PUGET SOUND ENERGY
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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.

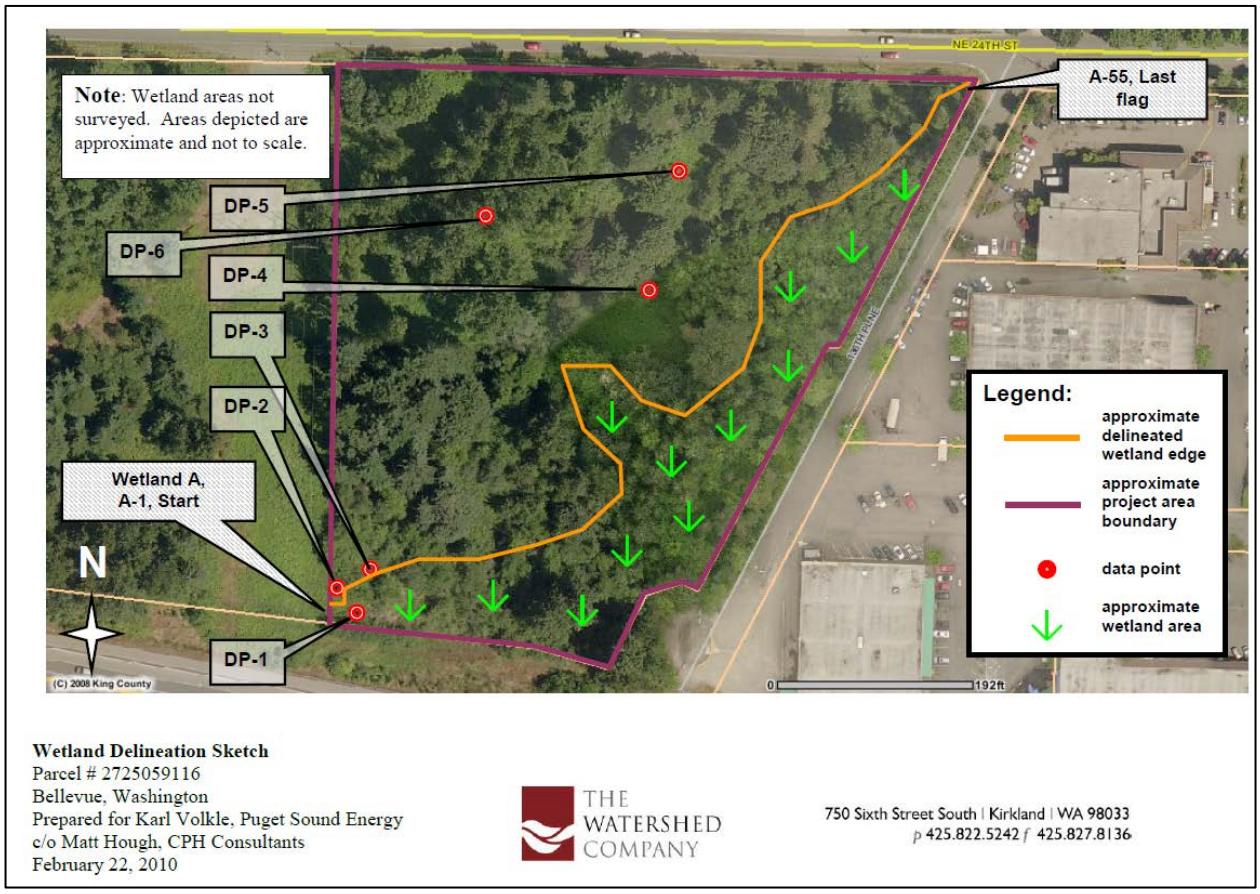
Lakeside-Goodes Corner 115kV Line: In the vicinity of the Lakeside and new Richards Creek substations, the Lakeside-Goodes Corner line is currently on double circuit structures with the existing Talbot Hill-Lakeside #1 line (which will be upgraded to 230 kV). When the existing Talbot Hill-Lakeside #1 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.

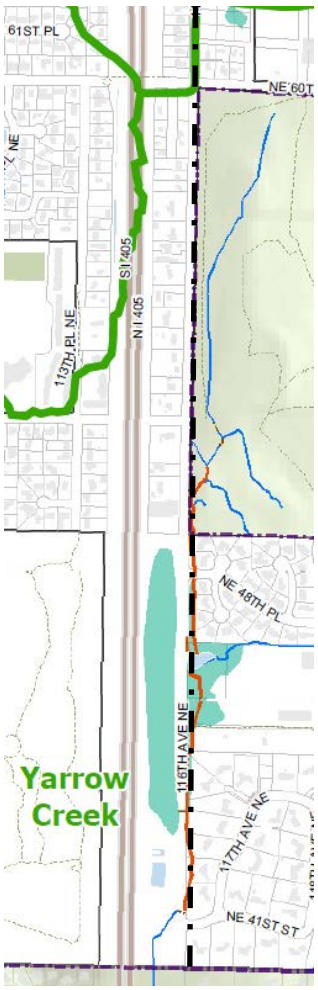
Critical Areas: During initial planning of Energize Eastside in 2014, three substation sites were identified and evaluated both by PSE and the Community Advisory Group. The substations sites were named Richards Creek (subject of CUP application), Westminster, and Vernell. These sites were chosen because 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