3.3 WATER RESOURCES

3.3.1 INTRODUCTION

This section describes the Study Area's existing conditions and its downstream receiving waters as they relate to water resources. The analysis was prepared using existing information available in public sources or provided by the City such as current impervious areas from parcel records and stormwater management plans.

After establishing current conditions, the impacts analysis examines how redevelopment will impact the quality and quantity of water resources due to stormwater runoff and recharge from the Study Area.

This analysis identifies significant impacts to water quality using the following thresholds:

- Net change in untreated pollution-generating hard surfaces (PGHS)
- Net change in effective hard surface

In addition, each alternative is evaluated using the following performance measure responding to the City Council Guiding Principles listed in Section 2.3:

- Amount of effective hard surfaces

Finally, the section discusses features of the alternatives, City programs and regulations, and other methods potential mitigation measures that could address significant impacts.

3.3.2 AFFECTED ENVIRONMENT

REGULATORY ENVIRONMENT

Federal stormwater regulations in the Clean Water Act are typically promulgated through local stormwater requirements. It is anticipated that federal stormwater-related requirements will be met through compliance with state and local stormwater codes and requirements.

For projects with an area of disturbance exceeding one acre, the developer is required to file a Notice of Intent with Ecology for coverage under the National Pollutant Discharge Elimination System (NPDES) program's General Permit for Stormwater Discharges Associated with Construction Activities. These filings typically require projects to provide erosion-control measures consistent with Ecology's *Stormwater Management Manual for Western Washington*. Permanent stormwater features must meet the manual's design standards or be equivalent.

The City's stormwater code for design of stormwater facilities requires compliance with the *2012 Stormwater Management Manual for Western Washington*, as Amended in December 2014 (Ecology, 2014) and the amendments/additions to the ecology manual listed in the *City of Bellevue Utilities Department—Storm and Surface Water Engineering Standards*. (City of Bellevue, 2017e) The stormwater codes are focused on reducing potential pollution and stormwater rate and volume increases from hard surfaces. New development and redevelopment are required to comply with the current standards for stormwater treatment and discharge. Much of the Study Area was developed prior to the advent of modern stormwater requirements or under less stringent editions.

For projects that result in 2,000 square feet or more of new plus replaced hard surface, or where projects result in 7,000 square feet or more of land disturbing activity, the City's stormwater code requires the use of On-site Stormwater Management Best Management Practices (BMPs) to the extent feasible to infiltrate, disperse, and retain runoff without causing flooding or erosion impacts. BMPs may include Low Impact Development (LID) techniques such as infiltration facilities, dispersion, bioretention facilities, permeable pavements, vegetative roofs, rainwater harvesting, reduction of hard surface area, and retention of native vegetation. New and redevelopment projects must either:

- Use On-site Stormwater Management BMP's to infiltrate, disperse, and retain stormwater runoff on-site to for all surfaces to the extent feasible, or
- Demonstrate compliance with the LID Performance Standard by matching developed discharge durations to pre-developed durations for the range of predeveloped discharge rated from 8 percent of the two-year peak flow to 50 percent of the two-year peak flow.

In addition to employing BMPs to the extent feasible, all new and redevelopment projects within the Study Area are required to provide water quality mitigation for pollution-generating hard surfaces (PGHS) if thresholds per the City's stormwater code are exceeded. If a project results in 5,000 square feet or of PGHS, water quality treatment is required for the PGHS. Most projects within the Study Area will require compliance with the "Enhanced treatment" performance criteria for water quality runoff treatment. Discharge of untreated stormwater from PGHS to groundwater is prohibited, except for discharge achieved by infiltration or dispersion of runoff using BMPs.

New and redevelopment projects in the Study Area will also be required to provide flow-control for effective hard surfaces if thresholds per the City's stormwater code are exceeded. If a project results in 10,000 square feet or more of both new and replaced effective hard surface, or if a project causes a 0.10 cubic feet per second increase in the 100-year flow frequency from a threshold discharge area comparing existing condition runoff to post-project runoff, then flow control is required for all new and replaced effective hard surfaces. Sturtevant, Kelsey, and West Tributary Basin Creeks are designated as Fish Bearing: Type F, and are therefore not exempt from flow control requirements. All developments that trigger the above thresholds must meet the standard flow control requirements by matching developed discharge durations to pre-developed durations for the range of pre-developed discharge rates from 50 percent of the two-year peak flow up to the full 50-year peak flow. Sturtevant Creek basin has been approved by Ecology as having at least 40 percent total impervious surface areas since 1985. For new and redevelopment projects located in the Sturtevant Creek basin, the pre-developed condition to be matched is the existing land cover condition, or land cover condition commensurate with achieving a target flow regime identified by an approved basin study. The pre-developed condition for the Kelsey and West Tributary Creek Basins is forested.

Road projects in the Study Area will be required to provide flow control for new effective hard surfaces per the City's stormwater code if the total of hard surfaces exceeds 10,000 square feet. Additionally, flow control will be required for both new and replaced effective hard surfaces if the project adds 50 percent or more to the existing hard surfaces within the project limits. If the new hard surfaces add less than 50 percent to the total existing hard surfaces within the project limit, flow control for replaced effective hard surfaces will not be required.

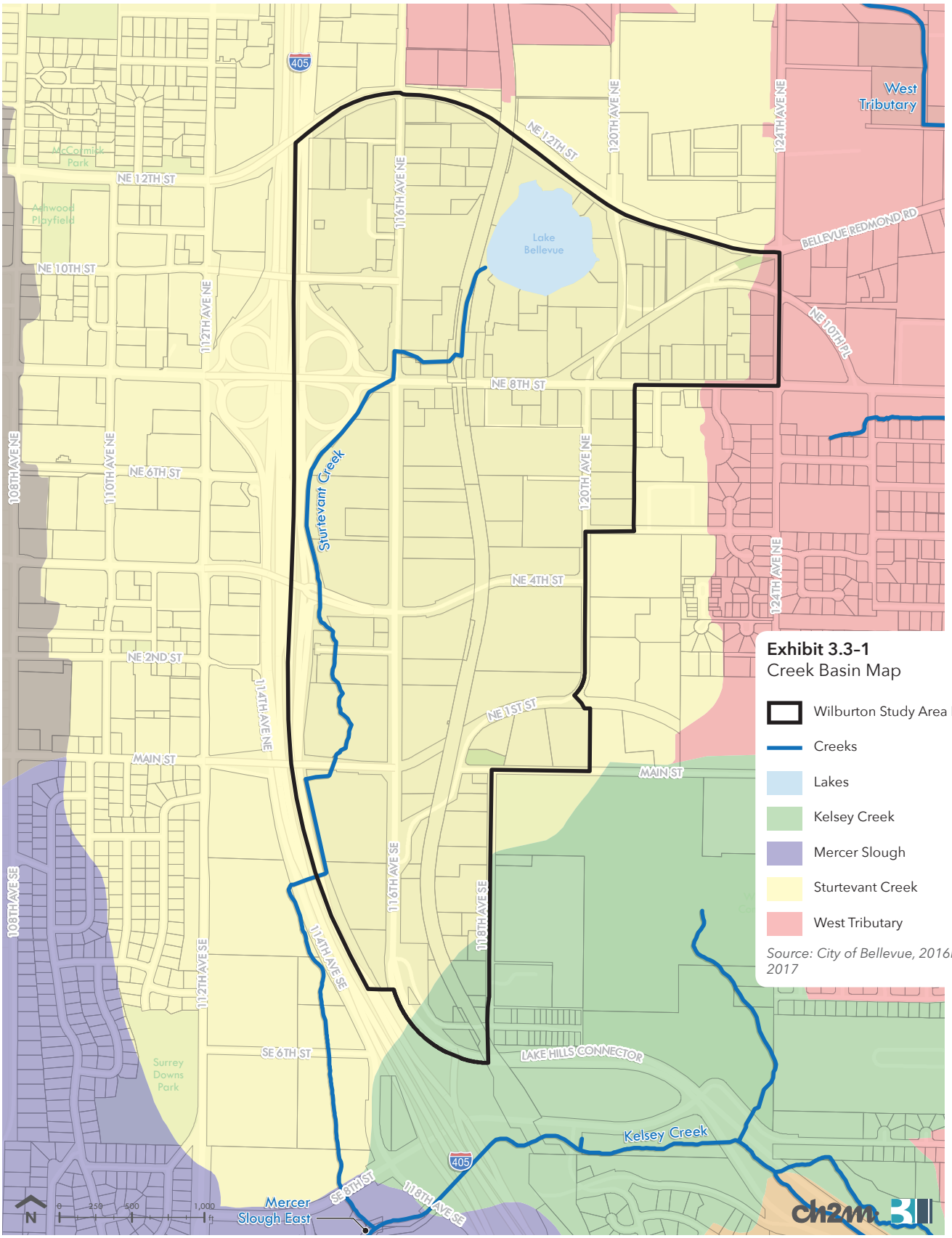
For areas that discharge stormwater to wetlands within the Study Area, new and redevelopment projects will also be required to provide additional stormwater volume controls in compliance with the City's stormwater code.

DRAINAGE BASINS AND LAND COVER

The Study Area is currently developed for medical, commercial office, and retail uses, including automobile dealers, and to a limited degree, residential land uses. In general, stormwater runoff from the Study Area drains to roadside ditches, catch basins, and storm drains. Runoff is collected and conveyed into larger storm drains within the major streets, and discharges into local creeks and drainage tributaries.

The Study Area comprises approximately 294 acres of urban developed area and drains to three tributary creeks: Sturtevant Creek, Kelsey Creek, and West Tributary Basin Creek. All three creeks are part of the Greater Lake Washington Watershed, referred to as the Water Resources Inventory Area (WRIA) 8 in King County. Approximately 4.2 acres at the northeast corner of the Study Area drains to West Tributary Basin Creek, which is a tributary to Kelsey Creek. The southeast corner of the Study Area, approximately 7.1 acres, drains to Kelsey Creek. The balance of the Study Area, approximately 282.7 acres, drains to Sturtevant Creek (see Exhibit 3.3–1).

Sturtevant Creek drains a total area of approximately 770 acres. The creek originates at Lake Bellevue in the northern portion of the Study Area, draining southward into Mercer Slough. Interstate 405 runs parallel to the creek, crossing it midway between Lake Bellevue and the Mercer Slough. The creek is surrounded on both sides by heavy commercial uses and high traffic streets, making the basin approximately 71 percent hard surface. The basin is dominated by public right-of-way and commercial/office land uses.


405
West Tributary
NE 12TH ST
120TH AVE NE
124TH AVE NE
McCormick Park
Ashwood Playfield
116TH AVE NE
Lake Bellevue
BELLEVUE REDMOND RD
NE 10TH ST
112TH AVE NE
NE 10TH PL
NE 8TH ST
108TH AVE NE
110TH AVE NE
NE 6TH ST
Sturtevant Creek
120TH AVE NE
NE 4TH ST
124TH AVE NE
NE 2ND ST
114TH AVE NE
NE 1ST ST
MAIN ST
MAIN ST
116TH AVE SE
108TH AVE SE
118TH AVE SE
114TH AVE SE
112TH AVE SE
SE 6TH ST
Surrey Downs Park
LAKE HILLS CONNECTOR
Kelsey Creek
405
SE 8TH ST
118TH AVE SE
Mercer Slough East
N
0 250 500 1,000 ft
Exhibit 3.3-1
Creek Basin Map
Wilburton Study Area Boundary
Creeks
Lakes
Kelsey Creek
Mercer Slough
Sturtevant Creek
West Tributary
Source: City of Bellevue, 2016h; CH2M, 2017
ch2m

(City of Bellevue, 2009) Lake Bellevue in the upper portion of the basin is surrounded by residential and commercial development. The drainage system serving the overall basin consists primarily of roadside ditches and storm drainage pipes. Sturtevant has documented chinook salmon use and drains into a Type B wetland.

Kelsey Creek drains a total area of approximately 2,820 acres. (City of Bellevue, 2010c) The creek flows through Larson Lake and loops around the west and south and drains to the Mercer Slough. Kelsey Creek also includes other tributaries: West Tributary Basin Creek, Sears Creek, Valley Creek, and Goff Creek. The basin is approximately 40 percent hard surface and consists of a variety of land uses, most of which is public right-of-way, single-family residential, open space/park, and multifamily residential. (City of Bellevue, 2010c) The drainage system serving the overall basin consists primarily of roadside ditches and storm drainage pipes. Kelsey Creek and the West Tributary are considered a Tier 2 salmon recovery area, necessary for chinook recovery.

The West Tributary Basin Creek drains a total area of approximately 1,000 acres. The creek drains into Kelsey Creek, which drains to the Mercer Slough. The basin is approximately 46 percent hard surface and consists of a variety of land uses, the majority being public right-of-way, single-family residential, open space/park, and industrial. (City of Bellevue, 2010a) The drainage system serving the overall basin consists primarily of roadside ditches and storm drainage pipes.

The Mercer Slough, receiving waterbody for Sturtevant Creek and Kelsey Creek, drains a total area of approximately 1,300 acres. The southern portion of the slough flows through the protected Mercer Slough Nature Park, underneath I-90, and into Lake Washington. The northern part of the slough contains an east and a west branch. Sturtevant and Kelsey Creeks flow into the northern part of the slough and supply water to both branches. The major land uses consist of public right-of-way, single-family residential, and open space/park. Approximately 35 percent of the basin is covered by hard surface area. (City of Bellevue, 2010b)

Lake Washington, the receiving water body of the Mercer Slough, is the second largest natural lake in Washington. Most of the immediate watershed is highly developed and urban in nature.

Hard surfaces prevent rainfall from infiltrating surficial soils. When runoff from these effective hard surface areas discharges directly into

a piped storm drainage system, it results in rapid flow of stormwater to downstream water bodies. Additionally, effective hard surfaces are a large source of urban pollution, especially when runoff water is contaminated by vehicular traffic. These pollution-generating hard surfaces are a primary source of pollution that can impair water quality in downstream waters. The Study Area is already highly urbanized with a total hard surface coverage of approximately 81 percent. Under current conditions, most of this pollution-generating hard surface area is directly connected to conveyance systems that drain minimally treated stormwater to the creek basins. Parcels developed prior to 1976 likely have some level of water quality and flow control, but were not designed to the Department of Ecology's standards. For purposes of this study, benefits will not be quantified for parcels developed between 1976 and 1992. Parcels developed after 1992, coinciding with the Washington State Department of Ecology's 1992 Stormwater Manual, are assumed to have some level of both water quality treatment and flow control. See Exhibit 3.3–2 for a summary of these existing conditions.

Exhibit 3.3–2 Existing Land Cover Summary, in Acres

TOTAL						
Area	Hard Surface	Pervious Surface	PGHS[1]	PGHS[1]	EFFECTIVE HARD SURFACE[2]	EFFECTIVE UNMITIGATED HARD SURFACE[3]
294.1	237.3	56.8	178.7	141.8	237.3	187.4

1 Pollution-Generating Hard Surface.

2 Hard surface areas plumbed directly into a piped storm drainage system without treatment with BMPs.

3 Effective hard surface areas not mitigated with flow control facilities.

Source: CH2M, 2017

WATER QUALITY

Water bodies within and downstream of the Study Area exhibit water quality conditions generally associated with urban developed areas, such as higher concentrations of metals and sediments, elevated water temperature, and increased fecal coliform. (Bellevue, 2012) Washington State Department of Ecology (Ecology) monitors the quality of state waters, and maintains a list of water bodies that have water quality concerns (the 303(d) list). The latest version of the 303(d) list, approved by the U.S. Environmental Protection Agency, was released by Ecology in 2016. The list divides water body impairments into five major categories:

- **Category 1.** A water body that meets tested standard for clean waters.
- **Category 2—water body of concern.** A water body for which some evidence exists of a water quality problem, but not enough to require initiating a water quality improvement project.
- **Category 3—insufficient data.** A water body that has not been tested.
- **Category 4—polluted water body that does not require a total maximum daily load (TMDL) assessment.** A polluted water body that does not require a TMDL because its pollution problems are being solved in one of three ways:
  - » **Category 4a—has a TMDL.** A water body that has an approved TMDL in place and is actively being rehabilitated.
  - » **Category 4b—has a pollution control program.** A water body that has a program in place that is expected to solve the problem.
  - » **Category 4c—is impaired by a nonpollutant.** A water body that is impaired by causes that cannot be addressed through a TMDL, such as low water flow, channelization, and dams.
- **Category 5—polluted water body that requires a TMDL.** A water body for which sufficient data exists showing that the water quality standards have been violated for one or more pollutants and for which there is no current TMDL or pollution control plan in place.

Exhibit 3.3–3 summarizes the parameters for the Washington State Department of Ecology's 303(d) water quality standards that have been exceeded within the water bodies in the Study Area.

Exhibit 3.3–3 Water Body Impairments, 2016

WATER BODY BASIN	Fecal Coliform	Dissolved Oxygen	Temp	Total Phosphorous	pH	Mercury	Sediment
Sturtevant Creek	–	–	–	–	–	–	–
Kelsey Creek	Category 5	Category 2	Category 5	–	Category 5	–	–
West Tributary Basin Creek	–	–	–	–	–	–	–
Mercer Slough	Category 5	Category 5	Category 5	–	–	Category 2	–
Lake Washington	–	–	–	–	–	–	Category 2

Source: Washington State Department of Ecology (Ecology), 2016

GROUNDWATER

There are no groundwater protection areas or significant groundwater uses within the Study Area. There are several wells within the larger vicinity of drainage basins, including the Beaux Arts Village, which obtains municipal water primarily from groundwater, and from the City of Bellevue. (King County, 2009)

Glacial till underlies much of the Study Area at a shallow depth. Water infiltrates relatively slowly through this material. During rainy seasons, it is not uncommon for perched groundwater to develop above layers of glacial till. During drier summer months, groundwater plays a critical role in providing base flows to the creeks.

The City of Bellevue prepared GIS data based on findings of an infiltration feasibility study performed by Associated Earth Sciences (see Exhibit 3.3–4). Per the findings of this analysis, approximately 132.8 acres (45.17 percent) of the Study Area is feasible for using infiltration BMPs for mitigation of stormwater volumes. (City of Bellevue, 2016h)

FLOODING

Federal Emergency Management Agency (FEMA) 100-year floodplains, as mapped by FEMA, were analyzed to determine potential flooding within and downstream of the Study Area. The only identified 100-year floodplain within the Study Area consists of the area surrounding Lake Bellevue. Downstream of the Study Area, the 100-year floodplain lies along the Mercer Slough. Kelsey Creek and West Tributary Basin Creek drainage basins also include 100-year floodplains that lie along the creek extents, and are located outside the limits of the Study Area. (Federal Emergency Management Agency, 1995) (King County, 2017)

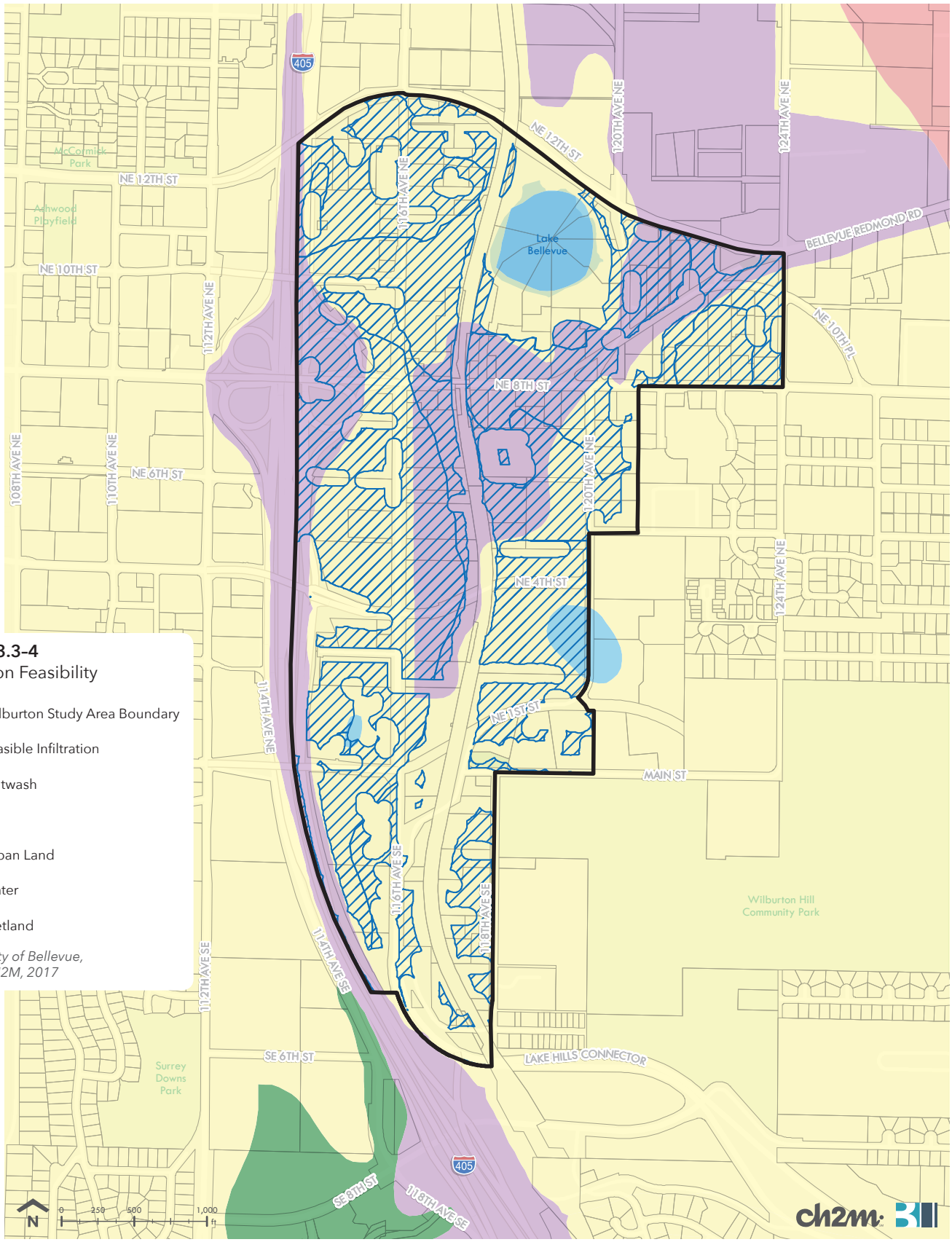


Exhibit 3.3-4
Infiltration Feasibility

- Wilburton Study Area Boundary
- Feasible Infiltration
- Outwash
- Till
- Urban Land
- Water
- Wetland

Source: City of Bellevue, 2016h; CH2M, 2017

Although Sturtevant Creek does not have a formally delineated floodplain, occasional flooding has been reported south of Lake Bellevue. (Sound Transit, 2011a) No other flooding reports were identified within the Study Area.

3.3.3 IMPACTS

This section describes potential impacts on the quality and quantity of water resources due to stormwater runoff and recharge from the Study Area. Water resources analyzed include Sturtevant Creek, Kelsey Creek, West Tributary Basin Creek, the Mercer Slough, Lake Washington, and underlying groundwater aquifers.

For the purposes of this EIS, the following thresholds of significance are used to define impacts to water quality:

- Net change in untreated PGHS
- Net change in effective hard surface

IMPACTS COMMON TO ALL ALTERNATIVES

Impacts on surface water and stormwater would result primarily from changes in the quality of runoff from hard surfaces in the Study Area. Similarly, impacts on groundwater would result primarily from changes in the amount of recharge from the surface area due to the change in hard surfaces and/or stormwater infrastructure. Under predeveloped conditions, native vegetation and surficial soils generally intercept and absorb rainfall. Typically, predeveloped runoff infiltrates into permeable soils with minimal surface runoff and is stored underlying aquifers. The stored water is either evapotranspired through native vegetation and trees, or it slowly enters water bodies via interflow. Under typical developed conditions, vegetative cover and topsoil are disturbed or removed, and hard, impermeable surfaces are added. This results in reduced capacity of the land surface to absorb and infiltrate runoff, and increased runoff is generated. The increased rate of runoff and volume can create erosion and degrade habitat, carrying increased pollutants that have accumulated on hard surfaces into downstream water bodies.

The Study Area is already developed with mixed commercial uses and some residential land use with a high percentage of hard surface coverage, and runoff is conveyed via storm drains to creeks.

Runoff from much of the Study Area is conveyed to Sturtevant Creek, while smaller portions of the Study Area are conveyed to Kelsey and West Tributary Basin Creeks. The creeks drain to the Mercer Slough and ultimately to Lake Washington as described in Section 3.3.1.

All alternatives would result in changes in hard surface coverage as the Study Area is redeveloped. New and redevelopment projects are required to implement BMPs to the extent feasible to reduce stormwater runoff and provide flow control per the City's stormwater code, which would provide mitigation to reduce the potential increases in runoff volume and flow rate. Overall, for each alternative, peak flows are anticipated to be less than, or the same as existing conditions at the discharge points for the Study Area due to the application of best management practices.

As development increases, the land utilization and vehicle traffic within the Study Area would increase with the addition of residential units, commercial/retail space, and use of public facilities. The increase in vehicular traffic would result in approximately proportional increases in many pollutants, particularly metals and hydrocarbons. However, the redevelopment is anticipated to result in a greater proportion of non-pollution generating roof areas that replace existing pollutant generating surfaces like parking areas and provide an opportunity for vegetated roofs. Therefore, although there could be a rise in pollutants, it will be easier to collect and treat runoff due to more concentrated pollution generating surfaces. Additional increases in runoff of nutrients can result in reduced dissolved oxygen in receiving water bodies, and increased residential pollution can increase fecal coliform loading.

Improved water quality and quantity controls required by the City's stormwater code for applicable new developments and redevelopment projects will help reduce the potential impacts of increased hard surface. Potential impacts on water quality are, therefore, evaluated based on the relative change in total pollution-generating hard surfaces that would remain untreated (e.g., not redeveloped) as a result of anticipated growth and implementation of the stormwater code. Impacts on downstream flow volumes and groundwater recharge are evaluated based on the total net change in effective hard surface (e.g., hard surface not managed by BMPs or flow control) that would result based on anticipated growth and implementation of the stormwater code under each alternative.

Short-term Impacts

Short term impacts to water resources would arise in the construction phase of redevelopment. Construction impacts on water resources would be addressed through compliance with Minimum Requirement #2 Construction Stormwater Pollution and Prevention in the City's stormwater code, as well as compliance with Ecology's NPDES Construction Stormwater General Permit, if the project results in one acre or more of land disturbing activity. Short term impacts are greater if the amount of construction is greater.

Long-term Impacts

Hard surface coverage for existing conditions was estimated from existing GIS and aerial imagery. The proposed future hard surface coverage under the alternatives was estimated by assuming all new and redevelopment projects would generally build to the maximum allowable hard surface coverage as defined by City of Bellevue zoning code. Similarly, the portion of pollution-generating hard surfaces (e.g., roadways, driveways, and parking) versus non-pollution generating hard surfaces (e.g. building roofs, sidewalks, and patios) was estimated from allowable building coverage by the code and typical recent development as measured through aerial imagery. If new and redeveloped parcels triggered applicable stormwater code requirements for flow control and water quality per the City's stormwater management standards, it resulted in flow control for most hard surfaces and water quality treatment for pollution-generating hard surface. Most redevelopments within Sturtevant Creek Basin did not need require flow control facilities. Due to the potential density of the Study Area, BMPs assume that full infiltration or dispersion of impervious surfaces would be infeasible; however, the minimum percentages, based on site area and infiltration capability of the soils, were assumed to be implemented.

PERFORMANCE MEASURES EVALUATION

The amount of effective hard surface area is used as a quantitative indicator to compare each alternative's ability to achieve City Council Principles with regards to water resources. As described in Section 1.2, the performance measure's purpose is to assist in the screening of alternatives using evaluation criteria, in response to City Council Guiding Principles (Section 2.3).

Each alternative's emphasis is summarized below, based on the net change in effective hard surface area from existing to proposed conditions. All alternatives result in between two and four percent reduction in effective hard surface and are scored as Moderate.

Exhibit 3.3-5 Evaluation Framework: Comparison of Alternatives—Water Resources

PERFORMANCE MEASURE	NO ACTION ALTERNATIVE	ALTERNATIVE 1	ALTERNATIVE 2
Amount of effective hard surfaces	●	●	●

▲ *Strong Emphasis* ● *Moderate Emphasis* ▼ *Weak Emphasis*

Roadway Improvements

Under all alternatives, currently planned roadway projects will be implemented, as described in Chapter 2. Assumed impacts to water resources for each roadway project is described below.

- **NE 6th Street Extension:** The project would extend NE 6th Street from I-405 eastward to either 116th Avenue NE or 120th Avenue NE. If extended to 120th Avenue NE, the street would likely be an elevated structure over 116th Avenue NE to accommodate the changes in grade between the existing infrastructure and its intersection with 120th Avenue NE. Much of the project area is currently developed as private commercial parcels, and the extension would require substantial property acquisition. Due to the existing high percentage of hard surface in the project area, it is assumed that the project would not add more than 50 percent to the existing hard surfaces and therefore would not trigger flow control requirements per the City's stormwater code. The project would be required to provide BMPs to the extent feasible, as well as water quality mitigation. Therefore, it is anticipated the project will result in an increase in stormwater runoff volumes and rates as well as the effective hard surface area, and reduce the untreated PGHS.
- **NE 4th Street & NE 8th Street / Eastside Rail Corridor (ERC) Crossings:** In all alternatives, the crossing will include a non-motorized bridge over NE 8th Street to fully separate pedestrian and bicycle trail users from vehicular traffic, and an at-grade crossing on NE 4th Street with full signalization. The project areas are assumed to be entirely hard surface under

existing conditions, and it is assumed that BMPs will not be feasible for the projects. Additionally, it is assumed the separate projects will not trigger thresholds requiring water quality or flow control mitigation, and therefore will result in no change to PGHS and effective hard surface area. If either of the projects do trigger thresholds requiring mitigation, the result would be a reduction in PGHS and effective hard surface area.

GRAND CONNECTION

The Grand Connection is planned as a signature urban priority non-motorized connection between Lake Washington and the East-Side Rail Corridor (ERC), including a bridge over I-405 at the Wilburton terminus. There are three options for the Wilburton terminus portion of the Grand Connection that would occur under Alternatives 1 and 2, though they would not be implemented under the No Action Alternative. The three options are evaluated below with regards to general impacts to water resources.

Option A: Sculptural Bridge. This option could create an extension from NE 6th Street into the Study Area via a pedestrian crossing over I-405. The bridge would navigate south of the East Link light rail aerial guideway and descend to a landing in the Study Area consisting of a multimodal pathway bordered by open park spaces, landscape, and plaza, with a potential stormwater facility; see Exhibit 3.3–6. Option A could require acquisition of private property between I-405 and 116th Avenue NE as well as coordination with future development east of 116th Avenue NE, and is expected to result in reduction of PGHS and hard surfaces as well as an increase in pervious landscape area of approximately 240,000 square feet. Most new and replaced hard surfaces are expected to be non-pollution generating, and it is assumed that BMPs and flow control could be provided to mitigate runoff from hard surfaces as required in the City's stormwater code if thresholds are exceeded.

Option B: Stand-alone Bridge. This option creates a pedestrian bridge extending across I-405 that stands apart from East Link light rail aerial guideway and interstate infrastructure. The bridge could connect to a landing in the Study Area consisting of a multi-modal pathway bordered by open park spaces, landscape, and plaza and a potential stormwater facility; see Exhibit 3.3–7. The proposed parks and open space within the Study Area could be smaller than that proposed in Option A. Option B could require substantial

Exhibit 3.3-6
Grand Connection Option A: Sculptural Bridge with Park and Stormwater Features

Source: Balmori Associates, 2017

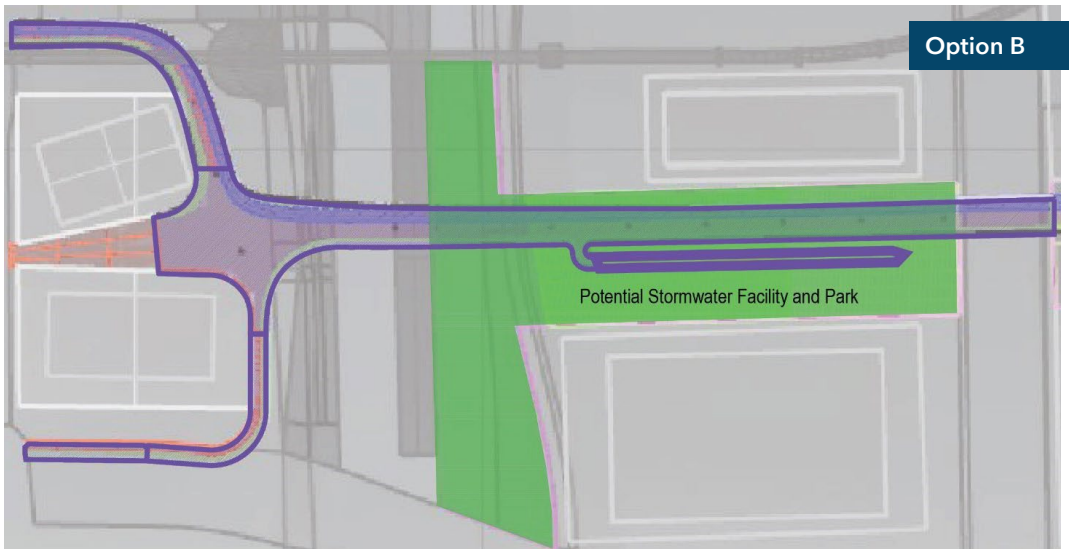


Exhibit 3.3-7
Grand Connection Option B: Linear Bridge with Park and Stormwater Features

Source: Balmori Associates, 2017

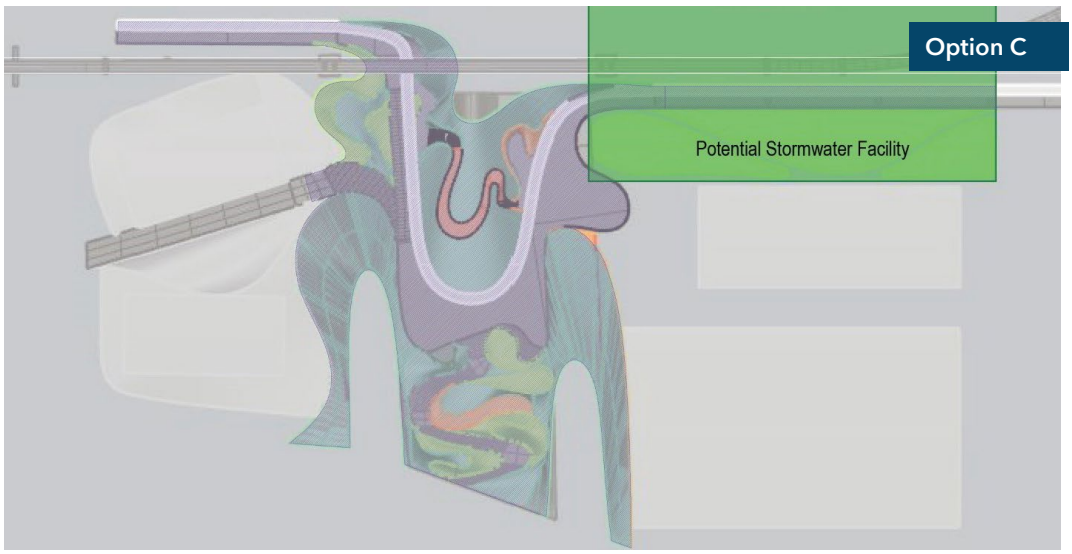


Exhibit 3.3-8
Grand Connection Option C: Lid Park with Park and Stormwater Features

Source: Balmori Associates, 2017

acquisition of private property between I-405 and 116th Avenue NE, and is expected to result in reduction of PGHS and hard surfaces as well as an increase in pervious landscape area, though to a lesser extent than Option A, of 167,000 square feet. Most new and replaced hard surfaces are expected to be non-pollution generating, and it is assumed that BMPs and flow control could be provided to mitigate runoff from hard surfaces as required in the City's stormwater code if thresholds are exceeded.

Option C: Lid Park. This option could cover I-405 with a "lid" over the existing interstate ramps between NE 4th Street and NE 6th Street. The lid could include similar open park space, plaza, and landscape features as presented in Options A and B. The lid is anticipated to result in a reduction of surface runoff from the interstate to water resources.

The lid surface would be a combination of hardscape and landscape for a total of approximately 200,000 square feet. It would also include a stormwater facility and greenspace in the Study Area, though smaller than proposed in Options A and B, at approximately 30,000 square feet. See Exhibit 3.3–8.

Most new hard surfaces on the lid are expected to be non-pollution generating, and it is anticipated that BMPs and flow control will be implemented to further reduce effective hard surfaces through compliance with the City's stormwater code. However, Option C does not provide the benefit of removing PGHS within the Study Area to the same extent as Options A and B.

Options A and B present advantages over Option C in terms of constructability with regard to water resources. Both Options A and B consist of landings in the Wilburton Commercial Area that directly replace PGHS and other hard surfaces with new pervious surfaces, pathways, and plaza areas. Option C proposes a smaller landing that would directly replace PGHS and other hard surfaces. All three options present opportunities for utilizing BMPs such as permeable pavements, infiltration facilities, rain gardens, etc. in a decentralized approach to collect and infiltrate surface runoff to the ground close to the runoff source. Runoff from the lid in Option C would be separately collected and conveyed to a new stormwater facility within the Study Area. Options A and B present opportunities for managing stormwater with decentralized facilities close to sources of runoff. Multiple stormwater facilities could be used with smaller individual footprints, allowing facilities to be directly integrated

with landscape areas without greatly encroaching into public space areas. Option C, on the other hand, does not allow for use of decentralized stormwater mitigation to the same extent as Options A and B, and would result in fewer facilities with larger footprints.

PUBLIC SPACE

Five options for public space in the Study Area are qualitatively evaluated for impacts to water resources. Overall, all public space options are anticipated to reduce existing PGHS and hard surface with new pervious surfaces and mitigated hard surfaces, providing an overall benefit to water resources. Exhibit 3.3–9 is a summary of the amount and types of greenspace created in the Study Area under Wetlands, Grand Connection and the Eastside Rail Corridor.

Exhibit 3.3–9 Summary of Greenspace Created in Study Area

GREENSPACE TYPE/AREA	ACRES OF NEW GREENSPACE
Wetlands	
Perimeter Fringe Wetland at Lake Bellevue	1
WSDOT Stream Mitigation Site	0.34
Main Street Wetland	4
Grand Connection	
Option A Sculptural Bridge	5.51
Option B Stand-alone Bridge	3.83
Option C Lid Park	0.69
Eastside Rail Corridor	8.6
Public Space	
Grand Connection Lid (Same as Option C Above)	0.69, same as Option C
Civic Center	Unknown
Neighborhood Green	Unknown, would add to estimates above
ERC Linear Park (Similar to Eastside Rail Corridor Above)	Minimum of 8.6, and potentially more if corridor width is enhanced for additional open space
Natural Network	Unknown, would add to estimates above depending on extent of creek daylighting or relocation of structures further from lake

Source: City of Bellevue, BERK, CH2M, 2017

The wetlands and ERC open space is universal to all alternatives, whereas the Alternatives 1 and 2 would have the potential to add Grand Connection Open Space, and other Public Space to a greater extent than the No Action Alternative.

- **Grand Connection Lid:** This option is an opportunity to create a significant open space amenity at a major gateway into the Study Area. The Lid could result in a reduction of runoff from the interstate, but would only moderately reduce PGHS or provide opportunity for decentralized stormwater management to the same extent as other Public Space options. Refer to Option C above for further discussion.
- **Civic Center:** This option could provide a large public space in the Study Area with an anticipated similar size to the Grand Connection Lid. Unlike the Grand Connection Lid, which would be located over I-405, Civic Center could be placed on land within a core development zone. If the infiltration potential of the location is low, non-infiltrating GSI could be implemented. If the infiltration potential of the location is high, it presents opportunities for replacing PGHS and hard surface with pervious surfaces. Due to the expected size of this option, it is anticipated that thresholds for requiring BMPs, water quality treatment, and flow control could be triggered per the City's stormwater code. This option presents opportunities for utilizing BMPs such as permeable pavements, infiltration facilities, bioretention facilities, etc. in a decentralized approach to collect and infiltrate surface runoff to the ground close to the runoff source. Multiple stormwater facilities could be utilized with smaller individual footprints, allowing facilities to be directly integrated with landscape areas without greatly encroaching into public space areas. This option is complementary to the Grand Connection Option A, and to a lesser extent, Option B.
- **Neighborhood Green:** This option could provide smaller decentralized park spaces and plazas throughout the Study Area. It is assumed parks and plazas could be developed individually, and that each park would result in an overall reduction of PGHS and effective hard surface. Depending on the amount of PGHS or hard surface added or replaced in each individual park, requirements for providing BMPs, water quality treatment, or flow control may or may not be triggered per the City's stormwater code. As a result, this option may not provide as much mitigation for PGHS and hard surfaces as other open space options.

- **ERC Linear Park:** This option could expand strategic locations of the ERC with modest park space and with a link to the Grand Connection. The existing ERC consists of a greater percentage of pervious surface than other locations in the Study Area. Thus, ERC Linear Park may not result in as great of a reduction of effective hard surface as other open space improvements. Opportunities for larger spaces may be diminished due to the width of the ERC, as well as development and private property ownerships adjacent to the ERC.
- **Natural Network:** This option could enhance, daylight, and utilize natural systems such as Lake Bellevue and Sturtevant Creek by creating amenities and open space in natural networks. A significant portion of the area around Lake Bellevue is currently developed, and much of Sturtevant Creek is conveyed through a pipe in the Study Area. Natural Network presents the opportunity to re-establish natural areas around Lake Bellevue and restore Sturtevant Creek as a natural drainage pathway. In addition to resulting in a net reduction of PGHS and hard surfaces, this option would also provide ecological benefits as discussed in Section 3.4. Overall, Natural Network is likely to have the greatest overall benefit to water resources in the Study Area.

SUMMARY COMPARISON OF ALTERNATIVES

Estimates of land cover changes under each alternative are shown in Exhibit 3.3–10 and Exhibit 3.3–11. Action alternatives would have a greater area of pervious space, less PGHS, and far less untreated PGHS. There are minimal differences among the alternatives regarding total effective unmitigated hard surfaces.

Exhibit 3.3–10 Land Cover Summary Under Each Alternative, in Acres

	TOTAL (ACRES)						
	Area	Hard Surface	Pervious Surface	PGHS[1]	Untreated PGHS[1]	EFFECTIVE HARD SURFACE[2] (ACRES)	EFFECTIVE UNMITIGATED HARD SURFACE[3] (ACRES)
Existing	294.1	237.3	56.8	178.7	141.8	237.3	187.4
No Action Alt.	294.1	232.5	61.6	158.7	103.2	233.9	178.6
Alternative 1	294.1	229.9	64.2	143.3	85.8	233.9	176.8
Alternative 2	294.1	229.9	64.2	141.1	85.8	233.9	176.8

1 Pollution-Generating Hard Surface
2 Hard surface areas plumbed directly into a piped storm drainage system without treatment with BMPs
3 Effective hard surface areas not mitigated with flow control facilities
Source: CH2M, 2017

Exhibit 3.3–11 Change in Land Cover Summary Under Each Alternative, in Acres

	NET CHANGE IN ACRES				
	Hard Surface	PGHS[1]	Untreated PGHS[1]	EFFECTIVE HARD SURFACE[2] (ACRES)	EFFECTIVE UNMITIGATED HARD SURFACE[3] (ACRES)
No Action Alt.	-4.8 (-2.0%)	-20.0 (-11.2%)	-38.6 (-27.2%)	-3.3 (-1.4%)	-8.8 (-4.7%)
Alternative 1	-7.4 (-3.1%)	-35.4 (-19.8%)	-56.0 (-39.5%)	-3.4 (-1.4%)	-10.6 (-5.7%)
Alternative 2	-7.4 (-3.1%)	-37.6 (-21.0%)	-56.0 (-39.5%)	-3.4 (-1.4%)	-10.6 (-5.7%)

Note: All areas are expressed relative to existing conditions. See Exhibit 3.3–2 for a summary of existing conditions.
1 Pollution-Generating Hard Surface
2 Hard surface areas plumbed directly into a piped storm drainage system without treatment with BMPs
3 Effective hard surface areas not mitigated with flow control facilities
Source: CH2M, 2017

IMPACTS OF THE NO ACTION ALTERNATIVE

Under the No Action Alternative, new and redevelopment projects could occur assuming the current Comprehensive Plan, Land Use Code, and Zoning Maps are retained. Exhibit 3.3–12 displays the land cover assumptions used for existing conditions.

Exhibit 3.3–12 Existing Zoning Code—Allowable Surface Coverage Summary

ZONING	% BUILDING	% PGHS	% OTHER HARD SURFACE	% TOTAL HARD SURFACE
BR-CR	45[1]	20[1]	10[1]	75
BR-MO	45[1]	20[1]	10[1]	75
GC	35	35[1]	15[1]	85
O	35	40[1]	10[1]	80
OLB	35	40[1]	10[1]	80

1 Value not listed in Bellevue zoning code and is assumed from measurements in GIS and aerial imagery.
Source: City of Bellevue, CH2M, 2017

All new and redevelopment projects that trigger thresholds per the City's stormwater code could be required to provide BMPs, where feasible, such as bioretention facilities, rainwater harvesting, permeable pavements, and other infiltration and flow reduction techniques. Based on GIS information available from the City of Bellevue, the new and redevelopment projects are located over soils classified as till or urban land. Soils below parcels are further classified as having Low or Moderate infiltration capabilities. Preliminary modeling with till soils indicates that infiltration BMPs are capable of reducing runoff volumes from hard surfaces in the range of 5–10 percent. Therefore, parcels that trigger thresholds requiring BMPs and identified as having soils with low infiltration capabilities are assumed to have a net reduction in effective impervious area of 5 percent. Similarly, parcels identified as having soils with moderate infiltration capabilities are assumed to have a net reduction in effective impervious area of 10 percent.

All new and redevelopment projects that trigger thresholds per the City's stormwater code would be required to have flow control mitigation with detention facilities and to provide "enhanced basic" water quality treatment, or "basic" water quality treatment for a single-family parcel project.

Roadway Improvements

Under the No Action Alternative, currently planned roadway projects will be implemented, as described in Chapter 2 and Section 3.8. Assumed impacts to water resources for each roadway project is as previously stated in Impacts Common to All Alternatives and described below.

- **116th Avenue NE Cross Section:** In the No Action Alternative, the 116th Avenue NE Cross Section will remain unchanged. Therefore, there are no changes to pollution-generating hard surface area and effective hard surface area.

Grand Connection

Options for the Grand Connection are not evaluated under the No Action Alternative, as the Grand Connection would not be constructed as part of a No Action Alternative.

Public Space

Under the No Action Alternative, it is anticipated that currently-planned parks and open space projects will be implemented. Overall, it is anticipated that currently-planned open space improvements would result in a reduction of effective hard surface and PGHS, providing a net benefit to water resources.

Summary

The resulting effective hard surface area for the No Action Alternative is estimated to decrease by approximately 8.8 acres (-4.7 percent) from existing conditions due to the nature of anticipated development and improvements, as well as code-required stormwater management measures. The resulting untreated PGHS within the Study Area is estimated to decrease by approximately 38.6 acres (-27.2 percent) from existing conditions due to code-required implementation of water quality treatment.

This analysis assumes that all associated redevelopment within the Study Area would be required to comply with the City's stormwater code; therefore, no additional cumulative impacts are anticipated.

IMPACTS OF ALTERNATIVE 1

Under Alternative 1, new and redevelopment projects could occur assuming a more intense urban form. Zoning is assumed to have a total allowable hard surface coverage of 80 percent, like the current BelRed zoning code. Refer to Chapter 2 for additional information on future zoning under Alternative 1. Exhibit 3.3–13 displays the land cover assumptions used for existing conditions. The No Action Alternative summary is provided for comparison.

Exhibit 3.3–13 Alternative 1 Zoning—Allowable Surface Coverage Assumptions

	ZONING	% BUILDING	% PGHS	% OTHER HARD SURFACE	% TOTAL HARD SURFACE
Existing Zoning Code (No Action)	BR-CR	45[1]	20[1]	10[1]	75
	BR-MO	45[1]	20[1]	10[1]	75
	GC	35	35[1]	15[1]	85
	O	35	40[1]	10[1]	80
	OLB	35	40[1]	10[1]	80
Alternative 1	B2: Multifamily Suburban	45	20	15	80
	B3: Mixed-use Suburban	50	20	10	80
	B4: General Urban	60	10	10	80
	B5: Urban Center	70	0	10	80

1 Value not listed in Bellevue zoning code and is assumed from measurements in GIS and aerial imagery.

Source: City of Bellevue, CH2M, 2017

All new and redevelopment projects that trigger thresholds per the City's stormwater code would be required to provide BMPs, where feasible, such as rainwater harvesting, permeable pavements, and other infiltration and flow reduction techniques. Based on GIS information available from the City of Bellevue, the new and redevelopment projects are located over soils classified as till or urban land. Soils below parcels are further classified as having low or moderate infiltration capabilities. Preliminary modeling with till soils indicates that infiltration BMPs are capable of reducing runoff volumes from hard surfaces in the range of 5-10 percent. Therefore, parcels that trigger thresholds requiring BMPs and identified as having soils with low infiltration capabilities are assumed to

have a net reduction in effective impervious area of 5 percent. Similarly, parcels identified as having soils with moderate infiltration capabilities are assumed to have a net reduction in effective impervious area of 10 percent.

Flow control mitigation with detention facilities would also be required for all new and redevelopment projects per the City's stormwater code. In addition, all new and redevelopment projects would be required to provide "enhanced" water quality treatment.

Roadway Improvements

Under Alternative 1, currently planned roadway projects will be implemented, as described in Chapter 2. Assumed impacts to water resources for each roadway project is as previously stated in Impacts Common to All Alternatives and described below.

- **116th Avenue NE Cross Section:** In Alternative 1, the 116th Avenue NE cross-section will be revised to include buffered bike lanes, wider sidewalks with street trees, and a planted median. Under this alternative, the reconstructed roadway is assumed to result in no change in PGHS. The project would require compliance with the City's stormwater code, and it is assumed that water quality treatment will be provided to mitigate stormwater runoff from PGHS. In addition, it is assumed that the project will provide BMPs to the extent feasible as required by the City's stormwater code, which would result in a net reduction of effective hard surface area. Overall, it is anticipated that both untreated PGHS and effective hard surface area will be reduced with these improvements.

Under Alternative 1, improvements would build upon the existing street grid with the addition of more local streets and pedestrian/bicycle connections. Similar to the NE 6th Street Extension, it is assumed the new streets would replace existing hard surfaces and add more than 50 percent to the existing hard surfaces. The additional right-of-way areas would be required to comply with the City's stormwater code, including BMPs to the extent feasible, flow control, and water quality mitigation. Therefore, it is anticipated the project will result in no change, and potentially reduce, the untreated PGHS and the overall effective hard surface area.

Grand Connection

Of the three options for the Wilburton terminus of the Grand Connection, Option A is anticipated to have the greatest benefit to water resources in Alternative 1. Option A would have a larger footprint than Option B within the Study Area, and would result in a greater replacement of existing PGHS and hard surface with new pervious surface. Option A also presents a greater opportunity over Option C for integrating BMPs and stormwater facilities within new landscape areas with a decentralized approach, which is of greater benefit in terms of constructability and user experience.

Public Space

Of the five options for Public Space in the Study Area, the Natural Network is anticipated to have the greatest benefit to water resources in Alternative 1. Natural Network provides a similar or greater reduction in PGHS and hard surfaces when compared to other options. However, Natural Network includes the added benefit of restoring, enhancing, and exposing natural areas adjacent to water resources within the Study Area, which has an added ecological benefit. Integration of open space amenities with natural habitat restoration would have the greatest benefit with the smallest footprint, complementing the anticipated urban growth within the Study Area. The next most beneficial options are Grand Connection Lid and Civic Center. Refer to Section 3.1.3 for further discussion.

Summary

The resulting net change in effective hard surface area for Alternative 1 is estimated to decrease by approximately 10.6 acres (-5.7 percent) from existing conditions due to the nature of anticipated development and improvements, as well as code-required stormwater management measures. The resulting net change in untreated PGHS within the Study Area is estimated to be a reduction of approximately 56.0 acres (-39.5 percent) from existing conditions due to code-required implementation of water quality treatment.

This analysis assumes that all associated redevelopment within the Study Area would be required to comply with the City's stormwater code; therefore, no additional cumulative impacts are anticipated.

IMPACTS OF ALTERNATIVE 2

Alternative 2 is like Alternative 1, except that potential growth would be higher and the urban form would be more intense across the Study Area. Zoning is assumed to have a total allowable hard surface coverage of 80 percent, like the current BelRed zoning code. Refer to Chapter 2 for further information on future zoning under Alternative 2. Exhibit 3.3–14 displays the land cover assumptions used for existing conditions. The No Action Alternative summary is provided for comparison.

Exhibit 3.3–14 Alternative 2 Zoning—Allowable Surface Coverage Assumptions

	ZONING	% BUILDING	% PGHS	% OTHER HARD SURFACE	% TOTAL HARD SURFACE
Existing Zoning Code (No Action)	BR-CR	45[1]	20[1]	10[1]	75
	BR-MO	45[1]	20[1]	10[1]	75
	GC	35	35[1]	15[1]	85
	O	35	40[1]	10[1]	80
	OLB	35	40[1]	10[1]	80
Alternative 2	B3: Mixed-use Suburban	50	20	10	80
	B4: General Urban	60	10	10	80
	B5: Urban Center	70	0	10	80
	B6: Urban Core	70	0	10	80

1 Value not listed in Bellevue zoning code and is assumed from measurements in GIS and aerial imagery.
Source: City of Bellevue, CH2M, 2017

All new and redevelopment projects that trigger thresholds per the City's stormwater code would be required to provide BMPs, where feasible, such as bioretention facilities, rainwater harvesting, permeable pavements, and other infiltration and flow reduction techniques. Based on GIS information available from the City of Bellevue, the new and redevelopment projects are located over soils classified as till or urban land. Soils below parcels are further classified as having Low or Moderate infiltration capabilities. Preliminary modeling with Till soils indicates that infiltration BMPs are capable of reducing runoff volumes from hard surfaces in the range of 5–10 percent. Therefore, parcels that trigger thresholds requiring BMPs and identified as having soils with low infiltration capabilities are assumed to have a net reduction in effective impervious area of

5 percent. Similarly, parcels identified as having soils with moderate infiltration capabilities are assumed to have a net reduction in effective impervious area of 10 percent.

Flow control mitigation with detention facilities would also be required for all new and redevelopment projects per the City's stormwater code. In addition, all new and redevelopment projects would be required to provide "enhanced" water quality treatment.

Roadway Improvements

Under Alternative 2, currently planned roadway projects will be implemented, as described in Chapter 2. Assumed impacts to water resources for each roadway project is as previously stated in Impacts Common to All Alternatives and described below.

- **116th Avenue NE Cross Section:** In Alternative 2, the 116th Avenue NE cross-section will be revised to include buffered bike lanes, wider sidewalks with street trees, and a planted median. Under this alternative, the reconstructed roadway is assumed to result in no change in PGHS. The project would require compliance with the City's stormwater code, and it is assumed that water quality treatment will be provided to mitigate stormwater runoff from PGHS. In addition, it is assumed that the project will provide BMPs to the extent feasible as required by the City's stormwater code, which would result in a net reduction of effective hard surface area. Overall, it is anticipated that both untreated PGHS and effective hard surface will be reduced with these improvements.

Under Alternative 2, improvements would build upon the existing street grid with the addition of more local streets and pedestrian/bicycle connections. Similar to the NE 6th Street Extension, it is assumed the new streets would replace existing hard surfaces and add more than 50 percent to the existing hard surfaces. The additional right-of-way areas would be required to comply with the City's stormwater code, including BMPs to the extent feasible, flow control, and water quality mitigation. Therefore, it is anticipated the project will result in no change, and potentially reduce, the untreated PGHS and the overall effective hard surface area.

Grand Connection

Of the three options for the Wilburton terminus of the Grand Connection, Option A is anticipated to have the greatest benefit to water resources in Alternative 2. Option A would have a larger footprint than Option B within the Study Area, and would result in a greater replacement of existing PGHS and hard surface with new pervious surface. Option A also presents a greater opportunity over Option C for integrating BMPs and stormwater facilities within new landscape areas with a decentralized approach, which is of greater benefit in terms of constructability and user experience.

Public Space

Of the five options for Public Space in the Study Area, Natural Network is anticipated to have the greatest benefit to water resources in Alternative 2. Natural Network does provide a similar or greater reduction in PGHS and hard surfaces when compared to other options. However, Natural Network includes the added benefit of restoring, enhancing, and daylighting natural areas adjacent to water resources within the Study Area, which has an added ecological benefit. Integration of open space amenities with natural habitat restoration would have the greatest benefit with the smallest footprint, complementing the anticipated urban growth within the Study Area. The next most beneficial options are the Grand Connection Lid and Civic Center. Refer to Section 3.1.3 for further discussion.

Summary

The resulting net change in effective hard area for Alternative 2 is estimated to decrease by approximately 10.6 acres (-5.7 percent) from existing conditions due to the nature of anticipated development and improvements, as well as code-required stormwater management measures. The resulting net change in untreated PGHS within the Study Area is estimated to be a reduction of approximately 56.0 acres (-39.5 percent) from existing conditions due to code-required implementation of water quality treatment.

This analysis assumes that all associated redevelopment within the Study Area would be required to comply with the City's stormwater code; therefore, no additional cumulative impacts are anticipated.

3.3.4 MITIGATION MEASURES

INCORPORATED PLAN FEATURES

Beneficial impacts to water resources would result from the Grand Connection and Open Space options discussed in Section 3.3.2.

REGULATIONS AND COMMITMENTS

There are Federal, State, and City regulations intended to reduce the potential impact to water resources due to development and redevelopment projects. These regulations are summarized in the *Regulatory Environment* subsection of Section 3.3.2.

Regulatory requirements for addressing water resource impacts would be met under each Alternative, as discussed in Section 3.3.3. If thresholds listed in the City's stormwater management standards are exceeded as redevelopment occurs, projects would be required to provide BMPs to the maximum extent feasible to infiltrate, disperse, or retain stormwater runoff. Projects would also be required to provide water quality treatment to reduce pollution levels in stormwater, and flow control to reduce runoff flow rates as thresholds are exceeded. Compliance with these regulations is anticipated to result in a net benefit to water resources in the Study Area.

OTHER PROPOSED MITIGATION MEASURES

If the alternatives result in adverse impacts after the implementation of code-required mitigation measures, additional mitigation measures would need to be developed as needed on a case by case basis related to specific redevelopment projects to comply with applicable federal, state, and City requirements.

The City may also select Grand Connection and Public Space concepts that have the best overall impact to water resources. The selected options could include those that result in the greatest reduction of PGHS and hard surface, provide opportunities for integrating BMPs and stormwater facilities with a decentralized approach, trigger thresholds that would require water quality treatment and flow control mitigation per the City's stormwater

standards, and result in enhancement of natural systems such as Lake Bellevue and Sturtevant Creek as amenities.

The City could also implement new development code standards to further reduce development of new and replaced hard surfaces or further reduce potential for runoff. One option could include a required amount of greenspace on redeveloped parcels to encourage development of pervious areas and integration of BMPs into landscape areas of the site. A second option could be to provide more stringent stormwater regulations to further reduce runoff rates and volumes in the Sturtevant Creek Basin, such as requiring flow control to be provided to "pre-developed forested" conditions rather than "existing" conditions. A third option would be to incentivize programs that support optimal stormwater management among other sustainability measures, similar to the amenity system for Downtown, including but not limited to LEED, Built Green, or Living Building Challenge.

3.3.5 SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS

None of the alternatives would have significant unavoidable adverse impacts on water resources, because all redevelopment projects would likely result in an improvement of runoff and recharge flow rates and water quality over existing conditions. In addition, the net change in effective hard surface area would be reduced through implementation of BMPs and flow control facilities.

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