



CHAPTER 5. WATER RESOURCES

5.1 HOW WERE WATER RESOURCES IN THE COMBINED STUDY AREA EVALUATED?

Several sources of information were used to characterize the known and likely water resources in the combined study area (Alternatives 1, 2, and 3 as depicted on Figure 1-4 in Chapter 1), including the following federal, state, and local sources:

- Washington Department of Ecology (Ecology) Water Quality Assessment and 303(d) List (Ecology, 2014);
- U.S. Fish and Wildlife Service (USFWS) National Wetlands Inventory (USFWS, 2015);
- U.S. Department of Agriculture (USDA) Natural Resources Conservation Science (NRCS) Web Soil Survey (NRCS, 2015);
- Critical areas GIS datasets for the study area communities;
- Technical reports; and
- Aerial imagery.

These information sources indicate the resources that may be present in the combined study area. No field surveys were performed for this programmatic analysis, because the specific location of project elements has not been determined. The description of resources includes streams, rivers, lakes, ponds, wetlands, and groundwater, as well as stormwater and floodplains.

The resource protection policies and requirements of the study area communities that could apply to the project were identified, primarily from comprehensive plans and critical area regulations and codes. These requirements are described, along with federal and state regulations for protection and management of water resources. The applicability of regulations would be determined based on project design and location.

Water Resources Key Findings

Alternatives 1 and 3 could cause potentially significant impacts if overhead or underground lines are placed in streams, lakes, wetlands or their buffers; however, limitations imposed by regulatory agencies and avoidance of these resources would reduce this potential to minor or moderate.

Construction of an underwater transmission line (Alternative 1, Option D) could result in temporary and localized impacts to Lake Washington, including local turbidity, potential disturbance of contaminated sediment, underwater noise, and impacts to the shoreline.

All of the alternatives have the potential to cause minor water quality impacts due to construction site runoff, dewatering discharge, or accidental spills.

5.2 WHAT ARE THE RELEVANT PLANS, POLICIES, AND REGULATIONS?

Policies and regulations to manage and protect surface and groundwater resources are administered by federal, state, and local governments. The primary agencies and their regulations that might apply to this project are summarized in Tables 5-1 and 5-2. The applicability of these regulations would be determined based on project design and location.

Table 5-1. Surface Water Resource Protection Framework

| Regulatory Program or Policies | Regulatory Agency | Regulated Activities/Program |
|----------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Federal | | |
| Dredge and Fill Requirements and Section 10 Permit for Work in Navigable Waters - Clean Water Act (33 CFR ¹ Part 320) Section 404 | U.S. Army Corps of Engineers (Corps) | Any project that proposes discharging dredged or fill material into Waters of the United States must obtain a Section 404 permit. Case law and rule amendments have specifically defined Waters of the United States (40 CFR 230.3). Case-by-case analysis is required to confirm applicability of this law to surface waters such as rivers, streams, ditches, lakes, ponds, territorial seas, and wetlands. Any work in, over, or under navigable Waters of the United States requires a Section 10 permit. The purpose of Section 10 permitting is to prohibit the obstruction or alteration of these navigable waters. |
| Federal Emergency Management Agency (FEMA) | Executive Order 12127 merged many previous separate disaster-related responsibilities into FEMA. Public Law 100-707 amended the Disaster Relief Act of 1974 (Public Law 93-288) - creating the system by which a presidential disaster declaration of an emergency triggers financial and physical assistance through FEMA. | Federal law requires that all local governments review and appropriately manage land uses in floodways and floodplains to prevent increased flooding. |

| Regulatory Program or Policies | Regulatory Agency | Regulated Activities/Program |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| State | | |
| <p>Water Quality Certification - Clean Water Act Section 401 (33 United States Code 1251 et seq.) and Washington State Water Pollution Control Act (Chapter 90.48 RCW¹)</p> | <p>Ecology</p> | <p>Ecology issues a Section 401 water quality certification to applicants receiving a Section 404 permit from the Corps, indicating that Ecology anticipates that the applicant's project will comply with state water quality standards and other aquatic resource protection requirements under Ecology's authority. This process is the mechanism by which Ecology helps ensure the state's policy of "no net loss" of wetlands is implemented. Depending on the type of Section 404 permit, some 401 permits are preauthorized.</p> <p>All projects affecting surface waters in the state, including those that are not subject to the federal Clean Water Act Sections 404/401, must still comply with the provisions of the state's Water Pollution Control Act.</p> |
| <p>National Pollutant Discharge Elimination System (NPDES) – Clean Water Act 33 USC Sections 1251 et seq. and WAC² 197-11-200 through 240</p> | <p>Ecology and local governments through NPDES Municipal Stormwater Permits</p> | <p>The Environmental Protection Agency has delegated authority to Ecology. Local governments are municipal stormwater permittees (King County, Bellevue, Clyde Hill, Issaquah, Kirkland, Medina, Mercer Island, Newcastle, Redmond, Renton, and Sammamish). The NPDES permit program controls water pollution by regulating sources that discharge pollutants into Waters of the U.S. Different types of permits are issued for different types of projects and sites under this program.</p> <p>All construction projects disturbing more than 1 acre of land and discharging to surface water or a conveyance system that drains to surface waters must obtain NPDES coverage.</p> <p>Municipal NPDES permits require local governments to develop and implement a stormwater management program to reduce the contamination of stormwater runoff and prohibit illicit discharges. Local governments must ensure development projects and certain public and private facility operations comply with the program.</p> |

| Regulatory Program or Policies | Regulatory Agency | Regulated Activities/Program |
|---------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Hydraulic Project Approval (HPA) – WAC 220-660 | Washington State Department of Fish and Wildlife (WDFW) | Although primarily intended to address aquatic species and habitat protection, it indirectly protects surface water quality by limiting and regulating activities that can occur in or discharge to Waters of the State. The HPA program applies to work that uses, diverts, obstructs, or changes the natural flow or bed of any of the salt or fresh waters of the state. This includes bed reconfiguration, all construction or other work waterward, under and over the ordinary high water line, including dry channels, and may include projects landward of the ordinary high water line (e.g., activities outside the ordinary high water line that will directly impact fish life and habitat, such as felling trees into streams or lakes, bridge maintenance, dike construction, etc.). |
| Local | | |
| Local Comprehensive Plans – required under the State of Washington Growth Management Act (Chapter 36.70A RCW) | King County and all study area cities | Local government planning policies call for the protection, preservation, and enhancement of water resources. |
| Shoreline Management Act- Chapter 90.58 RCW | King County and all study area cities through authority delegated by Ecology | As discussed in Chapter 10, cities and counties adopt shoreline master programs that establish allowed uses, buffers, setback requirements, and mitigation requirements for regulated waterways. All cities and counties in Washington are required by the Shoreline Management Act to enact shoreline management programs. |
| Local Critical Area Ordinances/ Regulations – required under the State of Washington Growth Management Act (Chapter 36.70A RCW) | King County and all study area cities | Local governments establish policies and development guidelines to protect the functions and values of <i>critical areas</i> (rivers, streams, lakes, wetlands, floodplains, aquifer recharge areas, and other). All cities and counties in Washington are required by the Growth Management Act to adopt critical area regulations (RCW 36.70A.060). Buffers are designated by the local governments around critical areas to help protect their functions. The size of the buffer depends on the classification of the area, and activities within those buffers are regulated to further protect the critical area. |

| Regulatory Program or Policies | Regulatory Agency | Regulated Activities/Program |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Local codes for floodplain management (required for participation in the Federal Emergency Management Act Flood Insurance Rate Program) including: King County Code Chapter 21A.24 Bellevue City Code Chapter 20.25H Section IX Renton Municipal Code 4.3.050 Kirkland Municipal Code Chapter 21.56 Newcastle Municipal Code Chapter 18.24 Redmond City Code Chapter 15.04 | King County and all study area cities | Many of the streams and rivers in the combined study area have designated 100-year floodplains, which must be considered when nearby development is proposed (Figure 5-1). Study area communities regulate development in the floodplain to reduce the impact of flooding on structures. |

¹Code of Federal Regulations
²Revised Code of Washington
³Washington Administrative Code

Table 5-2. Groundwater Resource Protection Framework

| Regulatory Program or Policies | Regulatory Agency | Regulated Activities/ Program |
|-----------------------------------------------------------------------------------------------------------------------------------|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| State | | |
| EPA water pollution control regulations (Section 431.02 of the Clean Water Act and corresponding State of Washington regulations) | Ecology | Establishes the mechanism for regulating discharges of pollutants to groundwater. |
| Water Quality Standards for Groundwaters of the State of Washington (Chapter 173-200 WAC) | Ecology | Establishes maximum contaminant concentrations for the protection of a variety of beneficial uses of Washington's groundwater. |
| Washington Groundwater Management Areas (Chapter 173-100 WAC) | Ecology | Establishes procedures to designate groundwater management areas and procedures for developing groundwater management programs to protect groundwater quality. |

| Regulatory Program or Policies | Regulatory Agency | Regulated Activities/ Program |
|------------------------------------------------------------------------|------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Washington Well Head Protection (Chapter 246-290 WAC) | Ecology | Establishes the boundaries for each well, well field, or spring and processes to manage potable water. |
| Washington Underground Injection Control Program (Chapter 173-218 WAC) | Ecology | Protects groundwater quality by regulating the disposal of fluids into the subsurface. |
| Washington water rights regulations (various) | Ecology | Establishes a permitting process to allow applicants to apply water to a specific beneficial use. |
| Local | | |
| Local Critical Aquifer Recharge Area ordinances – GMA RCW 36.70A | Study area communities | Provides local governments with a mechanism to classify, designate, and regulate areas deemed necessary to provide adequate recharge and protection for aquifers used as sources of potable (drinking) water. Most jurisdictions in the combined study area (except Clyde Hill, Hunts Point, Yarrow Point, Medina, and Beaux Arts Village) have identified aquifer protection zones and/or enacted groundwater or aquifer protection policies. These policies are considered when development is proposed in the vicinity. |

5.3 WHAT WATER RESOURCES ARE FOUND IN THE COMBINED STUDY AREA?

Surface waters in the combined study area consist of wetlands, lakes and ponds, rivers and streams, and their associated floodplains. The combined study area is located within Water Resources Inventory Area (WRIA) 8 (the Cedar-Sammamish River watershed) and WRIA 9 (the Duwamish-Green River watershed). The combined study area contains two rivers and numerous streams, described below under Section 5.3.1. In addition to Lake Washington and Lake Sammamish, there are several smaller lakes, described under Section 5.3.2. Additional wetlands and small streams are likely present that have not been mapped, as well as drainage ditches and other stormwater features that have been added, modified, or diverted over time.

5.3.1 Streams and Rivers

There are about 2,000 mapped streams and rivers in the combined study area (King County, 2015). The major streams and rivers in the combined study area include the Sammamish River, Cedar River, Bear Creek, Evans Creek, Kelsey Creek, Richards Creek, May Creek, Coal Creek, and Issaquah Creek (Figure 5-1).

The Sammamish River begins at the northern outlet of Lake Sammamish and empties into the northern end of Lake Washington. Major tributaries of the Sammamish River in the combined study area include Bear Creek and Evans Creek. A number of streams flow into Lake Sammamish, including Issaquah, Tibbetts, Pine Lake, and Laughing Jacobs creeks. The Cedar River is part of the Cedar River – Lake Washington drainage and empties into Lake Washington at its southern end. In addition to the Sammamish and Cedar rivers, a number of smaller streams flow into Lake Washington, including Kelsey Creek, May Creek, and Coal Creek.

5.3.2 Lakes and Ponds

The two largest lakes in the combined study area are Lake Washington and Lake Sammamish. Smaller lakes in the area include Lakes Bellevue, Kathleen, and McDonald; and Larsen, Phantom, Pine, Beaver, and Tradition lakes (Figure 5-1).

Lake Washington is bordered on the east by unincorporated King County, Kirkland, Bellevue, Medina, Newcastle, and Renton, and the Towns of Beaux Arts Village, Hunts Point, and Yarrow Point (Figure 5-1). The Alternative 1 and 3 study areas are in the direct vicinity of Lake Washington or Lake Sammamish. The smaller lakes in Issaquah, Sammamish, and King County are only within the Alternative 3 study area.

Most of Lake Washington's shoreline is developed with residences and urban development. The lake has been highly altered and its water level regulated through the Lake Washington Ship Canal, operated by the U.S. Army Corps of Engineers (USACE, 2012a, 2012b). As mentioned previously, the Cedar River and the Sammamish River drain into Lake Washington, which eventually drains out through the Ship Canal. Portions of Lake Washington are on Ecology's 303(d) list as impaired (Category 5) for bacteria, polychlorinated biphenyls (PCB), 2,3,7,8 TCDD (dioxin), total chlordane, as well as derivatives of DDT (Ecology, 2015). Site-specific evaluations of potential locations of contaminated sites will be conducted in Phase 2; however, it has been assumed that contaminated sediments associated with historical uses and stormwater discharges are also present in Lake Washington.

Similar to Lake Washington, the shorelines of Lake Sammamish are highly developed for residential uses, but with large parks (Marymoor Park to the north and Lake Sammamish State Park to the south (Figure 5-1). Lake Sammamish is bordered on the west by the cities of Bellevue and Redmond, to the east by Sammamish, and to the south by Issaquah. Portions of the north and south ends of the lake are also bordered by unincorporated King County. Portions of Lake Sammamish are also on Ecology's 303(d) list as impaired (Category 5) for bacteria and dissolved oxygen (Ecology, 2015). Low-density development typically surrounds the smaller lakes in the combined study area, although several are surrounded by recreational areas, and one (Larsen Lake) has both agricultural and recreational uses along its perimeter.

5.3.3 Wetlands

Wetlands are commonly defined as areas with wetland hydrology (inundated or saturated most of the year), hydric soils (soils with characteristics affected by the presence of water),

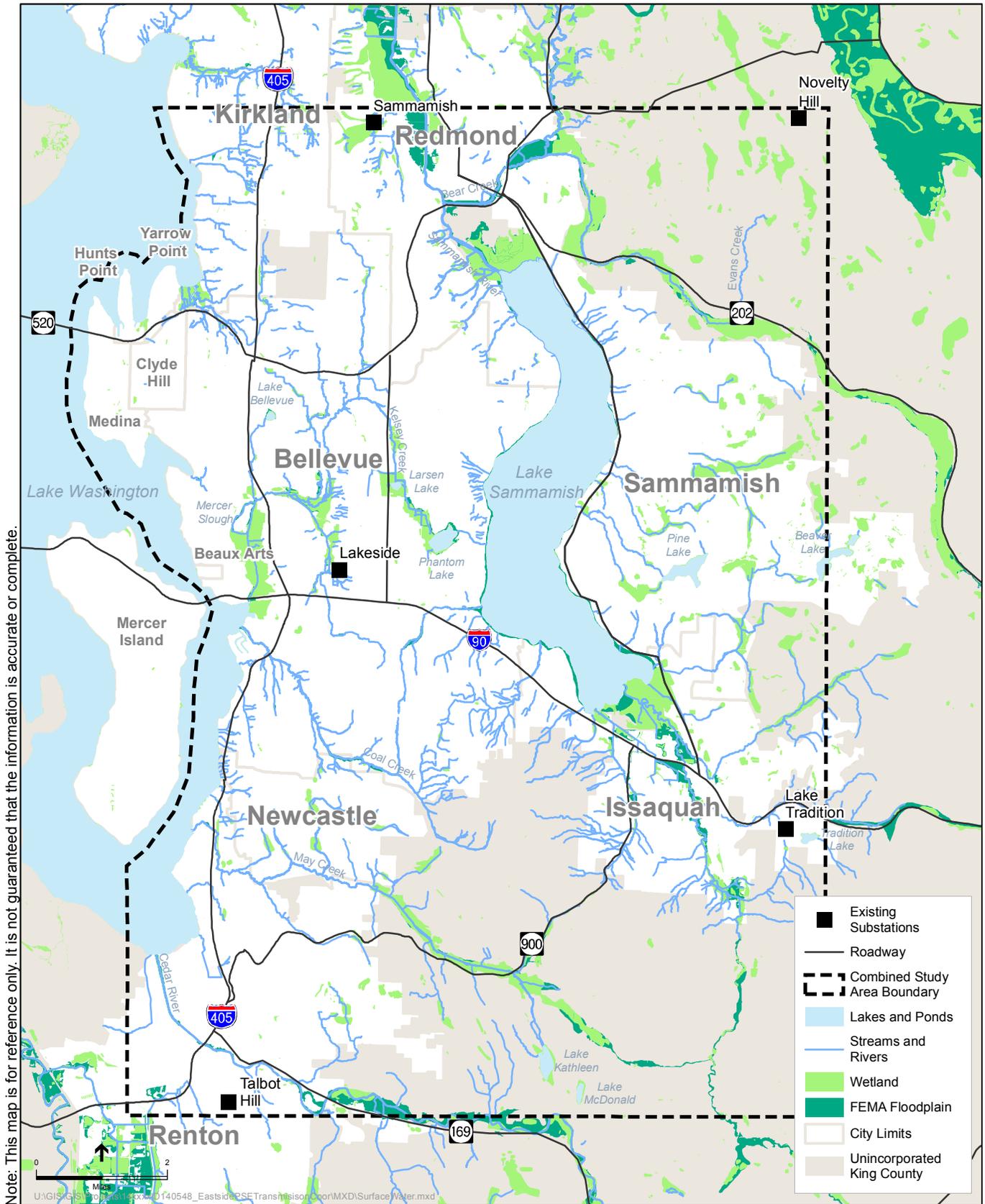
and hydrophytic (water-loving) vegetation. Wetlands can be associated with lake edges, streams, and riparian corridors as well as scattered, low-lying places. They provide a suite of ecosystem functions and services, such as fish and wildlife habitat, floodwater control, *groundwater recharge*, pollutant removal, and others. They also provide economic services because of their connection to hunting, fishing, agriculture, and recreation. Over 1,000 wetlands have been mapped in the combined study area (King County, 2015). Some of the larger wetland complexes are found in or adjacent to Phantom and Larsen Lakes; Mercer Slough; the north and south portions of Lake Sammamish; and adjacent to many of the major streams and rivers in the combined study area (Figure 5-1).

5.3.4 Floodplains

Floodplains are relatively flat lands adjacent to rivers, streams, and lakes that are subject to occasional or periodic flooding. Included within the floodplain are the floodway (an area that carries flood flows) and the flood fringe (areas covered by the flood that do not experience a strong current). In the event of a flood, floodplains can help to detain debris, sediment, and water, and reduce damage to surrounding areas. Construction and development activity within the floodplain reduces the floodway capacity and is regulated, as described in Section 5.2. Floodplains are delineated by the Federal Emergency Management Agency (FEMA), which also determines the flood risks in areas susceptible to flooding. The 100-year flood is used as the base flood by FEMA, and it has a 1 percent chance of occurring in each year.

5.3.5 Stormwater

Stormwater runoff comes from any surface that rain or snow can reach (rooftops, paved areas, bare soil, lawns, etc.). Even natural systems (forests and fields) may release stormwater. As raindrops reach the ground or as snow melts, water that does not immediately infiltrate (soak into the soil) moves downhill and accumulates with other rain or meltwater, eventually reaching surface waters. Stormwater moving over impervious surfaces (rooftops, paved surfaces, etc.) will continue flowing toward surface waters until it is controlled. Stormwater may pick up and transport pollutants such as fertilizers, oil, and gasoline and carry them to surface waters or groundwater. Stormwater also often gathers in increasingly large amounts as it moves downhill toward surface waters, and if stormwater volumes are not managed, they can contribute to or cause flooding. Flooding is a public safety issue and can cause property damage and habitat destruction. Therefore, stormwater is regulated to protect water quality and to prevent flooding.



SOURCE: King County 2015; ESA 2015; WA Ecology 2014; FEMA 2010; Kirkland 2015; Redmond 2015; Sammamish 2015; Issaquah 2015; Newcastle 2015; Renton 2015; Bellevue 2015. For more info visit www.energizeeastsideeis.org/map-surfacewater

Energize Eastside EIS 140548
Figure 5-1
 Major Water Resources

5.3.6 Groundwater

Chapter 3 describes the geologic setting in which groundwater has developed. Groundwater is water found underground in cracks and spaces in soil, sand and rock. It is stored in and moves slowly through these geologic formations, which are called aquifers, and can also be isolated in lenses or pockets below ground. Groundwater is a source of recharge for lakes, rivers, and wetlands. It supplies drinking water and is also frequently used for irrigation and in many industrial processes.

Since groundwater is an important source of potable water in the Pacific Northwest, Washington’s Growth Management Act requires local governments to protect aquifers. Most of the aquifer protection areas in the combined study area are within King County jurisdiction, with some smaller areas within the city limits of Renton and Issaquah (King County, 2015). In addition, *wellhead protection areas* are found within the cities of Sammamish, Issaquah, Renton, Newcastle, Bellevue, and Redmond, and the Towns of Beaux Arts Village and Yarrow Point (King County, 2015).

A **wellhead protection area** is the surface and subsurface area surrounding a water well or well field supplying a public water system. Within this area, uses and activities are regulated to prevent contamination of the water supplied by the well or wells.

Groundwater is also considered from an engineering perspective for development projects. Project plans must account for the depth and likely volumes of groundwater to ensure structural stability and avoid flooding related to groundwater. As described in Chapter 3, 25 soil types have been mapped in the combined study area (NRCS, 2015). The soils and their likely groundwater characteristics are presented in Appendix D.

It is anticipated that recent development (after the NRCS soil mapping occurred) has further disturbed native soils or groundwater. Depending on the location, type of project, and likely depth to groundwater and likelihood to encounter it, engineers will conduct site-specific geotechnical borings confirming actual groundwater conditions and elevations to supplement existing mapping.

5.4 HOW WERE POTENTIAL WATER RESOURCE IMPACTS ASSESSED?

The analysis of water resources used project construction methods and criteria for facility locations described in Chapter 2 to assess whether construction or operation of the action alternatives could affect surface water and groundwater. The general applicability of water resource regulations to the project was assessed for each alternative. The analysis considered the scale of each alternative in determining potential impacts to surface and groundwater quality, and whether clearing of vegetation, construction grading activities, or other project actions could alter groundwater or surface waters.

For this analysis, the magnitude of project-related impacts are classified as being minor, moderate, or significant as follows:

Minor – If project activities would cause temporary alterations or disturbance of water resources; impacts can be fully mitigated, according to permit requirements; or impacts are largely avoided by the implementation of best management practices.

Moderate – If project activities would cause permanent alterations to water resources but can be fully mitigated, according to permit requirements.

Significant – If project activities would cause permanent or net loss of acreage or impairment of functions that cannot be fully mitigated; noncompliance with applicable water quality standards; or groundwater contamination that cannot be avoided by construction best management practices.

5.5 WHAT ARE THE LIKELY CONSTRUCTION IMPACTS RELATED TO WATER RESOURCES?

5.5.1 Construction Impacts Considered

Although construction details for each alternative have yet to be developed, general construction activities are understood for these types of projects. A site-specific analysis of impacts from construction will be completed during Phase 2 of the EIS process. Most of the alternatives for the proposed project would include vegetation clearing for infrastructure, and operation of heavy equipment. The scale and proximity of construction activities to water resources would determine the intensity of potential impacts.

Federal, state, and local regulations that address protection of water resources during construction are discussed in Section 5.2. Best management practices would be implemented to control stormwater around the construction sites to avoid erosion and associated sedimentation in water bodies.

5.5.1.1 Construction Site Runoff

Construction areas would be susceptible to erosion during rain events as construction, excavation, or grading activities expose bare soils. Increased sedimentation and turbidity of project site runoff could occur in surface waters if erosion is untreated or uncontrolled. Besides sediment, runoff could also contain other contaminants such as fuels, oils, hydraulic fluids, and organic compounds. Significant surface water impacts could be avoided if construction complies with applicable local and state permits and best management practices.

Additionally, a *Stormwater Pollution Prevention Plan* (SWPPP) and a Construction Stormwater and Erosion Control Plan would be prepared and implemented, to ensure that measures are in place to protect water quality, prevent erosion and sedimentation, and manage activities and potential pollutant sources.

Turbidity is a measure of water clarity. It indicates how much materials suspended in the water reduce the passage of light through the water. Suspended materials could include soil particles, algae, plankton, microbes, or other substances.
(EPA, 2012)

5.5.1.2 Discharge from Dewatering

Dewatering may be required to remove water that seeps or drains into excavation areas during construction. Sedimentation tanks would be used to settle soil particles and potentially filter or treat water pumped from excavation areas. Depending upon the quality and quantity of the pumped water, it could be discharged onsite, to an upland area for infiltration and/or filtration or directly to nearby surface waters or to sewer systems. Resulting impacts would likely be minor as long as projects comply with applicable local and state permits and best management practices.

5.5.1.3 Accidental Spills or Leaks

Oil, fuel, and other chemicals could inadvertently spill or leak from construction equipment, leading to contamination of surface waters. Large, uncontrolled spills could potentially flow to nearby storm drainage systems or seep into groundwater or surface waters. Uncontrolled spills are expected to be unlikely because Spill Prevention and Control Plans and local and state permit requirements would be implemented and followed.

5.5.1.4 Impacts to Wetlands, Streams, and Lakes

Wetlands, streams, lakes, and their buffers could be temporarily altered during construction, potentially leading to loss of acreage or function. Any such alteration would be required to comply with applicable regulations and accompanying mitigation requirements. Temporary periods of turbidity or disturbance of contaminated sediments could occur during in-water work, potentially impacting the water quality of streams or lakes, including offshore and nearshore environments of Lake Washington. The implementation of best management practices, and compliance with local and state permit requirements would be required to reduce potential water quality impacts.

The **nearshore environment** is a zone extending waterward from the shoreline, typically to a water depth of about 10 feet, and providing unique habitat for aquatic species. See Chapter 6 for a more detailed description of aquatic habitat.

5.5.1.5 Impacts to Groundwater

Construction activities have the potential to contaminate shallow groundwater resources, as described above for accidental spill and leaks. In addition, the installation of power poles and the construction of substations could change or interfere with the flow of shallow groundwater in adjacent areas, and the compaction of soils along the transmission corridor could reduce the rate surface water infiltration and groundwater recharge. The implementation of best management practices would be required as part of complying with local and state permits. These measures would help to minimize potential water quality impacts.

5.5.1.6 Potential Pipeline Damage

While unlikely due to measures employed to prevent such accidents, it is possible that the Olympic Pipeline could be damaged during construction. A pipeline rupture could have significant adverse effects on surface water and groundwater quality, depending on the location, size, and length of time of the rupture.

5.5.2 No Action Alternative

Under the No Action Alternative, PSE's existing maintenance activities and programs would continue. No utility lines or facilities would be built; therefore, there would be little or no additional impacts to water resources.

5.5.3 Alternative 1: New Substation and 230 kV Transmission Lines

Impacts are described according to the major components associated with Alternative 1. Substation impacts are described first, followed by impacts associated with the transmission line options. All four options under Alternative 1 would require expansion of an existing substation (Lakeside) or construction of a new transformer and substation (Vernell or Westminster) on property already owned by PSE. This would involve the use of heavy equipment and other ground disturbing activities. If wetlands, streams, or their buffers are located on or near the substation construction sites, they could be impacted. Depending on the location of the water resource, impacts could be temporary or permanent. Impacts to wetlands, streams, or their buffers would require mitigation under applicable regulations. If facilities are constructed adjacent to water resources but can avoid long term impacts and comply with all permit requirements, impacts would be minor. Some wetlands or streams and/or their buffers may be permanently affected, depending on the facility siting process. If long term impacts cannot be avoided, impacts could be moderate. Impacts would not be significant due to limitations imposed by regulatory agencies.

Groundwater could be encountered during excavation at substations, depending on location and depth of the excavation. If groundwater were encountered in construction areas, it would be managed with isolation or dewatering measures, in accordance with the project Construction Stormwater and Erosion Control Plan, and other applicable best management practices. Temporary pumping of excavations could occur if groundwater were present in large quantities. Pumped water would need to be discharged in compliance with appropriate regulations to avoid potential turbidity from sediment or hazardous material impacts to surface waters. Impacts are expected to be minor, given that they would be limited to the construction period and would be compliant with permit conditions.

As described above, ground disturbance from construction could result in pollutants and sediments entering stormwater runoff, and an increased short-term risk of impacts to water resources. Best management practices would be implemented to reduce the potential for these effects, in accordance with local requirements. Spill prevention plans would also be prepared to ensure that measures are in place to protect water quality. Therefore, impacts to groundwater and surface water quality are not anticipated.

5.5.3.1 Option A (New Overhead Transmission Lines) and Option B (Existing Seattle City Light 230 kV Transmission Corridor)

5.5.3.1.1 Construction Site Runoff

As discussed in Section 5.5.1.1, no significant surface water impacts are expected from construction site runoff because construction will be required to comply with applicable local and state permits, and best management practices would be implemented.

5.5.3.1.2. Discharge from Dewatering

If groundwater is encountered during excavation or drilling for power poles, the area would be isolated and dewatered as necessary. Pumped water would be discharged in compliance with appropriate regulations to avoid potential turbidity from sediment or hazardous material impacts to surface waters.

5.5.3.1.3. Accidental Spills or Leaks

Equipment used for access, staging, and installing power poles (listed in Appendix B) could accidentally discharge or deposit pollutants, such as hydraulic fluids, fuels or oils into surface waters unless proper site controls are in place. However, impacts from uncontrolled spills are expected to be minimal because Spill Prevention and Control Plans and local and state permit requirements would be implemented.

5.5.3.1.4. Impacts to Wetlands, Streams, and Lakes

Wetlands and streams and their buffers are located within or adjacent to existing rights-of-way and are likely to occur in any new corridors for potential new lines. The existing SCL rights-of-way cross several major streams, including Kelsey, Coal, May, and Richards Creeks, and the Cedar River, along with the wetlands associated with them. Ground disturbance from heavy machinery and excavation for the installation of poles for new or rebuilt overhead transmission lines has the potential to impact these resources. Equipment could be operated in a manner to avoid wetlands, streams, and their buffers, and new poles would also be located to avoid these areas, to the extent feasible. However, impacts to some wetlands, streams, and their buffers are likely to be unavoidable. Mitigation would be required to comply with applicable regulations. Impacts to water resources would be minor to moderate; however, impacts would not be significant due to limitations imposed by regulatory agencies.

Construction could also potentially occur within floodplains around streams, rivers, or lakes in the combined study area. Facility siting would attempt to avoid construction in these areas, but they may be difficult to avoid. Compliance with local codes would reduce potential floodplain impacts, helping to reduce potential impacts. . For example, local codes apply measures such as not allowing equipment or material to be stored in the floodplain, and putting strict limits on excavation in floodplain areas (King County Code Chapter 21A.24, Bellevue City Code Part 20.25H Section IX Part 20.25 E., Renton Municipal Code 4.3.050, Kirkland Municipal Code Chapter 21.56, Newcastle Municipal Code Chapter 18.24, Redmond City Code Chapter 15.04). If construction in a floodplain is found to be necessary, additional mitigation would be required. Because of strict requirements associated with work in streams, rivers, lakes, and floodplains, construction impacts are expected to be minor.

5.5.3.1.5. Impacts to Groundwater

As described above, construction activities are expected to have minor impacts on groundwater, due to the limited areas of excavation required. The size, number, and likely locations of the power poles would be unlikely to result in an adverse effect on shallow groundwater flow. Any minor effects would be localized and would need to be evaluated during design to ensure that groundwater is not redirected in a way that affects structures or surface waters.

5.5.3.1.6. Potential Pipeline Damage

The Olympic Pipeline, which parallels one of PSE's 115 kV transmission lines, could be damaged during construction under Alternative 1, Option A. Although this is considered unlikely due to measures that PSE and the pipeline operator employ whenever construction occurs near the pipeline, a rupture could have significant adverse effects on groundwater quality and other surrounding water resources depending on the location, size and length of time of the rupture.

5.5.3.2 Option C: Underground Transmission Lines

5.5.3.2.1. Construction Site Runoff

As discussed in Section 5.5.1.1, no significant surface water impacts are expected from construction site runoff because construction will comply with applicable local and state permits, and best management practices would be implemented.

5.5.3.2.2. Discharge from Dewatering

This option results in the greatest amount of excavation, and therefore the greatest potential to encounter groundwater. If groundwater is encountered during excavations to install underground transmission lines, the area would be isolated and dewatered as necessary. Pumped water would be discharged in compliance with appropriate regulations to avoid potential impacts to surface or groundwater resources.

5.5.3.2.3. Accidental Spills or Leaks

Equipment used for access, staging, and installing the underground transmission lines (listed in Appendix B) could accidentally discharge or deposit pollutants, such as hydraulic fluids, fuels or oils into surface waters or contaminate groundwater resources unless proper site controls are in place. However, uncontrolled spills are expected to be minimal since Spill Prevention and Control Plans and local and state permit requirements would be implemented. Should spills or leaks occur, groundwater in the vicinity of excavations could be contaminated.

5.5.3.2.4. Impacts to Wetlands, Streams, and Lakes

Construction of new underground transmission lines would require trenching and conduit installation. The installation is expected to use conventional open-cut methods (trenching), but horizontal directional drilling or other trenchless construction methods could be used to avoid wetlands, streams, or their buffers. In the event that trenching is proposed through wetlands, streams, or their buffer areas, the same impacts and regulations described for Alternative 1, Options A and B would apply. If impacts to wetlands, streams, or their buffers were limited to the construction period, and were able to be mitigated in accordance with applicable permit requirements, impacts would be minor. Permanent impacts would be minor to moderate. Impacts to wetlands, streams, or their buffers that would be mitigated through compliance with applicable regulations would not be considered significant. Trenching methods in floodplains or areas of shallow groundwater would have a greater potential of impacting these resources compared to Options A or B.

5.5.3.2.5. Impacts to Groundwater

Underground transmission lines and associated vaults could adversely affect shallow groundwater flow, either by penetrating a perched water table, or by laterally blocking flow. Such effects would be localized and would need to be evaluated during design to ensure that groundwater is not redirected in a way that affects structures or surface waters. Underground transmission lines would be designed so no significant impact would result.

5.5.3.2.6. Potential Pipeline Damage

If the corridor selected for the transmission line is adjacent to the Olympic Pipeline, the risk of damage to the pipeline from construction of the underground transmission line would be greater than the other alternatives, due to the much greater extent of excavation necessary for underground installation. As described for Alternative 1, Option A, a rupture of the pipeline could significantly affect groundwater quality and other surrounding water resources. Although the risk would be greater under Option C, the likelihood of a rupture is still considered low due to measures employed to prevent such accidents.

5.5.3.3 Option D: Underwater Transmission Lines

5.5.3.3.1. Construction Site Runoff

Stormwater management would be required for any actions on land, as described for the options above. With its largely underwater components, Alternative 1, Option D would have fewer upland areas where stormwater would need to be managed during construction.

Site runoff impacts resulting from Option D would most likely occur where the underwater line would come ashore to connect to overland facilities. Ground disturbed near the lake shore could lead to erosion of soil, which could be transported into the lake during rain events. This could lead to localized turbidity in the lake; however, best management practices required by state and local permits would likely avoid or abate this type of impact.

Potential impacts would also be substantially greater for conventional trenching operations, than if directional boring methods were used. Trenching would result in greater ground disturbances, thereby increasing the potential for erosion and turbidity discharges to the lake and nearshore environment. Best management practices would be implemented to minimize or eliminate such discharges; however, some localized water quality impacts could occur. Trenchless equipment such as horizontal directional drilling could be employed to further minimize potential impacts, if feasible. With either method however, some type of barrier (sheet or soldier pile barriers and cofferdams) between in-water work areas and the rest of the lake would likely be installed.

5.5.3.3.2. Discharge from Dewatering

As described above for the other Alternative 1 options, if groundwater is encountered during excavations to install power poles or underground transmission lines in the upland portions of Option D, the area would be isolated and dewatered as necessary. Pumped water would be discharged in compliance with appropriate regulations to avoid potential impacts to surface or groundwater resources. However, excavation of nearshore areas for the upland-to-underwater transition segment, is expected to encounter substantially greater amounts of groundwater, which is not likely to be manageable with pumping. Therefore, it is expected

that the area would be isolated with a sheet pile cofferdam or soldier pile walls to prevent the release of sediments or turbid water into Lake Washington. With best management practices impacts would be minor.

5.5.3.3.3. Accidental Spills or Leaks

As described for the other Alternative 1 options, equipment used for access, staging, and installing the above ground or underground portions of transmission lines for Alternative 1, Option D could accidentally discharge or deposit pollutants, such as hydraulic fluids, fuels or oils into surface waters or contaminate groundwater resources unless proper site controls are in place. However, uncontrolled spills are expected to be minimal since Spill Prevention and Control Plans and local and state permit requirements would be implemented.

In addition, equipment needed to install the nearshore and underwater portions of the transmission line under Option D would have similar or greater potential to impact the surface water of Lake Washington. During placement of the underwater cable, although unlikely, it is possible that barges could have leaks or accidents that could spill diesel fuel into the lake, with potential negative impacts on water quality. However, appropriate best management practices are expected to minimize or eliminate the potential for spills or leaks. Any construction on or near the lake would be subject to in-water permit requirements that strictly control work activities.

5.5.3.3.4. Impacts to Wetlands, Streams, and Lakes

Alternative 1, Option D would have lower potential to impact wetlands, streams, or buffers than Options A and B, since a large portion of the line would be underwater. Impacts to wetlands, streams, and their buffers associated with the shoreline of Lake Washington could be avoided if the upland-to-underwater transition segment were installed using trenchless construction methods. If trenchless methods are not practicable, and these areas associated with the lake could not be avoided, then impacts to wetlands and streams or their buffers would be mitigated in accordance with permit requirements. If impacts are limited to the construction period in accordance with all permit requirements, impacts would be considered minor. Long term impacts that affect the shoreline water resources could be moderate. Impacts would not be significant due to limitations imposed by regulatory agencies. The potential for floodplain impacts would be the same as described for Options A and B.

As described in Chapter 2, underwater cables would likely be installed using a barge designed to dredge and bury the cable 3 to 5 feet below the lake bottom, or laid directly on the lake bottom in deeper areas. This type of in-water construction would result in localized turbidity in the vicinity of the construction area. Contaminated sediments, such as petroleum, metals, and semivolatile and volatile organic compounds, could be located along the cable alignment, although the siting and design process would include studies to determine this potential and avoid known or suspected areas of contamination. If contaminated sediments are disturbed during construction, they could be resuspended into the water column, resulting in potential impacts to water quality and aquatic habitat.

Best management practices would be used to minimize potential water quality impacts during in-water work, such as using a temporary sheet pile containment wall or turbidity curtain. The type and extent of contaminants, if present, would determine if additional or different

construction methods should be used. PSE would be required to meet all applicable water quality standards and in-water work permit conditions. As discussed in Chapter 6, construction would occur within approved in-water construction windows as determined by the Washington Department of Fish and Wildlife (WDFW) as part of the permitting process. In addition, all in-water work would be subject to the requirements of the Corps and Ecology. If PSE meets regulatory criteria, then impacts to water quality from construction of the underwater transmission line would be minor.

5.5.3.3.5. Impacts to Groundwater

As described above, construction activities are expected to have minor impacts on groundwater, due to the limited areas of excavation required in upland areas. Alternative 1, Option D would have lower potential to impact groundwater resources because a large portion of the line would be underwater. The size, number, and likely locations of the upland power poles would be unlikely to result in an adverse effect on shallow groundwater flow.

Trenching for the underwater line has the potential to alter patterns of upwelling groundwater in nearshore areas adjacent to hillside seeps or groundwater discharge zones. Groundwater discharge in these areas supplies cool water to lakeshore spawning salmonids, and supports longshore transport of sediment. Additional site-specific evaluations would be needed to determine the potential magnitude of this impact.

5.5.3.3.6. Potential Pipeline Damage

If the corridor selected for the upland transmission line segments is adjacent to the Olympic Pipeline, the risk of damage to the pipeline from construction would be similar to those described above for the other options. However, the potential for such damage would likely be substantially lower for Alternative 1, Option D, because the upland segments would be substantially shorter, due to the underwater segment.

5.5.4 Alternative 2: Integrated Resource Approach

The types of impacts described for Alternative 1 would be similar for some of the components of Alternative 2. The energy storage and peak generation plant components of Alternative 2 could be similar to transformer/substation work since they would be located at or adjacent to existing substations. Overall, Alternative 2 has a lower potential for impact to water resources than Alternative 1 because construction would be smaller in scale (small projects on individual homes and businesses). Groundwater, floodplains, and stormwater issues would be handled in the same way as described above for Alternative 1. As a result, impacts on water resources are anticipated to be minor.

5.5.5 Alternative 3: New 115 kV Lines and Transformers

The type of impacts for this alternative would be the same as those anticipated for Alternative 1, Option A. However, the extension of shared rights-of-way needed for Alternative 3 would likely be narrower, up to 40 feet, and involve less construction activity than for a 230 kV transmission line, as components are smaller. However, the transmission corridor for Alternative 3 would be much longer (60 miles) than Alternative 1, Option A (18 miles), and thus would have the greatest likelihood of crossing wetlands, streams or their buffers of the alternatives considered, with resulting potential impacts. If water resources can be largely

avoided during construction, impacts would be minor. If these resources cannot be avoided impacts would be minor to moderate. Impacts would not be significant due to compliance with limitations imposed by regulatory agencies.

5.6 HOW COULD OPERATION OF THE PROJECT AFFECT WATER RESOURCES?

5.6.1 Operation Impacts Considered

Water quality could be affected during the long-term operation of the project if impervious surface areas and associated surface water runoff are increased, or stored hazardous materials or chemicals are inadvertently released to surface or ground waters. However, regulations enacted to protect water resources in the State of Washington, and mitigation measures that would be required for impacts, make these types of direct losses unlikely to occur.

5.6.2 No Action Alternative

Under the No Action Alternative, PSE's existing maintenance or repairs of substations and any underground or overhead distribution lines would continue. No utility line or facility construction beyond conductor replacement is likely to occur.

As described in Chapter 8, hazardous materials used for ongoing facility operations and maintenance could reach area surface waters or groundwater if not properly contained or managed. The oil in distribution transformers on power poles could reach streams, rivers, lakes, or ponds unimpeded, since poles would be the most likely type of existing infrastructure to exist in wetlands or buffers, or directly adjacent to these water resources. Oil spills from maintenance or repair equipment could potentially degrade water quality. The potential impacts of spilled oil would depend on many factors, including the type and existing condition of the water resource potentially contaminated; the time of year (wet or dry season) of the spill; the volume of oil spilled; and the chronic effects of the oil spilled. In general, because of ongoing maintenance of PSE facilities, the potential for impact to surface water resources is low, and the potential impact is minor.

5.6.3 Alternative 1: New Substation and 230 kV Transmission Lines

At the new or expanded substation, operation of all four of the options under Alternative 1 would generally have the same types of potential impacts as described above. All four options would require stormwater management as part of design, depending on the substation size and location. Impacts to wetlands and streams from operation of the project are expected to be minor.

Impacts associated with the transmission line options are described below.

5.6.3.1 Option A (New Overhead Transmission Lines) and Option B (Existing Seattle City Light 230 kV Transmission Corridor)

Once construction is complete, operational impacts would be minimal, associated with minor vegetation removal and regular upkeep such as painting or cleaning. Access roads for poles

and transmission lines would also be maintained; however, impacts to water resources would likely be minor.

5.6.3.2 Option C: Underground Transmission Lines

Once installed, regular access to the underground transmission line for Alternative 1, Option C would be limited to regularly scheduled maintenance. However, if an accident should occur and repairs to the transmission line are needed, there could be impacts to wetlands, streams, or buffers if the transmission line is adjacent to these water resources. Access to the line would likely occur through vaults left in place along the alignment, although some trenching could be required depending on the location and nature of the problem. If impacts cannot be avoided, as with the initial installation during construction, mitigation for impacts to wetlands, streams, or their buffers would be required by existing regulations. Impacts to wetlands, streams, or their buffers would be minor because it is expected that they could be avoided and any impact fully mitigated.

5.6.3.3 Option D: Underwater Transmission Lines

No permanent impacts on water resources are anticipated for underwater transmission lines in Lake Washington because access to the underwater transmission line would not be required once operational. If the cable were damaged by other activities in the lake, it would need to be repaired or replaced, which would likely involve removal and reinstallation. Impacts associated with substantial repairs or replacement could be similar to that associated with initial construction, including localized turbidity during the replacement period.

Underwater transmission lines would require aboveground or underground lines on land to connect to a substation. Access roads and aboveground vaults would also be needed in nearshore areas as well as upland areas. Permanent impacts on water resources for aboveground and underground lines under Alternative 1, Option D would be similar to those described for Options A and C.

5.6.4 Alternative 2: Integrated Resource Approach

No permanent impacts on water resources would be likely from operation of some Alternative 2 components since infrastructure would be minimal and likely located on private properties with a small footprint. As for Alternative 1, stormwater management would be needed for the energy storage and peak generation plant components of Alternative 2. Some equipment or facilities could contain hazardous materials (for example, batteries used in energy storage facilities and transformers with wind turbines for distributed generation facilities). If these components were to be damaged or leak, that material could reach water resources, with the same types of impacts described under the No Action Alternative and the potential impact is minor.

5.6.5 Alternative 3: New 115 kV Lines and Transformers

Operational impacts for Alternative 3 would be similar to those anticipated for Alternative 1, Option A. Because the corridor proposed for Alternative 3 is longer (60 miles) than Alternative 1, there is more potential for impacts from maintenance or repair. As previously noted, these impacts are expected to be minor because all maintenance will be consistent with applicable permit and regulatory requirements.

5.7 WHAT MITIGATION MEASURES ARE AVAILABLE FOR POTENTIAL IMPACTS TO WATER RESOURCES?

A substantial set of federal, state, and local regulations are in place to protect water resources including surface waters and their buffers, floodplains, and groundwater, and to control stormwater. Site-specific mitigation measures will be determined by appropriate agencies. Overall, these regulations require the following:

- Comply with applicable requirements from local, state, and federal regulatory agencies for all construction affecting water resources directly or indirectly.
- Avoid and minimize impacts to Waters of the U.S. (lakes, wetlands, streams, and buffers), or provide compensatory mitigation for losses that are approved.
- Control construction within floodplains so that flood risk is not increased and floodway capacity is not reduced.
- Avoid placing splice vaults in nearshore environments or where wetlands or stream mouths are present.
- Require trenchless construction for underground and underwater power line segments.
- Manage stormwater to ensure it is properly detained and treated prior to release.
- Bore underneath water resources to avoid temporary and permanent impacts to those areas when feasible.
- Design, install, and maintain underwater pipelines consistent with applicable regulatory requirements and standards set by the Washington Utilities and Transportation Commission and the U.S. Department of Transportation's Pipeline and Hazardous Materials Safety Administration.

5.8 ARE THERE ANY CUMULATIVE IMPACTS TO WATER RESOURCES AND CAN THEY BE MITIGATED?

If wetlands, surface waters, or groundwaters were impacted by the project (either directly through fill or indirectly via water quality or other impacts) the project would contribute to regional losses of these resources. As the region urbanizes, these resources are incrementally reduced through development projects, and any further losses would contribute to that trend. Compliance with permit requirements would help to minimize losses to resource function and value, but some permanent loss could be unavoidable.

5.9 ARE THERE ANY SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS TO WATER RESOURCES?

Alternatives 1 and 3 could result in potentially minor to moderate impacts to water resources, if facilities are sited to cause temporary or permanent impacts to wetlands, streams, Lake

Washington, or buffers for these areas. The siting and design process will undertake to avoid these resources to the extent possible, if it is not possible to avoid them, PSE will comply with all applicable mitigation requirements. Impacts would not be significant due to limitations imposed by regulatory agencies. Nearshore excavation associated with Alternative 1, Option D could result in the resuspension of contaminated sediments and increased turbidity in surrounding area. However, these water quality impacts would be temporary and localized.