measures for impact minimization (timing of work, avoidance of buffer areas within the identified site during the nesting season, on-site monitors during activities, etc.).
5. Submit planned measures to WDFW and USFWS for approval/notification.
6. Continue communication with project managers, crews, and agencies throughout construction/vegetation management activities.

3.5 Electrical System Modification

Three general categories of actions are being implemented to systematically upgrade PSE's electrical system to avian-safe standards: incident response, proactive system modification, and preventative new construction. All these approaches to upgrading the system must work together cohesively to significantly reduce the risk of avian incidents (injuries or mortalities). Methods used to retrofit the electrical system have been approved by PSE's Standards group, and are consistent with APLICs Suggested Practices for Avian Protection on Power Lines (APLIC 2006).

3.5.1 Reactive Project Development

Reactive retrofit plans are developed in response to avian incidents. Plans may involve adding protective devices to poles or spans, or redesigning lines at high-priority sites where mortalities have occurred, including nearby equipment that poses similar risks in high-avian-use nesting, foraging, or roosting areas.

For reactive projects, PSE is committed to completing work in a timely manner, and also acknowledges the parameters related to completing projects within a specific timeframe as described below. The timeframe for project completion varies somewhat, as different species and different circumstances require different remediation procedures.

For small bird mortalities: Program biologists record data about the incident upon notification. Servicemen should automatically respond by covering equipment on the pole where the incident occurred. The data for these mortalities are submitted annually to the USFWS RMBPO.

For eagle incidents: Program biologists secure the bird and transfer it to the USFWS following procedures as requested by USFWS OLE. A site visit is conducted immediately or as soon as possible, and a retrofit project plan is developed typically within two weeks and submitted to the appropriate first-response engineer. The job is entered into the system and crews are notified and scheduled, and have up to 90 days to complete the project. If additional permits are required (Department of Transportation, shoreline, etc.), additional time may be needed to complete the project. Eagle projects usually are completed within 12 months of the incident, but are likely completed in a shorter timeframe, particularly in emergency situations, assuming that there are no other required permits. Depending on other factors, some projects (such as burying power lines) may also take longer to complete under certain circumstances.

3.5.2 Proactive System Modification

Proactive system modification plans are developed based on the avian electrocution and collision risk posed by existing lines in high-use avian areas (nesting sites, eagle perch poles, etc.). While specific incidents have not been reported at these sites, structures are modified where appropriate to reduce or eliminate risks.

3.5.3 Preventative Efforts

All new or rebuilt lines in high-raptor-use areas are constructed to PSE's avian-safe standards (Section 3.8). Avian habitat areas are outlined in PSE's electrical circuit mapping system, and cover most of PSE's service area. By consulting the avian habitat map and employing avian-safe construction standards in the areas noted, PSE is systematically reducing the risk of avian electrocutions as part of its established maintenance cycle. Implementing avian protection standards during construction is a cost-effective means of proactively providing benefits.

3.6 Internal Incident Tracking

PSE collects information on all bird/power line incidents to ensure compliance with applicable government regulations and to enable PSE to prevent future incidents at high-risk sites. Sections 4.1 and 4.2 outline the initial incident reporting and agency notification procedures. These are designed to allow PSE to respond quickly to bird incidents and to ensure that short-term response actions are conducted in a manner consistent with regulatory requirements.

As indicated in section 3.1.1, the local dispatcher or system operator fields an incident report call from a PSE employee or contractor and records information on the bird incident. The local dispatcher or system operator then immediately notifies an Avian Protection Program biologist to transfer the information. The local dispatcher or system operator should then route the incident to the appropriate personnel for entry into the outage management system.

Program biologists maintain an incident tracking database, which includes non-outage incidents, mapping, mitigation projects, preventative actions, cost, and retrofit maintenance information. The internal database provides information needed for internal risk assessment and tracking, USFWS reporting requirements, and PSE's annual reliability report regarding bird-caused outages.

3.7 Outage Management and Reliability

PSE has been recording animal-caused outages in its outage management system since 1977. Since 2000, when the Avian Protection Program was officially implemented, and employees began training on bird-caused outage response procedures, the reporting of bird-caused outages has increased. Employees also began distinguishing between bird- and animal-caused outages in 2000, improving incident-tracking accuracy.

PSE's outage metrics involve two factors: frequency and duration. Bird- and animal-caused outages are second only to tree-caused outages in frequency, and have reduced PSE's electrical system reliability with an average of approximately 1,900 animal-caused outages each year between 2000 and 2010. These outages are relatively short and typically affect fewer customers, as they generally occur on pole-mounted equipment such as transformers, cut-outs, jumper wires, and so on, and are often relatively simple to repair.

Approximately 99% of these bird- and animal- caused outages occur on PSE's distribution system, with the remaining outages occurring at substations. The frequency of bird- and animal- caused outages has been trending downward since they peaked in 2004 due to three main factors. PSE implemented a "bushing cover program," and raptor-safe standards for new power line construction in 2004. These measures, along with retrofitting avian mortality sites as mitigation, have decreased the number of avian collisions and electrocutions on PSE's electrical system since the program began in 2000.

Additionally, when lines are constructed or rebuilt with tree wire (a covered wire that offers protection from tree-caused outages), these spans and poles are considered avian-safe, since birds are protected from electrocution caused by brush contact. As more lines are covered in tree wire each year through avian capital projects or during routine power line upgrades in high-use avian areas, the potential for bird-caused outages diminishes.

3.8 Avian-Safe Standards

PSE's avian-safe standards (appendix G) require that all new lines be constructed using avian-safe design in areas of avian habitat (high concentrations of large birds nesting, roosting, or foraging; or lands managed as avian habitat, eagle nesting or roosting areas, etc.). These standards were first implemented in 2004, are regularly updated, and include numerous avian-safe design features, which generally either cover or provide appropriate spacing between exposed electrical equipment. These standards are consistent with the Suggested Practices for Avian Protection on Power Lines (APLIC, 2006), and APLIC's collision manual, Reducing Avian Collisions with Power Lines (APLIC, 2012).

When PSE constructs or rebuilds lines in raptor habitat areas, specific devices are recommended for specific configurations if framing the system to be avian-safe, or constructing with sufficient spacing, is not an option. Program biologists work together with planners and engineers to develop the most appropriate method for applying avian-safe standards on a site-specific basis. When deciding which type of device to use there are several factors to consider, including equipment configuration, type of birds at risk for interaction, nearby habitat and availability of natural perches, and the life span of different devices. The Electric Distribution Line Construction Standards document

provides all the available options, and program biologists make specific recommendations based on these considerations.

For example, poles with narrowly-spaced conductors, particularly in eagle use areas, may have anti-perching devices, bird guard conductor covers, or raised perches installed, depending on the most likely type of interaction, pole configuration, nearby habitat, and wind conditions. Other standards address nest platforms, line markers, and a variety of equipment covers. When bird-caused outages occur on equipment poles, PSE standards require the installation of bushing covers, cut out covers, and covered jumpers (when possible) when servicemen respond. All new transformers are installed with bushing covers and covered jumpers.

4.0 Reporting and External Relationship Management

Several external entities are vital to the effectiveness of the program. The cooperation of these entities is essential not only to the success of progressive APP development and implementation, but also to the general extended application of program principles company-wide to benefit the resource.

- The **US Fish and Wildlife Service** enforces federal wildlife laws. In addition to maintaining compliance with federal laws, the program also strives to maintain a positive relationship with the USFWS through timely reporting and mitigation actions, open communication, and seeking guidance on management activities. The program biologists also offer an annual field review of avian protection work completed in the previous year with the local USFWS enforcement agent.
- The **Washington Department of Fish and Wildlife** reports and responds to swan interactions with PSE's electrical system, collects and disposes of all swan carcasses, and facilitates the capture, banding, and release of injured and recoverable swans.
- **Wildlife rehabilitators** occasionally report and respond to avian-powerline incidents, provide rehabilitation services for birds injured on PSE's system whenever possible, and facilitate the release of recovered birds.
- The **Avian Power Line Interaction Committee** provides networking opportunities with utility biologists nationwide, promotes development of innovative solutions to avian issues, provides a forum to review the best available science, produces nationally-recognized publications for avian protection to which PSE is an active contributor, and conducts workshops and meetings with the involvement of PSE's avian biologists.
- **Avian protection device manufacturers** advise the program regarding avian protection devices, provide samples of new devices, and improve the function and durability of their devices based on feedback from PSE.

4.1 Reporting

One of the primary functions of the program is to facilitate open communication and promote understanding between PSE and the USFWS, the federal agency responsible for administering the ESA, MBTA, and BGEPA. Reporting is an important facet of this

interaction, and there are several ways this is accomplished. The program biologists report eagle or ESA incidents to OLE within 24 hours or next business day and to the RMBPO within 48 hours, submits data to the USFWS online reporting database, reports annually to the RMBPO regarding avian mortalities company-wide, and offers the USFWS enforcement agent a field review of remediation projects completed in the previous year. Reporting of mortalities and injuries is driven by the terms of PSE's Special Purpose Utility Permits, which are managed by the avian biologists, as well as agreements with the USFWS OLE.

Other large birds are recorded in PSE's incident tracking database, and their data is transferred periodically to the USFWS online mortality database. Incidents involving small or unknown birds are tracked internally, are typically mitigated through PSE's bushing cover program, and are reported annually to the USFWS RMBPO.

- **Notification to USFWS.** Program biologists are responsible for notifying the USFWS OLE of any incident involving an eagle or other ESA-protected avian species within 24 hours or the next business day, and the RMBPO within 48 hours.
- **Reporting to the USFWS online database.** The APP provides avian incident data to the USFWS periodically through the current USFWS online reporting system. Eagle incidents are typically reported online within one week after the information is collected. Incidents involving swans and other birds are added periodically throughout the calendar year in which they occur.
- **Annual Report to the RMBPO.** Each year the APP completes an annual report for avian incidents associated with PSE's electrical system and wind facilities, and submits the report to the USFWS Regional Migratory Bird Permit Office in Portland. This report is completed in accordance with the Special Purpose Utility Permits (appendices B & C).
- **Annual field visit with the OLE.** Each year program biologists offer the local USFWS enforcement agent an opportunity to conduct a review in the field of remediation projects completed at incident sites in the previous year.

4.2 Agency Coordination

In addition to notifying the USFWS immediately after learning of eagle-related incidents, contributing data to the USFWS online reporting database, and reporting annually to the USFWS RMBPO regarding avian mortalities company-wide, program biologists manage the Special Purpose Utility Permits for handling and temporarily possessing avian species and nests. This involves updating the permits with USFWS RMBPO as needed, understanding the key components of the permits, being aware of changes in permit policies or conditions, and educating others in the company of any changes. For example, starting in 2013, PSE was granted two separate permits: one for its electrical facilities, and one for its wind facilities. Each of the two permits has distinct, although similar, requirements and conditions.

Another important aspect of agency coordination involves staying current with changes in policy, agency initiatives including studies and programs, the regulatory environment, and the best available science locally and nationally related to species of concern.

The Avian Protection Program is also responsible for notifying the USFWS, WDFW, and other appropriate agencies when PSE conducts power line construction or other activities such as vegetation management near eagle nests, osprey nests, heron rookeries, or other sensitive areas during the breeding season as described in section 3.4.3. This may involve further consultation or management direction from USFWS or WDFW.

4.3 Avian Power Line Interaction Committee (APLIC)

PSE has been a member of the Avian Power Line Interaction Committee (APLIC) since 2004, and continues to be an active contributor to workshops, business meetings, and written publications that provide industry standards for avian protection issues. Much has been gained through this network of utility biologists and agency personnel, as well as equipment vendors.

APLIC is a forum that provides professional leadership opportunities for PSE's Avian Protection biologists as well as discussion of new technologies, regulatory development, best management practices, changes in program effectiveness, current industry issues/concerns nationwide, and funding for research. PSE's APP biologists have contributed to industry standards publications including *Suggested Practices for Avian Protection on Power Lines* (APLIC, 2006) and *Reducing Avian Collisions with Power Lines* (APLIC, 2012). Participation in APLIC meetings provides a direct benefit for professional development in this field, and for refining PSE's Avian Protection Program.

4.4 Non-Governmental Organizations

PSE makes an effort to partner with organizations whenever possible to provide increased benefit to the resource. Some organizations PSE regularly coordinates with are the Audubon Society, The Nature Conservancy, and the Trumpeter Swan Society. Some of these projects include installing bluebird nest boxes, erecting osprey nest platforms, retrieving sick and injured swans, and providing educational presentations.

5.0 Long-Range Planning

5.1 Understanding the Issue

There are generally three types of outcomes when birds interact with the electrical system: electrocution, collision, and collision-electrocution. Electrocutions occur when birds make direct contact with energized and grounded conductors or equipment. This risk is associated with the spacing between equipment, and is the main cause of mortality for eagles on PSE's system. Collisions are caused by birds flying directly into conductors, causing injury or mortality from impact, such as a broken wing or neck. Collisions on PSE's system usually involve swans, due to their large body size, poor maneuverability, and behavior of flying in poor weather conditions and low light. Collision-electrocutions occur when birds collide with power lines and either make phase-to-phase contact, or come in "brush contact" with power lines. This can result in electrocution, flashover, system outages, or even fire.

As discussed in section 3.4, another type of avian interaction on PSE's electrical system involves bird nests, particularly osprey and raven nests. Nest material on utility poles can come in contact with energized equipment, and these materials may either pose an

electrocution risk by conducting electricity when wet, or else ignite, killing or injuring birds and damaging the pole and system. Even when a nest is not likely to cause a problem, the nesting birds themselves are at increased risk of injury or mortality from contact with electrical equipment.

Depending on the type of equipment, configuration, and the nature of avian interaction with a specific segment of PSE's facilities, along with several other factors, the Avian Protection Program coordinates with others to systematically modify its system.

Figure 5. Bald eagle on a PSE three-phase transformer bank in Skagit County

5.2 Understanding the Equipment

Because distribution lines and transmission lines differ in voltage, they have different spacing and clearance requirements in accordance with the National Electric Reliability Corporation (NERC) and PSE standards. The voltage of a power line dictates the spacing and clearance requirements of the conductors, so that as the voltage increases, the height and spacing of conductors increase as well. These differences in voltage and spacing relate to other factors influencing the risk of avian incidents as discussed in this section.

Distribution power lines pose a higher risk than transmission lines for all three types of interaction due to the close spacing between conductors, energized and grounded equipment, and the low visual profile that increases the risk of collision. Transmission lines generally pose little electrocution risk to birds due to the spacing between grounded and energized equipment.

Although all of these structures have the potential for avian interaction, electrocution, or collision, many factors must be considered when determining the level of risk to birds. The APP must consider these factors when assigning priority to avian incident sites, proactive projects, and preventative work.

5.2.1.1 Distribution Lines

Most avian incidents occur on distribution lines, which are typically 69 kV or less. This increased risk is a result of several factors. Distribution lines are generally spaced approximately two to six feet apart and are supported on poles that range from 30 to 65 feet high. The conductor height is at least 18 feet at the lowest point of the span. Due to close spacing, smaller and less-visible wire, and the placement of other electrical equipment such as transformers and terminations, these lines pose a higher risk of avian incidents.

5.2.1.2 Transmission Lines

Transmission lines, typically over 69 kV, have conductors spaced approximately 7 to 30 feet apart, and are supported on poles ranging from 50 to 120 feet high. The conductors are suspended at least 20 feet high at the lowest point in the span. Because of their wide conductor spacing, higher visual profile (particularly with bundled conductors), taller height, and lack of equipment on their poles, transmission structures are less frequently involved in avian incidents on PSE's system.

5.2.1.3 Bonding and Grounding

Many utilities that operate in environments where lightning regularly occurs have a policy of bonding and grounding all metal mounting hardware on distribution poles, and have an overhead ground wire on transmission lines. This is to eliminate problems caused by hardware becoming electrically charged due to capacitive or static effects. When the hardware becomes charged, it can shock linemen working on the pole, and if the charge builds, can cause fire and damage to the system. Bonding the hardware together can eliminate that charge and also helps to avoid damage to the system from lightning strikes. This makes the line safer to work on and improves reliability of the system. However, bonded equipment gives birds a close ground point of contact when they perch on an equipment pole.

PSE typically does not bond mounting hardware because of the low incidence of lightning strikes in its service territory, along with the damp climate that helps to dissipate charges that might have built up in a drier climate. Therefore, the risk of pole fires caused by charge build-up or lightning strikes is minimal in western Washington, and the risk to birds from simultaneously contacting energized and bonded/grounded equipment is reduced. Kittitas County is an exception to this, since there is a higher probability of lightning and charge buildup in the drier climate east of the Cascade Mountain range. In Kittitas County, poles and spans must be evaluated on a case-by-case basis for bonded/grounded equipment and the relative risk of electrocution for birds.

5.3 Risk Assessment

Avian electrocutions on and collisions with power lines are caused by a combination of engineering, biological, and environmental factors. The primary engineering factors are the spacing between energized and grounded equipment, configuration, and the type and condition of equipment. Voltage, conductor spacing, and grounding practices are of particular concern when evaluating the risk of avian electrocution. Two main design factors dictate the relative safety of power lines for avian species: the separation of phase conductors relative to the flesh-to-flesh wingspan of the species, and the distance

between grounded hardware (ground wires, metal braces, etc.) and energized conductors relative to the wingspan or the height of the species. When evaluating the risk of collision, it is important to consider the type and configuration of the line (transmission vs. distribution, single phase vs. three phase, and spacing between conductors), surrounding habitat, and avian activity.

Though each unit (pole or span) is different in locale and exposure, each can pose a potential electrocution or collision risk to birds. Based on this information, distribution poles and spans, and particularly transformer poles, are generally considered higher risk for electrocution. PSE is committed to retrofitting its power lines in high-risk areas systematically using the methodologies defined in this section to reduce this risk to avian species. Risk assessment aids the Avian Protection Program in determining which projects to implement each year. This ensures that the projects completed are the most effective at protecting birds while using funds efficiently. Some of the factors considered are:

- Type of line (transmission vs. distribution)
- Configuration of line and equipment
- High-avian-use habitat
- Nesting habitat and problem nesting sites
- Proximity to existing raptor nest sites
- Traditional flyways
- Facilities adjacent to wetlands
- Prey populations
- Perch and nesting substrate availability
- Observed use of electrical facilities

PSE's risk assessment methodology is based on previous incidents, field observations of avian activity, habitats, land use, line configuration, equipment type, equipment condition, and likelihood of avian use of PSE facilities. Program biologists review the incident tracking database, incident maps, electrical system information, and field observations to identify risk of avian interaction and to prioritize sites. Understanding avian behavior and PSE's electrical system, with consideration of habitat, land use, and avian activity in relation to PSE facilities, is vital to this method of risk assessment.

Table 3. PSE avian risk assessment considerations.

Pole Site	Line Span	Habitat/Avian Behavior
Spacing of conductors	Spacing and size of conductors	History of avian incidents
System configuration	Presence of other flight obstructions (buildings, trees, roads, etc.)	Proximity to nest/roost sites
Equipment on pole	Alignment of lines relative to flyways	Proximity to prey/foraging areas
Existing avian protection (Bird guards, perch deterrents, elevated perches, equipment covers, etc.)	Existing avian protection (line markers, tree wire, etc.)	Available natural perches nearby
Use of electrical facilities for perching/nesting	Agricultural land use	Concentration of avian populations

5.3.1 Electrical System Risk Factors

Through tracking of bird-caused outages and avian incidents in general, program biologists can conclude that approximately 95% of PSE's known avian incidents occur on its distribution system. Approximately 60% of bird- and animal-caused outages, about 1,200 per year, occur at overhead transformers.

Given the scope of the issue and the large number facilities required to provide power across nine counties and transect additional counties with transmission lines, the Avian Protection Program must be efficient at assessing risk system-wide, consider many factors, and prioritize work accordingly. PSE's electrical system consists of:

- A transmission system including 2,602 miles of power lines, approximately 30,036 poles, and 62 substations.
- A distribution system including 10,446 miles of overhead power lines, 304,029 poles, 293 substations, and 1,111 distribution circuits.
- A total of 13,048 miles of transmission and distribution power lines, 304,029 distribution poles (transmission poles are not factored into this equation due to their low avian risk factor), 334,065 combined spans, and 355 substations.

These numbers are based on an assumed average of 25.7 poles per mile and one span of line per pole. The calculation for the average poles per mile of distribution and transmission takes into consideration double circuit lines, where two circuits run on the same poles, and underbuild, where the distribution line runs along the same poles as the transmission line.

In total, currently there are 304,029 distribution poles and 334,065 combined transmission and distribution spans for a combined total of 638,094 units (poles *and* spans). There are approximately 173,000 overhead transformers on PSE's system that pose a potential electrocution hazard to avian species.

In addition to evaluating the risk associated with the line configuration, assessing the biological and environmental risk factors and using historical data help the program to further narrow its focus to more efficiently utilize resources and systematically upgrade the system to avian safe standards.

5.3.2 Biological Risk Factors

Several biological factors influence avian interactions with power lines. These factors include bird species, size, age, and behavior. Raptors often use power poles for perching, and due to their wingspan they are at higher risk of electrocution than smaller birds. Age influences risk because younger birds are generally less skillful at flying, and less maneuverable while taking off or landing on a power pole. Behavior becomes a factor seasonally, such as during the breeding season when eagles are more attentive to other eagles, and pay less attention to where they are flying. This puts them at higher risk of collision. In PSE's service territory, swans are at a higher risk for collision with power lines for similar reasons. They are not very maneuverable in flight, they fly low in rural areas in poor weather and low-light conditions, and fly in flocks where only the lead birds may see obstacles while the other birds just follow along and sometimes collide with the lines.

5.3.3 Environmental Risk Factors

Some of the primary considerations related to environmental risk factors are land use, habitat, and the ways birds interact with a particular landscape. In rural areas with fewer trees, there is higher potential for avian interaction with the electrical system, since raptors will use poles for perching, shade, shelter, or even nesting and there are fewer obstructions for low-flying birds which increases their chance of colliding with lines.

Another environmental factor is weather, which can change the ways that birds interact with the system. Birds may take shelter from wind, snow, or sun on power poles in areas of fewer trees. Wind, rain, and fog can increase the risk of both collisions and electrocutions. Because wet poles and birds are more conductive, rain increases the risk of electrocution on poles that are safe when dry. Wind makes it more difficult for birds in flight to maneuver around poles and power lines, and rain and fog influence visibility and the birds' reaction time.

In high-avian-use areas where a variety of species are using the landscape for nesting, roosting, or foraging, bird interactions with the electrical system increase, along with the risk of mortality and injury. Program biologists consult regularly with the USFWS and WDFW to monitor avian nesting and wintering areas and evaluate the risk of PSE's electrical system in high avian use areas.

5.3.4 Applying Risk Assessment Methodology

By considering the factors listed above, the Avian Protection Program biologists are able to assign a numerical ranking system to a specific pole, span, or segment of the electrical system to help prioritize sites. Depending on the number and types of risk factors that apply to a specific component of the electrical system, we can assign a number, 1-5, to the equipment.

For example, a three-phase pole with the neutral on the crossarm near an eagle nest in a swan foraging area in rural Skagit County would be considered a category-5 pole. The same pole in a residential area may only be considered a category 2, depending on the wire spacing.

Similarly, a span of three-phase distribution line in rural Skagit County between two potato fields with no other obstructions along the power line would be considered a high priority, such as a category 3. If there was a history of swan collisions in the area, this may be raised to a category 4, and if it overlaps with eagle habitat, it may be raised to a category 5.

6.0 Budget Management

PSE manages response efforts for each incident involving species protected by the MBTA, including small birds in addition to eagles, swans, and other large birds. PSE's Avian Protection Program has access to both operations and maintenance (O&M) and capital budgeting mechanisms to fund reactive and proactive projects. These efforts are exclusive of the implementation of avian-safe standards and the bushing cover program, which supplement program progress.

Many factors are considered for each proactive or reactive project to determine the most effective use of funds and appropriate type of retrofits for the site. Although typically O&M projects are less costly to complete initially because they are generally applied on a smaller scale, capital projects are usually more cost-effective in the long term because they involve more complete upgrades with longer life cycles, and thus require less maintenance.

6.1 Capital Expenditures

The capital projects involve completing a new unit of property, such as installing new poles or replacing conductors. While they may be combined with remediation, these are typically proactive projects. Program biologists work with system planners to develop and complete proactive projects with dual benefits for avian safety and system reliability.

The majority of avian capital projects involve the installation of tree wire, a covered conductor generally used to keep branches from causing outages by crossing multiple conductors. Tree wire is also effective for protecting birds from electrocution, both mid-span and at the pole, by eliminating the possibility of contacting multiple uncovered conductors at once. This also eliminates the risk of electrocution from brush contact as birds fly through the lines. Other examples of capital projects are setting new poles, installing longer cross-arms, replacing conductors (more than four spans), placing lines underground, and erecting nest platforms.

6.2 Operations and Maintenance (O & M) Expenditures

Because most avian protection devices have not been considered new units of property to date, retrofit projects completed to mitigate most avian incidents are classified as O&M. Thus, projects such as installing bird guards, line markers, and equipment covers are considered maintenance activities. The majority of O&M projects have been completed to mitigate eagle, swan, hawk, owl, and other large bird mortalities through the installation of avian protection devices. In addition to project completion costs, the O&M budget also includes the costs of conducting site visits, rehabilitating injured birds, investigating avian incidents, collecting and managing data, planning retrofit projects, tracking maintenance; providing risk assessment, project oversight, verifying retrofit projects; and submitting reports.

7.0 Policy Management and Training

It is the responsibility of the program to facilitate the correct implementation of state and federal bird protection guidelines.

Employee and contractor training has contributed to the successful integration of the program in day-to-day business through improved reporting of avian incidents, increased familiarity with appropriate procedures, correct application of avian protection devices, and overall awareness of the avian-power line issue. Program biologists are available to provide any assistance or training needed to support operations managers in meeting their responsibilities.

Program biologists also seek opportunities for public education and outreach. To support this, program biologists have created a brochure (appendix I), participated in activities such as the Skagit Bald Eagle Festival, and partnered with organizations such as the Audubon Society, The Nature Conservancy, and the Trumpeter Swan Society to address avian concerns, complete habitat enhancement projects, and help manage avian issues in the region.

Internal Resources

The Avian Protection Program depends upon the cooperation, commitment, and accountability of many parties to achieve clear objectives. A number of PSE departments and groups influence the function and success of the Avian Protection Program.

- **Servicemen and line crews.** Report avian-caused outages to the APP, install avian protection devices on equipment poles where small bird and animal electrocutions occur, complete APP mitigation projects, and report raptors perching on power poles to help identify sites for proactive projects.
- **Engineers (new construction).** Consult the APP for the most effective configuration and use of avian protection devices when constructing new power lines in avian high-use areas to reduce the risk of avian interaction with the system.
- **PSE Standards.** Develop and maintain up-to-date standards for avian-safe devices and configurations for new construction.
- **Land planners and project managers.** Consult the APP for best management practices for construction activities in close proximity to active bald eagle, osprey, and other raptor nests to minimize the potential for disturbance.
- **Vegetation management.** Coordinate with the APP to reduce the potential for disturbance of active bald eagle, osprey, and other raptor nests due to vegetation management activities.
- **Cultural resources.** Review avian retrofit projects to minimize the impacts of related ground-disturbing activities, such as new pole placement, on sensitive cultural resources.

- **Environmental managers of wind facilities.** Consult the APP for guidance on avian concerns, to report avian mortalities, and to develop best management practices through adaptive management.
- **Other PSE plants and facilities.** Consult the APP for guidance on avian concerns, notify the APP of avian issues, and work with the APP to implement solutions.

8.0 Program Maintenance and Refinement

8.1.1 Program Effectiveness and Process Improvement

The program must be effective to achieve and maintain compliance with bird protection laws and meet USFWS performance expectations. Program biologists continuously examine the effectiveness and efficiency of program policies and procedures, and adapt the program as necessary. This process is aided by participation in APLIC workshops and meetings, regular inspections of avian protection projects, coordination with device manufacturers, and regular training for employees.

The program's primary objective is identifying and executing appropriate methods for avian protection, whether line configuration or installation of avian protection devices. Furthermore, where avian protection devices are installed, they must be used appropriately, installed correctly, and maintained in order to be effective. This is achieved through coordination with engineers, reference to PSE standards, training crews on how the devices work, and on-site instruction by program biologists.

8.1.2 Retrofit Effectiveness

Monitoring retrofit effectiveness involves tracking the durability and wear of the devices after installation to ensure that broken or missing devices are replaced in avian high-use areas in a timely way to avoid increased risk of collision or electrocution in areas that had already been modified. Program biologists provide feedback to avian protection device manufacturers regarding the durability of the products so that the manufacturers can improve the technology as appropriate. The database is capable of tracking the condition of retrofits and the life cycle of avian protection devices to facilitate efficient replacement as needed.

As an active APLIC member, PSE works closely with other utilities and research efforts to stay up-to-date with changing standards and choose the most cost-effective methods to achieve maximum performance. Whenever avian protection devices are discovered to be effective in some conditions and ineffective in others, standards and practices may be modified to ensure appropriate application of devices.

9.0 Wind Facilities and Avian Protection

PSE has an uncommon role as a utility that owns and operates wind generation facilities, and is committed to the responsible development, construction, and operation of its wind energy projects. PSE strives to balance the need for clean renewable energy with the need for wildlife protection and conservation.

Avian Protection Program biologists support the environmental managers of each of PSE's wind facilities through providing guidance related to avian issues and concerns, review of monitoring plans and reports, coordination with the technical advisory committees (TACs) and participation in meetings, responding to incidents involving eagles or other species of concern, facilitation of positive relationships with resource agencies, and reporting.

Program biologists also support PSE wind facilities by networking with the American Wind Energy Association (AWEA), the Avian Power Line Interaction Committee (APLIC), and government agencies to keep up-to-date with the best available science, to participate when possible in the development of policy and guidance, and to coordinate with a variety of entities to understand the scope of the issue.

9.1 Avian Protection at PSE's Wind Facilities

Program biologists have provided input regarding general avian management at wind sites as needed. As these facilities were designed, developed, and brought online, avian-safe designs for power lines and other equipment were implemented. Some examples of avian protection measures that have been implemented at these facilities are:

- Installing covered jumper wire on approximately ¼ mile of distribution line to minimize risk of avian electrocution at Hopkins Ridge in 2006.
- Installing line markers on necessary guy wires on transmission poles at Hopkins Ridge in 2009.
- Installing reflective markers on approximately 20 miles of fencing, and removing approximately 6 miles of unnecessary fencing to reduce the risk of bird (particularly sage-grouse) collisions at Wild Horse in 2010-2011.
- Installing line markers on both distribution and transmission lines at drainages and stream crossings to minimize the risk of avian collisions, and also marking guy wires at Lower Snake River.
- Erecting eight nest platforms in 2013 to provide safe nesting structures for ravens that previously nested on power poles near the substation at Lower Snake River. Perch deterrents were also installed on the original nest poles to prevent ravens from nesting near electrical equipment, minimizing the risk of bird electrocution as well as damage to the system.

9.2 Bird and Bat Conservation Strategies

PSE has developed bird and bat conservation strategy documents (BBCSs) for each of its wind facilities to describe the actions taken and measures implemented during project development, construction, and operation to avoid, minimize, and mitigate potential adverse effects on birds, bats, and their habitats at PSE's wind facilities, including permit conditions and best management practices (BMPs).

These BBCSs are consistent with state and federal land-based wind energy guidelines and follow the tiered approach as described in the federal guidelines, although construction occurred prior to finalization of the federal guidelines. The BBCSs include sections describing site selection and preliminary evaluation (Tier 1), pre-construction assessment and monitoring (Tier 2), consultation, project design conditions and BMPs, construction

conditions and BMPs (Tier 3), operational conditions and BMPs, including post-construction monitoring (Tier 4), and finally mitigation and ongoing/long-term measures (Tier5).

9.3 Monitoring and Reporting

PSE's wind facilities have their own avian incident procedures as specified in the Wildlife Incident Handling and Reporting System (WIHRS), and as agreed upon by the technical advisory committee (TAC) for each site. In addition, Western EcoSystems Technology (WEST) monitored the sites under contract as directed through the permitting and TAC input for each site. Detailed descriptions of these processes are found in the bird and bat conservation strategies. Avian injuries and mortalities associated with wind facilities are reported to the USFWS annually by the avian protection program biologists. Incidents involving eagles or protected species are reported to the OLE promptly (within 24 hours or next business day), and to the RMBPO within 48 hours or the next business day, in consistence with PSE's special purpose utility permit for its wind facilities.

PSE is committed to mitigating significant avian mortalities at its wind facilities. Each incident involving an eagle or protected species will be addressed individually through consultation with the OLE, and mitigation measures will be developed as appropriate. As new information becomes available regarding avian interaction with wind facilities, PSE will consult with the USFWS, WDFW, and others as appropriate to maintain up-to-date avian response procedures.

10.0 Conclusion

For the APP to be effective, all these components must be combined cohesively to manage avian issues throughout PSE's system. This is achieved through periodic program evaluation and process improvement, through continued development of relationships both within PSE and between PSE and outside entities, and through training, outreach, and education to improve awareness of the program and its achievements.

Increasing awareness of the program among the general public provides the opportunity to improve the customer experience and the perceived value of PSE's service. Partnering with NGOs and agencies to support their initiatives provides greater value to protected avian species; examples are PSE's swan program partnership with WDFW and the Trumpeter Swan Society (TSS), PSE support of WDFW Golden Eagle nest surveys, and PSE support of local wildlife rehabilitators.

Coordination regarding policy development and change with agencies that enforce bird protection laws, working closely with other utilities' avian biologists through APLIC, and understanding the political environment assists program biologists in navigating these issues to effectively manage avian concerns company-wide With the successful implementation of this plan, PSE will continue to be a nationally recognized leader in the field of avian protection.

11.0 References

APLIC (Avian Power Line Interaction Committee). 2012. Reducing Avian Collisions with Power Lines: The State of the Art in 2012. Edison Electric Institute and APLIC. Washington, D.C.

———. 2006. Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006. Edison Electric Institute, APLIC, and the California Energy Commission. Washington, D.C. and Sacramento, CA.

———. 2005. Avian Protection Plan (APP) Guidelines web document. http://www.aplic.org/uploads/files/2634/APPguidelines_final-draft_Aprl2005.pdf, updated November 16, 2006, viewed on February 5, 2014.

AVIAN PROTECTION PLAN

Appendix A. Corporate Policy CPM-22

PUGET SOUND ENERGY

PUGET SOUND ENERGY
The Energy To Do Great Things

Corporate Policy Manual **CPM - 22**

SUBJECT

Revised: December 7, 2011

ENVIRONMENTAL POLICY

References:

Corporate Ethics and Compliance Code

Environmental Impact Statements

Key Words:

environment **protection** **compliance**

Approvals:

Kimberly J. Harris
President and CEO

Steve R. Secrist
Vice President, General Counsel,
and Chief Ethics & Compliance Officer

POLICY: Puget Sound Energy (PSE) and its employees at all levels will comply with all environmental laws, regulations, and Company environmental policies. The Company encourages environmentally responsible and sustainable behavior, and holds Company employees accountable for environmental performance.

DISCUSSION: PSE encourages this behavior, and holds Company employees accountable for environmental performance as follows:

Compliance:

- We comply with all applicable environmental laws and regulations.
- We provide sufficient resources to maintain environmental compliance with laws and regulations.
- We ensure that regular independent reviews of environmental aspects of our business are conducted through our environmental audit plan.

Responsibility: All levels of management are responsible for the following:

- Integrating appropriate environmental management into business practices,
- Understanding environmental compliance requirements associated with their job functions; and
- Committing to bring environmental compliance issues and concerns forward for resolution.

Pollution Prevention:	• We reuse and recycle when possible; we safely handle and dispose of waste. • We continually work on process improvements to minimize the amount and toxicity of waste generated, as well as prevent the release of regulated substances into the environment.
Communication:	• We work to keep a constructive dialogue and make informed decisions through communication of environmental information to management, employees, and the public. • We work with governments and others to create responsible environmental laws and regulations that reflect sound public policy.
Training	• We provide formal and informal training to employees to ensure awareness of their individual roles and responsibilities with respect to complying with environmental laws and regulations.
Improvement:	• We continually seek opportunities to improve the effectiveness of our environmental programs.

PROCEDURES:

WHO	DOES WHAT
Vice President, General Counsel, and CECO	Review and provide legal advice, as needed, regarding environmental compliance requirements.
Environmental Services Dept.	• Assist various departments with compliance with certain applicable environmental laws, regulations, regulatory agreements and permits. Other departments are also involved with environmental compliance work. • Communicate to employees, through appropriate training and notification, environmental compliance requirements. Provide training for employees and respond promptly and effectively in an environmental emergency situation. • Communicate with regulators as appropriate regarding compliance and environmental performance. • In cooperation with facility and department managers, maintain an Environmental Audit Program to monitor compliance at PSE facilities. • Provide timely and appropriate responses to public inquiries about certain environmental issues involving the Company, and initiate communication with other interested parties. • Promote the development and adoption of relevant environmental policies,

	laws, and regulations through active support and participation in governmental, legislative, and rule-making processes and other forums dedicated to providing public officials with technical information and advice. • Take the lead on appropriate corrective action where past practices are found to have adversely impacted the environment.
PSE Directors	• Monitor and verify compliance; promptly report any non-compliance or suspected non-compliance to appropriate departments; take appropriate action, including modification or curtailment of operations, if necessary, to prevent serious harm to the environment. • Provide the appropriate and adequate personnel and other resources to comply with environmental requirements. • Emphasize and facilitate environmental training and compliance programs at the Facility/Department level to ensure adequate training for all employees. • Encourage employee actions/suggestions for improving environmental performance.
All Employees	• Comply with environmental laws, regulations regulatory agreements, permits and internal corporate requirements. • Promptly report any non-compliance or suspected non-compliance to appropriate department. • Continuously strive to improve environmental performance.

AVIAN PROTECTION PLAN

Appendix B. Special Purpose Utility Permit – Electrical Facilities

PUGET SOUND ENERGY

DEPARTMENT OF THE INTERIOR
U.S. FISH AND WILDLIFE SERVICE

FEDERAL FISH AND WILDLIFE PERMIT

2. AUTHORITY-STATUTES
16 USC 703-712

REGULATIONS
50 CFR Part 13
50 CFR 21.27

1. PERMITTEE

PUGET SOUND ENERGY, INC.
ATTN: MELVIN WALTERS
PO BOX 97034 PSE-095
BELLEVUE, WA 98009-9734
U.S.A.

3. NUMBER
MB041685-0

4. RENEWABLE ☒ YES ☐ NO

5. MAY COPY ☒ YES ☐ NO

6. EFFECTIVE
04/01/2013

7. EXPIRES
03/01/2016

8. NAME AND TITLE OF PRINCIPAL OFFICER *(If #1 is a business)*
MELVIN L. WALTERS
SENIOR ENVIRONMENTAL SCIENTIST

9. TYPE OF PERMIT
MIGRATORY BIRD SPECIAL PURPOSE UTILITY SALVAGE PERMIT - ELECTRIC

10. LOCATION WHERE AUTHORIZED ACTIVITY MAY BE CONDUCTED
Activities Conducted: Utility Service Area
Records Kept: 10885 NE 4th St PSE-095; Bellevue, WA 98004
KING COUNTY

11. CONDITIONS AND AUTHORIZATIONS:

A. GENERAL CONDITIONS SET OUT IN SUBPART D OF 50 CFR 13, AND SPECIFIC CONDITIONS CONTAINED IN FEDERAL REGULATIONS CITED IN BLOCK #2 ABOVE, ARE HEREBY MADE A PART OF THIS PERMIT. ALL ACTIVITIES AUTHORIZED HEREIN MUST BE CARRIED OUT IN ACCORD WITH AND FOR THE PURPOSES DESCRIBED IN THE APPLICATION SUBMITTED. CONTINUED VALIDITY, OR RENEWAL, OF THIS PERMIT IS SUBJECT TO COMPLETE AND TIMELY COMPLIANCE WITH ALL APPLICABLE CONDITIONS, INCLUDING THE FILING OF ALL REQUIRED INFORMATION AND REPORTS.

B. THE VALIDITY OF THIS PERMIT IS ALSO CONDITIONED UPON STRICT OBSERVANCE OF ALL APPLICABLE FOREIGN, STATE, LOCAL, TRIBAL, OR OTHER FEDERAL LAW.

C. VALID FOR USE BY PERMITTEE NAMED ABOVE.

D. **Possession and transport.**

(1) You and subpermittees are authorized to collect, transport and temporarily possess carcasses and partial remains of migratory birds, **except Bald Eagles and Golden Eagles (Eagles)** and species listed as **Threatened or Endangered** under the U.S Endangered Species Act (see 50 CFR § 17.11), found at the location/property specified in Block 10 for migratory bird mortality monitoring purposes or disposal or burial of carcasses for human health and safety purposes.

For **Eagles and federally listed Threatened or Endangered Species** you must call a U.S. Fish and Wildlife Service (Service), Office of Law Enforcement (OLE) special agent for instructions and approval before collecting or moving the carcass or any of its parts. It may be necessary to preserve the carcass onsite until an agent or other Service or State representative arrives to collect it. Your OLE contact phone numbers are:

Hawaii: 808-861-8525
Oregon: 503-682-6131
Idaho: 208-442-9551
Washington: 425-883-8122

(2) Except for take caused by your infrastructure and operations, you may not collect or disturb and must immediately report to OLE any dead migratory birds that appear to have been poisoned, shot, or otherwise killed or injured as the result of potential criminal activity.

(2) Except for take caused by your infrastructure and operations, you may not collect or disturb and must immediately report to OLE any dead migratory birds that appear to have been poisoned, shot, or otherwise killed or injured as the result of potential criminal activity.

E. **Active Nest Relocation. Except for federally listed Endangered or Threatened Species and Eagles,** *in emergency situations* you

☒ ADDITIONAL CONDITIONS AND AUTHORIZATIONS ALSO APPLY

12. REPORTING REQUIREMENTS
ANNUAL REPORT DUE: 01/31
You must submit an annual report to your Regional Migratory Bird Permit Office each year, even if you had no activity. Form: www.fws.gov/forms/3-202-17.pdf.

ISSUED BY

TITLE
CHIEF, MIGRATORY BIRD PERMIT OFFICE - REGION 1

DATE
05/07/2013

are authorized to relocate active migratory bird nests, including eggs or nestlings, found on the utility structures when (1) the safety of the migratory birds, nests or eggs is at risk, or (2) the migratory birds, nests, or eggs pose a threat of serious bodily injury or a risk to human life, including a threat of fire hazard, mechanical failure or power outage. You may not use this authority for situations in which migratory birds are merely causing a nuisance or inconvenience.

If you need to harass or live-trap and relocate an Endangered or Threatened Species, Bald Eagle, or Golden Eagle, or their nests, you must obtain an additional permit to do so.

F. **Data Collection.**
(All relevant and applicable data associated with each carcass or part collection, or injured bird, should be recorded, including the information below. Required data are designated with an asterisk (*).
(a) discovery date *
(b) collection/recovery date *
(c) species *
(d) sex and age (juvenile/adult), if known
(e) condition of bird (alive or dead) *
(f) condition of carcass (entire, partial, scavenged)
(g) description of carcass (intact, feather spot, headless, wing sheared, blood in mouth)
(h) pole/structure ID number
(i) line name/circuit number/circuit name
(j) location (State/county/address, cross streets, or nearest town) *
(k) the GPS coordinates in decimal degrees for the location where carcass/part found, if known
(l) apparent cause of mortality/injury (collision, electrocution, other)
(m) estimated date of mortality or estimate of time since death (e.g., <1 day, 1 day, 2-3 days)
(n) weather conditions at likely time of death, if known
(o) information on carcass or injured bird disposition
(p) any special notes or additional information

G. **Injured birds.** Injured migratory birds, including Eagles and federally listed Threatened or Endangered Species, must be transferred to a federally permitted migratory bird rehabilitator or a licensed veterinarian for care. Rehabilitation and/or veterinary costs are the utility's responsibility. See condition I for reporting instructions.

H. **Take and collection of live, non-injured migratory birds, eggs, or nests is not authorized by this permit.** In addition, this permit does not authorize the take, capture, harassment or disturbance of **Eagles or federally listed Endangered or Threatened Species** (see 50 CFR 17.11).

I. **Reporting.**
You must report bird injuries and deaths in accordance with the time frames specified in (a) and (b) below. You must submit a written mortality or injury report to your Regional Migratory Bird Permit Office (RMBPO) PermitsR1MB@fws.gov.

(1) You must report any **Bald Eagle or Golden Eagle** or **Threatened or Endangered Species** found dead or injured to OLE immediately if possible, but no later than the **next business day** (see Condition D for contact information) and PermitsR1MB@fws.gov. Your report must include as much of the information from condition F as possible. You can provide information not available at the time of your initial report to OLE and your RMBPO within **48 hours** or as directed by the OLE special agent. *A written mortality or injury report must be submitted to your RMBPO, to include the data in condition F, no later than **one week (7 days)** from the date of discovery and collection of the carcass.*

A list of Threatened and Endangered species by State may be found in the Service's Threatened and Endangered Species System (TESS) database at: <http://www.fws.gov/endangered>.

(2) You must submit an **Annual Report** of dead and injured birds, including Eagles and Threatened and Endangered Species, discovered, collected, and/or buried, *and any active nests relocated,* to your RMBPO by January 31 following each calendar year in which the permit is in effect. Your report must include at a minimum the information designated as required in condition F. For active nests, please indicate the species and date relocated. The report form 3-202-17 is available at <http://www.fws.gov/forms/3-202-17.pdf>. You may submit a Special Purpose Utility Excel Data Sheet or your own Excel spreadsheet in lieu of using form 3-202-17, but all of the information requested on the 3-202-17 form, including the signed certification statement, must be included.

A Special Purpose Utility Excel Data Sheet is available from your RMPO. To request a copy, please email PermitsR1MB@fws.gov.

J. **Disposition of Carcasses and Parts.**
(1) In accordance with Condition D(1) above, the Service will advise you on disposition of **Eagle and Threatened or Endangered Species** specimens. The special agent will advise if they will recover an eagle carcass or if you need to ship the carcass to the Service. With prior written authorization from an OLE special agent, you may ship carcasses directly to the NER (contact the NER at 303-287-2110 for shipping instructions). The written authorization from the special agent must accompany the **Eagle** if it is shipped to the NER. Disposition must be reported in your annual report to your RMBPO.

(2) Unless otherwise specified in this permit, carcasses and parts of **migratory birds (except Eagles and federally listed Threatened and Endangered species)** that have been reported to the Service and documented in your records may be
(a) turned over to the State wildlife agency for official purposes, or,

(b) with additional authorization from your RMBPO, donated to a public scientific or educational institution or to an individual or entity authorized by Federal permit to acquire and possess migratory bird specimens.

All dead specimens and parts (**except Eagles and Threatened and Endangered species**) that you do not transfer to another authorized party may be left in the field, or must be disposed of by burial or incineration.

K. **Renewal.** Any renewal request for this permit must include information on any modifications made to your operations or infrastructure to avoid or minimize migratory bird mortalities, and if you have made modifications, any preliminary results of those modifications

L. **SUBPERMITTEES**: Miranda Bowen, Jennifer Diaz, Haley Edwards, Tony Fuchs, Kurt Krebs, Scott Heller, Shelly Miller, Brennan Milloy, Dan Rottler, Jamie Carothers, Ryan Severe, Paul Smith, Larry Tornberg, Ann Walsh, Fred White, Melissa Woodworth, Emmallee Davis, Paul Haag, Jerry Baker, and

In addition, any person who is employed by or under contract to the permittee for the activities specified in this permit, or any person who is otherwise designated as a subpermittee in writing by the permittee may exercise the authority of this permit.

M. **Standard Conditions.** You and any subpermittees must comply with the attached **Standard Conditions for Migratory Bird Special Purpose - Utility Salvage Permits**. **These standard conditions are a continuation of your permit conditions and must remain with your permit.**

This permit does not, nor shall it be construed to, authorize lethal take or injury of migratory birds or limit or preclude the U.S. Fish and Wildlife Service from exercising its authority under any law, statute, or regulation, or from taking enforcement action against any individual, company, or agency. This permit is not intended to relieve any individual, company, or agency of its obligations to comply with any applicable Federal, State, Tribal, or local law, statute, or regulation.

AVIAN PROTECTION PLAN

Appendix C. Special Purpose Utility Permit – Wind Facilities

PUGET SOUND ENERGY

DEPARTMENT OF THE INTERIOR
U.S. FISH AND WILDLIFE SERVICE

FEDERAL FISH AND WILDLIFE PERMIT

2. AUTHORITY-STATUTES
16 USC 703-712

REGULATIONS
50 CFR Part 13
50 CFR 21.27

1. PERMITTEE

PUGET SOUND ENERGY
10885 NE 4TH ST
PSE-09S
BELLEVUE, WA 98004-5591
U.S.A.

AMENDED

3. NUMBER	AMENDMENT
MB11491B-1	

4. RENEWABLE	5. MAY COPY
☒ YES ☐ NO	☒ YES ☐ NO

6. EFFECTIVE	7. EXPIRES
11/27/2013	03/31/2016

8. NAME AND TITLE OF PRINCIPAL OFFICER *(If #1 is a business)*
HALEY EDWARDS
RESOURCE SCIENTIST

9. TYPE OF PERMIT
SPECIAL PURPOSE UTILITY PERMIT FOR MIGRATORY BIRD MORTALITY MONITORING-WIND

10. LOCATION WHERE AUTHORIZED ACTIVITY MAY BE CONDUCTED
Work conducted on **PSE Wind** facilities: **Hopkins Ridge**; (11,000ac aprox. 15mi NE in Columbia Co), **Lower Snake River** (21,610ac aprox. 10mi W of Pomeroy, Garfield Co.), and **Wild Horse**; 25901 Vantage Hwy, Ellensburg, WA. Phys. records maintained at: 39 Falling Springs Rd, Pomeroy, WA; E-records maintained at: address in block 1 above

11. CONDITIONS AND AUTHORIZATIONS:

A. GENERAL CONDITIONS SET OUT IN SUBPART D OF 50 CFR 13, AND SPECIFIC CONDITIONS CONTAINED IN FEDERAL REGULATIONS CITED IN BLOCK #2 ABOVE, ARE HEREBY MADE A PART OF THIS PERMIT. ALL ACTIVITIES AUTHORIZED HEREIN MUST BE CARRIED OUT IN ACCORD WITH AND FOR THE PURPOSES DESCRIBED IN THE APPLICATION SUBMITTED. CONTINUED VALIDITY, OR RENEWAL, OF THIS PERMIT IS SUBJECT TO COMPLETE AND TIMELY COMPLIANCE WITH ALL APPLICABLE CONDITIONS, INCLUDING THE FILING OF ALL REQUIRED INFORMATION AND REPORTS.

B. THE VALIDITY OF THIS PERMIT IS ALSO CONDITIONED UPON STRICT OBSERVANCE OF ALL APPLICABLE FOREIGN, STATE, LOCAL, TRIBAL, OR OTHER FEDERAL LAW.

C. VALID FOR USE BY PERMITTEE NAMED ABOVE.

D. **Possession and transport.** You are authorized to collect, transport and temporarily possess carcasses and partial remains of migratory birds found at the location/property specified in Block 10 for monitoring migratory bird mortality associated with operation of the wind facility. To accurately determine species fatality rates, which is the important research justification for authorizing this special purpose permit, the monitoring study should include standardized carcass searches, searcher efficiency trials, and carcass removal by scavenger trials.

Except for take caused by your infrastructure and operations, you may not collect or disturb and must immediately report to U.S. Fish and Wildlife Service Office of Law Enforcement (OLE) any dead migratory birds that appear to have been poisoned, shot, or otherwise killed or injured as the result of potential criminal activity. Your OLE contact phone number is 425.883.8122.

E. **Relocation.** Except for Endangered or Threatened Species and Bald Eagles or Golden Eagles, *in emergency situations* you are authorized to relocate active migratory bird nests, including eggs or nestlings, found at the location/property specified in Block 10 when (1) the safety of the migratory birds, nests or eggs is at risk, or (2) the migratory birds, nests, or eggs pose a threat of serious bodily injury or a risk to human life, including a threat of fire hazard or power outage. You may not use this authority for situations in which migratory birds are merely causing a nuisance. You must monitor relocated nests daily to assess success of the relocation.

If you seek to harass or live-trap and relocate an Endangered or Threatened Species, Bald Eagles, or Golden Eagles you must get an additional permit to do so.

F. **Data Collection.**

☒ ADDITIONAL CONDITIONS AND AUTHORIZATIONS ALSO APPLY

12. REPORTING REQUIREMENTS
Annual reports are due by January 31 of each year and the forms are available on the Internet at:
http://www.fws.gov/pacific/migratorybirds/Permits/reports.html or http://www.fws.gov/forms/3-202-17.pdf

ISSUED BY	TITLE	DATE
[signature]	CHIEF, MIGRATORY BIRD PERMIT OFFICE - REGION 1	11/27/2013

(1) The following data must be recorded for each search:
(a) date,
(b) start time,
(c) end time,
(d) interval since last search,
(e) observer,
(f) search method used,
(g) Identifying information for the turbine or turbines searched, and,
(h) weather data for each search, including the weather for the interval since the last search.

(2) All relevant data associated with each carcass or parts collection must be recorded, including:
(a) date,
(b) species,
(c) sex and age (if known),
(d) observer name and contact information,
(e) turbine or pole number,
(f) distance of carcass from turbine or pole,
(g) azimuth from turbine (including GPS coordinates in decimal degrees),
(h) habitat surrounding carcass (*e.g.*, bare ground, tall grass, shrubby)
(i) condition and description of carcass with suspected cause of death if apparent (entire, partial, scavenged, wing severed from body, blood oozing from mouth from apparent blunt force trauma),
(j) estimated time of death ($\leq$ 1 day, 2 days, etc.),
(k) information on carcass disposition, and
(l) any relevant notes or additional information.

(3) All carcasses and partial remains collected must be digitally photographed, bagged, and labeled with:
(a) the date,
(b) a unique specimen number,
(c) the transect or subplot number, and
(d) the turbine or pole number.

G. **Injured birds.** To provide treatment to injured birds, you must capture, stabilize and immediately transfer injured or sick migratory birds found at the location specified in Block 10, including eagles and Threatened or Endangered species, to a federally permitted migratory bird rehabilitator for care. The rehabilitator (or if not available, a licensed, practicing veterinarian) can decide to euthanize a migratory bird or eagle. Rehabilitation costs are your responsibility. See condition I for reporting instructions.

H. **Collection of live, non-injured migratory birds, eggs, or nests is not authorized by this permit.** You are not authorized to take, capture, harass or disturb Bald Eagles or Golden Eagles, or species listed as Threatened or Endangered under the U.S. Endangered Species Act (see 50 CFR 17.11).

I. **Reporting.**
(1) You must report bird injuries and deaths in accordance with the timeframes specified below. We request that you also report voluntarily comparable bat injury and mortality information. If you have an account with the U.S. Fish and Wildlife Service (Service) Bird Injury and Mortality Reporting System (BIMRS) for reporting wind industry incidents, you must report the incidents in BIMRS at: *https://birdreport.fws.gov/.* If you do not have a BIMRS account, you must report the incident to PermitsR1MB@fws.gov.

(a) You must report any **Bald Eagle or Golden Eagle** found dead or injured to OLE by the **next available business day** (see Condition D for contact information) and your migratory bird permit office at PermitsR1MB@fws.gov. Your report must include as much of the data as possible in F(2) above. You can provide information not available at the time of your initial report to OLE within 48 hours or as directed by the OLE officer.

(b) You must report any **Threatened or Endangered Species** found dead or injured within **48 hours**. The report must include as much of the data as possible in F(2) above. A list of Threatened and Endangered species by State may be found in the U.S. Fish and Wildlife Service's Threatened and Endangered Species System (TESS) database at: *http://www.fws.gov/endangered.*

(c) You must report any emergency active nest relocation activity (per condition E) within **3 business days**. Your report must include the species and number of active nests, including eggs and nestlings, relevant site locations, method of relocation, and a complete description of the emergency circumstances warranting the relocation.

(2) You must submit an **Annual Report** of dead and injured birds collected (which you may generate from the BIMRS database if your company holds an account) to your migratory bird permit issuing office by January 31 following each calendar year in which the permit is in effect. Your report must include at a minimum the following for each carcass or partial carcass collected and each live, injured migratory bird captured: species, date collected or captured, location, condition (live or dead), pole/turbine number, apparent cause of mortality, weather conditions when mortality/injury occurred, name and contact information of person collecting, and disposition of those carcasses or parts. The report form 3-202-17 is available at *http://www.fws.gov/forms/3-202-17.pdf.*

(3) **Banded Birds** (carcasses collected and injured birds) must be reported to the U.S. Geological Survey Bird Banding Laboratory at 1-800-327-2263 or *http://www.reportband.gov*. Information provided must include, as accurately as possible, species of bird, band number, date recovered, recovery location that can be narrowed down to a specific 10-minute block, and name and contact information of the

person who recovered the carcass or bird.

J. **Disposition of Carcasses and Parts.**
(1) You must deliver **Bald Eagle and Golden Eagle** carcasses to the Service Office of Law Enforcement (OLE), to be forwarded to the National Eagle Repository (NER) in Colorado. However, with prior authorization from an OLE Special Agent you may ship carcasses directly to the NER (contact the NER at 303-287-2110 for shipping instructions). Disposition must be reported in your annual report to the issuing permit office and in BIMRS if you have a BIMRS account.

(2) You must transfer dead or injured **Threatened and Endangered Species** in accordance with instructions from your migratory bird permit issuing office. The disposition of these animals must be reported in your annual report to the issuing permit office and in BIMRS if you have a BIMRS account.

(3) Migratory Bird carcasses and parts (other than those of Eagles and Threatened and Endangered species) must be stored at the facilities at the location specified in Block 10 until the end of the calendar year in which they were collected. Unless otherwise specified by the permit issuing office or OLE, carcasses and parts may be:
(a) necropsied or used for searcher efficiency and scavenger removal trials;
(b) turned over to the State wildlife agency regulating migratory bird mortality monitoring activities associated with wind energy; or,
(c) with additional authorization from the permit issuing office, donated to a public scientific or educational institution or to an individual or entity authorized by federal permit to acquire and possess migratory bird specimens.

All dead specimens and parts (except Eagles and Threatened and Endangered species) that you do not transfer to another authorized party must be disposed of by such means as are necessary to ensure that they are not exposed to animals in the wild, such as by burning or burying them.

K. **Renewal.** In addition to an updated monitoring protocol, any renewal request for this permit must include information on the fatality rates of affected species or fatality patterns, analysis of those rates/patterns, whether any adjustments or measures were taken to avoid or minimize mortalities, if so, and preliminary results of those modifications.

L. **Subpermittees.**
(1) Any person who is employed by or under contract to the permittee for the activities specified in this permit or is otherwise designated by the permittee as a subpermittee in writing may exercise the authority of this permit.

(2) Subpermittees must be at least 18 years of age. As the permittee, you are legally responsible for ensuring that your subpermittees are adequately trained and adhere to the terms of your permit. You are responsible for maintaining current records of who you have designated as a subpermittee, including copies of letters you have provided.

Authorized subpermittees: Mel Walters, Jennifer Diaz, Shelly Miller, Brennan Milloy, Dan, Rottler, Melissa Woodworth, Tony Fuchs, Scott Heller, Larry Tornberg, Anne Walsh, Miranda Bowen, Kurt Krebs, Jamie Carothers, Ryan Severe, Paul Smith, Fred White, Emmallee Davis, Paul Haag, Jerry Baker, and WEST, Inc.

M. **Carrying your permit.** You and any subpermittees must carry a legible copy of this permit and display it upon request whenever you are exercising its authority. Subpermittees must also carry your written subpermittee designation letter.

N. **Records.** You must maintain records in accordance with 50 CFR 13.46 and 50 CFR 21.27 and this permit. You must keep all required records and collected wildlife parts relating to permitted activities at the location you identified in writing to the migratory bird permit issuing office.

O. **Personal use.** This permit does not authorize personal use of any migratory birds, parts, nests or eggs salvaged, transported, or temporarily possessed under the authority of this permit.

P. **Other permissions.** This permit does not authorize you to conduct activities on Federal, State, tribal, or other public or private property without additional prior written permits or permission from the agency/landowner.

Q. **Applicable laws.** You may not conduct the activities authorized by this permit if doing so would violate the laws of the applicable State, county, municipal or tribal government or any other applicable law.

R. **Site inspections.** Acceptance of this permit authorizes the Director's agent to enter the wind development property at any reasonable hour as necessary to inspect the wildlife, records, turbines, property, and associated infrastructure for wildlife impacted by the wind development, and for compliance with the terms of this permit and governing regulations.

This permit does not, nor shall it be construed to, authorize lethal take or injury of migratory birds or limit or preclude the U.S. Fish and Wildlife Service from exercising its authority under any law, statute, or regulation, or from taking enforcement action against any individual, company, or agency. This permit is not intended to relieve any individual, company, or agency of its obligations to comply with any applicable Federal, State, Tribal, or local law, statute, or regulation.

AVIAN PROTECTION PLAN

Appendix D. Large MBTA Protected Species in PSE's Service Territory

PUGET SOUND ENERGY

Common Name	Scientific Name	Federal Status	State Status
American white pelican	*Pelecanus erythrorhynchos*	None	Endangered
American Widgeon	*Mareca americana*		
Bald Eagle	*Haliaeetus luecocephalus*	Species of Concern	State Sensitive
Band-tailed pigeon	*Columba fasciata*		
Barn owl	*Tyto alba*		
Barred owl	*Strix varia*		
Barrow's goldeneye	*Bucephala islandica*		
Blue-winged teal	*Anas discors*		
Brandt's cormorant	*Phalacrocorax penicillatus*	None	State Candidate
Brant	*Branta nigricans*		
Brown pelican	*Pelecanus occidentalis*	Species of Concern	Endangered
Bufflehead	*Bucephala albeola*		
Burrowing owl	*Athene cunicularia*	Species of Concern	State Candidate
Canada goose	*Branta canadensis*		
Canvasback	*Aythya valisineria*		
Cinnamon teal	*Anas cyanoptera*		
Common egret	*Casmerodius albus*		
Common goldeneye	*Bucephala clangula*		
Common loon	*Gavia immer*	None	State Sensitive
Common merganser	*Mergus merganser*		
Common raven	*Corvus corax*		
Common scoter	*Oidemia nigra*		
Cooper's hawk	*Accipiter cooperii*		
Double-crested cormorant	*Phalacrocorax auritus*		
Emperor goose	*Philacte canagica*		
Ferruginous hawk	*Buteo regalis*	Species of Concern	Threatened
Flammulated owl	*Otus flammeolus*	None	State Candidate
Gadwall	*Anas strepera*		
Golden Eagle	*Aquila chrysaetos*	None	State Candidate
Great blue heron	*Ardea herodias*	None	State Monitored
Great gray owl	*Strix nebulosa*	None	State Monitored
Great horned owl	*Bubo virginianus*		
Greater sage-grouse			
Greater scaup	*Aythya marila*		
Green heron	*Butorides virescens*	None	State Monitored
Green-winged teal	*Anas caolinensis*		
Gull species	*Larus spp.*		
Gyrfalcon	*Falcon rusticolus*	None	Monitored

Harlequin duck	*Histrionicus histrionicus*		
Hawk owl	*Surnia ulula*		
Hooded merganser	*Lophodytes cucullatus*		
Kestrel	*Falco sparveius*		
Lesser scaup	*Aythya affinis*		
Lewis' Woodpecker	*Melanerpes lewis*	None	State Candidate
Long-eared owl	*Asio otus*		
Mallard	*Anas platyrhynchos*		
Marbled murrelet	*Brachyramphus marmoratus*	Threatened	Threatened
Merlin	*Falco columbarius*		State Candidate
Northern Goshawk	*Accipiter gentilis*	Species of Concern	State Candidate
Northern harrier	*Circus cyaneus*		
Northern spotted owl	*Stix occidentalis*	Threatened	Endangered
Oldsquaw	*Clangula hyemalis*		
Osprey	*Pandion haliaetus*	None	Monitored
Pelagic cormorant	*Phalacrocorax pelagicus*		
Peregrine Falcon	*Falco peregrinus*	Species of Concern	State Sensitive
Pigeon hawk	*Falco columbarius*		
Pileated woodpecker	*Dryocopus pileatus*	None	State Candidate
Pintail	*Anas acuta*		
Prairie falcon	*Falco mexicanus*	None	Monitored
Red-breasted merganser	*Mergus serrator*		
Redhead	*Aythya americana*		
Red-tailed hawk	*Buteo jamaicensis*		
Red-throated loon	*Gavia stellata*		
Ring-necked duck	*Aythya collaris*		
Rough-legged hawk	*Buteo lagopus*		
Ruddy duck	*Oxyura jamaicensis*		
Sandhill crane	*Crus canadensis*	None	Endangered
Screech owl	*Otus kennicottii*		
Sharp-shinned hawk	*Accipiter striatus*		
Short-eared owl	*Asio flammeus*		
Shoveler	*Spatula clypeata*		
Snow goose	*Chen hyperborea*		
Snowy egret	*Leucophoyx thula*		
Snowy owl	*Nyctea scandiaca*	None	State Monitored
Spotted owl	*Strix occidentalis*	Threatened	Endangered
Swainson's hawk	*Buteo swainsoni*	None	Monitored
Trumpeter swan	*Olor buccinator*		
Turkey vulture	*Cathartes aura*		
Western Grebe	*Aechmophorus occidentalis*	None	State Candidate

Whistling swan	*Olor columbianus*
White-fronted goose	*Anser albifrons*
White-winged scoter	*Melanitta deglandi*
Wood duck	*Aix sponsa*

AVIAN PROTECTION PLAN

Appendix E. Avian Incident Reporting Form

PUGET SOUND ENERGY

PUGET SOUND ENERGY
The Energy To Do Great Things

Avian Incident Reporting Form

Do not transport/remove bird carcass or injured bird before contacting avian protection program biologist. Temporary possession of MBTA species can result in fines to individuals and PSE.

Contact Information: Mel Walters | 425.785.4963 | Melvin.walters@pse.com

Haley Edwards | 206.419.4919 | haley.edwards@pse.com

Date of Discovery

Description of bird

Injury ☐ Mortality ☐ Problem Nest ☐

Bird species or description

Note any bands, tags, or markers and ID numbers.

Location - Address or intersection

Type of facility Other

Type of equipment involved

Pole number(s)

Response actions taken

Notes/Comments/Additional information

*Under the Migratory Bird Treaty Act, It is a violation to take (kill, transport, sell, or possess) protected avian species, regardless of intent, without proper permits or authorization. Therefore, under no circumstances should company personnel remove or have in their possession the carcass of a dead bird unless specifically directed by one of the Avian Protection Program biologists, who are authorized by the USFWS and WDFW as applicable. Violations could result in criminal prosecution including prison or fines to PSE or the responsible individual.

AVIAN PROTECTION PLAN

Appendix F. PSE Avian Safe Materials Catalogue 1275

PUGET SOUND ENERGY

Wildlife Protectors

Equipment Wildlife Protectors

Item	Material ID
Overhead Equipment	3450000
Overhead Equipment (Tyco)	9996101
Overhead Equipment, G&W Line Reclosers	9998805
Substation Equipment, Regulators	9995568
E/Barrier	9995994
Raptor Protector, Cutout	9996514
Raptor Protector, Loadbreak (Flashguard) Cutout	9998806
Regulator, S-L Arrester	9998115

Specification 1275.6595 (AMI only)

Wildlife protectors are used on transformers, regulators, sectionalizers, capacitors, and distribution lines to prevent outages where wildlife problems exist. The protectors have a minimum dielectric strength of 30 kV and are nontracking.

MID 9998805 is a flexible silicone rubber bushing cover used to cover exposed jumper connections on G&W vacuum line reclosers.

MID 9995568 is used in substation applications and to cover the S and L bushings of regulators. Insulating tape (*MID 9995573*) is also required.

Animal guard (*MID 9995994*) is bolted to 34.5 kV (or lower) insulators to prevent small animals from contacting phase-to-phase, or phase-to-ground energized conductors in substations.

MID 9996101 is easily installed using a hotstick on energized conductors. First, latch open the cover, then use a hotstick to press the cover around the insulator. A cam mechanism automatically closes and locks the cover into position.

MID 9996514 snaps onto the top of the insulator on 15 kV cutouts. It can be installed on energized cutouts with a hotstick.

MID 9998806 snaps onto the top of the insulator on 15 kV loadbreak (flash guard) cutouts. It can be installed on energized cutouts with a hotstick.

MIDs 9998116 is used to protect the bushings and series arrester of volume regulators.

Bird Diverters

Item	Material ID
Bird Flapper Swivel	9996143
Bird Flapper Fixed	9997190
Bird Flapper Circular	9997191
Antiperch Triangle (fits 3-3/4″ x 4-3/4″ crossarms)	9996146
Antiperch Triangle (fits 5-3/4″ x 5-3/4″ crossarms)	9996147
Antiperch Triangle (fits 4-3/4″ x 5-3/4″ crossarms)	9996147

Specification 1275.6595 (AMI only)

Bird diverters are used to prevent birds coming into contact with overhead lines. Antiperch triangles are used to discourage birds from landing on crossarms.

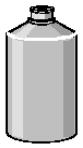
Equipment Wildlife Protectors continued on next page

9998115
Regulator Arrester

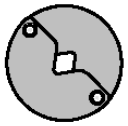
9996101
Tyco Overhead Equipment

9998805
G&W Line Reclosers

3450000
Overhead Equipment



9995568
Substation Equipment, Regulators



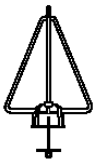
9995994
E/Barrier

9996514
Cutout Protector

9996514
Loadbreak Cutout Protector

9996143
Bird Flapper Swivel

9997190
Bird Flapper Fixed



9996146
9996147
Antiperch Triangles

9997191
Bird Flapper Circular

DSD 001457

Equipment Wildlife Protectors, *continued*

Conductor Covers

Item	Material ID
E/Insulation 0.25″ to 0.477″ Range	9997828
E/Insulation 1.212″ to 1.735″ Range	9997404
E/Insulation 3″ to 3.5″ Range	9998584
Eco Electrical Raptor Protector, Single Pin	9998807
Tyco Raptor Protector, Single Pin	9996213
Tyco Raptor Protector, Double Pin	9996975
Tyco Raptor Protector, Wire	9996214
Protector Locking Clip Pin	9998348

Raptor Protector Cover Application

	And The Angle (°) Is:		
If Insulator Configuration Is:	0° to 3°	3° to 30°	>30°
Single Pin	9998807	(1)9996213 & (2)9996214	No Suitable Cover
Double Pin	(1)9996975 & (2)9996214	(1)9996975 & (2)9996214	No Suitable Cover

Specification 1275.6595 (AMI only)

Conductor covers are used to cover energized lines to prevent injury to birds or other animals and reduce outages. These covers do not reduce the minimum working clearances.

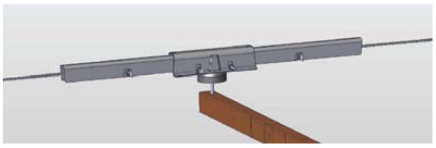
Tyco raptor protector device requires two of *MID 9996214* and one *MID 9996213* (for single pin) or *MID 9996975* (for double pin) for each installation. Use with wire sizes from #2 to 795.

MID 9998348 is used to lock and secure Tyco pin-type protectors onto the conductor pin insulator(s).

ECO Electrical Raptor Protector *MID 9998807* can be used on wire sizes up to 795 ACSR.

MID 9997404 is a split silicone rubber hose used for insulating 1 inch copper bus in substations. It provides 20 kV insulation phase to ground.

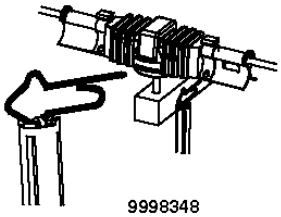
MID 9997828 is a split silicone rubber hose used for insulating guy wire and energized conductors. It will cover wire with an OD from 0.25″ to 0.477″ and provide 20 kV insulation phase to ground.



9998807
ECO Electrical
Single Pin Protector

Typical
E/Insulation

9996975
Tyco Double Pin Protector



9998348
Protector Locking Clip Pin

9996213
Tyco Pin Protector

9996214
Tyco Wire Protector

DSD 001458

AVIAN PROTECTION PLAN

Appendix G. Avian Safe Construction Standards

PUGET SOUND ENERGY

AVIAN PROTECTION PLAN

Appendix H. Avian Protection Retrofit Plan Form

PUGET SOUND ENERGY

AVIAN PROTECTION PROGRAM WORK REQUEST

PUGET SOUND ENERGY
The Energy To Do Great Things

DATE:
LOCATION:
WBS NUMBER(S):
INCIDENT NUMBER(S):
FIRST RESPONSE ENGINEER:

Avian Protection Program Contacts:
Mel Walters: melvin.walters@pse.com
425.785.4963
Haley Edwards: haley.edwards@pse.com
206.419.4919

List of Materials	Material ID Number	Quantity
Firefly Bird Flapper Swivel (Firefly)	9996143	
Firefly Bird Flapper Fixed (fixed firefly)	9997190	
Birdmark Flapper	9997191	
Anti-perch Triangle* (3 ¾ " x 4 ¾ " crossarms)	9996146	
Anti-perch Triangle (5 ¾ " x 5 ¾ " crossarms)	9996147	
Anti-perch Triangle (4 ¾ " x 5 ¾ " crossarms)	9996147	
Tyco Raptor Protector, Pin	9996213	
Tyco Raptor Protector, Double Pin	9996975	
Tyco Raptor Protector, Wire (Bird Guard)	9996214	
Tyco Raptor Protector, Cutout	9996514	
Tyco Overhead Equipment Cover (Bushing Cover)	9996101	
Eco Raptor Protector	9998807	
Cut out cover – loadbreak	9998806	
Perch (Two cross-arms)		

WORK INSTRUCTIONS:

AVIAN PROTECTION PLAN

Appendix I. Avian Protection Program Brochure

PUGET SOUND ENERGY

Why does PSE have an Avian Protection Plan?

PSE is committed to reducing our electrical system's potential to harm birds, maintaining service reliability for our customers, and complying with state and federal regulations related to birds. PSE is proud to be a leader in Avian Protection.

PSE responds to 200-250 bird-related incidents each year.

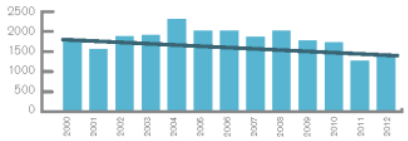
PSE had an average of about 1,500 bird and animal caused outages between 2009 and 2012.

PSE completes an average of over 400 avian-safe units (spans and poles) each year with remediation projects to protect birds from electrocutions and collisions.

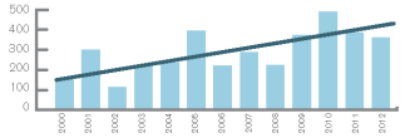
PSE builds all new construction in avian habitat areas using avian safe standards.

PSE's APP has partnered with the Audubon Society, The Nature Conservancy, The Trumpeter Swan Society, and is an active member of the Avian Power Line Interaction Committee.

Number of bird/animal caused outages



Number of avian-safe units completed by the APP (poles and line spans)



Bird protection laws

Almost all species of birds are protected from "take," which can mean to "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, collect, or attempt any such conduct," under one or more of the following:

Migratory Bird Treaty Act (MBTA)

Bald and Golden Eagle Protection Act (BGEPA)

Endangered Species Act (ESA)

There are three main types of bird-related utility equipment incidents:

Electrocutions occur when birds make direct contact with energized and grounded conductors or equipment, and spacing between equipment can influence this risk.

Collisions occur when birds fly directly into conductors, causing injury or mortality from impact, such as a broken wing or neck.

Problem nests become a risk when nest material on utility poles comes in contact with energized equipment, and can conduct electricity when wet, and potentially ignite, cause outages, and pose a hazard to the nesting birds.

Electrocutions, collisions, and problem nests can cause harm to birds, electrical outages, fires, and other damage to the electrical system. PSE is actively engaged in reducing all three types of incidents.

Avian First Response contacts & resources

Puget Sound Energy
Mel Walters
425-785-4963
melvin.walters@pse.com

Haley Edwards
206-419-4919
haley.edwards@pse.com

Washington Department of Fish & Wildlife
Mill Creek Office
425-775-1311
teammillcreek@dfw.wa.gov

La Connor Office
Seasonal Swan Hotline
360-466-4345 ext. 266

U.S. Fish & Wildlife Service
Western Washington Regional Office
425-883-8122
www.fws.gov

Avian Power Line Interaction Committee
www.aplic.org

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PSE.COM/ENVIRONMENT

Puget Sound Energy

Avian Protection Program

Promoting bird safety & improving electric system reliability. An overview of PSE's efforts to protect Washington's birds

PUGET SOUND ENERGY
The Energy To Do Great Things

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Making PSE's electrical system safer for birds

Line markers increase visibility of power lines to reduce the potential for collisions.

Equipment covers include bushing covers, cut out covers, and covered jumpers, which reduces the risk of bird electrocution on equipment poles.

Bird guards allow birds to perch safely on utility poles by covering energized conductors and providing sufficient spacing between conductors.

Nest platforms provide a safe nesting location in areas with few trees to minimize nesting on utility poles and reduce risk of harm to nesting birds, outages, and damage to equipment.

Perches provide a safe place for birds to perch on preferred poles away from electrical equipment. Triangles called perch discouragers deter birds from perching in unsafe locations.

Perch discouragers help move birds from unsafe parts of the crossarm to a safer perch with wider spacing between conductors.

PSE's Avian Protection Program is a voluntary program that addresses avian issues and concerns company-wide, including electrocutions and collisions, bird nests on electrical equipment, and even avian management at PSE's wind facilities.

Responsibilities of the Avian Protection Program:

- Maintain compliance with state and federal wildlife laws.
- Document and respond to incidents of bird mortalities, injuries, problem nests, and ensure appropriate notification and coordination with state and federal agencies.
- Systematically reduce the risk of avian electrocution and collision with PSE's electrical system.
- Maintain a positive relationship with regulatory agencies, manage appropriate federal and state permits, and regularly report to agencies as needed.
- Provide a framework for field personnel to manage bird/power line interactions.
- Increase electrical system reliability and environmental stewardship.
- Establish design standards for new equipment and power line construction to reduce the risk of avian mortalities and injuries.
- Coordinate with PSE planning, construction, and vegetation management to reduce affects to birds, nests, and habitat.
- Raise awareness among PSE employees and service providers about avian protection issues and the related company policies and procedures.

A problem osprey nests on a 3-phase transformer bank pole.

PSE installs about 4 nest platforms each year to provide safe nest locations for birds.

Wintering snow geese and trumpeter swans in Skagit County.

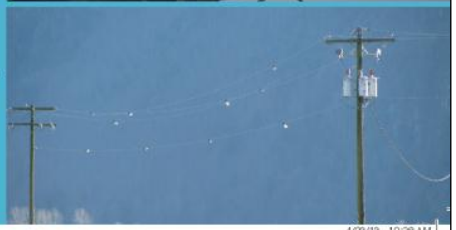
PSE responds to about 74 swan related incidents each year, including injuries, mortalities, lead-poisoning, and electric outages between 2009 and 2012.

Eagle nest near the Skagit River, Sedro Woolley.

PSE monitors eagle and other sensitive nests for disturbance when construction or vegetation management activities occur in close proximity during the nesting season.

Bald eagle perched on an avian-safe pole.

PSE installs about 365 bird guards each year in eagle nesting, foraging, and roosting habitat to reduce electrocutions.



Line markers along Jones Road, Whatcom County.

PSE marks about 130 spans of power lines each year in swan foraging and roosting habitat, making the lines more visible for birds to reduce collisions.

Attachment: J
Pole Finishes Report-City of Bellevue (South)

December 14, 2018

PUGET SOUND ENERGY

Energize Eastside Project

Pole Finishes Report-City of Bellevue (South)

PROJECT NUMBER:
132155

PROJECT CONTACT:
Darrin Gilbert- Senior Visual Resource Specialist
EMAIL:
darrin.gilbert@powereng.com
PHONE:
208-288-6123

POWER ENGINEERS

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Pole Finishes Report-City of Bellevue (South)

PREPARED FOR: PUGET SOUND ENERGY

PREPARED BY: DARRIN GILBERT, SENIOR VISUAL RESOURCE SPECIALIST
208-288-6123
DARRIN.GILBERT@POWERENG.COM

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ACRONYMS AND ABBREVIATIONS

FEIS	Final Environmental Impact Statement
FHWA	Federal Highway Administration
I-90	Interstate 90
KOP	Key Observation Point
kV	kilovolt
Project	Energize Eastside Project
PSE	Puget Sound Energy
ROW	right-of-way

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1.0 INTRODUCTION AND SUMMARY

Puget Sound Energy (PSE) proposes to upgrade approximately 16 miles of existing transmission line in the state of Washington through the cities of Redmond, Bellevue, Newcastle, and Renton. The Energize Eastside Project (Project) will consist of the rebuilding of an existing 115 kilovolt (kV) corridor to 230 kV and includes the construction of the new Richards Creek Substation, located in central Bellevue. The Project has completed the environmental review process required under the State Environmental Policy Act, concluding with the publication of the Final Environmental Impact Statement (FEIS) in March 2018 (City of Bellevue 2018). The Project is currently in the final design and permitting stage.

In support of the Project final design and permitting, POWER Engineers, Inc. has developed this report at the request of PSE to identify proposed transmission line structure ("pole") finishes to mitigate visual impacts created as a result of the Project, specifically, the visual contrast created by the presence of new structures. PSE has incorporated the results of the visual analysis contained in the FEIS, methodologies utilized by the Federal Highway Administration (FHWA), and industry accepted visual mitigation methodologies. The results of this study are preliminary recommendations to be reviewed and further developed with each jurisdiction and will be incorporated into the final design specifications. Final field review and refinement of pole finishes will occur that may further refine or change the results of this study.

Pole finish options reviewed for the project include those identified in the FEIS; each of these finishes exhibit a different color that would blend or contrast with the visual setting of the Project depending on the existing viewing conditions and surrounding features. Pole finishes (and associated colors) considered in this study include:

- Galvanized steel-dulled (light gray)
- Self-weathering steel (reddish-brown to brown, depending on age)
- Pigmented surface coating, consisting of either a powder coat or liquid application (variable, depending on setting and appropriate/available color)

The existing setting within the entire Project area includes the presence of a 115 kV H-frame, wood pole corridor consisting of two structures within an existing right-of-way (ROW). This existing transmission line heavily influences the visual character of the corridor. The Project would replace the H-frame, wood pole structures with a fewer number of either: 1) duel single-circuit steel structures, or 2) single double-circuit monopole steel structures. The existing setting within the study area is dominated by:

- Single family, moderate density residential land use settings and viewpoints that would have open, direct and generally unobstructed views of the Project against a lightly to moderately vegetated backdrop.
- Naturalistic landscape settings where recreationists or traveler views would see the Project against a forested backdrop.
- Variable residential landscape settings that allow for skylined or backdropped views against a distant, light colored landscape.
- Single family, moderate density residential settings that allows for Project views from elevated positions above the line and backdropped against distant, scenic views.
- Mixed commercial/industrial or residential/institutional landscape settings where views would be set against a dark, vegetated, and tall backdrop that also provides substantial screening.

All these settings currently contain views from nearby sensitive viewers of the existing 115 kV H-frame, wood pole corridor.

Pole finishes selected for this Study Area include dulled galvanized steel and self-weathering steel denoted along three segments (A though C). No powder coated or painted structures are proposed. Segment A is proposed to be finished with 20 self-weathering steel, and includes Structure 5/8 (TAL-RIC) to Structure 7/2 (TAL-RIC) from the 128th Avenue SE located to the Forest Hill Neighborhood Park; Segment B is proposed to be finished with 16 dulled galvanized steel, and includes Structure 7/3 (TAL-RIC) to Structure 8/2 (TAL-RIC) between 132nd Avenue SE and SE 43rd St.; and Segment C is proposed to be finished with 35 self-weathering steel, and includes Structure 8/3 (TAL-RIC) to Structure 7/5 (SAM-RIC) between SE 43rd St. and SE 26th Street.

2.0 METHODOLOGY

2.1 Approach

How structures blend with the existing visual environment, background and setting is expressed as visual contrast. Visual contrast occurs from differences in form, line, color, or texture of vegetation, landform and structural (architectural) components of the landscape, and color is accepted as the most influential visual property of surfaces. The FHWA Guidelines for the Visual Impact Assessment of Highway Projects (FHWA 2015), the system utilized in the Project FEIS to determine the potential visual impacts of the Project, measures the loss of Visual Quality resulting from a project in terms of compatibility of, degree of, and sensitivity to, a project's impact. For the purposes of selecting pole finishes, the visual setting is primarily influenced by the existing architectural features, surrounding vegetation, landscape position of the project (e.g., ridgeline crossing), existing infrastructure, and backdrop. The visual setting determines the potential for Project visual contrast and its effect on visual quality.

The Project was segmented into five "jurisdictional" segments (Study Areas) for analysis of potential contrast and visual setting: Renton, Newcastle, South Bellevue, North Bellevue, and Redmond. The City of Bellevue is broken out into two Study Areas within the municipality: North Bellevue and South Bellevue. With the exception of North Bellevue and South Bellevue, these jurisdictional segments are located exclusively within the associated city. The Study Area detailed in this report is located within the City of Bellevue (South) as shown in Figure 1.

Visual resource specialists who have visited the Project area to develop photo simulations and conduct previous visual assessments participated and conducted this study. Photography taken of the Project area for these efforts, as well as secondary data sources such as Google Earth Street View, were utilized to determine pole finishes described in this study.

The following visual setting conditions were evaluated along the corridor to determine potential contrast and determine pole finish along Project segments (if applicable):

- Location of nearby sensitive viewers and visibility of the Project.
- Project position in the landscape.
- Background color.
- Color of surrounding features.
- Surrounding land use or land cover.

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- Visual dominance of existing transmission line infrastructure remaining post-Project.

There may be differing visual settings along the corridor that may suggest conflicting potential pole finishes. For example, structures may be seen against a forested setting for some sensitive viewers adjacent to the Project but would also be seen against the skyline under some viewing conditions. In these cases, the dominant viewing condition affecting the greater number of viewers were assumed through a qualitative analysis. When viewed from a single viewpoint, variation in pole color, height and form can increase visual contrast and visual clutter in the corridor, potentially resulting in a higher visual impact in comparison to poles that are visually consistent. For this reason, changes in pole finish were proposed only where a different color would be beneficial for a lengthy segment of the proposed transmission line and the benefit of the different color outweighed the contrast created at the location where the color change is made. Changes in pole finish were not proposed for single poles or small groups of poles because the benefit of the color change would not outweigh the contrast created. Table 1 details the criteria used in the selection of final pole finishes.

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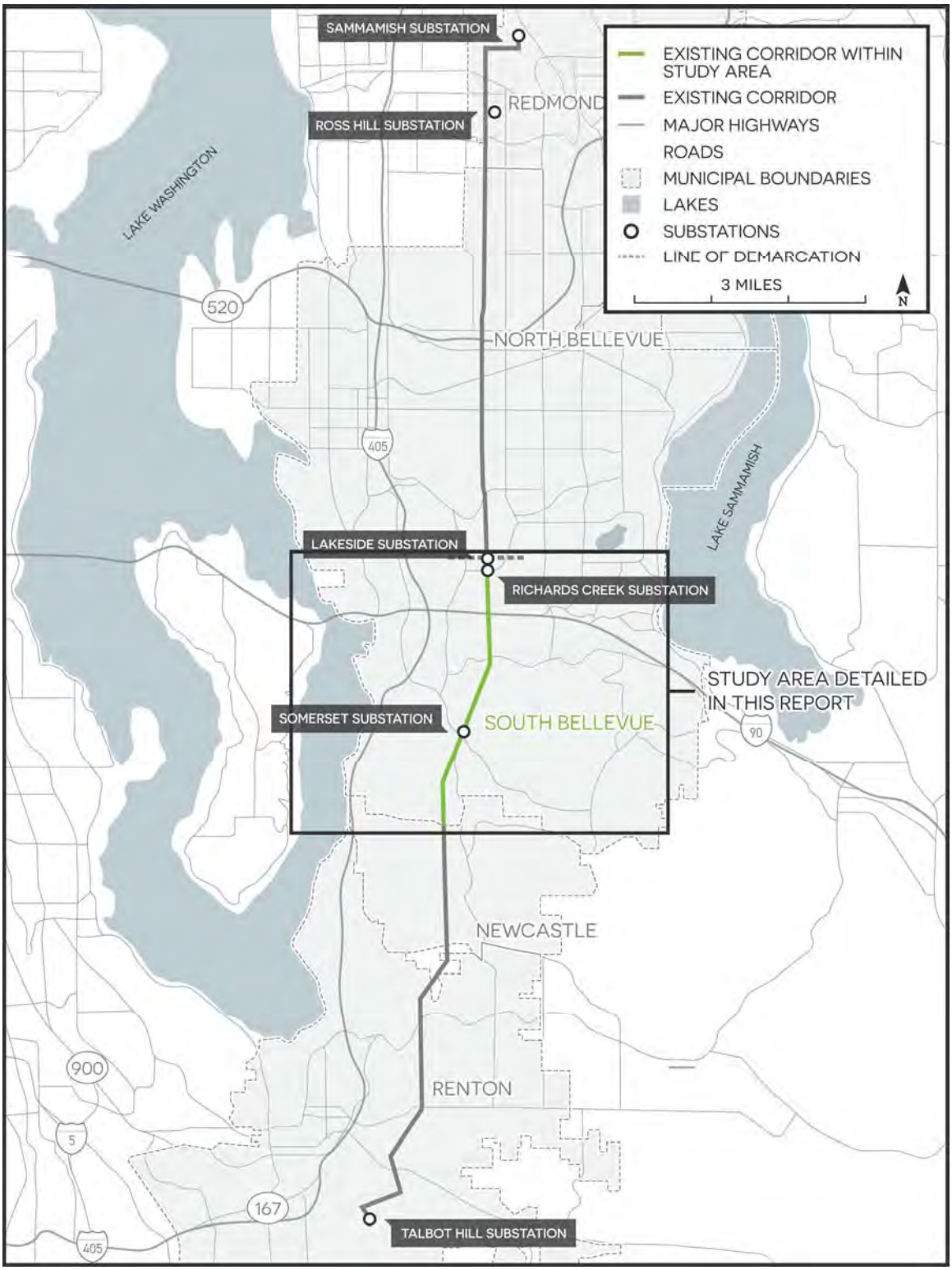
FIGURE 1 STUDY AREA



Specific color selection for pigmented surface coating was considered only where the proposed color would differ substantially enough from a dulled-galvanized (light gray) or self-weathering (dark reddish brown to brown) finish to reduce visual (color) contrasts. The anticipated vendor, Trinity Meyer Utility Structures, utilizes the Carboline 8812 polyurethane powder coating system (Carboline 2018). The Carboline 8812 polyurethane powder coating system "Color Logic" palette (Carboline 2018), which is available in 104 colors, was reviewed and a preliminary Color Logic color was selected and compared against the existing condition in areas where dulled galvanized or weathering steel finish selection would potentially not be sufficient to minimize color contrasts. Refer to Appendix C for the Carboline Color Logic color palette.

TABLE 1 POLE FINISH SELECTION CRITERIA

DOMINANT VIEWING CONDITION	FINISH
Background Color	
Project views are dominated by a backdrop of dark color or mix of colors due to presence of vegetation or development.	Weathering steel or powder coated*
Project views are dominated by a backdrop of light color or mix of colors due to absence of vegetation or development; or views of Project would occur predominantly against the sky.	Galvanized (dulled) or powder coated*
Surrounding Feature Color	
Project views are dominated by surrounding features that are a similar height or taller than the proposed structures and are darker in color.	Weathering steel or powder coated*
Project views are dominated by no surrounding features, are lighter in color, or are substantially shorter in height as the proposed structures.	Galvanized (dulled) or powder coated*
Surrounding Land Uses/Land Cover	
Natural/Naturalistic -Coniferous Dominated; No Potential Skylining; Views Primarily from Adjacent Viewers.	Weathering steel or powder coated*
Natural/Naturalistic Landscape-Grass/Shrub Dominated; Direct views.	Galvanized (dulled) or powder coated*
Natural/Naturalistic -Coniferous Dominated; Skylined Views Primarily from Distant Viewers.	Galvanized (dulled) or powder coated*
Developed-Existing Transmission Infrastructure; Project views are dominated by a backdrop of dark color or mix of colors due to presence of vegetation or development and are dominated by surrounding features that are a similar height or taller than the proposed structures and are darker in color.	Weathering steel or powder coated*
Developed-Existing Transmission Infrastructure; Project views are dominated by a backdrop of light color or mix of colors due to absence of vegetation or development; or views of Project would occur predominantly against the sky and are dominated by no surrounding features, are lighter in color, or are substantially shorter in height as the proposed structures.	Galvanized (dulled) or powder coated*
Developed-Residential-Low to Moderate Density/Low-Rise; Project views are dominated by a backdrop of dark color or mix of colors due to presence of vegetation or development and are dominated by surrounding features that are a similar height or taller than the proposed structures and are darker in color.	Weathering steel or powder coated*
Developed-Residential-Low to Moderate Density/Low-Rise; Project views are dominated by a backdrop of light color or mix of colors due to absence of vegetation or development; or views of Project would occur predominantly against the sky and are dominated by no surrounding features, are lighter in color, or are substantially shorter in height as the proposed structures.	Galvanized (dulled) or powder coated*
Developed-Residential-High Density/High Rise; Project views are dominated by a backdrop of dark color or mix of colors due to presence of vegetation or development and are dominated by surrounding features that are a similar height or taller than the proposed structures and are darker in color.	Weathering steel or powder coated*

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DOMINANT VIEWING CONDITION	FINISH
Developed-Residential-High Density/High Rise; Project views are dominated by a backdrop of light color or mix of colors due to absence of vegetation or development; or views of Project would occur predominantly against the sky and are dominated by no surrounding features, are lighter in color, or are substantially shorter in height as the proposed structures.	Galvanized (dulled) or powder coated*
Developed-Commercial or Industrial; Project views are dominated by a backdrop of dark color or mix of colors due to presence of vegetation or development and are dominated by surrounding features that are a similar height or taller than the proposed structures and are darker in color.	Weathering steel or powder coated*
Developed-Commercial or Industrial; Project views are dominated by a backdrop of light color or mix of colors due to absence of vegetation or development; or views of Project would occur predominantly against the sky and are dominated by no surrounding features, are lighter in color, or are substantially shorter in height as the proposed structures.	Galvanized (dulled) or powder coated*

*See powder coating discussion below. Powder coated poles are proposed only where the proposed color would differ enough from dulled galvanized or weathering steel to substantially reduce color contrast.

2.2 Potential Pole Finish Options

Finishes have been specified by location to better blend with the surrounding environment using the methodology discussed above. In some areas, where there are few trees as tall as the transmission line poles (and therefore the poles would be mostly viewed against the sky), or where the background is otherwise light in color, dulled galvanized poles could have lower contrast than poles with self-weathering finish.

2.2.1 Galvanized Steel

Hot-dip galvanizing is the process of coating fabricated steel by immersing it in a bath of molten zinc to create a zinc barrier that will protect the underlying base steel. Benefits of hot-dip galvanizing include corrosion protection, durability, abrasion resistance, longevity in varied environments and aesthetics. Hot-dip galvanizing is a total immersion process meaning the steel is fully submerged into cleaning solutions and the molten zinc coating all interior and exterior surfaces. This complete coverage ensures even the insides of hollow and tubular structures and the threads of fasteners are coated. As corrosion tends to occur at an increased rate on the inside of hollow structures where humidity and condensation occur, interior coverage is very beneficial. Hollow structures that are painted have no corrosion protection on the inside. Hot-dip galvanizing produces a gray finish. As the galvanized steel weathers and the zinc patina forms, the coating becomes a uniform matte gray. Galvanized steel is initially very shiny and will dull with age. However, the poles can be "dulled" to be non-reflective and contrast less with their surroundings. Dulled, galvanized steel typically results in a lower level of contrast with the sky or lighter backgrounds than darker finish options.

In harsh environments where there is a lot of moisture mixed with pollutants such as salts, the zinc can be consumed quickly leaving the steel unprotected. In these situations, some type of barrier coating applied over the zinc is needed.

2.2.2 Self-Weathering Steel

Weathering steels are formulated, using alloying metals such as nickel, copper and molybdenum to create a steel that will oxidize and create its own barrier coating. Unlike regular carbon steels that can rust and flake away until nothing is left, weathering steels rust to a point and stop. The oxide that is formed by the rusting process adheres tightly to the underlying steel, forming a patina that seals the pole against further

moisture penetration that can cause further rusting. Self-weathering steel poles start out with the expected gray coloring. As the steel poles oxidize, they progress to an orange coloring and eventually to a deep dark brown coloring. The time it takes for this color transition is dependent on the climate where the poles are installed. In warm, humid climates the process may take a year or less, but in cold, dry climates it may take many years. Any incidental damage to this oxide coating heals itself, reducing the need for any type of maintenance.

Self-weathering steel provides a more organic look that galvanized steel that helps poles to blend into wooded areas. It has been proposed for sections of this project where forested conditions occur, and the deep brown coloring would blend well with the surrounding vegetation and background.

Self-weathering steel does not perform well in areas that would keep the steel continuously wet or where there are a lot of pollutants such as salts. Self-weathering steel should not be buried in soil without some type of barrier coating.

2.2.3 Powder Coated Steel

A pigmented surface coating could potentially be used on structures under certain circumstances where the contrasts created by a dulled galvanized structure or self-weathering steel structure could be substantially decreased. Currently, the standard practice for applying color to the surfaces of tubular steel transmission poles at the factory is a process known as powder coating. In this process, a fine, granular material containing binders, resins, pigments, fillers and additives is electrostatically applied to the surface of the steel. The steel is then baked, during which time the powder melts and flows, eventually fusing to the metal and creating a hard and non-porous coating. Powder coating can be applied on galvanized surfaces or can be used on ungalvanized steel.

Advantages of powder coating are that finishes are available in a variety of colors, it provides barrier to protect from corrosion, and it is chemical and abrasion resistant. Disadvantages include fading due to sun exposure as the ultraviolet rays break down the color pigments. Powder coating offers barrier protection, but if the finish is scratched, punctured or otherwise compromised, corrosion will occur.

Application of powder coating over galvanized steel can extend corrosion protection longer than either process used independently. As previously noted, the he anticipated vendor, Trinity Meyer Utility Structures, utilizes Carboline 8812 polyurethane powder coating system (Carboline 2018) for their colorized transmission structures.

2.2.4 Painted Steel

There are a variety of paint systems that can be used on steel poles. Most are multi-coat systems using a zinc-rich primer and a barrier topcoat. Paint systems are generally chosen to provide a choice of color. Paint is typically the least durable finish option with the shortest corrosion protection life span. Paint will eventually degrade, resulting in fading and potentially flaking from the poles, resulting in a potentially unsightly finish and requiring reapplication of paint in the field. Painted structures pose additional challenges from a maintenance perspective, such as potential line operation “outages” during periodic repainting and the presence of maintenance vehicles within the ROW during repainting for extended periods of time.

Due to the lower level of durability and long-term corrosion protection in comparison to the other pole finish options, painted steel was eliminated from consideration and powder coating was carried forward as a colorized surface coating option along with the galvanized steel finish and self-weathering steel options.

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3.0 POLE FINISH SEGMENTS

3.1 Overview

This Section discusses each Pole Finish Segment proposed within the City of Bellevue (South). There is a total of three Pole Finish Segments: Segment A, Segment B, and Segment C (see Figure 2 at the end of this report). Proposed pole finishes, dominant viewing condition, and associated reference points for each structure within the City of Bellevue (South) is detailed in Appendix A. The table contained within Appendix A generally progresses from south to north, starting from the City's southern border.

3.2 Segment A

3.2.1 Viewing Conditions and Setting

Segment A begins at the City of Bellevue's southern border with the City of Newcastle and extends to the structure adjacent to Forest Hill Park Neighborhood Park (see Figure 3 [at the end of this report] and Appendix B-Key Observation Point [KOP] Central 38). This section of the Project is dominated by one of two conditions: 1) single family, moderate density residential land use that would have open, direct and generally unobstructed views of the Project against a lightly to moderately vegetated setting and not typically be skylined; or 2) views that would be seen against a forest backdrop from recreationists or travelers using Coal Creek Park and trails or Coal Creek Parkway. There would be some potential skylining of the Project along this segment by viewers that are offset from the Project, but typically only the highest portions of structures would be seen against the sky. Most of the views would be direct and adjacent from the ROW and seen against sections of landscape or against forested landscape elements that are darker in color. Currently, the existing 115 kV H-frame, wood pole structures substantially influence the character of the area, deviating from the moderate density, single family and naturalistic landscape settings by introducing industrialized features into the landscape.

3.2.2 Proposed Pole Finish and Rationale

Because dominant views are against a mixed forested or highly vegetated backdrop with taller, darker landscape elements, and because there is limited opportunity for skylined views, self-weathering steel would help blend the structures against the backdrop while minimizing potential contrasts. Optionally, the use of a powder coated structure, may further reduce contrasts with the surrounding landscape, but opinions expressed by the municipality and general public makes this option less desirable and would not significantly reduce impacts. Dulled galvanized structures would minimize contrasts for skylined views under some viewing conditions, but the use of this finish would create stronger structural contrasts for adjacent sensitive viewers. A total of 20 structures are proposed to be finished with self-weathering steel.

3.3 Segment B

3.3.1 Viewing Conditions and Setting

Segment B begins at Forest Hill Park Neighborhood Park and extends to SE 43rd Street, and would be seen from moderate density, single family residences and by public and private recreational viewers (see Figure 4 at the end of this report). The vicinity of the ROW typically has low to moderate densities of landscape vegetation, and the vegetation that does occur is dominated by lower growing trees and shrubs that do not provide significant backdrop.

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TABLE 2 SUMMARY OF POLE FINISHES

POLE FINISH SEGMENT	STRUCTURE # RANGE	PROPOSED FINISH	NO. OF STRUCTURES WITH FINISH
A- S. Bellevue	5/8 (TAL-RIC) though 7/2 (TAL-RIC)	Self-Weathering	20
B- S. Bellevue	7/3 (TAL-RIC) though 8/2 (TAL-RIC)	Dulled Galvanized	16
C- S. Bellevue	8/3 (TAL-RIC) though 7/5(SAM-RIC)	Self-Weathering	35

The topography in the area allows for skylined (see Appendix B, KOP Central 15, KOP Central 18, KOP Central 30, KOP Central 39 and KOP Central 40) or backdropped views against a distant, lighter colored landscape. The Project would be elevated in the landscape and would be seen by a high number of viewers that are positioned above the line (e.g., superior views) backdropped against views of Lake Washington, the downtown Bellevue skyline, the downtown Seattle skyline, and Puget Sound in the distance. Currently, the existing 115 kV H-frame, wood pole structures substantially influence the character of the area, deviating from the moderate density, single family setting by introducing industrialized features into the landscape.

3.3.2 Proposed Pole Finish and Rationale

Because dominant views would be against the sky for adjacent and distant viewers and because there is minimal tall, dark adjacent vegetative backdrop, a dulled-galvanized steel structure is proposed. This finish would be lighter in color and would typically create weaker contrasts than darker colored structures with a self-weathering steel finish. A total of 16 structures would be finished with dulled galvanized steel. Changing from self-weathering steel structures to dulled galvanized structures would cause minimal visual impacts because views of the two differing structures finish at the transition area between Segment A and Segment B and would not typically occur within the same viewshed. The last self-weathering structure (7/2 TAL-RIC) within Segment A would be viewed primarily from sensitive locations adjacent to the corridor (e.g. Forest Hill Park Neighborhood Park). Views of the first dulled galvanized structure (7/3 TAL-RIC) within Segment B would primarily occur from positions where the structured would be viewed against the sky for a majority of viewers.

3.4 Segment C

3.4.1 Viewing Conditions and Setting

This segment begins north of SE 43rd Street and extends to the Lakeside Substation, crossing an area of moderate density single family residential and institutional land use south of Interstate 90 (I-90) (see Figure 5 at the end of this report). North of I-90, the corridor becomes mixed commercial and industrial in character. Topography flattens as compared to Segment B, and the opportunity for skyline views of structures minimizes. Much of the landscape surrounding the ROW corridor has substantial tall vegetation. Views of the project, such as those from Tyee Middle School (see Appendix B- KOP South 24 and KOP South 25), would be set against this darker vegetated backdrop, and some skylining of the Project may occur. However, views such as the one shown in Appendix B- KOP South 25 would be the dominant condition. North of I-90, direct, but partially screened views from the commercial and industrial area would be seen against a substantially forested landscape. Currently, the existing 115 kV H-frame, wood pole structures substantially influence the character of the area, deviating from the single-family residential setting by introducing industrialized features into the landscape south of the I-90 corridor. The

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existing transmission lines substantially contribute to the industrial character of the area in the vicinity of the Lakeside and Richards Creek Substations.

3.4.2 Proposed Pole Finish and Rationale

Because the Project would typically be viewed against a taller, darker backdrop, because sensitive viewers would directly see the structures, and because there would be minimal skylining occurring along the Segment, self-weathering steel structures are the most appropriate finish for Segment C. Galvanized structures would minimize contrasts for skylined views but would create stronger color contrasts for adjacent sensitive viewers. A total of 35 structures are proposed to be finished with self-weathering steel. Changing from dulled galvanized structures to self-weathering steel structures would cause minor visual impacts because views of the two differing structures at the structure finish transition area between Segment B and Segment C could occur within the same viewshed for nearby sensitive viewers. However, the selection of the structure finishes within the two Segments mitigates impacts for viewers that would have the highest visibility and that would potentially be impacted to the greatest extent.

4.0 REFERENCES

City of Bellevue. 2018. Energize Eastside Project Final Environmental Impact Statement. Volume 1 through 4. March 2018.

Federal Highway Administration (FHWA). 2015. Visual Impact Assessment for Highway Projects.

Carboline Paint System. 2018. http://www.carboline.com/products/product-details/?prod=8812. Accessed multiple occasions, September/October 2018

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FIGURE 2 **POLE FINISH SEGMENTS**

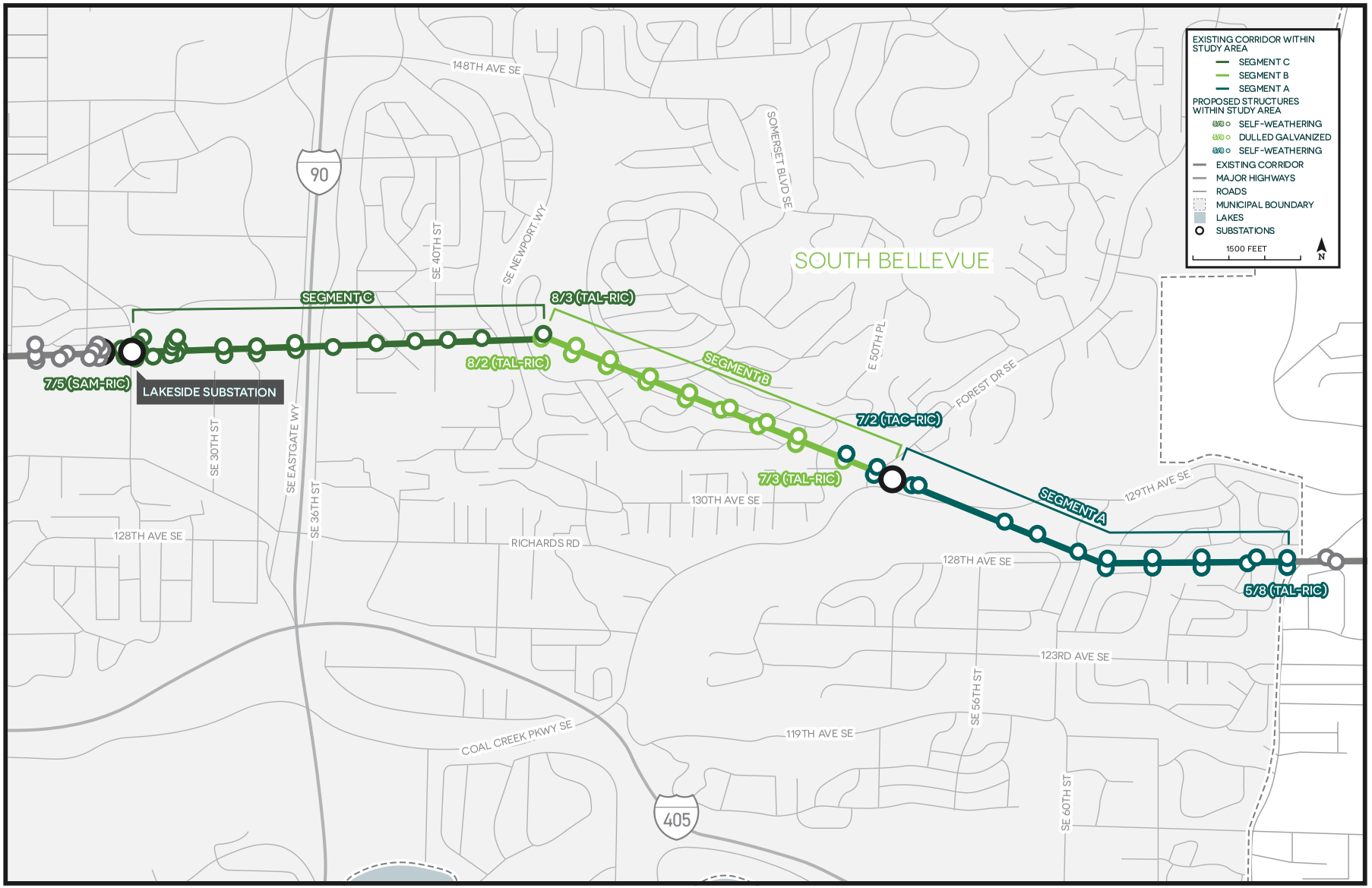

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FIGURE 3 **SEGMENT A**

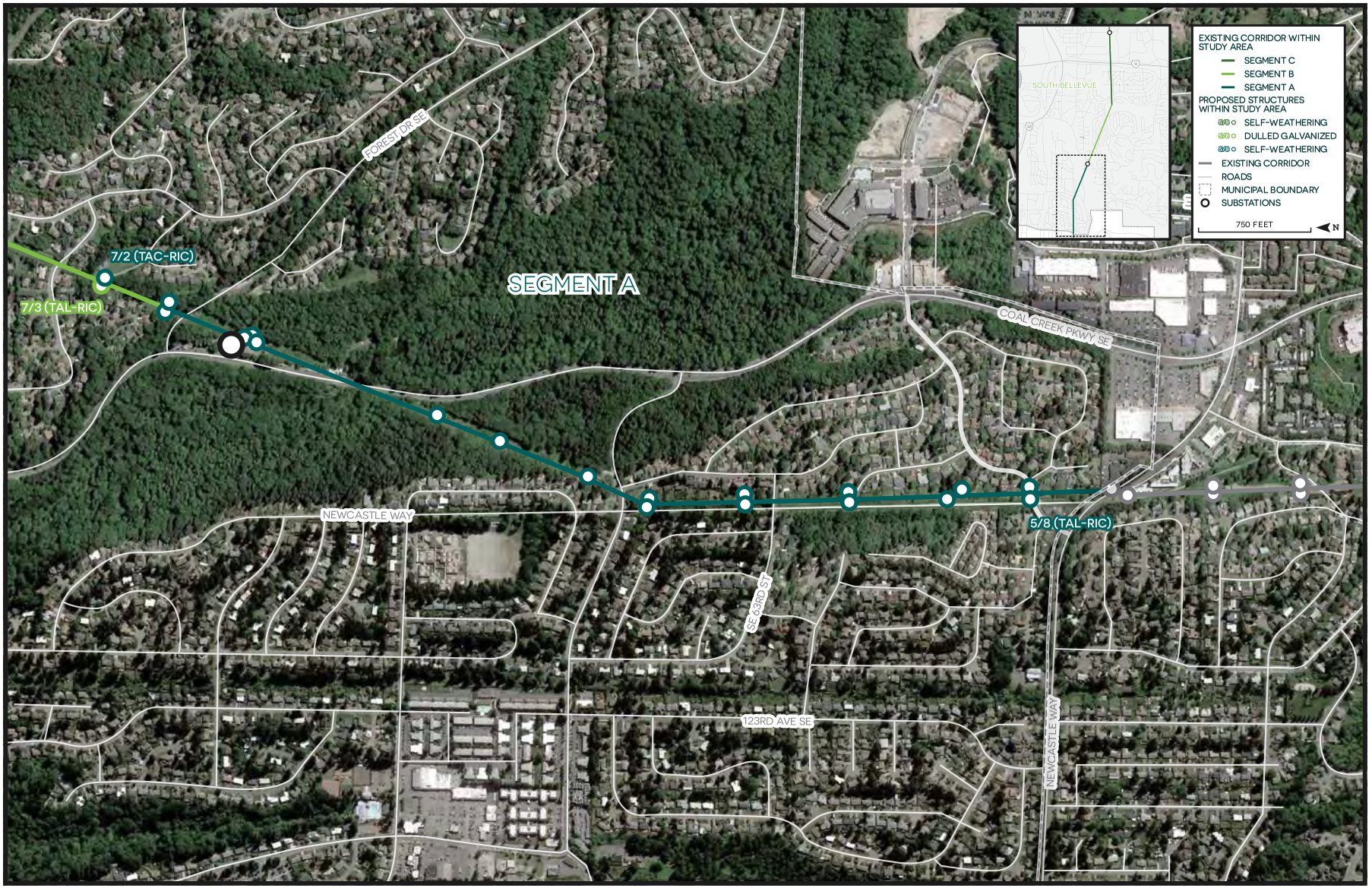

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FIGURE 4 **SEGMENT B**

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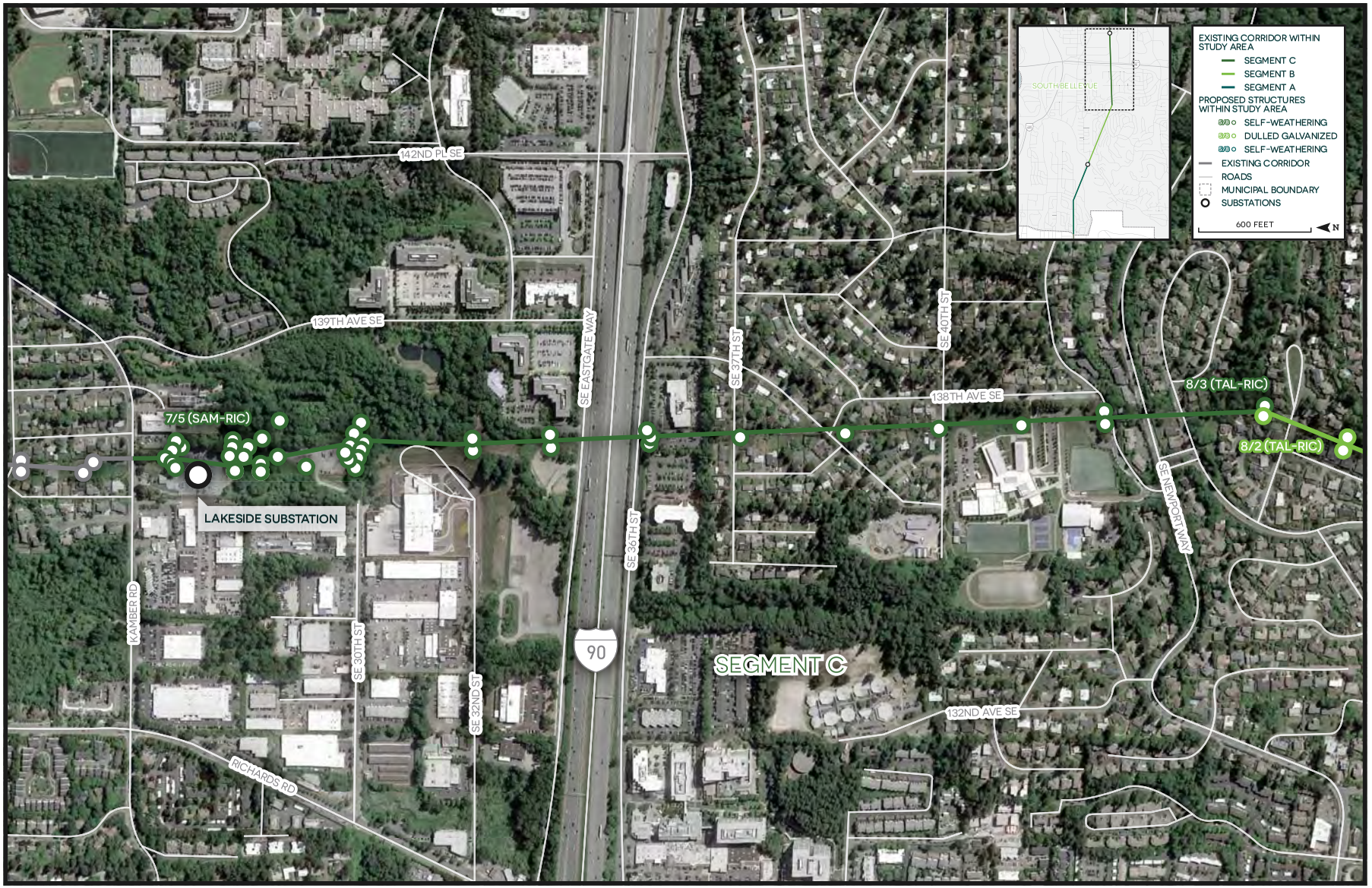
FIGURE 5 **SEGMENT C**



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APPENDIX A FINISHES FOR ALL STRUCTURES WITHIN BELLEVUE (SOUTH)

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STRUCTURE #	REFERENCE POINT	DOMINANT VIEWING CONDITION	PROPOSED FINISH
Pole Finish Segment A			
5/8 (TAL-RIC #1 & #2)		Adjacent to moderate density residential; minimal vegetative screening; partial to full structure potentially backdropped against moderately to highly vegetated right-of-way (ROW) edge/residential structure.	Self-Weathering
5/9 (TAL-RIC #1 & #2)		Adjacent to moderate density residential; minimal vegetative screening; partial to full structure potentially backdropped against moderately to highly vegetated ROW edge/residential structure.	Self-Weathering
6/1 (TAL-RIC #1 & #2)	SE 63rd St Crossing	Adjacent to moderate density residential; minimal vegetative screening; partial to full structure potentially backdropped against moderately to highly vegetated ROW edge/residential structure.	Self-Weathering
6/2 (TAL-RIC #1 & #2)	SE 63rd St Crossing	Adjacent to moderate density residential; minimal vegetative screening; partial to full structure potentially backdropped against moderately to highly vegetated ROW edge/residential structure.	Self-Weathering
6/3 (TAL-RIC #1 & #2)		Adjacent to moderate density residential; minimal vegetative screening; partial to full structure potentially backdropped against moderately to highly vegetated ROW edge/residential structure.	Self-Weathering
6/4 (TAL-RIC #1 & #2)		Adjacent to moderate density residential; minimal vegetative screening; partial to full structure potentially backdropped against moderately to highly vegetated ROW edge/ residential structure.	Self-Weathering
6/5 (TAL-RIC #1 & #2)		Heavily forested landscape, direct views from travel corridor and recreationists; minimal or no skylining.	Self-Weathering
6/6 (TAL-RIC #1 & #2)	Coal Creek Parkway Crossing	Heavily forested landscape, direct views from travel corridor and recreationists; minimal or no skylining.	Self-Weathering
6/7 (TAL-RIC #1 & #2)	Coal Creek Parkway Crossing; Somerset Substation	Heavily forested landscape, direct views from travel corridor and recreationists; minimal or no skylining.	Self-Weathering
7/1 (TAL-RIC #1 & #2)		Heavily forested landscape, direct views from travel corridor and recreationists; minimal or no skylining.	Self-Weathering
7/2 (TAL-RIC #1 & #2)	Forest Hill Neighborhood Park	Moderate-heavily vegetated landscape, direct views from travel corridor and recreationists; minimal or no skylining.	Self-Weathering
Pole Finish Segment B			
7/3 (TAL-RIC #1 & #2)		Adjacent to moderate density residential; to minimal vegetative screening; partial to full structure potentially visible against sky for adjacent and distant viewers; moderately vegetated, low vegetation along ROW	Dulled Galvanized

STRUCTURE #	REFERENCE POINT	DOMINANT VIEWING CONDITION	PROPOSED FINISH
7/4 (TAL-RIC #1 & #2)	Somerset Dr. SE Crossing	Adjacent to moderate density residential; to minimal vegetative screening; partial to full structure potentially visible against sky for adjacent and distant viewers; moderately vegetated, low vegetation along ROW.	Dulled Galvanized
7/5 (TAL-RIC #1 & #2)	Somerset Dr. SE Crossing	Adjacent to moderate density residential; to minimal vegetative screening; partial to full structure potentially visible against sky for adjacent and distant viewers; moderately vegetated, low vegetation along ROW.	Dulled Galvanized
7/6 (TAL-RIC #1 & #2)		Adjacent to moderate density residential; to minimal vegetative screening; partial to full structure potentially visible against sky for adjacent and distant viewers; moderately vegetated, low vegetation along ROW.	Dulled Galvanized
7/7 (TAL-RIC #1 & #2)		Adjacent to moderate density residential; to minimal vegetative screening; partial to full structure potentially visible against sky for adjacent and distant viewers; moderately vegetated, low vegetation along ROW.	Dulled Galvanized
7/8 (TAL-RIC #1 & #2)		Adjacent to moderate density residential; to minimal vegetative screening; partial to full structure potentially visible against sky for adjacent and distant viewers; moderately vegetated, low vegetation along ROW.	Dulled Galvanized
8/1 (TAL-RIC #1 & #2)		Adjacent to moderate density residential; to minimal vegetative screening; partial to full structure potentially visible against sky for adjacent and distant viewers; moderately vegetated, low vegetation along ROW.	Dulled Galvanized
8/2 (TAL-RIC #1 & #2)	Sumerset Blvd./SE Newport Way Crossing	Adjacent to moderate density residential; to minimal vegetative screening; partial to full structure potentially visible against sky for adjacent and distant viewers; moderately vegetated, low vegetation along ROW.	Dulled Galvanized
Pole Finish Segment C			
8/3 (TAL-RIC #1 & #2)	Sumerset Blvd./SE Newport Way Crossing	Adjacent to moderate density residential; minimal vegetative screening; partial to full structure potentially backdropped against moderately vegetated ROW edge/residential structures; minimal skylining.	Self-Weathering
8/4 (TAL-RIC #1 & #2)		Adjacent to moderate density residential; minimal vegetative screening; partial to full structure potentially backdropped against moderately vegetated ROW edge/residential structures; minimal skylining.	Self-Weathering
8/5 (TAL-RIC #1 & #2)		Adjacent to moderate density residential; minimal vegetative screening; partial to full structure potentially backdropped against moderately vegetated ROW edge/residential structures; minimal skylining.	Self-Weathering
8/6 (TAL-RIC #1 & #2)		Adjacent to moderate density residential; minimal vegetative screening; partial to full	Self-Weathering

STRUCTURE #	REFERENCE POINT	DOMINANT VIEWING CONDITION	PROPOSED FINISH
		structure potentially backdropped against moderately vegetated ROW edge/residential structures; minimal skylining.	
8/7 (TAL-RIC #1 & #2)		Adjacent to moderate density residential; minimal vegetative screening; partial to full structure potentially backdropped against moderately vegetated ROW edge/residential structures; minimal skylining.	Self-Weathering
8/8 (TAL-RIC #1 & #2)	I-90 crossing	Adjacent to transportation/commercial; minimal vegetative screening; partial to full structure potentially backdropped against moderately vegetated ROW edge.	Self-Weathering
8/9 (TAL-RIC #1 & #2) 0/5B (LAK-GOO)	I-90 crossing	Adjacent to transportation/commercial; minimal vegetative screening; partial to full structure potentially backdropped against moderately vegetated ROW edge.	Self-Weathering
8/10 (TAL-RIC #1 & #2) 0/5A (LAK-GOO)		Adjacent to commercial/industrial; minimal vegetative screening; partial to full structure potentially backdropped against moderately-highly vegetated ROW edge.	Self-Weathering
9/1 (TAL-RIC #1 & #2)	Richards Creek Substation/Lakeside Substation Area	Adjacent to commercial/industrial; minimal vegetative screening; partial to full structure potentially backdropped against moderately-highly vegetated ROW edge.	Self-Weathering
9/2 (TAL-RIC #1 & #2)	Richards Creek Substation/Lakeside Substation Area	Adjacent to commercial/industrial; minimal vegetative screening; partial to full structure potentially backdropped against moderately-highly vegetated ROW edge.	Self-Weathering
0/5C (LAK-GOO)	I-90 crossing	Adjacent to commercial/industrial and existing transmission infrastructure (light color/galvanized; minimal vegetative screening; partial to full structure potentially backdropped against moderately-highly vegetated ROW edge.	Self-Weathering
0/5 (LAK-GOO)	Richards Creek Substation/Lakeside Substation Area	Adjacent to commercial/industrial; minimal vegetative screening; partial to full structure potentially backdropped against moderately-highly vegetated ROW edge.	Self-Weathering
0/4 (LAK-GOO)	Richards Creek Substation/Lakeside Substation Area	Adjacent to commercial/industrial; minimal vegetative screening; partial to full structure potentially backdropped against moderately-highly vegetated ROW edge.	Self-Weathering
0/3 (LAK-GOO)	Richards Creek Substation/Lakeside Substation Area	Adjacent to commercial/industrial; minimal vegetative screening; partial to full structure potentially backdropped against moderately-highly vegetated ROW edge.	Self-Weathering
0/2 (LAK-GOO)	Richards Creek Substation/Lakeside Substation Area	Adjacent to commercial/industrial; minimal vegetative screening; partial to full structure potentially backdropped against moderately-highly vegetated ROW edge.	Self-Weathering
0/1 (LAK-GOO)	Richards Creek Substation/Lakeside Substation Area	Adjacent to commercial/industrial and existing transmission infrastructure (light color/galvanized); minimal vegetative	Self-Weathering

STRUCTURE #	REFERENCE POINT	DOMINANT VIEWING CONDITION	PROPOSED FINISH
		screening; partial to full structure potentially backdropped against moderately-highly vegetated ROW edge.	
7/9 (SAM-RIC #2)	Richards Creek Substation/Lakeside Substation Area	Adjacent to commercial/industrial; minimal vegetative screening; partial to full structure potentially backdropped against moderately-highly vegetated ROW edge.	Self-Weathering
7/8 (SAM-RIC #1&. #2)	Richards Creek Substation/Lakeside Substation Area	Adjacent to commercial/industrial; minimal vegetative screening; partial to full structure potentially backdropped against moderately-highly vegetated ROW edge.	Self-Weathering
7/7 (SAM-RIC #1 & #2) 0/1 (RIC-LAK #1)	Richards Creek Substation/Lakeside Substation Area	Adjacent to commercial/industrial; minimal vegetative screening; partial to full structure potentially backdropped against moderately-highly vegetated ROW edge.	Self-Weathering
7/6 (SAM-RIC #1&#2)	Richards Creek Substation/Lakeside Substation Area	Adjacent to commercial/industrial; minimal vegetative screening; partial to full structure potentially backdropped against moderately-highly vegetated ROW edge.	Self-Weathering
7/5 (SAM-RIC #1&#2)	Richards Creek Substation/Lakeside Substation Area	Adjacent to commercial/industrial and existing transmission infrastructure (light color/galvanized); minimal vegetative screening; partial to full structure potentially backdropped against moderately-highly vegetated ROW edge.	Self-Weathering
0/2 (RIC-LAK#1)	Richards Creek Substation/Lakeside Substation Area	Adjacent to commercial/industrial; minimal vegetative screening; partial to full structure potentially backdropped against moderately-highly vegetated ROW edge.	Self-Weathering
8/7 (SHU-LAK)	Richards Creek Substation/Lakeside Substation Area	Adjacent to commercial/industrial and existing transmission infrastructure (light color/galvanized); minimal vegetative screening; partial to full structure potentially backdropped against moderately-highly vegetated ROW edge.	Self-Weathering
8/8 (SHU-LAK)	Richards Creek Substation/Lakeside Substation Area	Adjacent to commercial/industrial and existing transmission infrastructure (light color/galvanized); minimal vegetative screening; partial to full structure potentially backdropped against moderately-highly vegetated ROW edge.	Self-Weathering
8/9 (SHU-LAK)	Richards Creek Substation/Lakeside Substation Area	Adjacent to commercial/industrial and existing transmission infrastructure (light color/galvanized); minimal vegetative screening; partial to full structure potentially backdropped against moderately-highly vegetated ROW edge.	Self-Weathering
8/10 (SHU-LAK)	Richards Creek Substation/Lakeside Substation Area	Adjacent to commercial/industrial and existing transmission infrastructure (light color/galvanized); minimal vegetative screening; partial to full structure potentially backdropped against moderately-highly vegetated ROW edge.	Self-Weathering

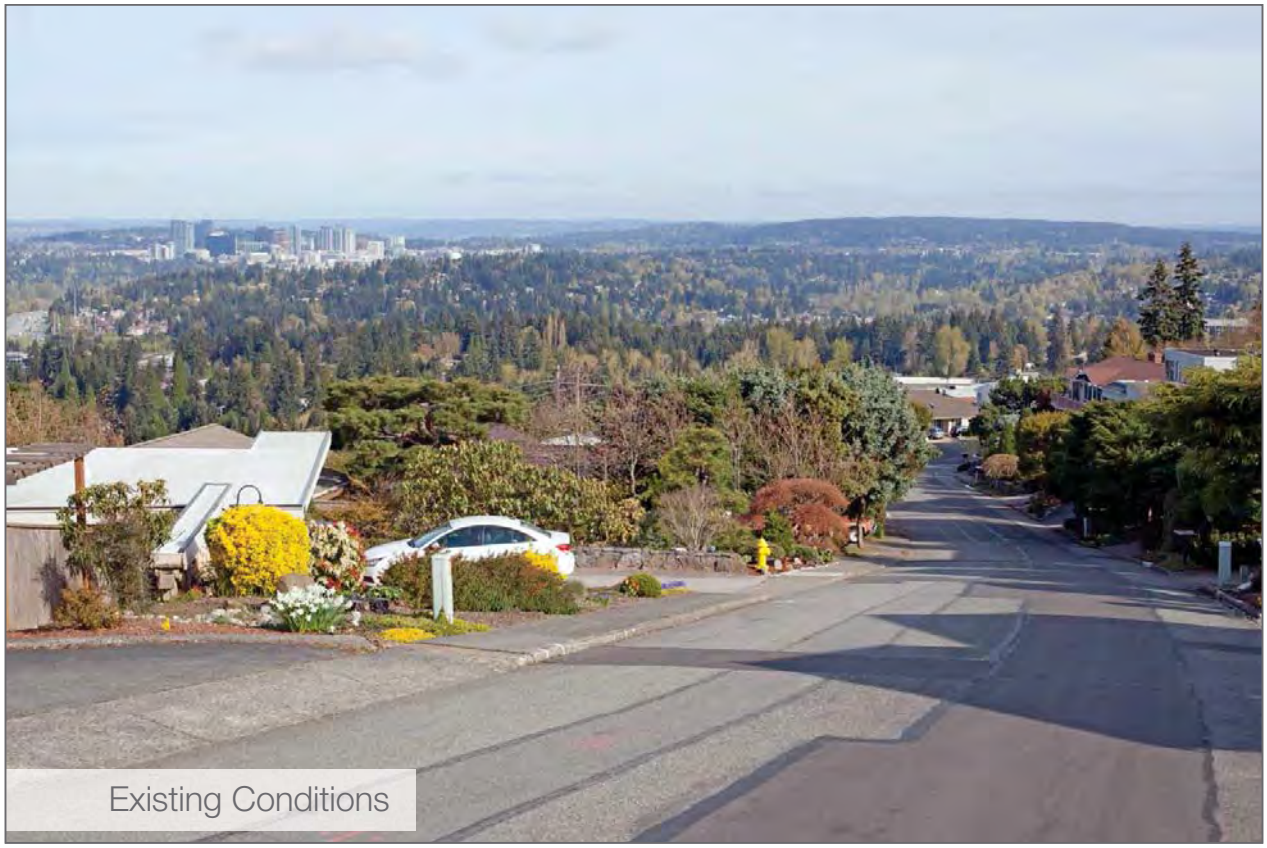
APPENDIX B PHOTO SIMULATIONS WITHIN BELLEVUE (SOUTH)

Address	**13233 SE 51st Pl, Bellevue**
Date	**7/24/2017**
Time	**2:21 PM**
Viewing Direction	**Northwest**
Existing Pole Heights	**~55 feet**
Proposed Pole Heights	**~65 feet**

KOP CENTRAL 38 SEGMENT 2

energizeEASTSIDE

PUGET SOUND ENERGY



Address	**4489 137th Ave SE, Bellevue**
Date	**4/10/2014**
Time	**9:32 AM**
Viewing Direction	**North**
Existing Pole Heights	**~55 feet**
Proposed Pole Heights	**~80 feet**

KOP CENTRAL 15 SEGMENT 2

energizeEASTSIDE

PUGET SOUND ENERGY

KOP CENTRAL 18 SEGMENT 2

Address	**4411 137th Ave SE, Bellevue**
Date	**5/7/2014**
Time	**10:53 AM**
Viewing Direction	**Northwest**
Existing Pole Heights	**~55 feet**
Proposed Pole Heights	**~80 feet**

energizeEASTSIDE

PUGET SOUND ENERGY

DSD 001500

Address	**4730 134th Place SE, Bellevue**
Date	**8/24/2016**
Time	**3:28 PM**
Viewing Direction	**West**
Existing Pole Heights	**~44 feet**
Proposed Pole Heights	**~75 feet**

KOP CENTRAL 30
SEGMENT 2

energizeEASTSIDE

PUGET SOUND ENERGY

Address	**4411 Somerset Dr SE, Bellevue**
Date	**7/24/2017**
Time	**9:26 AM**
Viewing Direction	**South**
Existing Pole Heights	**~55 feet**
Proposed Pole Heights	**~75 feet**

KOP CENTRAL 39 SEGMENT 2

energizeEASTSIDE

PUGET SOUND ENERGY

Address	**13300 SE 44th Pl, Bellevue**
Date	**7/24/2017**
Time	**2:05 PM**
Viewing Direction	**East**
Existing Pole Heights	**~55 feet**
Proposed Pole Heights	**~75 feet**

KOP CENTRAL 40 SEGMENT 2

energizeEASTSIDE

PUGET SOUND ENERGY

DSD 001503

Address	**13630 SE Allen Rd, Bellevue**
Date	**3/30/2016**
Time	**1:44 PM**
Viewing Direction	**Northeast**
Existing Pole Heights	**~60 feet**
Proposed Pole Heights	**~95 feet**

KOP SOUTH 24 SEGMENT 2

energizeEASTSIDE

PUGET SOUND ENERGY

Address	**13744 SE Allen Rd, Bellevue**
Date	**3/30/2016**
Time	**1:42 PM**
Viewing Direction	**Northeast**
Existing Pole Heights	**~65 feet**
Proposed Pole Heights	**~90 feet**

KOP SOUTH 25 SEGMENT 2

energizeEASTSIDE

PUGET SOUND ENERGY

DSD 001505

APPENDIX C CARBOLINE 8812 COLOR LOGIC

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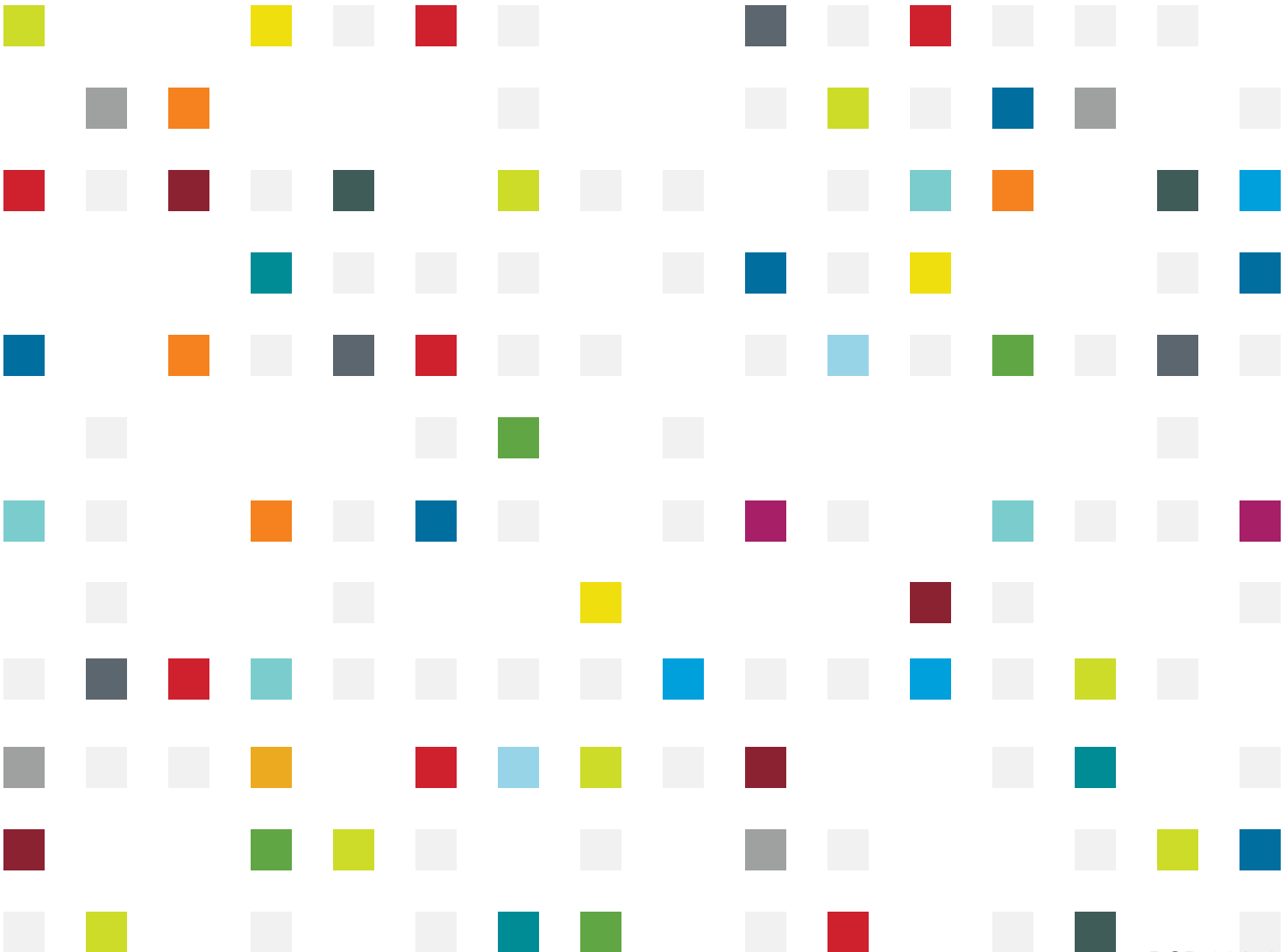
Coatings - Linings - Fireproofing

Color Logic

Intelligent Color Selection



DSD 001507

directions

new color developments and trends

1864 Vestal White	0832 Aviation White	0820 Carrera White	A882 Daybreak	C132 Blue Ice
G248 Sandcastle	8525 Classical	G171 Stratus Blue	G170 Viola	G169 Lapis Blue
7801 Constitution	G760 Grey Fog	J749 Louisiana Gray	4755 Pearl Gray	6225 Dark Beige
5255 Basket Weave	0855 Bamboo	0217 Desert Tan	B223 Cinnamon Kiss	7594 Merlot
F186 Window Pane	0381 Aleutian Green	4372 Hunter Green	F304 Wimbledon Green	2380 Rain Forest Green
1143 Nautilus	2127 Cyanine Blue	F193 Engine Blue	F140 Sapphire Blue	A700 Past Midnight

utility toolbox

maintenance and safety standards

A826 White Lotus	S800 Safety White	2133 Aquarius Blue	5141 Open Sky	S150 Safety Blue
C705 Light Gray	2716 Edison Gray	2713 Gull Gray	C703 Medium Gray	0754 Machine Gray
1675 Ignition Yellow	N625 Sun Yellow	6666 Safety Yellow	4444 Safety Orange	5555 Safety Red
1898 Aden White	9225 Cashew	G245 Dunes Tan	G250 Weathered Copper	F235 Dark Bronze
2394 Green Back	2383 Safety Green	D337 Offshore Green	C900 Black	

Colors shown are ink representation of actual color standards. Actual product appearance may vary slightly due to product, gloss, surface texture or method of application.
Vibrant colors may require additional coats or a primer similar in color to the finish coat for optimum color rendition.

DSD 001508

ovations

historical mainstays and timeless classics

A881 Veil White	A825 Haze White	3848 Eggshell	5803 Parchment	0808 Medium Buff
8882 Tank White	1867 Oyster Glow	0780 Neutral Gray	0794 Meridian Gray	2761 Mist Gray
6731 Sterling Gray	2758 Granite Gray	9750 Confederate Gray	0746 Midway Gray	4753 Gray Flannel
J343 Spring Green	J359 Greenhouse	5384 Patio Green	E369 Green Briar	0388 Vernal Green
0110 Silver Blue	1192 Blue Mist	4169 Atomic Blue	4184 Caribbean Blue	6164 National Blue
B775 Prestige	8285 Mobile Beige	2248 Walnut Grove	2277 Falcon Brown	0516 Tile Red

earthscapes

reflections of nature's own palette

G185 Skyward	G186 Cirrus Cloud	1315 Benicia Green	2332 Courtyard	9341 Lancaster Green
0895 River Reed	3216 Alpaca	K349 New Leaf	6797 French Gray	9218 Cocoa Brown
1606 Autumn Peak	8516 Copper Smith	8517 Potter's Clay	8528 Walnut Burl	3157 Moon Water

Colors shown are ink representation of actual color standards. Actual product appearance may vary slightly due to product, gloss, surface texture or method of application.
Vibrant colors may require additional coats or a primer similar in color to the finish coat for optimum color rendition.

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GARÍN PROV. DE BUENOS
AIRES, ARGENTINA
PHONE: 54-3327-44-2222
FAX: 54-3327-44-2223

AUSTRALIA – BRISBANE
7 PRODUCTION AVE
ERNEST JUNCTION
QUEENSLAND 4214
AUSTRALIA
PHONE: +61 7 3287 0222
FAX: +61 7 5594 9093

CANADA – ONTARIO
95 SUNRAY STREET
WHITBY, ONTARIO L1N9C9,
CANADA
PHONE: 905-430-3333
FAX: 905-430-3056

CHINA – DALIAN
HOU SHI CUN, DA WEI JIA
ZHEN
JIN ZHOU DISTRICT
DALIAN, CHINA 116110
PHONE: 86-411-8789-8441,
8442, 8443, 8444
FAX: 86-411-8789-8445

INDIA – CHENNAI
NO. 356 & 357 SIDCO
INDUSTRIAL ESTATE
AMBATTUR,
CHENNAI 600 098
INDIA
PHONE: 91-22-28500321
FAX: 91-22-28500323

INDONESIA – JAKARTA
MENARA SATU, BULEVAR
KELAPA GADING LA3 NO.1,
7FL, SUITE 706.
KELAPA GADING PERMAI,
JAKARTA 1420
INDONESIA
PHONE: +62 21 29375692
PHONE: +62 21 29375693
FAX: +62 21 29375696

ITALY – ALGHERO
VIA MILANO 150
20093 COLOGNO MONZESE
(MI), ITALY
PHONE: 3902-25 3751
FAX: 3902-25 37560

JAPAN – AMAGASAKI
TERAMOTO UNYU SOKO CO.,
LTD 17
MINAMIHATSUSHIMA-CHO,
AMAGASAKI, 660-0833 JAPAN
PHONE: 81-3-3643-4501
FAX: 81-3-3643-2951

MALAYSIA – JOHOR
400 ORCHARD ROAD #06-15
ORCHARD TOWERS
SINGAPORE 238875
PHONE: 65-6235-6001
FAX: 65-6733-6525

NEW ZEALAND – TAURANGA
91-111 OROPI ROAD
GREERTON
TAURANGA
NEW ZEALAND
PHONE: +64 7 5411 221
FAX: +64 7 541 1310

NORWAY – LIERSTRANDA
P.O. BOX 593
3412 LIERSTRANDA, NORWAY
PHONE: 47-32-857300
FAX: 47-32-857301

PUERTO RICO – SAN LORENZO
URB. APONTE #5
SAN LORENZO, PUERTO RICO
00754
PHONE: 787-736-4221
FAX: 787-736-53133

SAUDI ARABIA – DAMMAM
1ST INDUSTRY CITY, 28TH
STREET
P.O. BOX 1050
DAMMAM 31431,
KINGDOM OF SAUDI ARABIA
PHONE: +966 3 847 3044
FAX: +966 3 847 3689

SOUTH AFRICA – JOHANNESBURG
8 CRESSET ROAD
MIDRAND INDUSTRIAL PARK
JOHANNESBURG,
SOUTH AFRICA
PHONE: 27-11-2545500
FAX: 27-11-310-2872

SOUTH KOREA – BUSAN
43-1, JINYOUNG-RI
JINYOUNG-EUB
KIMHAE-CITY, 621-800
KYOUNGSANGNAMDO, KOREA
PHONE: 82-55-343-6441/5
FAX: 82-55-343-6414

THAILAND – BANGKOK
1/11 BANGCHAN INDUSTRIAL
ESTATE
SOI-SERI-THAI 54,
KANNAYAO, BANGKOK 10230
PHONE: +662 906 3042-3
FAX: +662 906 3044

TURKEY – BURSA
ALI OSMAN SONMES CAD.
NO:4
BURSA, DOSAB 16369 TURKEY
PHONE: 90-224-261-0537

UAE – DUBAI
P.O. BOX 3034
DUBAI, UAE
PHONE: 971-4-347-0460
FAX: 971-4-347-0242

USA – DAYTON
95 AIRPARK VISTA BLVD.
DAYTON, NV 89403
PHONE: 775-246-0760
FAX: 775-230-8859

USA – GREEN BAY
2122 ANGIE AVENUE,
BUILDING 7, SECTION 2
GREEN BAY, WI 54302
PHONE: 920-437-6561 X4208
FAX: 920-469-0358

USA – LAKE CHARLES
2425 FRUGE STREET
LAKE CHARLES, LA 70601
PHONE: 337-205-8410
FAX: 337-439-5296

USA – LOUISA
321 DUKE ST.
LOUISA VA 23093
PHONE: 540-967-5119
FAX: 540-967-5120

VENEZUELA – CARACAS
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VALENCIA EDO. CARABOBO
VENEZUELA
PHONE: 58-245-4000400
FAX: 58-245-5642011

VIETNAM – HO CHI MINH CITY
ROOM NO.63B,
6 PHUNG KHAC KHOAN ST.,
DAKAO WARD, DISTRICT 1,
HO CHI MINH CITY, VIETNAM
PHONE: (84) 08-3822-7684

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