# Energize Eastside Project

## Phase I Draft Environmental Impact Statement

January 28, 2016

**Prepared for the Cities of Bellevue, Kirkland, Newcastle, Redmond, and Renton**

City of Bellevue
Post Office Box 90012 ▪ Bellevue, Washington ▪ 98009 9012

January 28, 2016

To Interested Parties, Agencies, and Organizations

Enclosed is the Phase 1 Draft Environmental Impact Statement (EIS) for the "Energize Eastside" project proposed by Puget Sound Energy (PSE). The Energize Eastside project is a proposal to construct new electrical transmission lines and install a new high-voltage transformer to serve PSE's customers in the area between Lake Washington and Lake Sammamish, in King County, Washington.

The City of Bellevue and its four partner Eastside Cities (Kirkland, Newcastle, Redmond, and Renton) are jointly conducting a phased environmental review process under the State Environmental Policy Act for the Energize Eastside project. This Phase 1 Draft EIS assesses the range of impacts associated with broad options for addressing PSE's objectives, including alternatives and options that meet PSE's objectives at a lower environmental cost, in a non-project or programmatic EIS. Key environmental elements evaluated at a programmatic level in the Phase 1 Draft EIS include Views and Visual Resources, Land Use and Housing, Environmental Health, Recreation, Utilities, Plants and Animals, and Water. Earth, Greenhouse Gas Emissions, Energy and Natural Resources, Noise, Recreation, Historic and Cultural Resources, and Transportation were also assessed. The evaluations conducted during Phase 1 will be used to narrow the range of alternatives for consideration in the Phase 2 Draft EIS. The Phase 2 Draft EIS will be a project-level evaluation, describing impacts at a site-specific and project-specific level. This approach is consistent with the requirements for Phased Review outlined in WAC 197-11-060 (5)(c).

The City of Bellevue and its partner Eastside Cities request comments on the Phase I Draft EIS from the public, agencies, and organizations throughout the public comment period beginning January 28, 2016, and ending March 14, 2016. Comments must be postmarked or emailed prior to midnight March 14, 2016. Mailed comments should be addressed to Ms. Heidi Bedwell, Senior Planner, Land Use Division-Development Services, City of Bellevue, 450 110th Avenue NE, Bellevue, WA 98004. Email comments should be addressed to: info@EnergizeEastsideEIS.org. Comments may also be submitted online at: www.EnergizeEastsideEIS.org .

Individuals may also provide comments at any of the five public hearings to be held in February and March, 2016. The open houses/public hearings will be held at the following times and locations:

**City of Kirkland Justice Center:** 11750 NE 118th St, Kirkland, WA 98034; Tuesday, February 23, 2016. Public Meeting: 6:00 p.m. - 8:00 p.m.

**Renton City Hall:** 1055 S Grady Way, Renton, WA 98057; Thursday, February 25, 2016. Public Meeting: 6:00 p.m. - 8:00 p.m.

**Newcastle Elementary School:** 8400 136th Avenue SE, Newcastle, WA 98059; Saturday, February 27, 2016. Public Meeting: 2:00 p.m. - 4:00 p.m.

**Redmond City Hall:** 15670 NE 85th St, Redmond, WA 98052; Monday, February 29, 2016. Public Meeting: 6:00 p.m. - 8:00 p.m.

**Bellevue City Hall:** 450 110th Ave NE, Bellevue, WA 98004. Tuesday, March 1, 2016. Public Meeting: 6:00 p.m. - 9:00 p.m.

Following the Phase 1 Draft EIS, comments will be requested on the scope for the Phase 2 Draft EIS. The Final EIS will include responses to comments on both the Phase 1 Draft EIS and the Phase 2 Draft EIS.

Thank you for your interest and participation in the environmental review of the Energize Eastside project. We welcome your comments.

Sincerely,

Carol V Helland

Carol V. Helland, Environmental Coordinator
Development Services Land Use Director
City of Bellevue

# FACT SHEET

## NAME OF PROPOSAL

Energize Eastside Project

## PROPONENT

Puget Sound Energy (PSE)

## PROJECT LOCATION

The project involves improvements to PSE's electrical grid in the Eastside area of King County, Washington, to address a deficiency in electrical transmission capacity. The area identified by PSE as having a transmission capacity deficiency is situated between the Sammamish substation on the north end (Redmond/Kirkland area) and the Talbot Hill substation on the south end (Renton area). Transmission improvements would need to be tied to these two substations in order to address the need for the project; however, each alternative has a slightly different study area (see Chapter 2 figures). The combined study area for the project extends roughly from Lake Washington to the Novelty Hill substation (located east of Redmond in unincorporated King County) and the Lake Tradition substation in Issaquah.

Communities in the combined study area include the following: Unincorporated King County, Beaux Arts Village, Bellevue, Clyde Hill, Hunts Point, Issaquah, Kirkland, Medina, Newcastle, Redmond, Renton, Sammamish, and Yarrow Point.

## PROJECT DESCRIPTION

The purpose of the project is to address a projected deficiency in transmission capacity resulting from growth in electrical demand, which could affect the future reliability of electrical service for the Eastside. PSE proposes to construct and operate a major new transformer served by approximately 18 miles of new high-capacity electric transmission lines (230 thousand volts [kilovolts, or kV]) extending from Renton to Redmond. The proposed transformer would be placed at a substation near the center of the Eastside. Electrical power would be transmitted to this substation and the voltage lowered, or "stepped down" (transformed), from 230 kV to 115 kV for distribution to local customers.

This Phase 1 Draft EIS evaluates the proposed 230 kV improvements as well as alternatives to PSE's proposal. **Alternative 1** adds a new substation and has four options: constructing new 230 kV overhead transmission lines (Option A), using existing 230 kV overhead transmission lines (Option B), placing portions of the 230 kV line underground (Option C), and submerging portions of the 230 kV line under water (Option D).

The EIS also considers an integrated resource approach (**Alternative 2**), including a combination of energy efficiency, demand response, distributed generation, energy storage, and peak generator components. Construction of new 115 kV lines and transformers at existing substations (**Alternative 3**) is also considered. In accordance with the State Environmental Policy Act (SEPA), a **No Action Alternative** is also evaluated. A detailed summary of the alternatives evaluated in this Phase 1 Draft EIS is provided below.

## SUMMARY OF ALTERNATIVES AND OPTIONS

| **No Action Alternative** | |
|---|---|
| PSE would continue to manage its maintenance programs to reduce the likelihood of equipment failure, and would continue to stockpile additional equipment so that repairs could be made quickly. PSE would also continue its energy conservation program systemwide and for the Eastside.[1] As appropriate, conductor replacement on existing lines would occur. | |
| **Alternative 1: New Substation and 230 kV Transmission Lines** | |
| Option A: New Overhead Transmission Lines | Construct a minimum of 18 miles of new overhead transmission lines between the Talbot Hill and Sammamish substations. The new transmission lines may be entirely within existing utility easements, or partially in new locations currently not designated for utility operations. A new transformer would be installed at or near one of three PSE-owned properties that are either adjacent to existing substations or have been purchased for future substations. |
| Option B: Existing Seattle City Light 230 kV Transmission Corridor | Use Seattle City Light's existing SnoKing-Maple Valley 230 kV overhead transmission lines, and rebuild and reconductor both 230 kV transmission lines. Loop one 230 kV line to a new transmission substation, and loop the other 230 kV line to the Sammamish substation. |
| Option C: Underground Transmission Lines | Place any portion of the new transmission line alignments considered for Option A or B underground. |
| Option D: Underwater Transmission Lines | Place underwater transmission lines in Lake Washington. This option would need to be connected to the Talbot Hill and Sammamish substations and another centrally located substation with the new transformer, using either overhead or underground lines. |
| **Alternative 2: Integrated Resource Approach** | |
| Energy Efficiency Component | Accelerate and expand the energy efficiency measures proposed under the No Action Alternative to meet the project objectives for Energize Eastside. Measures would include replacement of older, inefficient appliances and lighting, adding insulation, weatherproofing, and other similar actions. |
| Demand Response Component | Reduce end-use electric customers' electricity usage in a given time period, or shift that usage to another time period. This requires special metering and control equipment that can be used to adjust electricity usage remotely, usually adjusting automatically according to pre-agreed parameters. |

| | |
|---|---|
| Distributed Generation Component | Construct distributed generation devices to generate power on PSE customers' property. Facilities would consist of gas turbines, anaerobic digesters, reciprocating engines, microturbines, and fuel cells. |
| Energy Storage Component | Build energy storage facilities to supplement power during peak periods. This would involve large batteries to store energy near one or more existing substation. |
| Peak Generation Component | Build 20-megawatt peak generation plants at PSE-owned substations within the Eastside. These systems typically burn natural gas to power a generator used to help meet peak demand. |

**Alternative 3: New 115 kV Lines and Transformers**

Approximately 60 miles of new overhead 115 kV lines would be constructed, and an existing Bonneville Power Administration 230 kV line would be extended to the Lake Tradition substation. These lines would likely follow existing utility or road rights-of-way, and would either replace or be co-located with existing transmission and distribution lines wherever possible.

Three new 230 kV to 115 kV transformers would be installed at the following existing substations: Lake Tradition, Talbot Hill, and Sammamish substations. At a minimum, the Talbot Hill substation would need to be expanded to accommodate an additional transformer and additional security measures would be required at all three substations. Several other substations would also need to be modified, and in some cases expanded.

[1]Energy efficiency improvements described under the No Action Alternative apply to all of the alternatives.

## CONSTRUCTION TIMING FOR THE PROJECT

PSE studies show that Eastside customer demand will reach a point when the capacity of the electric transmission system on the Eastside could experience a deficiency as early as winter 2017 - 2018. To be an effective solution, a project must be completed and in service by the identified target need date.

## STATE ENVIRONMENTAL POLICY ACT LEAD AGENCY

City of Bellevue is the Lead Agency.

The following municipalities are SEPA Co-Lead Agencies for the project: Kirkland, Newcastle, Redmond, and Renton.

## SEPA RESPONSIBLE OFFICIAL

Carol Helland
Development Services Land Use Director
City of Bellevue
450 110th Avenue NE
Bellevue, WA 98004

## EIS CONTACT PERSON

Heidi Bedwell
Energize Eastside EIS Program Manager
City of Bellevue
450 110th Avenue NE
Bellevue, WA 98004
Phone: (425) 452-4862
Email: HBedwell@bellevuewa.gov

## CONTACT PERSON FOR EACH CO-LEAD AGENCY

### City of Kirkland

Jeremy McMahan
Development Services - Planning Manager
(425) 587-3229
jmcmahan@kirklandwa.gov

### City of Newcastle

Tim McHarg
Director of Community Development
(425) 649-4444
TimM@ci.newcastle.wa.us

### City of Redmond

Catherine Beam
Principal Planner
(425) 556-2429
CBEAM@redmond.gov

### City of Renton

Jennifer Henning
Planning Director
(425) 430-7286
Jhenning@Rentonwa.gov

## GOVERNMENTAL ACTIONS

Because a preferred alternative has not been selected, it is not possible to present a complete list of approvals and permits that would be required. Following are the most common approvals and permits required for the types of projects presented in this document. These approvals and permits are listed below by jurisdictional agency.

### Federal

- Section 10/404 permit—U.S. Army Corps of Engineers
- Endangered Species Act consultation—National Marine Fisheries Service and/or U.S. Fish and Wildlife Service

### State

- National Pollutant Discharge Elimination System Construction Stormwater General Permit—Washington State Department of Ecology
- Section 401 Water Quality Certification—Washington State Department of Ecology
- Hydraulic Project Approval—Washington Department of Fish and Wildlife
- Section 106 National Historic Preservation Act or Executive Order 05-05 Consultation—Department of Archaeology and Historic Preservation
- Utility Rate Approval —Washington Utilities and Transportation Commission

### Local City or County

- Shoreline substantial development or conditional use permit, or variance
- Building and related permits, as needed
- Clearing and grading permits
- Street use permits

## AUTHORS AND PRINCIPAL CONTRIBUTORS

This Phase 1 Draft EIS has been prepared under the direction of the City of Bellevue, in consultation with the co-lead agencies.

Research and analysis were provided by the following:

- Environmental Science Associates (ESA) – Alternatives development; analysis of earth, greenhouse gas, water resources, plants and animals, energy and natural resources, environmental health, noise, land use and housing, views and visual resources, recreation, historic and cultural resources, public services, and utilities; EIS document coordination and production.
- Enertech Consultants – EMF modeling and technical information.
- Asher Sheppard Consulting – EMF health effects background information.
- Heffron Transportation, Inc. – Transportation analysis.
- FCS Group – Economic analysis.
- Stantec Engineering – Alternatives development and electrical engineering technical support.

## DATE OF ISSUE

January 28, 2016

## END OF COMMENT PERIOD

All comments must be postmarked or emailed before midnight, March 14, 2016.

## COMMENTING ON THE DRAFT EIS

Individuals may comment on the Draft EIS by emailing or mailing written comments to:

Heidi Bedwell
Energize Eastside EIS Program Manager
Senior Planner, Land Use Division, Development Services
City of Bellevue
450 110th Avenue NE
Bellevue, WA 98004
Email: info@EnergizeEastsideEIS.org

Online at: www.EnergizeEastsideEIS.org

Commenters should include "Energize Eastside" in the subject line of the email or letter.

Individuals may also provide comments at any of the five public hearings to be held in February and March, 2016. Each hearing will begin with an open house, followed by a short presentation and an oral comment period. Hearings will be held as follows:

**City of Kirkland Justice Center – 6:00 PM - 8:00 PM**
11750 NE 118th St.
Kirkland, WA 98034
Tuesday, February 23

**Renton City Hall – 6:00 PM - 8:00 PM**
1055 S Grady Way
Renton, WA 98057
Thursday, February 25

**Newcastle Elementary School Multipurpose Room – 2:00 PM - 4:00 PM**
8400 136th Avenue SE
Newcastle, WA 98059
Saturday, February 27

**Redmond City Hall – 6:00 PM - 8:00 PM**
15670 NE 85th St
Redmond, WA 98052
Monday, February 29

**Bellevue City Hall – 6:00 PM - 9:00 PM**
450 110th Ave NE
Bellevue, WA 98004
Tuesday, March 1

## AVAILABILITY OF THE DRAFT EIS

Copies of the Phase 1 Draft EIS and/or Notices of Availability have been distributed to agencies, tribal governments, and organizations on the Distribution List in Chapter 18.

The Draft EIS may be viewed online or downloaded from the project website www.energizeeastsideeis.org or may be viewed at the following locations:

**Libraries**

**Bellevue Library**
1111 110th Ave. NE
Bellevue, WA 98004

**Lake Hills Library**
15590 Lake Hills Blvd.
Bellevue, WA 98007

**Newcastle Library**
12901 Newcastle Way
Newcastle, WA 98056

**Newport Way Library**
14250 SE Newport Way
Bellevue, WA 98006

**Redmond Library**
15990 NE 85th Street
Redmond, WA 98052

**Renton Highlands Library**
*Before February 20th*
2902 NE 12th Street
Renton, WA 98055

*After February 20th*
2801 NE 10th Street
Renton, WA 98056

**Renton Library**
100 Mill Avenue South
Renton, WA 98057

**City Offices**

**City of Bellevue Development Services Department**
City Hall
450 110th Ave NE
Bellevue, WA 98004

**City of Newcastle Planning Division**
City Hall
12835 Newcastle Way, Suite 200
Newcastle, WA 98056

**Redmond City Hall**
Development Services Center (2nd floor)
15670 NE 85th St
Redmond, WA 98052

**City of Renton Planning Division**
City Hall, 6th floor
1055 South Grady Way
Renton, WA 98057

Printed copies are available to purchase for cost of reproduction ($300) by contacting the project email at info@energizeeastsideeis.org or by calling Environmental Science Associates at (206) 789-9658. Copies of the EIS on CD may also be obtained (available at no charge) at all four of the city offices listed directly above.

## AVAILABILITY OF BACKGROUND MATERIALS

The Draft EIS includes appendices with information that is important to help understand the EIS analysis. Other background materials developed specifically for this project and used by the consultants are available on the website listed above.

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# ACRONYMS AND GLOSSARY

| Term/Acronym | Description |
|---|---|
| Acetylene | A colorless gas that is widely used as a fuel. |
| AC | Alternating Current |
| ACGIH | American Council of Governmental Industrial Hygienists |
| Adzes | Hand tools used for woodworking. |
| ALS | Advanced Life Support |
| AM | Amplitude Modulation |
| Ambient Noise Level | The existing noise environment to which one has adapted. |
| Amplitude | Pressure level or energy content |
| Anaerobic Digesters | A collection of processes by which microorganisms break down biodegradable material in the absence of oxygen. The process is used for industrial or domestic purposes to manage waste and/or to produce fuels. |
| Ancillary | Providing necessary support to the primary activities or operation of an organization, institution, industry, or system. |
| Appurtenances | An accessory or other item associated with a particular activity. |
| ARCH | A Regional Coalition for Housing |
| Arcing | A luminous discharge of current that is formed when a strong current jumps a gap in a circuit or between two electrodes. |
| Arterial | A high-capacity urban road. The primary function of an arterial road is to deliver traffic from collector roads to freeways or expressways, and between urban centers at the highest level of service possible. |
| ASCE | American Society of Civil Engineers |
| Auger | A tool with a large helical bit for boring holes in the ground. |
| Auxiliary Rubber Tire Vehicle | A vehicle with spare rubber tires. |
| Backfill | To refill an excavated hole with the material dug out of it. |
| Backhoe | A mechanical excavator that draws toward itself a bucket attached to a hinged boom. |
| Best Management Practices (BMPs) | Measures developed on a project-specific basis to minimize potential construction-related impacts. BMPs vary depending on the activities involved. |

| Term/Acronym | Description |
|---|---|
| BiOp | Biological Opinion |
| BIP | Bellevue-Issaquah Pipeline |
| BKR | Bellevue-Kirkland-Redmond Pipeline |
| Block Load | The expected increase in energy demand from a specific customer or group of customers. |
| BMP | Best Management Practice |
| BPA | Bonneville Power Administration |
| Btus | British Thermal Units |
| Bucket Truck | A truck equipped with an extendable, hydraulic boom carrying a large bucket for raising workers to elevated, inaccessible areas. |
| Bulk Power System | A system for bulk transfer of electrical energy, from generating power plants to electrical substations located near demand centers. This is distinct from the local wiring between high-voltage substations and customers, which is typically referred to as electric power distribution. |
| CAA | Clean Air Act |
| CAP | Corrective Action Plan |
| Capacity Savings Program | A program to reduce demand temporarily in response to a price signal or other type of incentive, particularly during the system's peak periods. End-user customers receive compensation (either through utility incentives or rate design) to reduce non-essential electricity use or to shift electric load to a different time, without necessarily reducing net usage. |
| Carbon Sink | A natural environment that absorbs more carbon dioxide than it releases. |
| Carcinogen | A substance or agent that causes cancer. |
| Cathodic Protection System | A technique used to control the corrosion of a metal surface such as a pipe using an electrical current. The pipe is connected to a more easily corroded "sacrificial metal." |
| CEQ | Council on Environmental Quality |
| Certificate of Appropriateness (COA) | The entitlement required to alter an individual landmark and any property within a landmark district. |
| CFAI | Commission on Fire Accreditation International |
| CFR | Code of Federal Regulations |
| $CH_4$ | Methane |
| CHP | Combined Heat and Power |

| Term/Acronym | Description |
|---|---|
| CIP | Critical Infrastructure Protection |
| Clear Zone | Area where vegetation has been removed to construct a new facility, create an access road, or meet design criteria for operation of transmission lines. |
| Climate Change | The changing of the earth's climate caused by natural fluctuations and human activities that alter the composition of the global atmosphere. |
| CO | Carbon monoxide |
| $CO_2$ | Carbon dioxide |
| $CO_2e$ | $CO_2$ equivalents |
| COA | Certificate of Appropriateness |
| Cofferdam | A watertight enclosure pumped dry to permit construction work below the waterline, as when building bridges or repairing a ship. |
| Collector | A low-to-moderate-capacity road that serves to move traffic from local streets to arterial roads. |
| Collisions | When birds fly directly into conductors, resulting in injury or mortality from impact. |
| Combined Heat and Power (CHP) Plant | A plant designed to produce both heat and electricity from a single heat source. |
| Combustion Turbine Facilities | There are two types of combustion turbine technologies: single-cycle combustion turbines and combined-cycle combustion turbines. Electric utilities primarily use single-cycle combustion turbines as peaking or backup units. |
| Concrete Pump Truck | A machine used for transferring liquid concrete via a pumping motion. |
| Conductor Reel Trailer | Construction equipment used for overhead and underground cabling construction. |
| Conductor | An object or type of material that allows the flow of electrical current in one or more directions. A transmission line is an electrical conductor. Conductivity, in general, is the capacity to transmit electricity. |
| Conservation Voltage Reduction | Refers to controlling PSE's distribution voltage at slightly reduced levels to conserve energy. |
| Corrective Action Plan (CAP) | List of corrective actions that are to be made manually by local electrical system dispatchers to control local electrical problems. |

| Term/Acronym | Description |
|---|---|
| Corona | The electrical ionization of the air that occurs near the surface of the energized conductor and suspension hardware because of very high electric field strength. |
| Corona Discharge | Occurs when the voltage of the line exceeds the insulating capability of air. May result in audible noise such as random crackling or hissing being produced by the transmission lines. |
| Corona Ionization | The electrical breakdown of air in very strong electric fields. |
| Critical Areas | Areas identified by counties and local municipalities as needing to be protected. Critical areas include: geologic hazard areas, frequently flooded areas, wetlands, streams, fish and wildlife habitat conservation areas (FWHCAs), and critical aquifer recharge areas. |
| Crustal Faults | Faults formed by deformation of the earth's crust. |
| Cultural Resource | Collective evidence of the past activities and accomplishments of people. Buildings, objects, features, locations, and structures with scientific, historic, and cultural value are all examples of cultural resources. |
| CWA | Cascade Water Alliance |
| DAHP | Washington State Department of Archaeology and Historic Preservation |
| dB | Decibels |
| dBA | A-weighted decibels |
| DC | Direct Current |
| DDT | Dichlorodiphenyltrichloroethane, a colorless, crystalline, tasteless and almost odorless organochloride known for its insecticidal properties. |
| Demand Response Program | An incentive-based program that encourages electric power customers to temporarily reduce their demand for power at certain times in exchange for a reduction in their electricity bills. Some demand response programs allow electric power system operators to directly reduce load, while in others, customers retain control. Customer-controlled reductions in demand may involve actions such as curtailing load, operating on-site generation, or shifting electricity use to another time period. |
| Dielectric | Having the property of transmitting electric force without conduction; insulating. |
| Directional Boring | A steerable trenchless method of installing underground pipes, conduits, and cables in a shallow arc along a prescribed bore path by using a surface-launched drilling rig, with minimal impact on the surrounding area. |

| Term/Acronym | Description |
|---|---|
| Dispatch Generation | Short-term determination of the optimal output of a number of electricity generation facilities to meet the system load, given the transmission and operational constraints. |
| Distributed Generation | Power generation at the point of consumption. |
| Distribution Efficiency | When goods and services are consumed by those who need them most. |
| Distribution System | The final stage in the delivery of electric power; it carries electricity from the transmission system to individual consumers. |
| DNR | Washington State Department of Natural Resources |
| DOE | U.S. Department of Energy |
| Dredging | To clean out the bed of a harbor, river, or other water body by scooping out mud, weeds, and rubbish with a dredge. |
| Duct Bank | An assembly of conduits installed underground between buildings, structures, or devices to allow installation of power and communication cables. They may either be directly buried in earth, or encased in concrete (sometimes with reinforcing rebar). |
| Eastside | An area of King County, Washington, roughly defined as extending from Renton in the south to Redmond in the north, and between Lake Washington and Lake Sammamish. |
| EBCC | East Bellevue Community Council |
| Ecology | Washington State Department of Ecology |
| EIS | Environmental Impact Statement |
| Electrocutions | When birds directly contact energized and grounded conductors or equipment. |
| Electromagnetic | Of or relating to the interrelation of electric currents or fields and magnetic fields. |
| Electromagnetic Interference | Disturbance generated by an external source that affects an electrical circuit by electromagnetic induction, electrostatic coupling, or conduction. |
| Electric and Magnetic Fields (EMF) | Invisible areas of energy often referred to as radiation that are associated with the use of electrical power and various forms of natural and man-made lighting. Also referred to as electromagnetic fields. |
| Electric Field | The electric force per unit charge. |
| ELF | Extremely Low Frequency |
| Emergency Limit | A specific level of electrical loading that a system, facility, or element can support or withstand for a finite period. |

| Term/Acronym | Description |
|---|---|
| EMI | Electromagnetic Interference |
| EMS | Emergency Medical Services |
| ENA | Energy Networks Association |
| ESA | Endangered Species Act |
| Endangered Species | A species of animal or plant that is seriously at risk of extinction. These species are listed by state or federal agencies to implement protection measures. |
| Environmentally Acceptable | A solution that, through the environmental review process, would be found to minimize, to the extent practicable, the environmental impacts on the affected communities. |
| EPA | U.S. Environmental Protection Agency |
| Epidemiology | The study of patterns and possible causes of diseases in human populations. |
| EPF | Essential Public Facility |
| EPRI | Electric Power Research Institute |
| Erosion Hazard | An area where soils may experience severe to very severe erosion from construction activities or through changes in surficial conditions that expose soils to new erosive forces. Erosive forces can come from precipitation, changes in drainage patterns, removal of vegetation, wind, or wave action. Certain types of soil, such as silts, are generally more prone to erosion hazards. The potential for erosion also increases as the slope steepness increases. |
| ERP | Emergency Response Plan |
| Essential Public Facility (EPF) | A concept established by state law (RCW 36.70A.200 and WAC 365-196-550), intended to ensure that necessary facilities that are typically difficult to site can in fact be placed appropriately. |
| Excavator | Large machine for removing soil from the ground, especially on a building site. |
| FAA | Federal Aviation Administration |
| Facility Response Plan (FRP) | A plan prepared by certain facilities that store and use oil to demonstrate the facility's preparedness to respond to a worst-case oil discharge. |
| FCC | Federal Communications Commission |
| FEMA | Federal Emergency Management Agency |
| FERC | Federal Energy Regulatory Commission |
| FHWA | Federal Highway Administration |

| Term/Acronym | Description |
|---|---|
| Firm Load | Electricity supplies that are intended to be available at all times during a period covered by an agreement. |
| FM | Frequency Modulated |
| Foreground | The part of a view that is nearest to the observer. |
| Fossil Fuels | Buried combustible geologic deposits of organic materials, formed from decayed plants and animals that have been converted to crude oil, coal, natural gas, or heavy oils by exposure to heat and pressure in the earth's crust over hundreds of millions of years. |
| Frequency | The number of cycles that occur in 1 second, measured in hertz (Hz). |
| FRP | Facility Response Plan |
| Ft | Feet |
| Fuel Cell | A cell producing an electric current directly from a chemical reaction. |
| FWHCA | Fish and Wildlife Habitat Conservation Area |
| G | Gauss |
| Gas Turbine | A facility typically consisting of an air compressor and one or more combustion chambers where liquid or gaseous fuel is burned and the hot gases are passed to the turbine. The hot gases expand to drive the generator and are then used to run the compressor. |
| GHG | Greenhouse Gas |
| GHG Emissions | Any of the atmospheric gases that contribute to the greenhouse effect by absorbing infrared radiation produced by solar warming of the Earth's surface. They include carbon dioxide ($CO_2$), methane ($CH_4$), nitrous oxide ($NO_2$), and water vapor. |
| Generating Unit | Any combination of physically connected generators, reactors, boilers, combustion turbines, and other equipment operated together to produce electric power. |
| Generator | Machine for converting mechanical energy into electricity. |
| Geologic Hazard Areas | Areas susceptible to erosion, sliding, earthquake, or other geologic events. |
| GIS | Geographic Information Systems |
| GPS | Global Positioning System |

| Term/Acronym | Description |
|---|---|
| Grounding Conductor | A wire on a transmission pole, used for protection from lightning strikes that connects the static wire to the ground rod. Visually recognizable as the wire running the entire length of the pole, top to bottom. |
| Grounding Rules | Grounding is a means to provide safety to electrical workers and any people who may come in contact with structures such as streetlights, mast arms, metal poles, and guy wires. The NESC provides rules on grounding components as a means to safeguard any person from injury that could be caused by electrical potential. |
| Groundwater Recharge | A hydrologic process where water moves downward from surface water to groundwater. Recharge is the primary method by which water enters an aquifer. |
| gWh | Gigawatt Hours |
| GWP | Global Warming Potential |
| Haul Route | A crude, temporary road built to facilitate the movement of people, equipment, and materials during construction. |
| Hazardous Material | Any substance or material that could adversely affect the safety of the public, handlers, or carriers during transportation. |
| Hazardous Waste | Waste that is dangerous or potentially harmful to human health or the environment. Hazardous wastes can be liquids, solids, gases, or sludges. They can be discarded commercial products, like cleaning fluids or pesticides, or the byproducts of manufacturing processes. |
| HCA | High Consequence Area |
| HDD | Horizontal Directional Drilling |
| HFCs | Hydrofluorocarbons |
| High Consequence Land Use | A use that, if located in the vicinity of a hazardous liquid pipeline, would present an unusually high risk in the event of pipeline failure due to its function, including utilities providing regional service. |
| High Pressure Natural Gas Mains | The portion of the natural gas distribution system that operates at pressures greater than 60 pounds per square inch gage (psig). |
| Historic Resource | A prehistoric or historic archaeological site, as well as historic sites, buildings, structures, objects, districts, and landscapes. |
| Hoe Ram | A ram powered by an auxiliary hydraulic system on an excavator. Demolition crews employ the hoe ram for jobs too large for jackhammering or areas where blasting is not possible due to safety or environmental issues. |

| Term/Acronym | Description |
|---|---|
| HOV | High Occupancy Vehicle |
| HPA | Hydraulic Project Approval |
| HPFF | High-Pressure Fluid Filled |
| HUD | U.S. Department of Housing and Urban Development |
| HVAC | Heating, Ventilating, and Air Conditioning |
| Hz | Hertz |
| IARC | International Agency for Research on Cancer |
| ICES | International Committee on Electromagnetic Safety |
| ICNIRP | International Commission on Non-Ionizing Radiation Protection |
| IEEE | Institute of Electrical and Electronics Engineers |
| Impressed Current Anode | One type of anode used in a cathodic protection system to reduce pipe corrosion. |
| Insulator (electrical) | A material whose internal electric charges do not flow freely, and therefore make it nearly impossible to conduct an electric current under the influence of an electric field. Insulators are used in electrical equipment to support and separate electrical conductors without allowing current through themselves. They are often used to attach electric power distribution or transmission lines to utility poles and transmission towers. They support the weight of the suspended wires without allowing the current to flow through the tower to ground. |
| Integrated Resource Plan (IRP) | A plan prepared by PSE and updated every 2 years, describing how forecasted annual peak and energy demand will be met into the future. The IRP process considers a full range of power sector investments to meet new demand for electricity, not only in new generation sources, but also in transmission, distribution, and demand-side measures such as energy efficiency on an equal basis. |
| Interstate 405 (I-405) | A freeway that serves as the primary north-south facility on the east side of Lake Washington, connecting to I-5 in Lynnwood to the north and Tukwila to the south. |
| Interstate 90 (I-90) | An east-west freeway that traverses the entire continental United States, connecting to Seattle in the west and Boston, Massachusetts, in the east. |
| IRP | Integrated Resource Plan |

| Term/Acronym | Description |
|---|---|
| Issaquah Alps | The unofficial name for the highlands near the city of Issaquah, and includes Cougar Mountain, Squak Mountain, Tiger Mountain, Taylor Mountain, Rattlesnake Ridge, Rattlesnake Mountain, and Grand Ridge. |
| Jack-and-Bore Drilling | A method of installation that simultaneously 'jacks' casing while rotating helical augers within the casing to remove spoil. Hydraulic jacks located on the bore machine in the sending shaft provide the thrust that pushes the casing through the ground. The rotating augers carry the spoil to the back of the casing pipe for removal by muck bucket, excavator or conveyor. |
| K4C | King County – Cities Climate Collaboration |
| Ksat | A measurement of saturated hydraulic conductivity (permeability) that refers to the ability of soil to transmit water. |
| kV | Kilovolts |
| kV/M | Kilovolts per Meter |
| Kyoto Protocol | An international treaty among industrialized nations that sets mandatory limits on greenhouse gas emissions. |
| Labrets | Personal adornment items made of stone or bone, worn in the lower lip. |
| Lanceolate projectile points | A particular style of chipped stone artifacts used to tip arrows, dart points or spears. |
| Landslide Hazard Areas | Areas mapped by local jurisdictions where there is evidence of past landslides, where the slope is 15 percent to 40 percent and the soils are underlain by silt or clay that can perch groundwater, or where the slope is steeper than 40 percent, regardless of soil type. |
| Ldn (DNL) | Day-Night Average Sound Level |
| Lead Agency | The agency responsible for all procedural aspects of SEPA compliance. Typically it is the agency proposing the project, but lead agency status may be transferred to another agency through an agency agreement. |
| LED | Light-Emitting Diode |
| Leq | Equivalent Sound Level |
| LID | Low-Impact Development |
| Line Truck (electrical) | A truck used to transport personnel, tools, and material for electric supply line work. |

| Term/Acronym | Description |
|---|---|
| Lifecycle Emissions | Emissions associated with the creation and existence of a project, including emissions from the manufacture, transportation of the component materials, and from the manufacture of the machines required to produce the component materials. |
| Liquefaction | A loss of soil strength and stiffness caused by earthquake shaking or other rapid loading. |
| Lmax | Instantaneous Maximum Noise Level |
| LNG | Liquefied Natural Gas |
| Load Shedding | Cutting off the electric current on certain lines when the demand for electricity exceeds the power supply capability of the network. A last-resort measure used by an electric utility company to avoid a total blackout of the power system. |
| µT | Microtesla |
| M | Meters |
| Magnetic Field | Magnetic effect of electric currents and magnetic materials. |
| Max Load | Maximum amount of something a system is designed to handle or the maximum amount of something that the system can produce. |
| Mauls | Hand tools used for woodworking |
| Metro | King County Metro Transit |
| mG | Milligauss |
| Microturbines | Miniature rotating machines that convert fluid energy into mechanical energy. |
| Middens | Archaeological deposits consisting of refuse from human activities, usually composed of a mixture of soil, charcoal, and various food remains such as bone, shell, and carbonized plant remains; may also contain human remains. |
| MMT | Million Metric Tons |
| MUTCD | Manual on Uniform Traffic Control Devices |
| MVA | Megavolt Amperes |
| MW | Megawatts |
| N-0 | When the electrical system is operating normally. |
| N-1 | Outage condition that can occur at any time when a single element trips offline. |

| Term/Acronym | Description |
|---|---|
| N-1-1 | An N-1 outage followed by a period of time to manually adjust the system to a secure state, followed by a second N-1 outage. |
| N-2 | Outage condition that occurs when a single event trips multiple facilities. |
| $N_2O$ | Nitrous Oxide |
| NAAQS | National Ambient Air Quality Standards |
| NACE | National Association of Corrosion Engineers |
| Nameplate Capacity | The number registered with authorities for classifying the power output of a power station usually expressed in megawatts (MW). |
| National Electric Safety Code | The safety guidelines that PSE follows during the installation, operation, and maintenance of transmission lines and associated equipment. The NESC contains the basic provisions considered necessary for worker and public safety under specific conditions, including electrical grounding and protection from lightning strikes. |
| National Pollutant Discharge Elimination System (NPDES) | A program authorized by the Clean Water Act to control water pollution by regulating point sources that discharge pollutants into waters of the United States. |
| Natural Gas Pipeline Safety Act | An act passed in 1968 (now called the Pipeline Safety Law, 49 USC Section 60101 et seq.). Gives the federal government authority over pipeline safety for transporting hazardous liquids, natural gas, and other gases. The intent is for states to assume responsibility for intrastate pipeline safety, while the federal government (U.S. Department of Transportation, Research and Special Programs Administration, Office of Pipeline Safety) retains responsibility for interstate pipeline safety. |
| Nearshore Environment | An indefinite zone extending waterward from the shoreline, typically to a water depth of about 10 feet, and providing unique habitat for aquatic species. |
| NEPA | National Environmental Policy Act |
| NERC | North American Electric Reliability Corporation |
| NESC | National Electric Safety Code |
| NHPA | National Historic Preservation Act |
| NIEHS | National Institute of Environmental Health Science |
| NMFS | National Marine Fisheries Service |
| $NO_2$ | Nitrogen Dioxide |

| Term/Acronym | Description |
|---|---|
| Noise Contour | A line on a map that represents equal levels of noise exposure. |
| Noise Receptor | A location where noise can interrupt ongoing activities. Sensitive receptors for noise are generally considered to include hospitals, nursing homes, senior citizen centers, schools, churches, libraries, and residences. |
| Normal Operating Limit | A specific level of electrical loading that a system, facility, or element can support or withstand through the daily demand cycles without loss of equipment life. |
| NPDES | National Pollutant Discharge Elimination System |
| NRCA | Natural Resource Conservation Area |
| NRCS | Natural Resources Conservation Service |
| NRHP | National Register of Historic Places |
| Olympic Pipeline | Two steel pipeline systems, 16 inches and 20 inches in diameter, that transport gasoline, diesel, and jet fuel (petroleum products) from Blaine, Washington to Portland, Oregon. The pipelines are buried approximately 3 to 4 feet below the ground surface. |
| Open-Cut Trenching | Excavating a trench for the manual installation of an underground pipe or cable. |
| OPLC | Olympic Pipe Line Company |
| OPS | Office of Pipeline Safety |
| OSHA | Occupational Safety and Health Administration |
| PCBs | Polychlorinated Biphenyls |
| Peak Generation Plant | A supplemental power plant that operates only when demand for power is high. These plants often run on natural gas. |
| Peak Power Demand (event) | The maximum load during a specified period of time. |
| Perched | A term to describe a water table (or aquifer) located above an impermeable layer of rock or sediment, above the main water table/aquifer but below the surface of the land. |
| PFCs | Perfluorocarbons |
| PHMSA | Pipeline Hazardous Materials Safety Administration |
| PHS | Priority Habitat and Species |
| Pile Driver | A machine for driving piles into the ground. |
| PIPA | Pipelines and Informed Planning Alliance |

| Term/Acronym | Description |
|---|---|
| Pipeline Corrosion | Deterioration and destruction of pipe material due to electrochemical processes and other reactions of pipeline materials with their environment. |
| PM | Particulate Matter |
| Postcontact | Dating to after the point of contact between European-American peoples (including explorers, fur traders, and military personnel) with Native American peoples. In Seattle, the Postcontact or historic period is generally considered to have started with the arrival of the Denny Party in 1851. |
| Post Insulator | An insulator suitable for higher voltage applications. The conductor (transmission line) is fixed on top of the insulator via a connector clamp. The fixing clamps are located on the top and bottom of the insulator. |
| Power Grid | A system of synchronized power providers and consumers connected by transmission and distribution lines and operated by one or more control centers. |
| Precontact | Dating prior to the point of contact between European-American peoples (including explorers, fur traders, and military personnel) with Native American peoples. In Seattle, the Precontact period is considered to have ended with the arrival of the Denny Party in 1851. |
| Problem Nests | When nest material on utility towers touches energized equipment, potentially conducting electricity when wet and igniting, resulting in outages and hazards to the nesting birds. |
| Programmatic EIS | An environmental impact statement (EIS) that addresses in general terms the environmental effects of long-term, multi-step programs. |
| Projectile Points | Chipped stone artifacts used to tip arrows, dart points, or spears. |
| Proven Technology | Technology that has successfully operated with acceptable performance and reliability within a set of predefined criteria. It has a documented track record for a defined environment, meaning there are multiple examples of installations with a history of reliable operations. Such documentation shall provide confidence in the technology from practical operations, with respect to the ability of the technology to meet the specified requirements. |
| PSAP | Public Safety Answering Point |
| PSCAA | Puget Sound Clean Air Agency |
| PSE | Puget Sound Energy |

| Term/Acronym | Description |
|---|---|
| PSE's Green Power program | A program where Puget Sound Energy buys electricity from independent clean-energy producers that generate electricity from wind, sun, biogas and other renewable sources. It adds electricity to the grid, which offsets some of the conventional power used. |
| PSRC | Puget Sound Regional Council |
| PSRP | Pipeline Spill Response Plan |
| Puget Sound Basin | An elongated, north-south trending depression in western Washington between the Olympic Mountain Range to the west and the Cascade Mountain Range to the east. |
| Puget Sound Regional Council (PSRC) | An association of cities, towns, counties, ports, and state agencies that serves as a forum for developing policies and making decisions about regional growth management, environmental, economic, and transportation issues in the four-county central Puget Sound region of Washington state. |
| Puller | A device for separating two components that are secured by press fitting them. |
| RAS | Remedial Action Scheme |
| RCRA | Resource Conservation and Recovery Act |
| RCW | Revised Code of Washington |
| Reciprocating Engine | Typically a heat engine that uses one or more reciprocating pistons to convert pressure into a rotating motion. |
| Remedial Action Scheme (RAS) | A scheme designed to detect predetermined electrical system conditions and automatically take corrective actions that may include, but are not limited to, adjusting or tripping (shutting down) generation, shedding load, or reconfiguring a system. |
| RD&D | Research, Development, and Demonstration |
| Rill | A small stream |
| Right-of-Way (electric) | A corridor of land on which electric lines may be located. The transmission owner may own the land in fee, own an easement, or have certain franchise, prescription, or license rights to construct and maintain lines. |
| Sacrificial Anode | Highly active metals that are used to prevent a less active material surface from corroding. Sacrificial anodes are created from a metal alloy with a more negative electrochemical potential than the other metal it will be used to protect. |
| Saturated Hydraulic Conductivity | A property that describes the ease with which a fluid (usually water) can move through saturated media such as soil. |

| Term/Acronym | Description |
|---|---|
| SBCC | State Building Code Council |
| SCAP | Strategic Climate Action Plan |
| SCENIHR | Scientific Committee on Emerging and Newly Identified Health Risks |
| SCFF | Self-Contained Fluid Filled |
| SCL | Seattle City Light |
| Scoping | An initial step in the SEPA and NEPA environmental review process, where agencies, tribes, and the public learn about the proposed project and provide comments on the content that should be covered in the Environmental Impact Statement (EIS). Often, comments on the scope describe potential environmental impacts or suggest alternatives that should be evaluated. |
| Seiche Waves | A series of standing waves of an enclosed body or partially enclosed body of water caused by earthquake shaking. |
| Seismic Hazards | The primary effects of earthquakes, such as ground displacement from fault rupture and ground shaking, as well as secondary effects including liquefaction, settlement, tsunamis, and seiche waves. |
| SEPA | State Environmental Policy Act |
| Settlement | Increase in vertical strain on the soil causes the soil to compact. |
| Sequestration | Long-term storage of carbon dioxide or other forms of carbon. |
| Service Levels | Measures of system reliability, such as the number and hours of power interruption considered acceptable within a specified time period. |
| Sharrow | A street marking placed in the travel lane to indicate where people should preferably cycle. |
| Shed Load | Measure of last resort to prevent the collapse of the power system region-wide. When there is insufficient power station capacity to supply the demand (load) from all the customers, the electricity system becomes unbalanced, which can cause it to trip out regionally (a blackout), and which could take days to restore. PSE increases supply or reduces demand to bring the system back into balance by switching off parts of the network in a planned and controlled manner. |
| Sheet Erosion | The uniform removal of soil in thin layers by the forces of overland stormwater flow. |

| Term/Acronym | Description |
|---|---|
| Sheet Piles | A group of piles made of timber, steel, or prestressed concrete set close together to resist lateral pressure, as from earth or water. Combined sheet pile walls are mostly used in marine applications where they provide increased stiffness combined to regular sheet pile walls. |
| Sheet Piling | A construction technique used to retain soil during excavation that involves installing interlocking steel sheets along the planned excavation perimeter or shoreline. |
| Shoreline Areas | Areas of regulated shorelines that are identified by local governments via their shoreline master programs. Shoreline areas are classified into specific environment designations based on the existing use pattern, the biological and physical character of the shoreline, and the goals and aspirations of the community. Depending on the shoreline environment assigned, local governments assign different use allowances. Common shoreline environments include: high-intensity, shoreline residential, urban conservancy, rural conservancy, natural, and aquatic. |
| Soldier Pile Driving | An earth retention technique that retains soil, using vertical steel piles that are drilled or driven at regular intervals along the planned excavation perimeter, with horizontal lagging between piles. |
| $SF_6$ | Sulfur Hexafluoride |
| SF-E | Single Family – Suburban Estates |
| SF-S | Single Family – Suburban |
| Simple-Cycle Gas-Fired Generator | Gas turbine that is connected to an electrical generator. In the gas turbine, air is compressed in the gas compressor. Energy is added to the compressed air by burning liquid or gaseous fuel in the combustor. The hot, compressed air is expanded through a gas turbine, which drives both the compressor and an electric power generator. It can be started up quickly, bringing electricity on-line whenever it is needed. Simple-cycle power plants are often used to provide peak load or standby service. |
| SMA | Shoreline Management Act |
| Small Hydro | The development of hydroelectric power on a scale serving a small community or industrial plant. |
| Smart Growth | An urban planning and transportation concept that concentrates growth in compact walkable urban centers to avoid sprawl. It also advocates compact, transit-oriented, walkable, bicycle-friendly land use, including neighborhood schools, complete streets, and mixed-use development with a range of housing choices. |
| SMP | Shoreline Master Program |

| Term/Acronym | Description |
|---|---|
| $SO_2$ | Sulfur Dioxide |
| SPU | Seattle Public Utilities |
| Stepped Down | To reduce or decrease voltage. |
| Photovoltaic System | A power system designed to supply usable solar power by means of photovoltaics. Also known as “solar farms.” |
| Significant Tree | Trees that are specifically defined and protected for their unique ecological and aesthetic value. |
| Soldier Pile Barriers | Retaining walls using steel piles or reinforced concrete piles spaced at regular intervals. |
| Spill Prevention and Control Plan | A plan to prevent the discharge of oil or other substances into water bodies. |
| SR | State Route |
| State Route 520 | An east-west freeway that connects I-5 to the west in Seattle, and SR 203 to the east in unincorporated King County. |
| Static Wire | The top wire on a transmission pole that bleeds lightning surges off the transmission lines during a storm. Without a static wire, lightning-induced voltage would otherwise build up on the lines, causing damage. The static wire is connected to the grounding conductor. |
| Statistically Significant | An interpretation of statistical data that indicates that an occurrence was probably the result of a causative factor and not simply a chance result. Statistical significance at the 1% level indicates a 1 in 100 probability that a result can be ascribed to chance. |
| Stormwater Pollution Prevention Plan (SWPPP) | A plan describing best management practices (BMPs) to control and treat stormwater. |
| Study Area Communities | Beaux Arts Village, Bellevue, Clyde Hill, Hunts Point, Issaquah, Kirkland, Medina, Newcastle, Redmond, Renton, Sammamish, and Yarrow Point. |
| Subduction Zone | The place where two plates of the Earth’s crust come together with one riding over the other, often resulting in the formation of volcanoes inland. |
| Substation | Facility with equipment that switches, changes, or regulates electric voltage. |
| SWPPP | Stormwater Pollution Prevention Plan |
| T | Tesla |
| Take | Pursuing, shooting, poisoning, wounding, killing, capturing, trapping, collecting, molesting, or disturbing eagles. |

| Term/Acronym | Description |
|---|---|
| TCDD | Dioxin |
| Telecommunication Line | A pipe, cable, or an arrangement of lines of wire or other conductors, by which telephone or other kinds of communications are transmitted and received. |
| Tensioner | A device that applies a force to create or maintain tension. The force may be applied parallel to, or perpendicular to, the tension it creates. |
| Thermal Runaway | A positive feedback loop where an increase in cell temperature and pressure leads to an uncontrolled heat reaction. |
| Threatened Species | Any species (including animals, plants, fungi, etc.) that are vulnerable to endangerment in the near future. |
| Trackhoe | A hydraulic excavator that is used in construction to dig holes or trenches for infrastructure. |
| Transformer | A device used to change the voltage of an alternating current in one circuit to a different voltage in a second circuit, or to partially isolate two circuits from each other. Transformers consist of two or more coils of conducting material, such as wire, wrapped around a core (often made of iron). The magnetic field produced by an alternating current in one coil induces a similar current in the other coils. If there are fewer turns on the coil that carries the source of the power than there are on a second coil, the second coil will provide the same power but at a higher voltage. This is called a step-up transformer. If there are fewer turns on the second coil than on the source coil, the outgoing power will have a lower voltage. This is called a step-down transformer. |
| Transformed | The byproduct of a process through which energy is changed from one form to another. Oftentimes, this refers to the change in voltage of an electrical current. |
| Transmission | The bulk transfer of electrical energy from generating power plants to electrical substations located near demand centers. |
| Transmission Line | A system of structures, wires, insulators, and associated hardware that carry electric energy from one point to another in an electric power system. Lines are operated at relatively high voltages varying from 69 kV up to 765 kV, and are capable of transmitting large quantities of electricity over long distances. |
| Transmission Line Splicing | The act of cutting into an existing transmission line to add a new connection to that line or extend the line. |
| Trench | To dig a long cut or trench into the ground. |
| Trenchless Construction | A type of subsurface construction work that requires few trenches or no continuous trenches. |

| Term/Acronym | Description |
|---|---|
| TSP | Tubular Steel Pole |
| Turbidity | A measure of water clarity indicating 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. |
| Turbine | A machine that generates rotary mechanical power from the energy produced by a stream of fluid (such as water, steam, or hot gas). |
| UGA | Urban Growth Area |
| Urban Growth Areas/ Urban Growth Boundaries | The areas immediately adjacent to city limits where development can occur at urban densities. |
| USACE | U.S. Army Corps of Engineers |
| U.S. Conference of Mayors Climate Protection Agreement | An agreement where participating cities commit to: (1) strive to meet or beat the Kyoto Protocol targets in their own communities; (2) urge their state governments, and the federal government, to enact policies and programs that meet or beat the greenhouse gas emission reduction target suggested for the United States in the Kyoto Protocol (7% from 1990 levels by 2012) and urge the U.S. Congress to pass the bipartisan greenhouse gas reduction legislation. |
| USDA | U.S. Department of Agriculture |
| USFWS | U.S. Fish and Wildlife Service |
| USGS | U.S. Geological Survey |
| UTC | Washington State Utilities and Transportation Commission |
| Underbuild | To place transmission and distribution lines on the same poles. |
| Utility Locates | The process of identifying and labeling underground utility lines. Excavating without knowing the location of underground utilities can result in damage, which can lead to service disruptions. |
| Variable-Load Resources | A renewable energy source that cannot be dispatched due to its fluctuating nature, like wind power and solar power, as opposed to a controllable renewable energy source such as hydroelectricity, or biomass, or a relatively constant source such as geothermal power. |

| Term/Acronym | Description |
|---|---|
| Vault | An underground room providing access to subterranean public utility equipment, such as switchgear for electrical equipment. Utility vaults are commonly constructed of reinforced concrete boxes, poured concrete, or brick. They are placed at regular intervals along an underground transmission or distribution line to allow access to the line for installation and maintenance of the line. |
| Viewpoints | Locations from which visual resources can be viewed. Typically associated with residential properties or publicly accessible recreation areas, such as parks, trails, and open spaces. |
| Views | The observation of a visual resource from a particular location, such as a private residence or a public park. |
| Visual Resources | Natural and constructed features of a landscape that are viewed by the public and contribute to the overall visual quality and character of an area. Such features often include distinctive landforms, water bodies, vegetation, or components of the built environment that provide a sense of place, such as city skylines. |
| V/M | Volts per Meter |
| WAC | Washington Administrative Code |
| Wall Loss | The loss of material on the inside or outside of a casing or tubing due to corrosion. |
| Washington State Growth Management Act (GMA) | Requires state and local governments to manage Washington's growth by identifying and protecting critical areas and natural resource lands, designating urban growth areas, preparing comprehensive plans, and implementing those plans through capital investments and development regulations. |
| Watt (W) | The unit of electrical power equal to one ampere under a pressure of one volt. A watt is equal to 1/746 horse power. |
| Wavelength | The distance between a peak on the wave and the next peak of the same polarity. |
| WDFW | Washington State Department of Fish and Wildlife |
| WECC | Western Electricity Coordinating Council |
| Wedges | Hand tools used for woodworking. |
| Wellhead Protection Area | A surface and subsurface land area regulated to prevent contamination of a well or well-field supplying a public water system. This program, established under the Safe Drinking Water Act (42 U.S.C. 330f-300j), is implemented through state governments. |
| WHBR | Washington Heritage Barn Register |

| Term/Acronym | Description |
|---|---|
| WHO | World Health Organization |
| WHR | Washington Heritage Register |
| Wind Turbine | A turbine that generates electricity via a large vaned wheel that is rotated by the wind. |
| WNHP | Washington Natural Heritage Program |
| WRIA | Water Resources Inventory Area |
| WSDOT | Washington State Department of Transportation |
| XLPE (Cross-Linked Polyethylene) | The most common polymeric insulation material, widely used as electrical insulation in power cables of all voltage ranges. It is especially well suited to medium-voltage applications. |

# CHAPTER 1. INTRODUCTION AND SUMMARY

The City of Bellevue and its partner *Eastside* Cities (partner Cities) are jointly conducting a phased environmental review process under the State Environmental Policy Act (SEPA) for the "Energize Eastside" Project proposed by Puget Sound Energy (PSE). Energize Eastside is a proposal to build new electrical infrastructure to serve PSE's customers in the area between Lake Washington and Lake Sammamish, in King County, Washington. This first phase assesses the comprehensive range of impacts and implications associated with broad options for addressing PSE's objectives, in a non-project or *programmatic* Environmental Impact Statement (EIS). The second phase of this EIS process will assess project-level alternatives, as described in Section 1.5. This chapter provides an overview of the project and a summary of the findings of the Phase 1 Draft EIS. The project includes numerous terms that may not be familiar to all readers. Words shown in italics when they first appear in the document are included in the glossary, which follows the Table of Contents and precedes this chapter.

## 1.1 WHAT IS THE PROJECT THAT IS BEING EVALUATED IN THIS DRAFT EIS?

PSE is proposing to construct and operate a new 230 kilovolt (kV) to 115 kV electrical *transformer* served by approximately 18 miles of new high-capacity electric *transmission lines* (230 kV) extending from Renton to Redmond. The proposed transformer would be placed at a *substation* site near the center of the Eastside. The Eastside is an area of King County, Washington, roughly defined as extending from Renton in the south to Redmond in the north, and between Lake Washington and Lake Sammamish. Electrical power would be transmitted to this substation and the voltage lowered, or "stepped down" (transformed), from 230 kV to 115 kV for distribution to local customers.

This set of facilities is proposed in order to address a deficiency in electrical *transmission* capacity during peak periods that has been identified by PSE through its system planning process. This deficiency is expected to arise as a result of anticipated population and employment growth on the Eastside, and it is expected to negatively affect service reliability for Eastside customers within the next few years. The project would improve reliability for Eastside communities and would supply the needed

**What is an electrical transformer?** An electrical transformer is a stationary piece of equipment that converts electricity from one voltage to another. For Energize Eastside, the transformer would convert 230 kV power to 115 kV power to supply the local electrical distribution system.

**What is a transmission line?** A transmission line is a system of support structures and wires that typically carry electricity from a power source to a substation or between substations. In western North America's electrical grid system, transmission lines are operated at voltages of 115 kV, 230 kV, 500 kV, and greater.

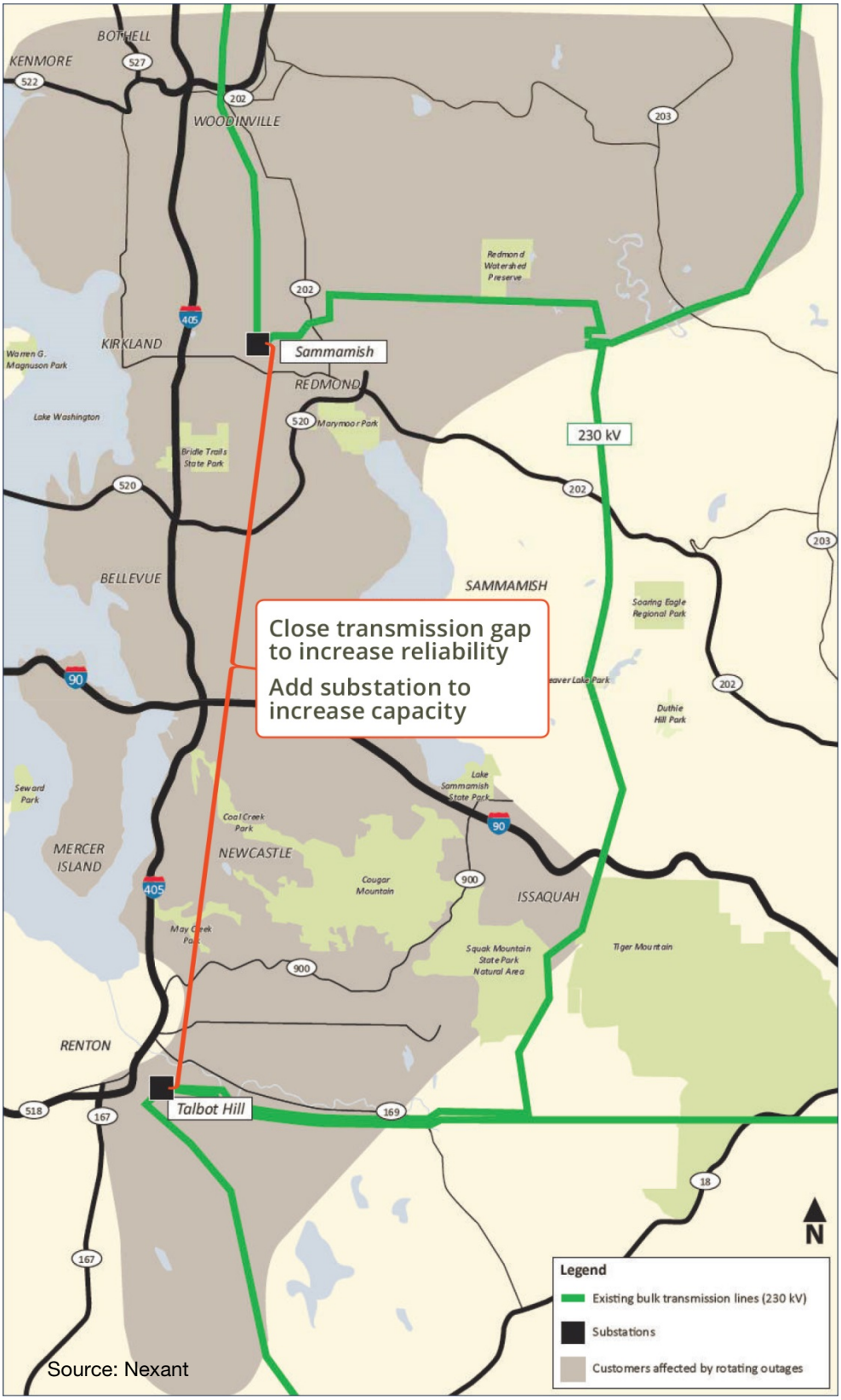
**What is a substation?** A substation is a facility with equipment that switches, changes, or regulates electric voltage. Substations typically include transformers and other equipment and obtain power from transmission lines.

electrical capacity for anticipated growth and development on the Eastside.

Based on federally mandated planning standards, PSE's analysis found that the existing transmission system could place Eastside customers and/or the regional power grid at risk of power outages or system damage during peak power events due to cold or hot weather. PSE's analysis concluded that the most effective solution was to add a 230-to-115 kV transformer within the center of the Eastside to relieve stress on the existing 230-to115 kV transformers that currently supply the area. This would need to be fed by new 230 kV transmission lines from the north and south. Figure 1-1 shows the Eastside and the locations of existing substations and transmission lines, and the area where a new substation and new 230 kV lines are proposed. The 230 kV system is proposed because that is the next highest voltage line (greater than the existing115 kV lines) that PSE could feasibly install and operate consistent with the regional grid system. As illustrated in Figure 1-1, there is no 230 kV transmission line that reaches the center of the Eastside area.

This Phase 1 Draft EIS evaluates the proposed 230 kV improvements as well as alternatives to PSE's proposal as described in more detail in Chapter 2.

**Figure 1-1. PSE Bulk Transmission System in the Eastside Area**




Source: Nexant

## 1.2 WHY IS THIS EIS BEING PREPARED?

Discussions between partner Cities and PSE determined that the proposal is likely to have significant adverse environmental impacts. Pursuant to SEPA, a Threshold Determination of Significance was issued as required in the Washington Administrative Code (WAC) 197-11-360 on April 30, 2015.

To address the potential for significant environmental impacts, PSE submitted an application for processing of an EIS with the City of Bellevue. As the largest and potentially most affected city, the City of Bellevue agreed with the other partner Cities to take the role of *lead agency*, consistent with WAC 197-11-944. The City of Bellevue is directing overall preparation of the EIS. Partner Cities including the Cities of Kirkland, Newcastle, Redmond, and Renton have reviewed preliminary versions of this Draft EIS and provided input on its preparation.

This Phase 1 Draft EIS is the first phase of a two-phase Draft EIS process to evaluate the potential for significant environmental impacts (see Section 1.5.1 for an explanation about the Phase 1 Draft EIS and the Phase 2 Draft EIS). The Phase 1 Draft EIS broadly evaluates the general impacts and implications associated with feasible and reasonable options available to address PSE's identified objectives for the project. The evaluations conducted during Phase 1 will be used to narrow the range of alternatives for consideration in the Phase 2 Draft EIS. The Phase 2 Draft EIS will be a project-level evaluation, describing impacts at a site-specific and project-specific level. This approach is consistent with the requirements for Phased Review outlined in WAC 197-11-060 (5)(c).

## 1.3 WHAT IS THE PURPOSE AND NEED FOR THE ENERGIZE EASTSIDE PROJECT?

PSE has determined that there is a need to construct a new 230 kV bulk electrical transmission line and an associated electrical substation east of Lake Washington to supply future electrical capacity and improve the reliability of the Eastside's electrical grid. PSE provided two documents that describe the need: the *Eastside Needs Assessment Report* and the *Supplemental Eastside Needs Assessment Report* (Gentile et al., 2014, 2015). These are referred to collectively as PSE's Eastside Needs Assessment.

**What is bulk electrical transmission?** Bulk electrical transmission is a system for transfer of electrical energy, from power generation plants to electrical substations near or within demand centers.

To better understand PSE's project proposal, the EIS Consultant Team obtained clearance and reviewed internal utility planning and operations information used by PSE in developing the Energize Eastside Project proposal. Because of security concerns, this information is released only to individuals with approved security clearance and who can meet other evaluation factors established by the Federal Energy Regulatory Commission (FERC) allowing restricted disclosure of Critical Energy Infrastructure Information (FERC, 2007).

The EIS Consultant Team, represented by Stantec (an electrical system planning and engineering subconsultant working in support of the Energize Eastside EIS effort), has reviewed this background information and studied the process used by PSE to establish a need for the proposed Energize Eastside Project. Stantec prepared a memorandum evaluating the stated need for the project, and confirmed that PSE's Eastside Needs Assessment was conducted in accordance with industry standards for utility planning (Stantec, 2015). See Appendix A for more information.

As outlined in WAC 197-11-060 (3)(a), it is the responsibility of the lead agency to make certain that a proposal that is the subject of environmental review is properly defined. The process of defining the proposal includes an objective understanding of the need for the project, to enable a thorough understanding of the project's objectives (see Chapter 2) and technical requirements, and in order to accurately identify feasible and reasonable project alternatives for consideration in the EIS. As noted in WAC 197-11-060(3)(a)(iii), proposals should be described in ways that encourage considering and comparing alternatives, and agencies are encouraged to describe proposals in terms of objectives rather than preferred solutions. An understanding of the need for the project helps in clarifying the objectives that have been used to develop the broad alternatives.

This EIS will not be used to reject or validate the need for the proposal. Rather, the EIS is intended to identify alternatives that could attain or approximate PSE's objectives at a lower environmental cost and disclose potential significant adverse environmental impacts associated with all alternatives identified.

The deficiency in transmission capacity on the Eastside that PSE has identified is based on a number of factors. It arises from growing population and employment, changing consumption patterns associated with larger buildings, more air-conditioned space, and a changing regulatory structure that requires a higher level of reliability than was required in the past. The regulatory changes that underlie the heightened concerns about reliability trace back to an August 2003 blackout in the midwestern and northeastern portions of North America that affected 55 million customers.[1] PSE has concluded that the most effective and cost-efficient solution to meet its objectives is to site a new 230 kV transformer in the center of the Eastside, which would be fed by new 230 kV transmission lines from the north and south (Stantec, 2015).

The population of the Eastside is expected to grow at a rate of approximately 1.2 percent annually over the next decade, and employment is expected to grow at an annual rate of approximately 2.1 percent, a projection based on internal forecasting conducted by PSE. For this forecast PSE used demographic data based on U.S. Census information and the Puget Sound Regional Council. PSE also relies on Moody's Analytics U.S. Macroeconomic Forecast, a long-term forecast for the U.S. economy, with adjustments for PSE's service territory using equations that relate national to regional conditions. Local economic data are provided by the Washington State Employment Security Department, U.S. Bureau of Labor

[1] See U.S. - Canada Power System Outage Task Force Final Report on the August 14, 2003 Blackout in the United States and Canada: Causes and Recommendations, April 2004.

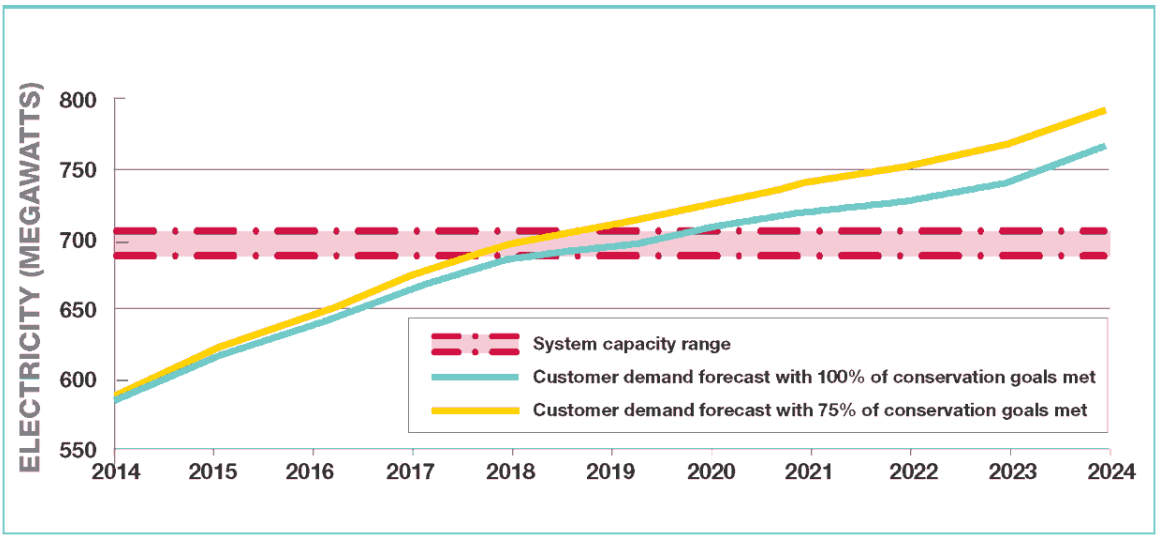
Statistics and Bureau of Economic Analysis, and local organizations such as the Washington Builders Association (Gentile et al., 2015).

This forecast is based on the assumption that economic activity has a significant effect on energy demand. Given the nature of expected development, PSE has projected that electrical demand will grow at an annual rate of 2.4 percent. As described in PSE's Eastside Needs Assessment, this growth rate takes into account population and employment growth as well as expected "block load" growth that PSE is aware will be coming in the next 10 years (Gentile et al., 2014, 2015).

**What is a block load?** A block load is the expected increase in energy demand from a specific customer or group of customers. PSE regularly asks its largest customers if they anticipate substantial increases in their electrical demand, to help estimate energy consumption growth expected to occur independent of employment or population growth rates.

Without adding at least 74 megawatts (MW) of transmission capacity for local peak periods in the Eastside, a deficiency could develop as early as winter of 2017 - 2018 or summer of 2018, putting customers at risk of *load shedding* (forced power outages) (Stantec, 2015). According to PSE projections, the 74 MW would marginally meet the demand through 2018 (Gentile et al., 2015). Figure 1-2 shows PSE's projected growth in load for the eastside from 2014 to 2024 and the capacity of its transmission system.

**Figure 1-2. Eastside Customer Demand Forecast**




Source: Gentile et al., 2015.

Based on these projections, load demand could increase to a point where, if adverse weather conditions occur and one or more components of the system are not operating for any reason, load shedding could be required in order to protect the Eastside and the rest of the regional grid. This is because, once the threshold is crossed, the physical limitations of the system are such that even the slightest overload will produce overheating that can damage equipment, and larger overloads will produce overheating more quickly. Once equipment is in an overload condition, the options are to let it fail or take it out of service. Both conditions leave the Eastside in a vulnerable state where the system is incapable of reliably serving customer

load. At that point, further actions such as load shedding may be needed in order to keep the system intact within the Eastside service area and beyond. By the end of the 10-year forecast period, a large number of customers would be at risk, and the load shedding requirement could be as high as 133 MW (Stantec, 2015). Specifically, PSE's estimate is that in the summer 2024 scenario, over 211,000 customers experience rotating outages on up to 9 days over a period of 16 days. In the winter 2023-2024 scenario, around 175,000 customers experience rotating outages on up to 13 days over a period of 29 days (Nexant, 2015).

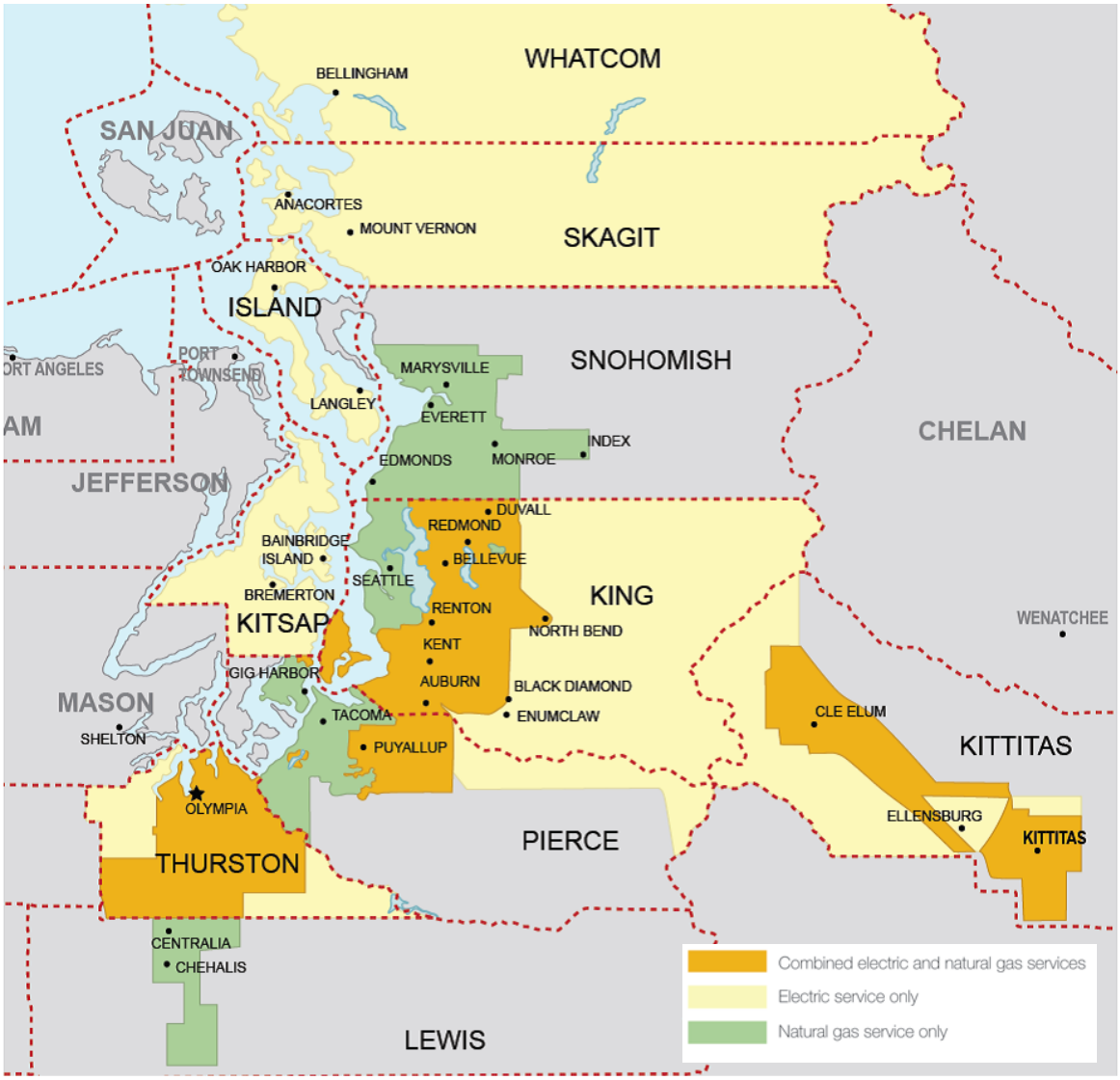
The load area in question is situated between two existing sources of bulk electrical power: the Sammamish substation on the north end (Redmond/Kirkland area) and the Talbot Hill substation on the south end (Renton area) (Figure 1-1). These two sites are the closest substations that bring 230 kV power supply to the Eastside, and therefore supply power to support most of this geographic area. Increases or decreases in load that are not directly supplied by these two substations, or power flow to other parts of the system outside the service area, have minimal effect on the ability of these substations to supply load. Because of the configuration and limited capacity of the transmission system within the Eastside, a direct change in electrical demand for power flowing through these two substations, or a change in power being supplied to these two substations, will affect the Eastside area. Once the higher voltage (230 kV) is transformed down to a lower voltage (115 kV) at these two substations, the system is limited by the physical capacity of the conductors and transformers that connect those two substations to the load and feed the area (Stantec, 2015).

**What is a conductor?** An object or type of material that allows the flow of electrical current in one or more directions. The wires on a transmission line are conductors.

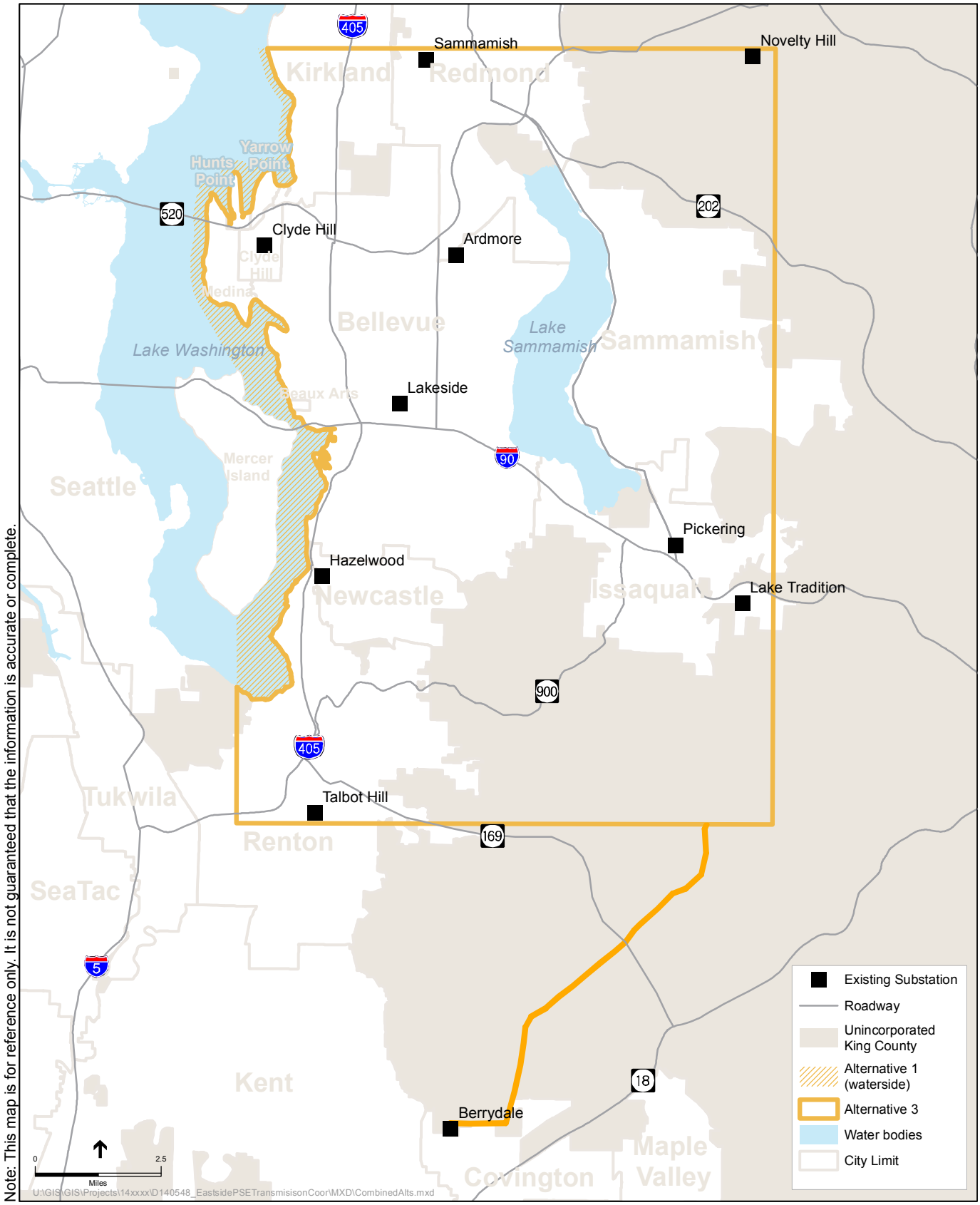
## 1.4 HOW DOES PUGET SOUND ENERGY'S ELECTRICAL SYSTEM WORK?

PSE is a regulated utility that serves approximately 1.1 million customers with electricity in a 4,500-square-mile service area (PSE, 2013a). Figure 1-3 shows PSE's service area for both electricity and gas service. This service area includes the study area for the Energize Eastside project. Study areas were developed for each of the three action alternatives evaluated in this Phase 1 Draft EIS (depicted on Figures 2-4, 2-5, and 2-6 in Chapter 2), because each alternative would affect slightly different geographic area. The *combined study area* is shown in Figure 1-4.

**Figure 1-3. PSE Service Area**




Source: PSE, 2016




Note: This map is for reference only. It is not guaranteed that the information is accurate or complete.

SOURCE: King County 2015; ESA 2015;
Puget Sound Energy 2015; WA Ecology 2014.

Energize Eastside EIS 140548

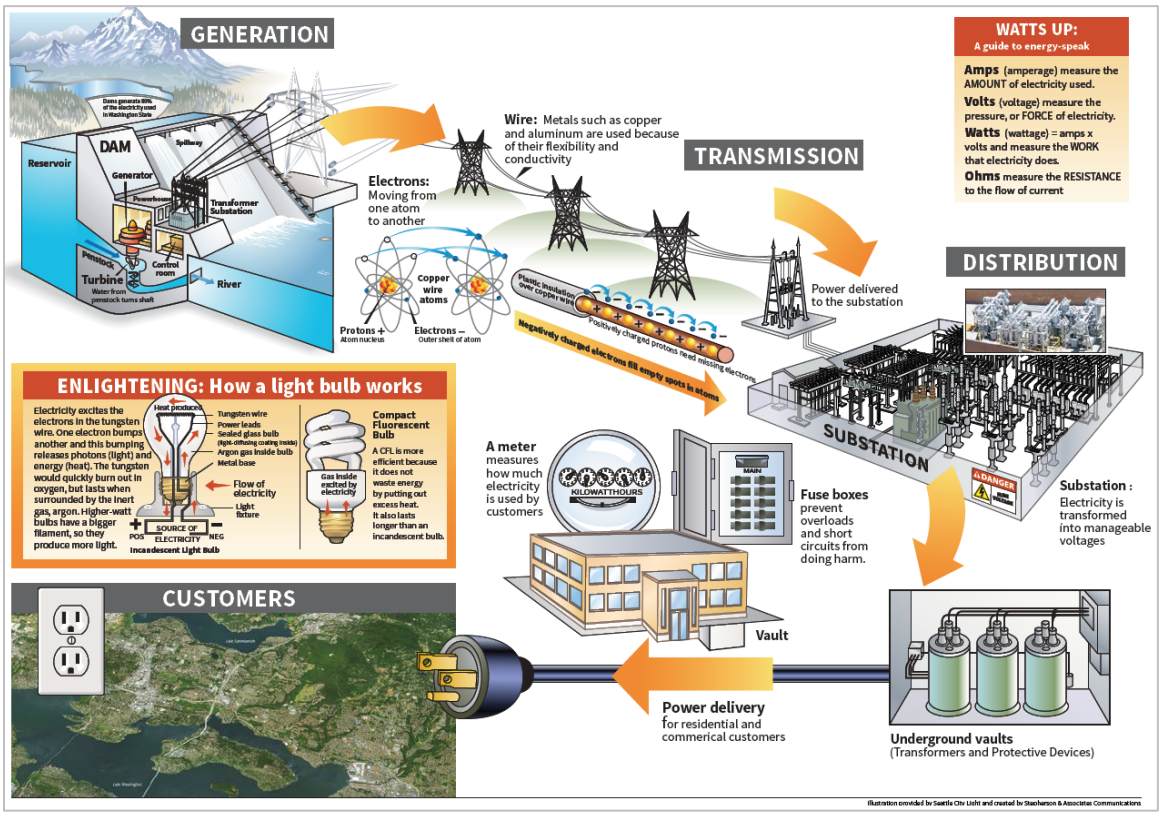
**Figure 1-4**

Combined Study Area

The Eastside represents approximately 14 percent of PSE's total electrical load. PSE is part of a western regional system, through which electricity is produced elsewhere and transported to the Eastside along high-voltage transmission lines. As electricity nears end users, the voltage is reduced (using transformers) and redistributed through transmission substations and distribution substations. Figure 1-5 provides an overview of how electrical transmission and distribution systems work.

Power is carried on high-voltage transmission lines (230 kV and greater) from generating facilities to the Eastside via the Sammamish substation in Redmond and Talbot Hill substation in Renton. From these substations, voltage is reduced to 115 kV and distributed to numerous Eastside distribution substations (PSE, 2013b). See Figure 1-1 above and Figure 16-1 in Chapter 16 for a map that shows PSE's existing electrical system on the Eastside and vicinity.

**Figure 1-5. How Electricity is Delivered from Generation to Customers**

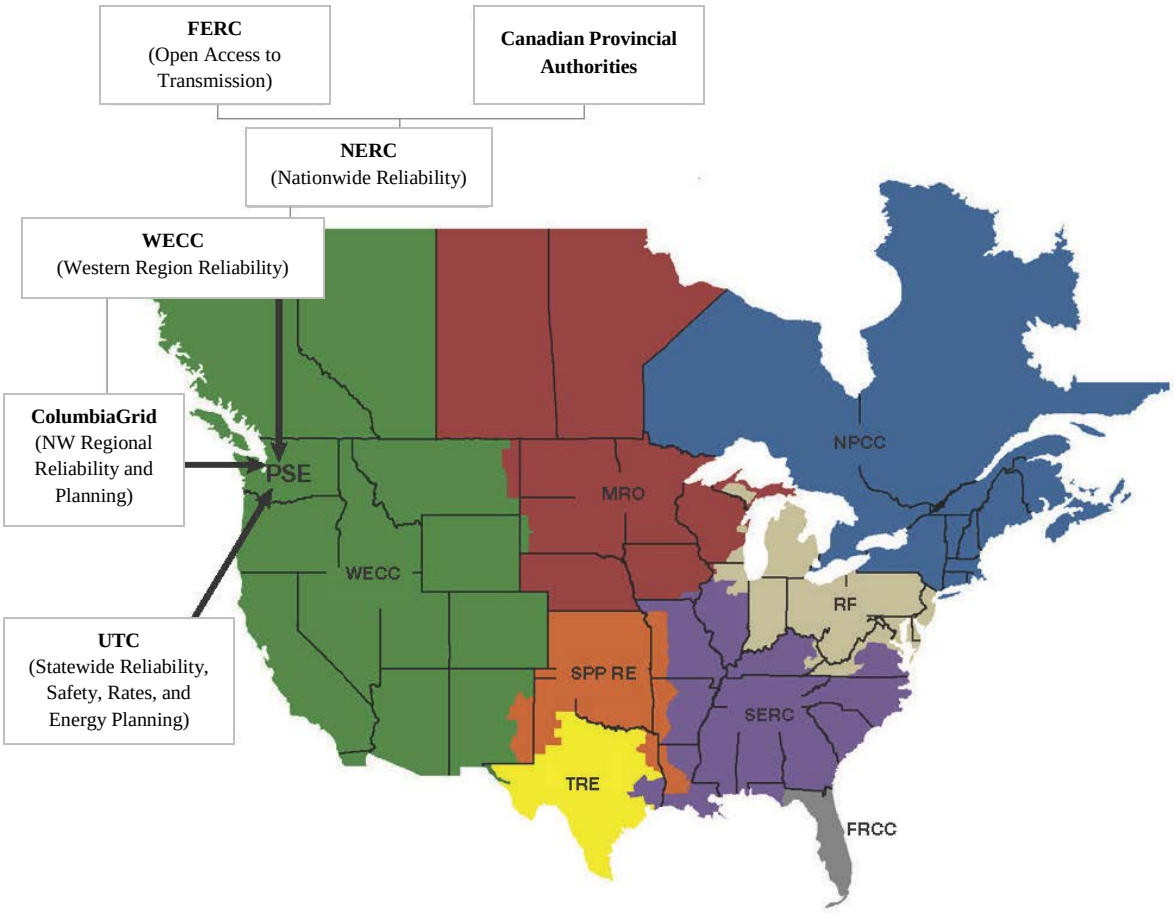



The Energize Eastside Project is intended to address an identified deficiency in the capacity of PSE's transmission system. It does not address the sources of generation, which at present are primarily located outside of the Eastside area. PSE conducts a separate planning process called an Integrated Resource Plan regarding its sources of energy (PSE, 2013a).

PSE's electric delivery system is regulated and coordinated by several state and federal agencies, including FERC, North American Electric Reliability Corporation (NERC), Western Electricity Coordinating Council (WECC), and Washington Utilities and

Transportation Commission (UTC). PSE cooperates and supports ColumbiaGrid in its regional planning processes. Figure 1-6 shows the agencies involved in regulation of PSE's transmission system. The general roles of each agency are described briefly in parentheses in Figure 1-6 and in further detail in Table 1-1.

**Figure 1-6. Regulatory and Planning Framework for PSE**




FERC: Federal Energy Regulatory Commission; FRCC: Florida Reliability Coordinating Council; MRO: Midwest Reliability Organization; NERC: National Electric Reliability Corporation; NPCC: Northeast Power Coordinating Council; RF: Reliability First; SERC: Southeastern Electric Reliability Council; SPP RE: Southwest Power Pool Regional Entity; TRE: Texas Reliability Entity; UTC: Washington State Utilities and Transportation Commission; WECC: Western Electricity Coordinating Council. Source: WECC 2015

**Table 1-1. Regulatory and Coordinating Agencies Governing PSE**

| | |
|---|---|
| Federal Energy Regulatory Commission (FERC) | FERC is a U.S. federal agency that regulates interstate transmission of electricity, natural gas, and oil, as well as Liquefied Natural Gas (LNG) terminals, interstate natural gas pipelines, and hydropower projects. FERC requires any public utility (including PSE) that owns, controls, or operates facilities used for transmission of electric energy in interstate commerce to provide open access transmission service comparable to that provided by transmission owners (such as PSE) to themselves (18 CFR 35.28). |
| North American Electric Reliability Corporation (NERC) | NERC is a not-for-profit international regulatory authority whose mission is to ensure the reliability of the *bulk power system* in North America, as certified by FERC. NERC develops and enforces Reliability Standards and annually assesses seasonal and long-term reliability. PSE is required to meet the Reliability Standards and is subject to fines if noncompliant. |
| Western Electricity Coordinating Council (WECC) | WECC is a Utah nonprofit corporation with the mission to foster and promote reliability and efficient coordination in the Western Interconnection, which includes much of western North America. The PSE service area is in the WECC region. WECC develops and implements Regional Reliability Standards and WECC Regional Criteria for the Western Interconnection. PSE is part of the Western Interconnection and is obligated to meet the Regional Reliability Standards. |
| ColumbiaGrid | ColumbiaGrid is a nonprofit membership corporation formed to: improve reliability of the transmission grid and efficiency in its use; provide cost-effective transmission planning and expansion; develop and facilitate the implementation of solutions relating to improved use and expansion of the interconnected Northwest transmission system; and support effective market monitoring within the Northwest and within the Western Interconnection while considering environmental concerns, regional interests, and cost-effectiveness. The corporation itself does not own transmission, but its members and the parties to its agreements own and operate an extensive network of transmission facilities. As a signatory to ColumbiaGrid, PSE is obligated to meet the objectives of operating a reliable electric grid. |
| Utilities and Transportation Commission (UTC) | The UTC is a Washington state regulatory agency. The UTC requires that PSE make its electric service available to all residents and businesses within its service area, and that the service must be delivered in a safe and reliable manner. This is known as the "obligation to serve" and is codified in Washington state law. This means that PSE shall operate a system that is safe and delivers reliable power, thus minimizing interruptions and outages. The UTC has the authority to levy fines against the company for failure to comply with regulatory requirements. |

The UTC requires providers of electricity to provide service on demand in support of growth that occurs in their service areas. PSE conducts an ongoing capacity planning process to ensure its power supply and infrastructure are adequate to meet anticipated future needs (PSE, 2013a). The *2013 Integrated Resource Plan* is the strategic plan for securing reliable and cost-effective energy resources (PSE, 2013a). PSE develops both short-range and long-

range infrastructure plans based upon economic, population, and load growth projections, as well as information from large customers and government stakeholders. The plan is reviewed annually with periodic updates to the plan. PSE's revised plan was submitted to the UTC November 30, 2015, but was not included in this Draft EIS because it was completed too late in this EIS process. It will be considered in Phase 2. The *2015 Integrated Resource Plan* (PSE, 2015) is available for review on PSE's website at https://www.pse.com/aboutpse/EnergySupply/Pages/Resource-Planning.aspx.

## 1.5 HOW IS THE SEPA REVIEW BEING CONDUCTED FOR THIS PROJECT?

### 1.5.1 Phase 1 and Phase 2 EIS

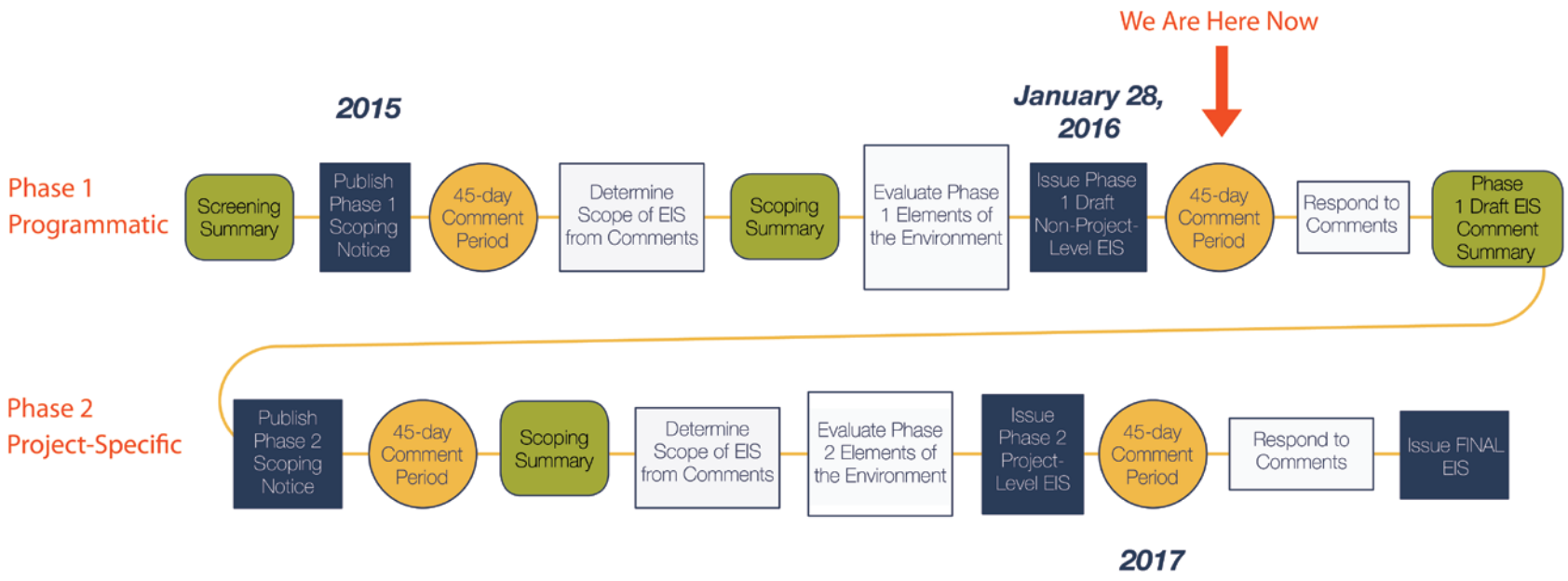
The Eastside Cities (Bellevue, Kirkland, Newcastle, Redmond, and Renton) determined that a Phased EIS (WAC 197-11-060(5)), supported by the EIS Consultant Team and in collaboration with the applicant, PSE, would be the best approach to adequately evaluate the proposal. The first phase, for which this Draft EIS has been prepared, programmatically evaluates the potential environmental impacts of various alternatives to be considered for addressing the identified project need. This Phase 1 Draft EIS broadly describes the types of impacts that the alternatives could cause and mitigation that would be available to minimize or avoid such impacts. It also describes any significant impacts that would be unavoidable for each alternative. This broad evaluation is intended to provide decision-makers and community members with a better understanding of what constructing and operating the alternative methods would mean to the community, and how to best evaluate the environmental impacts of project-level alternatives in Phase 2.

Following release of the Phase 1 Draft EIS, comments will be reviewed and responded to, in a Phase 1 Draft EIS comment summary. These comments will be used to inform the alternatives carried forward into the Phase 2 Draft EIS, which will include additional detail on the proposed project alternatives.

The Phase 1 Draft EIS generally does not analyze impacts associated with specific development at specified geographic locations. The Phase 2 Draft EIS will include project-level alternatives based on more defined geographic locations and a more detailed analysis of potential environmental impacts. Figure 1-7 illustrates the overall process for preparing the two phases of the Draft EIS. A Final EIS will be prepared to respond to comments on both Draft EIS documents.

The Phase 1 Draft EIS and Phase 2 Draft EIS together are intended to provide a comprehensive analysis of the project and alternatives. The Phase 2 Draft EIS will be a supplement to the Phase 1 Draft EIS as described in WAC 197-11-600 and WAC 197-11-620, and as part of a Phased EIS process per WAC 197-11-060(5). Commenting is invited for each of the Draft EIS stages and at each of the scoping stages. The Final EIS will include responses to comments on both Draft EIS documents and will be used by the partner Cities to support any permit decisions required.

**Figure 1-7. Environmental Impact Statement Process**



## 1.6 HOW WAS THIS EIS DEVELOPED?

The EIS was developed under the direction of the City of Bellevue, working closely with its partner Cities and its consultants. As previously noted, the project is proposed by PSE, a regulated utility. Therefore, PSE developed the project objectives and helped to define alternatives that would attain or approximate the proposal's objectives, as required by SEPA. The City of Bellevue and its team refined the Phase 1 alternatives to meet SEPA requirements, including development of a No Action Alternative.

The following major steps were taken to develop the Phase 1 Draft EIS:

1. Programmatic alternatives were defined through an iterative process with input by the EIS Consultant Team, PSE, City of Bellevue, and the other partner Cities. After examining the materials provided by PSE regarding its planning process for the project, alternatives were selected that would broadly define different ways of approaching the deficiency in transmission capacity identified by PSE. One approach would use 230 kV transmission lines as PSE proposes; one would use alternative methods that would minimize the need for new transmission lines; and one would use 115 kV transmission lines (which are more common on the Eastside and smaller in scale than 230 kV) along with substation upgrades. These three alternatives plus a No Action Alternative were carried forward in Phase 1 EIS scoping, which commenced in April 2015.

2. Phase 1 EIS public scoping outreach was conducted to assist in identifying technically viable alternatives that address PSE's reported deficiency in electrical transmission capacity. Scoping comments were requested to focus on identification of viable alternatives and associated impacts. Five public meetings were held at venues in Bellevue, Kirkland, Newcastle, and Renton, along with opportunities to provide comments online. More than 400 comments in the form of website forms, emails, oral testimony, and letters were received during scoping, as summarized in the *Phase 1 Draft EIS Scoping Summary and Final Alternatives* (City of Bellevue, 2015).

3. As a result of scoping, the alternatives were expanded and refined. The EIS Consultant Team reviewed all alternatives proposed during scoping, made a technical review of the efficacy of the proposed alternatives, and screened the alternatives against PSE's criteria for an effective solution as listed in PSE's 2015 *Supplemental Solutions Report* (Gentile et al., 2015). Staff representing each of the partner Cities discussed the findings, and a final set of alternatives was established by agreement among the Cities and PSE. These are also summarized in the *Phase 1 Draft EIS Scoping Summary and Final Alternatives* (City of Bellevue, 2015). The alternatives reflect the 19 project criteria developed by PSE (described in detail in Chapter 2). The Phase 1 Draft EIS includes three action alternatives and the No Action Alternative. All alternatives would attain or approximate PSE's objectives. Alternatives 2 and 3 would not fully meet all objectives, but would address the objectives sufficiently enough to be reasonable for consideration at this phase of analysis.

4. Input received during *scoping* was also used to define the environmental analysis needed, including methods used, area of study, and other topics. The topics to be studied were also summarized in the *Phase 1 Draft EIS Scoping Summary and Final Alternatives* (City of Bellevue, 2015).

5. Each chapter of this Phase 1 Draft EIS describes the methods used by the EIS Consultant Team to analyze potential environmental impacts. This process included consultation with PSE and numerous agencies throughout the Eastside, including the partner Cities as well as other study area communities.

6. The City of Bellevue and the other partner Cities reviewed drafts prepared by the EIS Consultant Team and provided comments for EIS Consultant Team response. Following this review, PSE reviewed a preliminary version of a portion of this Phase 1 Draft EIS for technical accuracy. PSE was provided and reviewed sections of Chapter 1 and Chapter 2 that did not contain analysis or conclusions of the analysis. The City of Bellevue, as SEPA lead agency, performed final review of the Phase 1 Draft EIS prior to publication.

## 1.7 HOW HAS PUBLIC INPUT BEEN INCORPORATED INTO THE EIS PROCESS?

As described above, the scope of this EIS has incorporated public comment received through website forms, emails, oral testimony, and letters. Comments regarding the need for the project helped focus attention on clarifying the project objectives. Comments regarding the alternatives resulted in changes to the alternatives proposed in the initial Scoping Notice published in April 2015. Comments regarding potential impacts were catalogued and evaluated by the lead agency to determine which impacts could potentially be significant. For some topics, even though significant impacts are not anticipated, there is sufficient controversy about potential impacts that the topics are included in the EIS. The results of the scoping process were summarized in the *Phase 1 Draft EIS Scoping Summary and Final Alternatives* (City of Bellevue, 2015).

## 1.8 WHAT ARE THE APPLICANT'S OBJECTIVES FOR THE ENERGIZE EASTSIDE PROJECT AND HOW WERE THEY USED FOR THIS DRAFT EIS?

The purpose and need for the project, summarized in Section 1.3, helped to define PSE's broad objectives for the project, which are as follows:

- Address PSE's identified deficiency in transmission capacity;
- Find a solution that can be feasibly implemented before system reliability is impaired;
- Be of reasonable project cost;
- Meet federal, state, and local regulatory requirements; and

- Address PSE's electrical and non-electrical criteria for the project (described in further detail in Chapter 2).

## 1.9 WHAT ALTERNATIVES ARE EVALUATED IN THE PHASE 1 DRAFT EIS?

Chapter 2 describes in detail the alternatives included in the Phase 1 Draft EIS. The EIS evaluates a No Action Alternative and three action alternatives, summarized below.

### 1.9.1 No Action Alternative

As required by SEPA, the No Action Alternative must be evaluated in an EIS, as a baseline against which the action alternatives can be gauged. The No Action Alternative includes the following:

- Ongoing maintenance that PSE can do without requiring state or local approvals;
- No new 230 kV transmission lines, substations, energy generation, or storage facilities; and
- No change to conservation efforts as described in the *2013 Integrated Resource Plan* (PSE, 2013a).

### 1.9.2 Alternative 1: New Substation and 230 kV Transmission Lines

This alternative includes installing a new transformer that would transform 230 kV bulk power to 115 kV. This new transformer would require either expansion of an existing substation on the Eastside or construction of a new substation. It would also need to be fed by new 230 kV transmission lines. The Phase 1 Draft EIS considers a range of 230 kV transmission options to serve the Eastside. These would range in length from approximately 18 miles up to 26 miles in length. The key elements of this alternative include the following:

- New substation at Vernell or Westminster, or adding a 230 kV substation near the existing 115 kV Lakeside substation. A new substation adjacent to the Lakeside substation would be known as Richards Creek substation; however, for simplicity, this site will be referred to as Lakeside.
- New 230 kV transmission line or an upgrade of an existing 230 kV transmission line from Redmond to Renton, located between Lake Washington and Lake Sammamish, using the following possible options:
    - A. Use of overhead lines in new or existing PSE or public *rights-of-way* and/or utility corridors;
    - B. Use of Seattle City Light's 230 kV transmission line corridor along with construction of new 230 kV lines looping the system into both the Sammamish and Lakeside substations;
    - C. Use of underground lines; and
    - D. Use of submerged lines.

- No change to conservation efforts as described in PSE's *2013 Integrated Resource Plan* (PSE, 2013a).

A new 230 kV transmission line would run a minimum of approximately 18 miles. The submerged line option would require the greatest length of all options considered under this alternative.

### 1.9.3 Alternative 2: Integrated Resource Approach

Alternative 2 combines the following methods to meet the projected need and PSE's stated electrical criteria:

- Energy efficiency (e.g., promoting use of LED lightbulbs rather than incandescent, more efficient appliances, and updated windows and insulation);
- Demand response (e.g., installing specialized devices to control customer electrical usage and help manage peak uses);
- Distributed generation (e.g., promoting use of various small-scale energy generation equipment tied to the PSE distribution system and controllable by PSE);
- Energy storage using large-scale battery systems; and
- Simple-cycle generation facilities of approximately 20 MW size, located at some PSE substations within the Eastside and operated as needed during peak demand periods, or other times as needed.

### 1.9.4 Alternative 3: New 115 kV Lines and Transformers

This alternative includes the following changes to the PSE transmission system:

- A new 230 to 115 kV transformer at Lake Tradition substation;
- A new transmission line between the Bonneville Power Administration (BPA) Maple Valley-Sammamish 230 kV line and the Lake Tradition substation;
- A third 230 to 115 kV transformer at Sammamish substation;
- A third 230 to 115 kV transformer at Talbot Hill substation;
- Three new 115 kV lines at Lake Tradition substation;
- Two new 115 kV lines at Sammamish substation; and
- Two new 115 kV lines at Talbot Hill substation.

The seven additional 115 kV lines would total approximately 60 miles in length. There would be no change to conservation efforts as described in the *2013 Integrated Resource Plan* (PSE, 2013a).

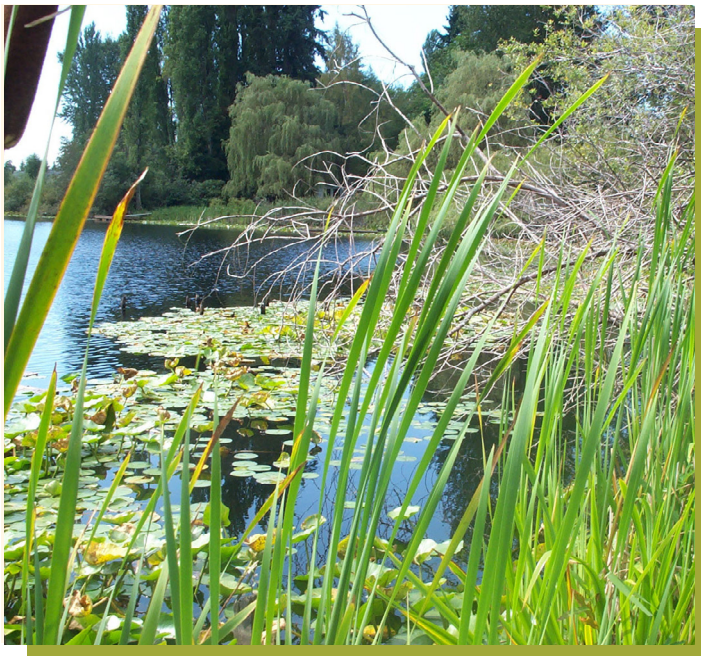
## 1.10 WHAT ARE THE KEY FINDINGS OF THIS DRAFT EIS?

The following pages provide a summary of the findings of each chapter of this Phase 1 Draft EIS regarding the impacts of the alternatives. For each element of the environment evaluated

in the EIS, these two-page summaries provide a brief description of key findings about the affected environment, potential impacts, mitigation available, and any unavoidable significant impacts. The number at the top of each page identifies the chapter from this Phase 1 Draft EIS that is summarized below. Summaries are not intended as a replacement for more thorough review undertaken in each chapter.

Impacts are generally categorized as minor, moderate, or significant. Each chapter defines these categories for the specific element of the environment and provides detailed descriptions of impacts. Impacts that are described in this EIS as “negligible” refer to small impacts that would be inconsequential.

# 3 Earth



## Affected Environment

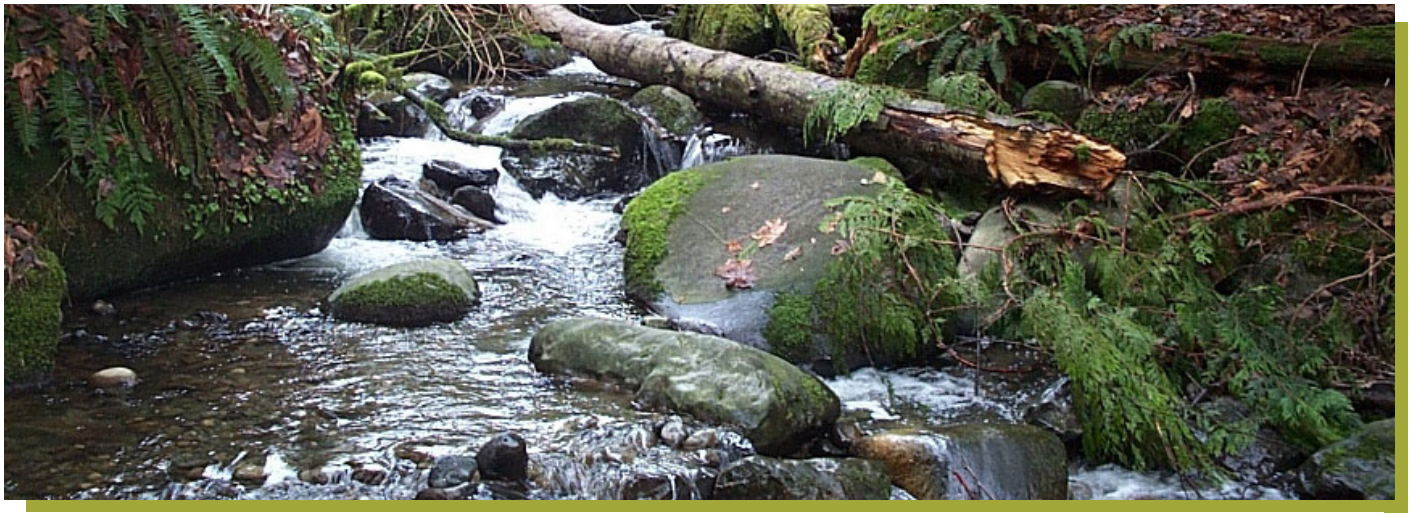
Geology of the combined study area is characterized by recent, surficial soils over thick glacially consolidated soils underlain by bedrock.

The Puget Sound basin is located within a seismically active area dominated by the Cascadia subduction zone.

Earthquakes in the region result from the Cascadia subduction zone, the deep subduction zone below the Puget Sound, or shallow crustal faults.

Liquefaction hazard areas include lowland lakeside areas of the northern and southern tips of Lake Sammamish, as well as the floodplains of Cedar River and Evans Creek.

Other geological hazards (steep slopes, erosion, landslides, and other hazards such as soft soils and old coal mines) are located in the combined study area.



## Summary of Impacts Common to All Alternatives

- Erosion during construction could occur.
- All of the alternatives would rely on a system that crosses seismic and other geologic hazard areas that range in severity.
- Incorporation of National Electric Safety Code (NESC) 2012 and NERC/ FERC standards and requirements into project design would minimize hazards.
- All impacts would be minor with implementation of best management practices, geotechnical recommendations, regulatory requirements, and industry standards.

## Summary of Impacts by Alternative

### NO ACTION

- With no new improvements, there would be no impacts related to geologic and seismic hazards that do not already exist today.

### ALTERNATIVE 1

- Impacts from all options would be similar.
- Implementation of facility design measures in accordance with regulatory requirements would result in minor impacts for each of the four options under Alternative 1.

### ALTERNATIVE 2

- Demand-side strategies would require less new construction, reducing the potential for new hazards. Impacts of battery storage and peak generation plants would be similar to Alternative 1 (minor).

### ALTERNATIVE 3

- Involves the most new construction over the widest area and would likely encounter a range of geotechnical and seismic hazards. Although the area of impact is the largest, the impacts themselves would be minor.

### Mitigation Measures

- Avoid construction on steep slopes, known and potential landslide zones, and areas with organic or liquefiable soils, where feasible.
- Implement construction best management practices.
- Adhere to applicable code requirements and monitor all improvements for changes.

### Significant Unavoidable Adverse Impacts

- Under all alternatives, including the No Action Alternative, there is an unavoidable seismic risk. None of the alternatives would increase that risk, but all action alternatives increase the number of facilities. New facilities built to current standards reduce risks, and no significant impacts are likely.

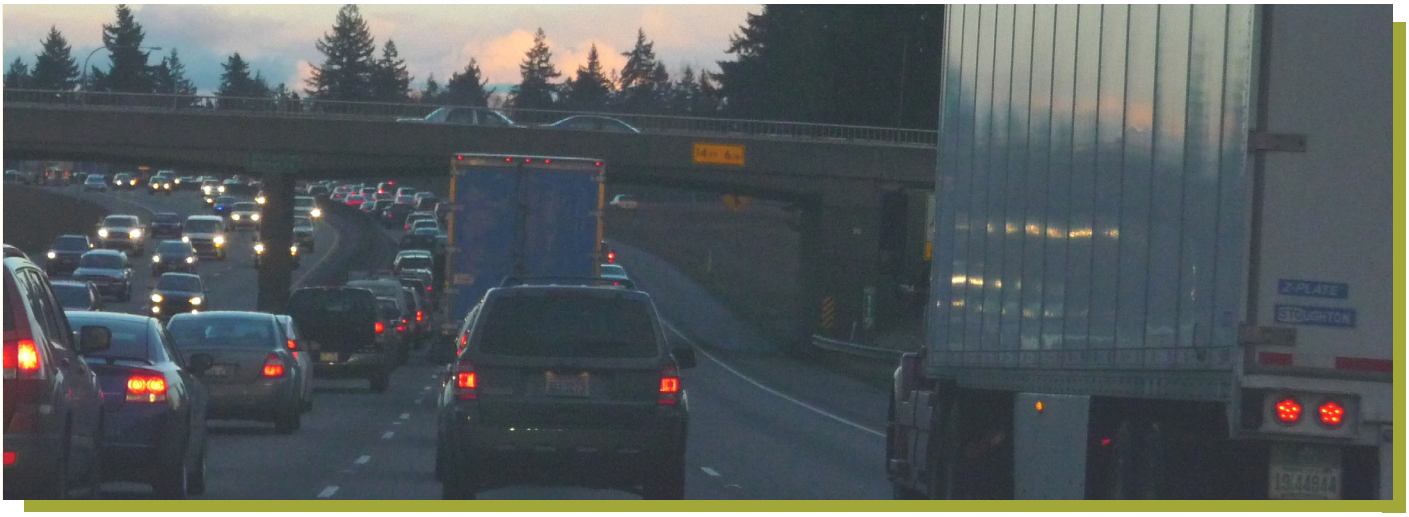
# 4 Greenhouse Gas Emissions

## Affected Environment

King County's Strategic Climate Action Plan has committed to a countywide Green House Gas (GHG) emission reduction of 25 percent by 2020.

Eight of the 12 study area cities have committed to reduce GHG emissions by 7 percent from 1990 levels through climate action plans.

Ecology estimated that in 2010, Washington produced about 106 million U.S. tons of $CO_2e$. Sources of GHG emissions in the state are transportation, electric generation; residential commercial, and industrial energy; agriculture, water management, and industrial processes.



## Summary of Impacts Common to All Alternatives

- All alternatives would release GHG during construction.

## Summary of Impacts by Alternative

### NO ACTION

- The No Action Alternative would not result in construction or operational GHG impacts.
- As part of ongoing maintenance, vegetation and tree removal would continue.

### ALTERNATIVE 1

- Option A could result in $CO_2$ sequestration losses from tree removal that exceed the state's GHG reporting threshold and could be a potentially significant adverse impact.
- Option B could require less tree removal than Option A and sequestration loss impacts could be a minor impact.
- Option C could result in the least sequestration loss from tree removal of the Alternative 1 options and would be considered a minor impact.
- Option D would result in a minor impact from construction emissions. Sequestration loss would occur on overland segments, similar to other options.

### ALTERNATIVE 2

- Peak generation plants could produce GHG emissions during operation and result in a moderate GHG impact.

### ALTERNATIVE 3

- Alternative 3 could result in $CO_2$ sequestration losses from tree removal that would be a significant adverse impact.

## Mitigation Measures

- Gas turbines or reciprocating engines may require air quality permits to restrict the use of fuel and associated GHG emissions.
- Vegetation replacement could reduce sequestration losses under Alternative 1, Option A, and Alternative 3 to a moderate level.
- Carbon offsets could be purchased.

## Significant Unavoidable Adverse Impacts

- If mitigation measures are employed, there would be no significant and unavoidable adverse impacts related to GHG emissions associated with any of the project alternatives.

# 5 Water Resources

## Affected Environment

The combined study area is within Cedar-Sammamish River watershed (WRIA 8) and Duwamish-Green River watershed (WRIA 9).

The two largest waterbodies are Lake Washington and Lake Sammamish.

There are about 2,000 mapped streams and rivers in the combined study area with associated floodplains. These include the Sammamish River, Cedar River, Bear Creek, Evans Creek, Kelsey Creek, Richards Creek, May Creek, Coal Creek, and Issaquah Creek.

There are over 1,000 mapped wetlands.

Most mapped groundwater aquifers in the combined study area are within King County's jurisdiction.

## Summary of Impacts Common to All Alternatives

- There is a potential for minor water quality impacts from construction site runoff, dewatering discharge, or accidental spills.
- There is a potential for minor impacts to water quality from operation, if impervious areas and associated surface water runoff are increased, or stored hazardous materials or chemicals are inadvertently released into surface waters.

## Summary of Impacts by Alternative

### NO ACTION

- Existing water resource conditions would not change and no impacts are expected.

### ALTERNATIVE 1

- There is a potential with all options for significant impacts to water resources from construction of overhead or underground lines in streams, lakes, wetlands, or their buffers, however, limitations imposed by regulatory agencies would reduce impacts to minor or moderate.
- Under Option D, minor to moderate temporary impacts to Lake Washington could result from construction of underwater transmission lines including impaired water quality, local turbidity, disturbance of contaminated sediment, underwater noise, and impacts to the shoreline.
- Although unlikely, significant impacts on water resources could occur if the Olympic Pipeline were ruptured during construction.

### ALTERNATIVE 2

- Minor impacts on water resources from construction and operation could occur for components that involve ground disturbance.

### ALTERNATIVE 3

- Similar impacts as for overhead transmission lines as under Alternative 1, Option A, could occur.

## Mitigation Measures

- Avoid locating facilities and infrastructure near or in streams, lakes, wetlands, floodplains, and groundwater.
- Employ best management practices required by water quality regulations during construction.
- Comply with local critical areas and stormwater management regulations for water retention and treatment at substations and other facilities during operation.

## Significant Unavoidable Adverse Impacts

- No significant unavoidable adverse impacts to water resources are likely to occur given the breadth of regulations that would govern construction and operation.

# 6 Plants & Animals

## Affected Environment

Vegetation cover types include forest, herbaceous, scrub-shrub,agriculture, and woody and herbaceous wetlands.

Habitat for fish and wildlife occurs in freshwater wetlands, forest, lakes and ponds, biodiversity areas and corridors, and natural areas within the combined study area.

Fish species listed under the Endangered Species Act are found in lakes and streams in the combined study area.

State priority species with potential habitat in the combined study area include waterfowl, pileated woodpecker, great blue heron, purple martin, and several raptors, turtles, and bats.

## Summary of Impacts Common to All Alternatives

- All alternatives could cause impacts to plants and animals due to habitat disturbance from infrastructure constructed and operated within existing developed areas.

## Summary of Impacts by Alternative

### NO ACTION

- Existing habitat conditions would not change and no impacts are expected.

### ALTERNATIVE 1

- Construction of any of the Alternative 1 options could cause minor to significant impacts from: habitat alteration; interference with critical survival activities; or direct injury, death, or harassment of some species. Impacts would depend on the scale of habitat alteration and species disturbance, and species affected.
- Option D could cause minor to significant impacts on fish from construction and operation of underwater transmission lines.
- Although the probability is low, once constructed, overhead transmission lines under Option A and B could result in significant impacts to threatened or endangered species or species of concern from collisions or electrocution.

### ALTERNATIVE 2

- Impacts to plants and animals may be significant resulting from the construction of a battery storage facility or peak generation plant, depending on the species affected and scale of habitat alteration and species disturbance.
- Impacts could be moderate to significant on wildlife due to noise disturbance from peak generation plants.

### ALTERNATIVE 3

- Similar impacts as for overhead transmission lines using existing corridors under Alternative 1, Option A.

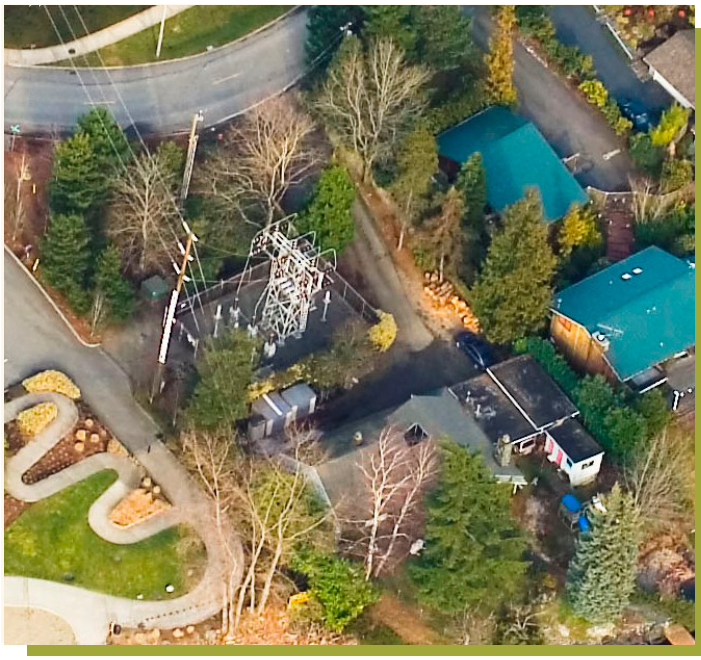
## Mitigation Measures

- Avoid and minimize vegetation, tree, and habitat removal to extent possible in development of facilities and infrastructure.
- Require measures to reduce noise and human activity near priority habitat areas in accordance with applicable permit requirements.
- Implement PSE Avian Protection Program to reduce avian collisions with overhead transmission lines, once constructed.

## Significant Unavoidable Adverse Impacts

- Alternative 1 could result in significant unavoidable impacts due to habitat loss, and if threatened or endangered species or species of concern are affected. Alternative 3 would use existing corridors, but system requirements could force additional clearing in valuable habitat areas, similar to Alternative 1.

# 7 Energy & Natural Resources



## Affected Environment

The mix of resources used regionally for energy production includes hydropower, coal, natural gas, wind, nuclear, biomass, landfill gas, petroleum, and waste. Relative use of each changes over time.

No federal policies or regulations govern types of energy resources PSE consumes; state policy guides types of resources and conservation levels.

The Energy Independence Act of Washington State requires that PSE must obtain 15 percent of its electricity from new renewable resources by 2020, as well as undertaking cost-effective energy conservation.

No local jurisdiction controls how PSE provides power; some have policies addressing sustainable development, climate change, or energy conservation.

## Summary of Impacts Common to All Alternatives

- No adverse impacts are likely to energy and natural resources from construction or operation.
- All alternatives are generally consistent with local jurisdictions' energy policies.
- None of the alternatives change the amount of energy generated regionally. All consume small amounts of energy during operation.

## Summary of Impacts by Alternative

### NO ACTION

- Involves no construction activities, and therefore no change to energy or natural resource usage.
- Operations do not increase energy used to provide power.
- No expanded transmission capacity could mean limits to peak energy availability, possibly with lower consumption of electricity than projected.

### ALTERNATIVE 1

- Described under impacts common to all.

### ALTERNATIVE 2

- Would employ energy resources locally, but would not substantially change the overall mix or amount of regional energy resources used for Eastside power delivery.

### ALTERNATIVE 3

- Described under impacts common to all.

### Mitigation Measures

- No mitigation is needed.

### Significant Unavoidable Adverse Impacts

- These are no significant unavoidable adverse impacts.

# 8 Environmental Health


## Affected Environment

Contaminated soil or groundwater is likely in places, from historical land uses (logging, agriculture, industry).

Hazardous materials are likely in electrical infrastructure (e.g., oil-containing transformers, High Pressure Fluid-Filled [HPFF] power lines used in some underground lines).

Pressurized flammable petroleum products transported in the Olympic Pipeline, which shares a corridor with a PSE transmission line, and is located in other portions of the combined study area.

Some risk of fire or explosion at substations or transmission lines exists due to damage from earthquakes or lightning strikes.

Hazardous materials and public safety risks are regulated by federal, state, and local codes/standards.

Power lines, electrical wiring, and appliances produce EMF and corona ionization is likely occurring around existing transmission lines; associated health risks for both have not been definitively identified through ongoing research.

## Summary of Impacts Common to All Alternatives

- Hazardous materials spilled during construction or operations would be subject containment and cleanup requirements that would prevent more than a minor impact from occurring.
- Each action alternative could be constructed in/near previously contaminated sites; proper management of those materials is expected impacts could be minor depending on location.
- Risk to the public is not likely from constructing or operating the project near pipelines due to extensive safety policies and regulations.
- EMF and corona ionization impacts are not expected.

## Summary of Impacts by Alternative

### NO ACTION

- Earthquakes or lightning strikes could damage transformers or drop power poles or lines, but potential public safety risks are not likely and negligible to minor impacts could be expected.

### ALTERNATIVE 1

- Similar to No Action, potential for minor to moderate impacts depending on option chosen.
- Risk of accidental rupture and explosion of Olympic Pipeline would increase during construction but be minimize by employing best management practices.
- With new equipment being installed, greater potential for spills of hazardous materials during construction and operation than No Action.
- HPFF cable, if used for new underground transmission, could be damaged and leak.
- Risks associated with encountering contamination or conflicts with petroleum pipelines are higher for Option C because of increased ground disturbance and the impacts are expected to be minor to moderate.

### ALTERNATIVE 2

- Distributed generation, energy storage, and peak generation plant components have a potential risk of minor impacts from fire or explosion at energy storage or generation facilities, similar to Alternatives 1 and 3.

### ALTERNATIVE 3

- Same as Alternative 1, Option A, potential for minor to moderate impacts, but increased potential to encounter contamination during construction because of longer corridors.

## Mitigation Measures

- Use vegetable-based oil for transformers rather than petroleum based oil or SF6.
- Minimize use of HPFF lines.
- Prior to starting work, conduct targeted characterization of soils at identified high- and moderate impact site locations.
- Design to avoid intercepting known contamination and use specialized material management plans to control contamination encountered during construction.
- Use best management practices for spill containment and cleanups.
- Install native plantings not needing pesticides at new sites.
- Investigate feasibility of alternative design options for transformers for greater seismic protection and avoidance of safety risks.
- Local governments and PSE would further evaluate the PIPA recommendations to determine if any additional safety practices could be implemented for Energize Eastside Project.
- Comply with all applicable requirements for avoiding utility conflicts during siting and design. Coordinate with potentially affected utilities.

## Significant Unavoidable Adverse Impacts

- Significant impacts would be avoided through compliance with all applicable regulations and industry safety standards.

# 9 Noise

## Affected Environment

Transportation is the primary source of noise in the study areas.

Both state and local codes establish limits on permissible noise levels but exempt substations and daytime construction activity.

Corona discharge from existing transmission lines may be audible, but it is a relatively low noise level.

Existing transformers and ancillary equipment may be audible at adjacent sensitive land uses.

Existing electrical substations produce audible noise, but are exempt from maximum permissible nose levels in the WAC.


## Summary of Impacts Common to All Alternatives

- Construction impacts would be minor if restricted to daytime hours, but nighttime work, if required, would be a moderate but temporary impact.

## Summary of Impacts by Alternative

### NO ACTION

- No construction-related or operational noise impacts.

### ALTERNATIVE 1

- Electrical substations could result in minor operational noise impacts.
- Operational noise from corona discharge would be negligible.

### ALTERNATIVE 2

- Peak generation plants or distributed generation could result in a minor to moderate operational noise impact.

### ALTERNATIVE 3

- Transformer noise could result in a minor operational noise impact.
- Operational noise from corona discharge would be negligible.

### Mitigation Measures

- Siting of transformers, substations, distributed generation sources (gas turbines, anaerobic digesters, etc.) should include attenuation measures to maintain noise levels at the nearest receptors within 5 dBA of existing levels.

### Significant Unavoidable Adverse Impacts

- There would be no significant unavoidable noise impacts.

# 10 Land Use & Housing

## Affected Environment

Population is projected to increase.

Land use is, and will remain, predominantly residential.

Housing was mostly single family units in 2014. The percentage of multifamily units will increase over time through most of the area. Mixed use development (housing and commercial combined) will become more common.

The percentage of industrial land uses will remain about the same.

All jurisdictions have land and shoreline use policies and zoning regulations addressing project consistency and design.

## Summary of Impacts Common to All Alternatives

- Construction of action alternatives would be of relatively short duration at any one location with negligible land use impacts.
- Land use goals and policies of the combined study area communities provide some guidance as to where new transmission lines, transformers, or the features of Alternative 2 should be located, and some have goals or policies supporting undergrounding of electrical lines. All acknowledge a need for adequate infrastructure to support development.
- Five jurisdictions promote combining utilities within the same corridors in some cases; some may prohibit combining regional utility lines with high flammable liquid pipelines for safety.
- Most jurisdictions would require new utilities that are not dependent on a shoreline location to be located outside the shoreline jurisdiction unless there is no feasible alternative.

## Summary of Impacts by Alternative

### NO ACTION

- Would not directly change any property uses, but could delay growth or shift growth to other areas of the region.
- Inconsistency with planning goals for adequate power supply could be a significant adverse impacts.

### ALTERNATIVE 1

- Moderate to significant land use impacts and housing impacts could occur because up to 327 acres of land could change to utility use, and some housing could be removed to accommodate new transmission lines.
- Although generally consistent with most planning policies, it may not be permissible to co-locate with Olympic Pipeline through three jurisdictions due to regulations for pipeline safety.
- Option C could use less new land because underground lines require less clear zone than overhead.
- Option D would have less over-land area and less potential for impacts than other options, but shoreline regulations prohibit new utilities in Lake Washington.

### ALTERNATIVE 2

- Negligible to moderate land use and housing impacts because limited conversion of land use would be required, mainly for the energy storage and peak plant components.
- Some development regulations would prohibit components in certain locations.

### ALTERNATIVE 3

- Same types of impacts as Alternative 1, Option A, but would only install new overhead lines along existing road or utility right-of-way.
- Total area of new corridor/clear zone could be less than building a new corridor but greater than using an existing corridor, as described under Alternative 1.

## Mitigation Measures

- Use existing utility corridors or properties already owned by PSE to minimize conversion of other land uses.
- Underground all or part of the line, or place through Lake Washington, to minimize conversion of land to utility use.
- Provide relocation assistance.

## Significant Unavoidable Adverse Impacts

- No significant unavoidable adverse impacts to land use or housing are expected. Alternative 1, Option A, could have significant impacts if a new corridor were required. The No Action Alternative could lead to unavoidable significant impacts. If unreliable power supply were to result in growth that is inconsistent with regional growth plans.

# 11 Views & Visual Resources

## Affected Environment

The area is mostly urbanized, bounded by large lakes to the east and west, and comprised primarily of low, rolling hills.

Most views are observed from private residences or publicly accessible parks, trails, and open spaces.

Visual resources include nearby mountains (e.g. the Cascades, Olympics, and Issaquah Alps), water bodies (e.g. Lake Washington, Lake Sammamish, and the Cedar River), and the Seattle skyline. Territorial views are the most common types of views.

Existing 115 kV lines are generally along road rights-of-way or in dedicated utility easements, and are suspended on 50 to 90-foot tall wood poles. Existing 230 kV lines operated by Seattle City Light are predominantly in residential areas, and are suspended on 100 to 135-foot steel poles, and lattice structures.

Most of the development, including residential areas, were developed after the transmission lines were constructed.

Existing large substations are typically in industrial, or commercial areas. Smaller substations are found adjacent to most land uses, including residential areas.

Views can affect property values positively or negatively. Although views of transmission lines can negatively affect property values, studies are inconclusive on the duration of negative effects.

## Summary of Impacts Common to All Alternatives

- Visual character of neighborhoods could change due to introduction of new or taller electrical infrastructure (e.g., transmission poles and substations) and creation of clear zone.
- View obstruction or changes to viewpoints or visual resources could result from placement of new infrastructure.
- Extent of impact would depend on the degree of contrast, number of viewers, duration of impact, and the sensitivity of the viewers.
- Construction impacts would be temporary and minor to moderate depending on location.

## Summary of Impacts by Alternative

### NO ACTION

- No visual impacts are expected.

### ALTERNATIVE 1

- All options would include a new or expanded substation. Westminster and Lakeside sites could have moderate impacts on adjacent park and residential uses.
- Option A could have greatest impacts due to taller poles, widest clear zones.
- Option B would use only the existing clear zone of SCL line.
- Option C would have the least visual impacts because lines would be underground.
- Option D would not be visible for the segment underwater, but requires overland segments to connect to substations, that could require a new corridor similar to Option A.

### ALTERNATIVE 2

- Primary visual impacts would be from 6-acre battery storage facility and from several 1-acre peak power generation facilities, all near substations.
- Total clearing and development would be less than all other alternatives.

### ALTERNATIVE 3

- Impacts could be minor where new transmission lines replace existing poles with taller poles and limited additional clearing is required.
- Impacts could be significant where 40 feet of additional corridor is required, especially where there are no lines at present.

## Mitigation Measures

- Co-locate transmission lines with current routes to reduce clearing.
- Place and design structures to minimize impacts.
- Use aesthetically pleasing system components (such as poles and davit arms) and landscaping to shield equipment.

## Significant Unavoidable Adverse Impacts

- Significant impacts from Alternative 1 would be unavoidable if a new corridor were developed.
- Significant impacts from Alternative 3 may be unavoidable due to the extensive area that must be served with new or taller poles.

# 12 Recreation

## Affected Environment

There are approximately 265 recreation sites covering about 16,400 acres in the study area.

Recreation sites include small pocket parks to large natural areas under the jurisdiction of 11 communities, King County, and Washington State.

Transmission lines and substations are found adjacent to several parks.

Recreation opportunities include:
Hiking/walking/running • Bicycling • Beach/water access • Horseback riding • Nature viewing • Playgrounds • Sports fields • Community centers

Informal recreation also occurs outside of formal recreation sites throughout the study area, including within some transmission easements that are used as trails.

## Summary of Impacts Common to All Alternatives

- There could be minor to moderate impacts to recreation if construction activities occur within or adjacent to a recreation site. Level of impact would vary depending on time of year of construction, recreation facilities affected, and how many facilities are affected concurrently.
- For any of the action alternatives, there could be significant impacts if use of recreation facility is permanently lost and cannot be replaced. Recreation facilities will be avoided to the extent practicable.
- Recreation facilities are often subject to restrictions limiting their conversion to another use.

## Summary of Impacts by Alternative

### NO ACTION

- There would be no impacts to recreation.

### ALTERNATIVE 1

- If infrastructure is placed within a recreation site and substantially alters, limits, or precludes the use of that site, impacts could be significant.
- Where existing transmission lines are already located within a recreation facility (Alternative 1, Option A) it is more likely that impacts cannot be avoided.

### ALTERNATIVE 2

- Permanent impacts from operation of Alternative 2 are not expected, with the possible exception of Lake Tradition NRCA if the substation in this location is chosen for a peak generation plant; impacts could be significant.

### ALTERNATIVE 3

- Impacts could be similar to Alternative 1, Option A, but there is greater potential to cross or be near recreation sites.

## Mitigation Measures

- Place any permanent infrastructure outside of recreation sites, where feasible.
- Employ best management practices to minimize construction traffic, dust, and noise.
- Restore recreation sites after construction where feasible; if they cannot be restored, replace lost recreation facilities and screen new infrastructure with vegetation.

## Significant Unavoidable Adverse Impacts

- Some significant impacts may be unavoidable if design or siting factors limit the ability to locate lines or facilities away from recreation sites.

# 13 Historic & Cultural Resources

## Affected Environment

Less than 25% of the combined study area has been tested for cultural resources.

There are 69 historic properties and 94 known archaeological resources in the study areas.

All action alternatives have areas classified as high to very high risk for containing Precontact cultural resources.

## Summary of Impacts Common to All Alternatives

- Ground disturbance could impact cultural resources, if present, and could be significant depending on the resource affected.
- Impacts to above ground historic properties could include vibration and increased dust.
- Energy efficiency methods that modify building facades, such as weatherization, may result in minor to moderate impacts to historic properties, if present.

## Summary of Impacts by Alternative

### NO ACTION

- Same as impacts common to all alternatives.

### ALTERNATIVE 1

- Ground disturbance would be greatest near new or expanded substation and for underground corridor (Option C).
- Possible underwater disturbance under Option D could affect sumerged historic resources.

### ALTERNATIVE 2

- This would cause the least amount of ground disturbance of all alternatives.
- Battery storage and peak power generation have greatest potential for impacts among components of Alternative 2.

### ALTERNATIVE 3

- Similar impacts as for Alternative 1, Option A and B except that more miles of transmission lines would be built, and several substations would be expanded, resulting in ground disturbance.

### Mitigation Measures

- Prior to construction, conduct a survey for any archaeological resources in areas of proposed ground disturbance, and prepare plans to address affected resources.
- If there are potential impacts to eligible or listed historic register properties, develop property-specific mitigation measures with stakeholders, including the Washington State Department of Archaeology and Historic Preservation.

### Significant Unavoidable Adverse Impacts

- There are no known significant unavoidable adverse impacts to historic and cultural resources. However, the exact location of the project is not known, and will be evaluated in phase 2.

# 14 Transportation

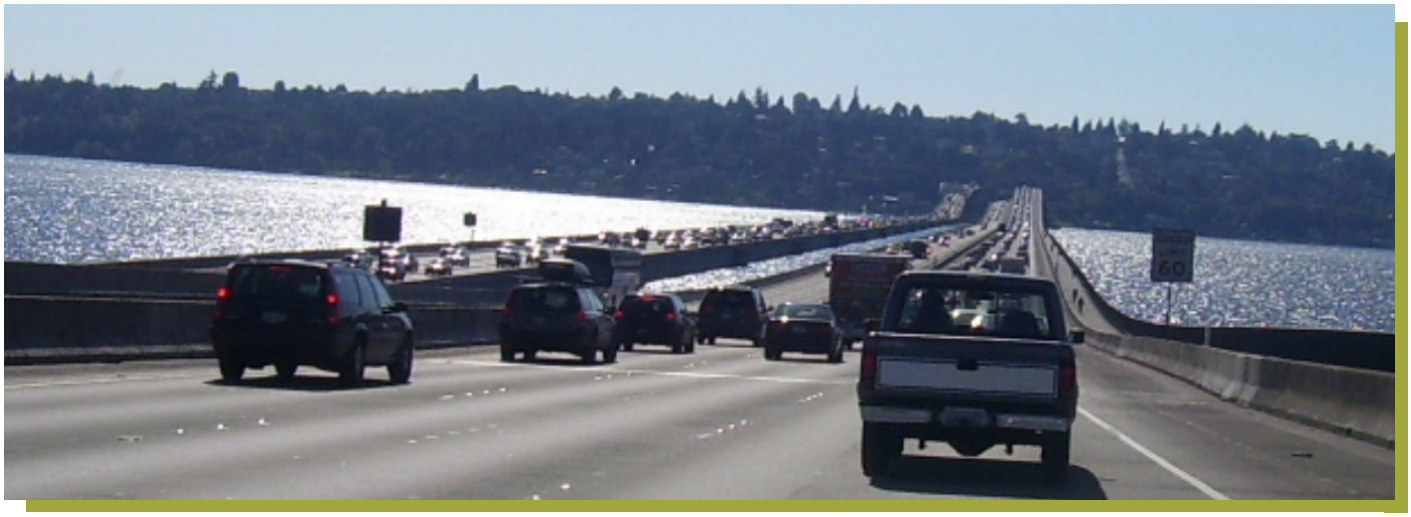


## Affected Environment

The street system consists of a mix of freeways, arterials, collectors, and local access streets that represent varying levels of emphasis on pedestrian orientation, mobility, and access. Most neighborhoods have on-street public parking and off-street private parking.

The combined study area is served by bus service that is most concentrated in the vicinity of transit centers, park-and-ride lots and freeway stations.

Pedestrian and bicycle facilities include sidewalks, shoulders, multi-use trails, and painted on-street bicycle and shared-use lanes.



## Summary of Impacts Common to All Alternatives

- Project elements would be physically separated from transportation infrastructure and services. Transportation infrastructure disrupted during construction would be restored, and streets, sidewalks, and trails disturbed during construction would be repaved.

## Summary of Impacts by Alternative

### NO ACTION

- No construction impacts.
- Power outages during operations could impact traffic operations and safety.

### ALTERNATIVE 1

- Construction impacts include restrictions on roadway use, sidewalk use, property access, transit, and parking, as well as construction-generated truck and commute trips, and potential pavement degradation.
- If the Olympic Pipeline were accidentally damaged during construction, products normally transported by pipeline would need to be shipped by other means, primarily by trucks.
- Construction impacts would be minor to moderate and operation impacts would be negligible.

### ALTERNATIVE 2

- Negligible to moderate construction impacts and negligible to minor operational transportation impacts, depending on components used.

### ALTERNATIVE 3

- Construction impacts similar to Alternative 1, with lower magnitude and duration of construction at any one location, but more geographically spread out.
- Negligible operational impacts.

### Mitigation Measures

- Mitigation could include “maintenance of traffic” plans that identify traffic control and detours to maintain mobility and safety for vehicular and nonmotorized travelers, and maintain access to properties.
- A public involvement program could provide information about the types and locations of construction impacts and the measures to minimize those impacts.

### Significant Unavoidable Adverse Impacts

- With the appropriate mitigation measures in place, no unavoidable significant adverse impacts to transportation are anticipated.

# 15 Public Services

Patch.com


## Affected Environment

The public services that were considered for this programmatic analysis are fire, emergency medical, and police services.

Individual communities may have their own police and fire departments or may contract with other jurisdictions, such as adjacent cities or King County, to provide the services. Many local fire and police agencies in the combined study area have mutual response agreements, which allow public safety responsibilities to be shared across jurisdictional boundaries.

Throughout the combined study area, individual fire departments set levels of service and target response times. Fire departments throughout the combined study area reported meeting level of service and response time targets for various types of emergencies, including emergency medical and other incidents.

Except for a few incidents of theft of ground wires in a utility corridor, police departments reported few unique crime-related problems associated with existing electricity substations or transmission corridors.


## Summary of Impacts Common to All Alternatives

- Minor to moderate impacts related to increased demand for emergency response services.
- Negligible impacts related to additional law enforcement demands.
- No adverse impacts on emergency communication or devices.

## Summary of Impacts by Alternative

### NO ACTION

- There could be minor impacts associated with a sudden, unplanned loss of electricity. Emergency response facilities are the highest priority for maintaining power during an outage, and they are equipped with backup power supplies.
- Although a significant adverse impact could result if a pipeline explosion near the transmission line occurred, the risk is minimized by conformance with regulatory requirements and procedures that address pipeline safety.

### ALTERNATIVE 1

- There could be minor to moderate impacts to emergency services as a result of construction or operation.
- Conformance with regulatory requirements and procedures would ensure that potential hazards are identified, and design plans developed, that minimize adverse effects from pipeline hazards.

### ALTERNATIVE 2

- Given the potential complexity of emergency response to certain facilities (i.e., battery storage and peak generation plant), moderate impacts could occur.

### ALTERNATIVE 3

- There could be minor to moderate impacts to emergency services as a result of construction and operation.

## Mitigation Measures

- Follow all siting, design, construction, and operational requirements, standards, and plans to reduce risk of pipeline damage and to reduce risk of a substation fire:
- Implement maintenance of traffic plans to minimize effects on emergency response.
- Notify emergency service providers and neighborhood residents of construction schedules, street closures, and utility interruptions as far in advance as possible.
- Coordinate with law enforcement agencies to implement crime prevention plans for construction sites and staging areas.

## Significant Unavoidable Adverse Impacts

- There would be no significant unavoidable adverse impacts.

# 16 Utilities


## Affected Environment

Comprehensive plans for study area communities contain goals and policies relating to the provision and management of utilities to meet community needs.

The combined study area includes both regional and local utilities. This programmatic analysis focuses on regional utilities in the combined study area, which includes: overhead 115 kV, 230 kV, and 500 kV transmission lines; electric substations; high-pressure natural gas mains; petroleum pipelines; water mains; major sewer conveyance lines; main feeder telephone and fiber optic lines.

Utilities are provided by a combination of City-managed providers and providers managed by other entities. Depending on their services, utilities not managed by the Cities are state regulated, federally licensed, and/or municipally franchised providers.

PSE natural gas mains and the Olympic Pipeline, an underground, flammable liquids pipeline, are located in existing PSE and Seattle City Light transmission lines easements and through other areas of the combined study area.

# Summary of Impacts Common to All Alternatives

- Construction disturbance could affect existing utilities if present. Potential for encountering utilities is higher when constructing within a road right-of-way or within existing utility easements. Impacts would be minor to moderate for all alternatives except Alternative 1, Option B (moderate to significant).
- Temporary service outages could occur during utility relocations; disruptions would likely be minimal.
- Inadvertent damage to underground utilities could occur if utility locations are uncertain or misidentified. Although such incidents do not occur frequently, if numerous relocations are required during project construction, the potential for accidents is more likely.
- Appropriate cathodic-protection measures would be determined by the utility owner on a case-by-case basis in accordance with applicable federal requirements; impacts on buried pipelines would be minor.

# Summary of Impacts by Alternative

## NO ACTION

- High electrical loads and lack of bulk transmission in the vicinity of the load could result in moderate to significant adverse impacts to electrical service reliability.
- A potential significant adverse impact if Olympic Pipeline were damaged and explodes near existing PSE lines. Potential hazards minimized to minor levels with conformance to standards and requirements.

## ALTERNATIVE 1

- If located in PSE easement, extensive coordination with Olympic Pipe Line Company would be required during project design and construction. Conformance with standards and requirements would ensure that potential hazards are identified and design plans developed to minimize adverse effects.

## ALTERNATIVE 2

- There could be moderate to significant adverse impacts on electric service reliability given the level of uncertainty in implementing this solution. The risk would be lower than the No Action, but higher than other action alternatives.
- Increased demand for natural gas and water to supply simple-cycle generators could require upgrades to major gas and water supply lines which are also difficult to site.

## ALTERNATIVE 3

- Higher likelihood of utility conflicts than all options under Alternative 1 due to more line installation along road rights-of-way and more substation expansion work.
- New overhead lines and substation expansion could be constructed near gas mains and the Olympic Pipeline resulting in the same potential impacts as Alternative 1, Option A.

## Mitigation Measures

- Coordinate with utility providers during project design to avoid and minimize conflicts.
- Schedule any utility relocations in advance to minimize the impact of potential service outages.
- Design, construct, and operate new facilities according to industry standards and applicable requirements.

## Significant Unavoidable Adverse Impacts

- No Action Alternative – less reliable service could result in power disturbances and could increase likelihood of power outages.
- Alternative 2 – uncertainties about feasibility and performance, participation, and conservation levels would result in risk to reliability.

## 1.11 HOW DO THE IMPACTS OF THE ALTERNATIVES COMPARE?

The following tables compare of the degree of impacts that can be expected from each of the alternatives on each of the elements in the environment that was evaluated in the Phase 1 Draft EIS. Table 1-2 compares construction impacts. Table 1-3 compares operational impacts.

## Table 1-2. Construction Impacts Comparison

| | No Action Alternative | Alternative 1: New Substation and 230 kV Transmission Lines | | | |
|---|---|---|---|---|---|
| **Element of the Environment** | **PSE would continue to manage its system as they do at present.** | **Option A: New Overhead Transmission Lines** | **Option B: Existing Seattle City Light 230 kV Transmission Corridor** | **Option C: Underground Transmission Lines** | **Option D: Underwater Transmission Lines** |
| **Earth** | Negligible | Minor | Minor | Minor | Minor |
| **Green House Gas Emissions** | Negligible | Minor to Significant | Minor | Minor | Minor |
| **Water** | Negligible to Minor | Minor to Moderate | Minor to Moderate | Minor to Moderate | Minor to Moderate |
| **Plants and Animals** | Minor | Minor to Significant | Minor to Significant | Minor to Significant | Minor to Significant |
| **Energy and Natural Resources** | Negligible | Negligible | Negligible | Negligible to Minor | Negligible |
| **Environmental Health** | Negligible | Minor | Minor | Minor to Moderate | Minor |
| **Noise** | Negligible | Minor to Moderate | Minor to Moderate | Minor to Moderate | Minor to Moderate |
| **Land Use and Housing** | Negligible | Negligible | Negligible | Negligible | Negligible |
| **Views and Visual Resources** | Negligible | Minor to Moderate | Minor to Moderate | Minor to Moderate | Minor to Moderate |
| **Recreation** | Negligible | Minor to Moderate | Minor to Moderate | Moderate | Minor |
| **Historic and Cultural Resources** | Minor to Moderate | Minor to Significant | Minor to Significant | Minor to Significant | Minor to Significant |
| **Transportation** | Negligible | Minor to Moderate | Minor to Moderate | Minor to Moderate | Minor to Moderate |
| **Public Services** | Negligible | Minor | Minor | Minor to Moderate | Minor |
| **Utilities** | Negligible | Minor to Moderate | Moderate to Significant | Minor to Moderate | Minor |

### Impact Categories

| | |
|---|---|
| Negligible | Impacts, if any, would be inconsequential |
| Minor | Noticeable but infrequent and temporary (such as a noise or emission), or limited in extent (such as a small change in appearance); typically not disruptive or destructive |
| Moderate | Adverse but limited in scope or effect; within an average range (such as non-impact construction noise like saws and drills, or periods of congestion typical during construction); not exceeding any regulatory standards |
| Significant | More than a moderate impact |

## Table 1-2. Construction Impacts Comparison (Continued)

| | Alternative 2: Integrated Resource Approach | | | | |
|---|---|---|---|---|---|
| **Element of the Environment** | **Energy Efficiency Component** | **Demand Response Component** | **Distributed Generation Component** | **Energy Storage Component** | **Peak Power Generation Component** |
| **Earth** | Negligible | Negligible | Negligible | Minor | Minor |
| **Green House Gas Emissions** | Negligible | Negligible | Negligible | Minor | Minor |
| **Water** | Negligible | Negligible | Negligible | Minor | Minor |
| **Plants and Animals** | Negligible | Negligible | Minor | Minor to Significant | Minor to Significant |
| **Energy and Natural Resources** | Negligible | Negligible | Negligible | Negligible | Negligible |
| **Environmental Health** | Negligible | Negligible | Negligible to Minor | Negligible to Minor | Negligible to Minor |
| **Noise** | Negligible | Negligible | Minor to Moderate | Minor to Moderate | Minor to Moderate |
| **Land Use and Housing** | Negligible | Negligible | Negligible | Negligible | Negligible |
| **Views and Visual Resources** | Minor | Minor | Minor | Minor | Minor |
| **Recreation** | Negligible | Negligible | Minor | Minor to Moderate | Minor to Moderate |
| **Historic and Cultural Resources** | Minor to Significant | Negligible to Minor | Minor to Significant | Minor | Minor |
| **Transportation** | Negligible | Negligible | Negligible | Minor | Minor |
| **Public Services** | Negligible | Negligible | Negligible | Minor | Minor |
| **Utilities** | Negligible | Negligible | Minor | Minor | Minor to Moderate |

### Impact Categories

| | |
|---|---|
| Negligible | Impacts, if any, would be inconsequential |
| Minor | Noticeable but infrequent and temporary (such as a noise or emission), or limited in extent (such as a small change in appearance); typically not disruptive or destructive |
| Moderate | Adverse but limited in scope or effect; within an average range (such as non-impact construction noise like saws and drills, or periods of congestion typical during construction); not exceeding any regulatory standards |
| Significant | More than a moderate impact |

## Table 1-2. Construction Impacts Comparison (Continued)

| | Alternative 3: New 115 kV Lines and Transformers |
|---|---|
| **Element of the Environment** | **60 miles of 115 kV single circuit lines and 3 new 230 kV to 115 kV transformers installed at existing substations (Lake Tradition, Talbot Hill, and Sammamish).** |
| **Earth** | Minor |
| **Green House Gas Emissions** | Significant |
| **Water** | Minor to Moderate |
| **Plants and Animals** | Minor to Significant |
| **Energy and Natural Resources** | Negligible |
| **Environmental Health** | Minor |
| **Noise** | Minor to Moderate |
| **Land Use and Housing** | Negligible |
| **Views and Visual Resources** | Minor to Moderate |
| **Recreation** | Minor to Moderate |
| **Historic and Cultural Resources** | Minor to Significant |
| **Transportation** | Minor to Moderate |
| **Public Services** | Minor to Moderate |
| **Utilities** | Moderate |

**Impact Categories**

| | |
|---|---|
| Negligible | Impacts, if any, would be inconsequential |
| Minor | Noticeable but infrequent and temporary (such as a noise or emission), or limited in extent (such as a small change in appearance); typically not disruptive or destructive |
| Moderate | Adverse but limited in scope or effect; within an average range (such as non-impact construction noise like saws and drills, or periods of congestion typical during construction); not exceeding any regulatory standards |
| Significant | More than a moderate impact |

## Table 1-3. Operation Impacts Comparison

| | No Action Alternative | Alternative 1: New Substation and 230 kV Transmission Lines | | | |
|---|---|---|---|---|---|
| **Element of the Environment** | **PSE would continue to manage its system as they do at present.** | **Option A: New Overhead Transmission Lines** | **Option B: Existing Seattle City Light 230 kV Transmission Corridor** | **Option C: Underground Transmission Lines** | **Option D: Underwater Transmission Lines** |
| **Earth** | Negligible | Minor | Minor | Minor | Minor |
| **Green House Gas Emissions** | Negligible | Minor | Minor | Minor | Minor |
| **Water** | Minor | Minor | Minor | Minor | Minor |
| **Plants and Animals** | Minor | Minor to Significant | Minor to Significant | Minor | Minor to Significant |
| **Energy and Natural Resources** | Negligible | Negligible | Negligible | Negligible | Negligible |
| **Environmental Health** | Negligible to Minor | Negligible to Minor | Negligible to Minor | Negligible to Minor | Negligible to Minor |
| **Noise** | Negligible | Negligible to Minor | Negligible to Minor | Negligible to Minor | Negligible to Minor |
| **Land Use and Housing** | Moderate to Significant | Moderate to Significant | Minor | Minor | Minor to Significant |
| **Views and Visual Resources** | Minor | Minor to Significant | Minor to Significant | Minor to Moderate | Minor to Significant |
| **Recreation** | Negligible | Minor to Significant | Minor to Significant | Negligible to Significant | Minor to Moderate |
| **Historic and Cultural Resources** | Minor to Moderate | Minor to Significant | Minor | Negligible | Negligible |
| **Transportation** | Negligible to Moderate | Negligible to Minor | Negligible to Minor | Negligible to Minor | Negligible to Minor |
| **Public Services** | Minor | Minor | Minor | Minor | Minor |
| **Utilities** | Moderate to Significant | Minor | Minor | Minor | Minor |

### Impact Categories

| | |
|---|---|
| Negligible | Impacts, if any, would be inconsequential |
| Minor | Noticeable but infrequent and temporary (such as a noise or emission), or limited in extent (such as a small change in appearance); typically not disruptive or destructive |
| Moderate | Adverse but limited in scope or effect; within an average range (such as non-impact construction noise like saws and drills, or periods of congestion typical during construction); not exceeding any regulatory standards |
| Significant | More than a moderate impact |

## Table 1-3. Operation Impacts Comparison (Continued)

| Element of the Environment | Alternative 2: Integrated Resource Approach | | | | |
|---|---|---|---|---|---|
| | Energy Efficiency Component | Demand Response Component | Distributed Generation Component | Energy Storage Component | Peak Power Generation Component |
| Earth | Negligible | Negligible | Minor | Minor | Minor |
| Green House Gas Emissions | Negligible | Negligible | Negligible to Moderate | Minor | Moderate |
| Water | Minor | Minor | Minor | Minor | Minor |
| Plants and Animals | Negligible | Negligible | Negligible | Minor to Significant | Minor to Significant |
| Energy and Natural Resources | Negligible | Negligible | Negligible | Negligible | Negligible |
| Environmental Health | Negligible | Negligible | Negligible to Minor | Negligible to Minor | Negligible to Minor |
| Noise | Negligible | Negligible | Minor to Moderate | Negligible | Moderate |
| Land Use and Housing | Negligible | Negligible | Negligible | Minor to Moderate | Minor to Moderate |
| Views and Visual Resources | Negligible | Negligible | Minor to Moderate | Minor to Significant | Minor to Moderate |
| Recreation | Minor to Significant | Minor to Significant | Minor to Significant | Minor to Significant | Minor to Significant |
| Historic and Cultural Resources | Minor to Moderate | Minor | Minor | Minor | Minor |
| Transportation | Negligible | Negligible | Negligible | Minor | Minor |
| Public Services | Negligible | Negligbile | Negligible | Moderate | Moderate |
| Utilities | Moderate to Significant | Moderate to Significant | Moderate to Significant | Moderate to Significant | Moderate to Significant |

### Impact Categories

| | |
|---|---|
| Negligible | Impacts, if any, would be inconsequential |
| Minor | Noticeable but infrequent and temporary (such as a noise or emission), or limited in extent (such as a small change in appearance); typically not disruptive or destructive |
| Moderate | Adverse but limited in scope or effect; within an average range (such as non-impact construction noise like saws and drills, or periods of congestion typical during construction); not exceeding any regulatory standards |
| Significant | More than a moderate impact |

## Table 1-3. Operation Impacts Comparison (Continued)

| | Alternative 3: New 115 kV Lines and Transformers |
|---|---|
| **Element of the Environment** | **60 miles of 115 kV single circuit lines and 3 new 230 kV to 115 kV transformers installed at existing substations (Lake Tradition, Talbot Hill, and Sammamish).** |
| **Earth** | Minor |
| **Green House Gas Emissions** | Minor |
| **Water** | Minor |
| **Plants and Animals** | Minor to Significant |
| **Energy and Natural Resources** | Negligible |
| **Environmental Health** | Negligible to Minor |
| **Noise** | Minor |
| **Land Use and Housing** | Minor to Moderate |
| **Views and Visual Resources** | Minor to Significant |
| **Recreation** | Minor to Significant |
| **Historic and Cultural Resources** | Minor to Moderate |
| **Transportation** | Negligible |
| **Public Services** | Minor |
| **Utilities** | Minor |

**Impact Categories**

| | |
|---|---|
| Negligible | Impacts, if any, would be inconsequential |
| Minor | Noticeable but infrequent and temporary (such as a noise or emission), or limited in extent (such as a small change in appearance); typically not disruptive or destructive |
| Moderate | Adverse but limited in scope or effect; within an average range (such as non-impact construction noise like saws and drills, or periods of congestion typical during construction); not exceeding any regulatory standards |
| Significant | More than a moderate impact |

## 1.12 WHAT ARE THE AREAS OF SIGNIFICANT CONTROVERSY?

### 1.12.1 Need for the Project

Controversy about the need for the project is high. Some members of the community reject the idea that the project is needed based on their understanding of how much energy actually needs to be transmitted through and into the Eastside area. Other members of the community accept PSE's assertion that the need is real and want only the most efficient and cost-effective approach to addressing it.

The purpose of this EIS is not to determine whether the project is needed, but to confirm that the methods used to define the need are consistent with industry standards and generally accepted methods. After determining that PSE's evaluation process has been conducted according to industry standards, the lead agency and the partner Cities have worked to understand the nature of the need that PSE has identified, and to look broadly at the possible alternatives that could address that need. This Phase 1 Draft EIS reflects the Cities' concern that the alternatives should include more options than alternative routes for 230 kV transmission lines.

### 1.12.2 What Alternatives Should be Examined

Prior to the development of the scope for this Phase 1 Draft EIS, PSE had considered a wide range of possible options in addition to a 230 kV transmission line solution, identifying that as its preferred approach. Because of the desire of the Cities to examine a wider range of options than only the 230 kV transmission line solution, PSE has cooperated in developing the alternatives solutions that have been evaluated in this EIS. PSE has conducted additional modeling to guide the scale of a 115 kV solution, and commissioned analysis on different routes and methods of developing a 230 kV solution.

In developing Alternative 2, the Cities have outlined a combination of options suggested by community members and evaluated by PSE in its own planning process. These options would require far greater efforts by PSE and its customers in adopting energy efficiency, demand-side reduction, distributed generation, energy storage, and peak power supplies than anything PSE has proposed or studied in its prior evaluations.

The intent in examining these alternatives in this Phase 1 Draft EIS is that the consequences of selecting specific project-level alternatives will be better understood.

Several options suggested by community members would modify assumptions PSE made in its planning analysis regarding the need for the project, specifically around the use of additional power plants outside of the Eastside during peak demand periods, and prohibiting the flow of electricity to Canada during peak demand periods. Options like these were examined but were found to be technically incapable of addressing the capacity deficiency PSE has identified on the Eastside. Options considered but not carried forward for analysis in this EIS are discussed in Chapter 2.

### 1.12.3 Impacts from the Project

Controversy also remains about how the impacts from any solution for the Energize Eastside Project will be borne by the communities the project will serve. Growth in electrical demand in the coming decades is expected to be driven by new multifamily and commercial development. The deficiency in transmission capacity could result in power outages throughout the Eastside, which is predominantly developed with single-family residences. Because there are no significant sources of electricity within the Eastside, virtually all electricity for the Eastside must come via transmission lines that extend through rural, single-family, and industrial areas as well as multifamily and commercial areas. Furthermore, residents in both single-family and multifamily areas on the Eastside work in the commercial areas where growth in electrical demand is expected to be concentrated. The controversy centers around what parts of the community would benefit from the lines, and what parts would bear the impacts.

Although significant impacts could occur with any alternative, the most controversial impacts relate to concerns about the visual impacts and potential for conflicts between electrical and flammable-liquid pipelines. Fear of these and other impacts led to concerns in the community about reduced property values, degradation of neighborhood character, and public safety. The Phase 1 Draft EIS acknowledges these concerns and provides the results of relevant studies prepared by local and national experts on the topics.

This Phase 1 Draft EIS does not define specific locations of impacts, and therefore it describes the impacts and associated tradeoffs in general terms. The project-level analysis in the Phase 2 Draft EIS will provide more detailed information about the areas that would be affected by various alternatives.

## 1.13 WHAT HAPPENS NEXT IN THE ENERGIZE EASTSIDE EIS PROCESS?

The Fact Sheet at the beginning of this Phase 1 Draft EIS includes the timeframe for public comment on the Draft EIS, including times and locations for public meetings to take comment, and the addresses where comments can be submitted. Once public comments have been received, the partner Cities will issue a Scoping Notice for the Phase 2 Draft EIS. The findings from this Phase 1 Draft EIS and comments received on it will be used to help outline proposed alternatives for inclusion in the Phase 2 (project-level) Draft EIS. Comments received on the Phase 1 Draft EIS will also be summarized and made available to the public. Scoping meetings will be held and comments accepted on the project-level analysis that will be prepared in the Phase 2 Draft EIS. Comments received on the scope of the Phase 2 Draft EIS will be summarized and made available to the public. Then the Phase 2 Draft EIS will be prepared.

After publication of the Phase 2 Draft EIS, public meetings will be held to take comments on that document. The Final EIS will include responses to comments on the Phase 1 and Phase 2 Draft EIS documents, as well as any additional analysis that may be required to provide a thorough project-level environmental review for the Energize Eastside Project. The Final EIS, expected to be completed in spring 2017, will be used by each of the study area communities in making permit decisions regarding the project.

# CHAPTER 2. PROJECT ALTERNATIVES

## 2.1 WHAT DOES THIS CHAPTER COVER?

This chapter provides a description of project alternatives evaluated in the Draft Environmental Impact Statement (EIS). The alternatives described in this chapter were developed based on discussions between the partner Cities, the EIS Consultant Team, and Puget Sound Energy (PSE). This chapter also identifies alternatives considered but not evaluated in the Draft EIS because they did not meet PSE's project objectives. As required by the State Environmental Policy Act (SEPA), benefits and disadvantages of delaying PSE's project are described at the end of this chapter. The project includes numerous terms that may not be familiar to all readers. Words shown in *italics* when they first appear in the document are included in the Glossary following the Table of Contents.

## 2.2 WHAT ARE PUGET SOUND ENERGY'S PROJECT OBJECTIVES FOR ENERGIZE EASTSIDE?

Under SEPA, alternatives evaluated in an EIS must feasibly meet or approximate the project objectives. PSE, a regulated utility and the proponent for the Energize Eastside Project, developed the objectives of the proposal. Under SEPA, the objectives must be defined in a manner that does not preclude feasible alternatives that would have lower environmental costs (WAC 197-11-440(5)(b)).

As described in Chapter 1, the objectives for the project are to address a deficiency in transmission capacity on the Eastside that PSE expects will arise in the near future; find a cost-effective solution that can be implemented before system reliability is impaired; meet federal, state, and local regulatory requirements; and address PSE's electrical and non-electrical criteria for the project as outlined below. The transmission capacity deficiency PSE has identified is a product of the complex system that PSE uses to supply power to the Eastside, and the regulations PSE must follow as a utility provider making use of the regional electrical grid. As such, the criteria for what constitutes a viable solution are correspondingly complex.

The following is a list of project criteria from PSE's *Supplemental Eastside Solutions Study Report* (May, 2015) (Gentile et al., 2015). PSE's criteria are based on regulations for utilities and prudent, safe industry practices. They include 15 electrical criteria and 4 non-electrical criteria. The criteria are listed below, followed by a detailed explanation of each criterion in Sections 2.2.1 and 2.2.2. Background information regarding system contingencies and normal winter and summer load forecasts is provided in Sections 2.2.3 and 2.2.4.

**Electrical Criteria Summary**

The project would meet the following criteria:

1. Applicable transmission planning standards and guidelines, including mandatory North American Electric Reliability Corporation (NERC) and Western Electricity Coordinating Council (WECC) standards (e.g., NERC TPL-001-4 and WECC TPL-001-WECC-CRT-2);
2. Within study period (2015– 2024);
3. Less than or equal to 95 percent of emergency limits for lines;
4. Less than or equal to 90 percent emergency limit for transformers;
5. Normal winter load forecast with [both] 100 percent and 75 percent conservation;
6. Normal summer load forecast with 100 percent conservation;
7. Adjust regional flows and generation to stress cases similar to annual transmission planning assessment;
8. Take into account future transmission system improvement projects that are expected to be in service within the study period;
9. Minimal or no re-dispatching of generation;
10. No load shedding;
11. No new *Remedial Action Schemes*;
12. No *Corrective Action Plans*;
13. Must address all relevant PSE equipment violations;
14. Must not cause any adverse impacts to the reliability or operating characteristics of PSE's or surrounding systems; and
15. Must meet performance criteria listed above for 10 or more years after construction with up to 100 percent of the emergency limit for lines or transformers.

**Non-electrical Criteria Summary**

The project would meet or approximate the following criteria:

1. *Environmentally acceptable* to PSE and communities;
2. Constructible by winter of 2017 - 2018;
3. Utilize *proven technology* which can be controlled and operated at a system level; and
4. Reasonable project cost, as defined in Section 2.2.2.4.

Collectively, these criteria were considered the fullest expression of PSE's objectives in developing solutions for the Energize Eastside Project. The electrical criteria listed are generally in line with criteria used in the electrical industry. Therefore, these criteria were

used to identify reasonable alternatives for consideration in this EIS. The non-electrical criteria listed are typical of considerations made by utilities in project planning. While these are important in considering the solution, for this Phase 1 Draft EIS these criteria were generally not used to screen out alternatives.

Consideration of environmental impacts is part of the process for selecting alternatives under SEPA, in that alternatives considered in an EIS must approximate the proponent's objectives at a lower environmental cost. While the desired implementation schedule is important and reasonable, there are uncertainties associated with any of the alternatives including PSE's proposal that could delay implementation beyond these dates. With regard to what is considered proven technology, there is no clear-cut definition of what makes a technology proven. Therefore, a wide range of technologies that are in use at various scales have been evaluated, including some technologies that PSE does not currently utilize. For PSE, what constitutes reasonable cost is driven by PSE's responsibilities to deliver power at the lowest feasible cost to ratepayers. However, under SEPA, alternatives may be considered that are not the lowest feasible cost. For the Phase 1 Draft EIS alternatives, cost was not used to screen out any alternatives, in order to provide a more complete understanding of the environmental effects of alternatives before project-level alternatives are selected.

To clarify PSE's criteria for the community and decision-makers, PSE, the Eastside Cities, and the EIS Consultant Team developed brief explanatory descriptions for each criterion, provided in Sections 2.2.1 and 2.2.2. These descriptions were developed based on PSE documents and the EIS Consultant Team's familiarity with the power delivery system in western North America. The descriptions have been reviewed for accuracy and completeness by PSE and City staff with the five partner Eastside Cities that are leading this EIS process, and consulting electrical engineers on the EIS Consultant Team (Stantec).

## 2.2.1 Electrical Criteria

The electrical criteria used by PSE are briefly defined below.

### *2.2.1.1 Applicable transmission planning standards and guidelines, including mandatory NERC and WECC standards*

These federal requirements mandate that PSE "shall demonstrate through a valid assessment that its portion of the interconnected transmission system is planned such that the Network can be operated to supply projected customer demands and projected Firm (non-recallable reserved) Transmission Services, at all demand levels over the range of forecast system demands" under NERC performance categories. Essentially, PSE must plan the system to function in scenarios where customer demand may be at its highest and/or elements of the system may be out of service. Below are examples of the standards and guidelines used during the PSE planning process.

#### 2.2.1.1.1 N-0 Thermal and Voltage Performance – NERC and WECC standards

This refers to system performance with all system components operating normally. The system must perform without violations (exceedances) of thermal and voltage limits with all systems operating and no contingencies occurring. A contingency refers to a system

condition in which an equipment component is not operating normally and may be turned off or in limited operation, either as a result of an emergency or as part of scheduled maintenance or system improvements. Additional discussion of N-0 is providwed in Section 2.2.3.

#### 2.2.1.1.2 N-1 Thermal and Voltage Performance – NERC and WECC standards

This refers to system performance with one contingency in the system. The system must perform without violations (exceedances) of thermal and voltage limits with one contingency occurring. Additional discussion of N-1 is provided in Section 2.2.3.

#### 2.2.1.1.3 N-1-1 & N-2 Thermal and Voltage Performance – NERC and WECC standards

This refers to system performance with two contingencies in the system. This could be due to an emergency, as part of scheduled maintenance or system improvements, or a combination of circumstances. The system must perform without violations of thermal and voltage limits with two contingencies occurring. Additional discussion of N-1-1 and N-2 is provided in Section 2.2.3.

#### 2.2.1.1.4 Use of Corrective Action Plans (CAPs) and Remedial Action Schemes (RAS) – NERC and WECC standards

See Sections 2.2.1.11 and 2.2.1.12 below.

#### 2.2.1.1.5 Substation Planning and Security Guidelines

PSE's Transmission Planning Guidelines state: "Transmission substations should be laid out for ultimate double 230 - 115 kV transformer bank configuration." On November 20, 2014, the Federal Energy Regulatory Commission (FERC) issued Order 802 Critical Infrastructure Protection (CIP). That order states, "Physical attacks to the Bulk-Power System can adversely impact the reliable operation of the Bulk-Power System, resulting in instability, uncontrolled separation, or cascading failures." On July 15, 2015, FERC issued a follow-up order to CIP-014. Paraphrasing from that order, certain registered entities are required to take steps (or demonstrate that they have already taken steps) to address physical security risks and vulnerabilities related to the reliable operation of the bulk power system. Owners or operators of the bulk power system must identify facilities that are critical to reliable operation. The owners or operators of those identified critical facilities shall develop, validate, and implement plans to protect against physical attacks that may compromise the operability or recovery of such facilities. Following the FERC direction, as well as prudent planning and operating standards, PSE limits the number of transformers at substations to two 230 – 115 kV transformer banks. In other words, based on security threats to the physical electric infrastructure, it is not reasonable or prudent to "put all your eggs in one basket."

### *2.2.1.2 Within study period (2015 – 2024)*

This refers to the 10-year study period during which potential solutions must meet the solution criteria. The study period is defined as the 10-year period between 2015 (the study year of the *Supplemental Eastside Solutions Study Report*) and 2024 (the final year of the WECC base cases used for the study).

#### 2.2.1.3 Less than or equal to 95 percent of emergency limits for lines

PSE has two thermal operating limits: normal and emergency. The *normal operating limit* is a specific level of electrical loading that a system, facility, or element can support or withstand through the daily demand cycles without loss of equipment life. The *emergency limit* is a specific level of electrical loading that a system, facility, or element can support or withstand for a finite period. The emergency rating is based upon the acceptable loss of equipment life or other physical or safety limitations for the equipment involved. If there is a violation of the emergency limit, a transmission line may not meet applicable clearance criteria and risk loss of mechanical strength due to overheating.

PSE's operating practice is to shift or *shed load*, or increase or decrease electrical generation, to avoid reaching an emergency limit. PSE utilizes 95 percent of the emergency limit as an indication of when PSE needs to start the process to study and upgrade the system to prevent violations of mandatory performance requirements and equipment degradation. The system operator receives an alarm when the transmission line reaches 95 percent of its emergency limit. If an alarm is triggered, the system operator takes steps to shift or shed load to prevent damage to the transmission line.

All PSE transmission lines of any voltage must remain equal to or below 95 percent of the emergency line-loading limit over the study period in order for a viable alternative to be considered a potential solution. This includes all periods of the year, whether the system is operating under normal or abnormal system configurations, or during light load or peak load conditions.

#### 2.2.1.4 Less than or equal to 90 percent emergency limit for transformers

As discussed above, PSE has two thermal operating limits: normal and emergency. If there is a violation of the emergency limit in a transformer, it may overheat, causing a breakdown in internal insulation and leading to a transformer failure or reducing its operational life. Substation transformers are filled with oil to facilitate cooling and insulation. However, if the transformer overheats, the oil may catch fire or explode, which is a serious safety concern. PSE's operating practice is to shift or shed load or *dispatch generation* to avoid reaching an emergency limit. PSE uses a measure of 90 percent of the emergency limit for transformers as an indication of when PSE needs to start the process to study and upgrade the system to prevent violations of mandatory performance requirements and equipment loss of life. The system operator receives an alarm when a 230 to 115 kV transformer reaches 90 percent of its emergency limit. If an alarm is triggered, the system operator takes steps to shift or shed load, or dispatch generation to prevent damage to the transformer.

All 230 kV to 115 kV PSE transformers must remain equal to or below 90 percent of the emergency loading limit over the study period in order for a viable alternative to be considered a potential solution. This includes all periods of the year, whether the system is operating under normal or abnormal system configurations, or during light load or peak load conditions.

#### 2.2.1.5 Normal winter load forecast with both 100 percent and 75 percent conservation

A normal winter load forecast represents a snapshot in time reflecting the highest expected load in winter for the given year of the forecast. The load is calculated for the coldest winter weather event with a 1 in 2 (50 percent) chance of occurring in a given year (also referred to as the two-year winter weather event). This would not be considered an average load, but a peak load. The peak load is used to ensure that the system can withstand the highest estimated loading under all system configurations and still reliably serve customers.

A 100 percent conservation level is the amount of reduction in load that PSE estimates could reasonably be attained through energy efficiency, *demand response*, and *distributed generation*. The 75 percent conservation level is the estimated amount of reduction in load multiplied by 0.75 to account for the possibility of achieving only 75 percent of the projected conservation. This factor addresses the potential that the level of conservation that is actually achieved may be inconsistent with the study model assumptions in some locations. Perfect precision cannot be attained without completely accurate data, and the 75 percent conservation level serves as a gauge to help planners understand the ramifications if the model does not precisely mimic a real-world scenario.

The "normal winter forecast with 100 percent conservation" is the peak load forecast for winter, taking into account the 100 percent conservation level for winter. The "normal winter forecast with 75 percent conservation" is the peak load forecast for winter, taking into account the 75 percent conservation level for winter. PSE needs both forecast scenarios to be met for a viable solution.

Load forecasts and conservation levels (reduction in load) are evaluated in detail in PSE's most recent Needs Assessment report and are based on several parameters, such as historical metering data and population statistics. Refer to the *Supplemental Eastside Needs Assessment Report* (PSE and Quanta Technology, 2015) for detailed information. Additional information on what is considered a normal winter load is provided in Section 2.2.4.

#### 2.2.1.6 Normal summer load forecast with 100 percent conservation

A normal summer load forecast represents a snapshot in time reflecting the highest expected load in summer for the given year of the forecast. The load is calculated for the warmest summer weather event with a 1 in 2 (50 percent) chance of occurring in a given year (two-year summer weather event). One major difference between summer and winter peak loads is the different demand levels and use patterns associated with winter heating versus summer cooling. The 100 percent conservation level used in summer is different from the amount of reduction used for a 100 percent winter conservation level. The "normal summer forecast with 100 percent conservation" is the peak load forecast for summer, taking into account the 100 percent conservation level for summer. It is the peak expected load to be used in the study for summer conditions.

Additional information on what is considered a normal summer load is provided in Section 2.2.4.

#### 2.2.1.7 Adjust regional flows and generation to stress cases similar to annual transmission planning assessment

In the course of conducting a load flow study to determine system constraints, many scenarios must be evaluated to simulate real-world possibilities. This is a requirement of the regional agencies (NERC and WECC) that govern the *power grid* in order to make sure it functions reliably for all utility customers. To that end, the transmission planning assessment is just one measure of system reliability. The load flow model itself is merely a mathematical simulation of all the components of the interconnected electric system. The model can only represent a snapshot of the system at a particular moment in time. To gain a full picture of system performance, many scenarios—sometimes called stress cases, sensitivity cases, or snapshots—must be reviewed. Each stress case adjusts both generation and regional flows. The combination gives a sense of real-world reaction to system operating conditions. The regional flows and generation levels used are based on a range of possible real-world conditions and are not a theoretical device to overwhelm the system. PSE studied both a minimal generation level stress case and a stress case that included an additional 1,000 megawatts (MW) of generation.

In addition, thousands of contingencies are evaluated. Contingencies are similar snapshots of the system that evaluate what happens when a transmission line or a transformer is out of service. The study also evaluates the possibility of two components being out of service at the same time. Light load periods as well as peak load periods present their own peculiar problems, and these too must be evaluated in snapshots. Finally, all of these snapshots begin to paint a picture for the planner of where the strengths and weaknesses of the system reside. This criterion requires that this type of stress case assessment must be performed for all solutions and a viable solution must work under all stress cases.

#### 2.2.1.8 Take into account future transmission system improvement projects that are expected to be in service within the study period

The transmission system is constantly evaluated by each utility and the regional entities that unite them to ensure its performance and ability to provide electric power to customers. Each utility and regional agency proposes improvements as needed, such as the 230 kV transformer and transmission line PSE has proposed. When an improvement project has been identified by a utility, it is the utility's or regional authority's responsibility to accurately report the change to WECC so that it can be reflected in the future load flow models that WECC prepares. It is important to know not only the extent of the project, but also when it will be placed in service. One of WECC's responsibilities is to gather this information and prepare the models of specific configurations of generation and transmission in operation (also referred to as cases) based on specific year, load, and other conditions, and make these available to utility planners. However, it is PSE's or the other utility planners' responsibility to make sure that the models they use are correct. Part of that responsibility includes adjusting for any facility plans that may have changed after the WECC model is built, and adjusting for any facilities that may not yet be in service for the years that the utility planner is assessing.

#### 2.2.1.9 Minimal or no re-dispatching of generation

Minimal or no re-dispatching of generation means that, in the normal course of study, PSE does not adjust the amount of generation coming from various generation sources to solve long-term problems. In a real-time scenario, generation is normally dispatched, which means a particular generation output level is set based on the needs of the local economy at a particular time period. Therefore, planners do not want a solution that involves ramping generation up or down to solve a long-term problem. In this case, dispatching generation has little or no impact on solving the transformer overloads on the Eastside, since there is no existing generation within the Eastside area, and ramping generation up or down outside of the Eastside area has little impact on Eastside transformer loading.

#### 2.2.1.10 No load shedding

Load shedding is an intentionally engineered electrical power shutdown when electricity delivery is stopped for a period of time, usually during peak load. A rolling blackout, also referred to as rotational load shedding or feeder rotation, is an intentionally engineered electrical power shutdown when electricity delivery is stopped for periods of time over different parts of the distribution region. Load shedding or rolling blackouts are a last-resort measure used by an electric utility company to avoid a larger or more catastrophic outage of the power system. Load shedding is a type of demand response for a situation when the demand for electricity exceeds the power supply capability of the network. Load shedding, or rolling blackouts, generally result from one of two causes: insufficient generation capacity, or inadequate transmission infrastructure to deliver sufficient power to the area where it is needed.

> What is **firm load**? Firm load is energy that a supplier is required by contract to provide without interruption (except during extreme emergencies).

As is typical of electric service providers, PSE does not use load shedding as a long-term solution to meet mandatory performance requirements. While NERC and WECC allow dropping load for certain contingencies, intentionally dropping *firm load* for an N-1-1 or N-2 contingency to meet federal planning requirements is not a practice that PSE endorses, because of the costs and inconvenience that outages impose on its customers.

#### 2.2.1.11 No new Remedial Action Schemes

A Remedial Action Scheme (RAS) is designed to detect predetermined system conditions and automatically take corrective actions that may include, but are not limited to, adjusting or tripping (shutting down) generation, shedding load, or reconfiguring a system. An RAS may accomplish objectives such as the following:

- Meet requirements identified in the NERC Reliability Standards;
- Maintain acceptable voltages;
- Maintain acceptable power flows; or
- Limit the impact of cascading outages, system instability, or extreme events.

An RAS is normally administered automatically to control regional issues in the power system. PSE, like other utilities, develops and employs RASs to address short-term conditions that may arise as a result of problems on their system or on the regional grid.

This criterion requires that for a solution to be viable, no additional RASs would be needed. This is because use of RASs complicates the operation of the existing system, which adds risk and reduces predictability. An RAS is not considered a long-term solution to solve a local transmission deficiency.

#### 2.2.1.12 No Corrective Action Plans

A *Corrective Action Plan* (CAP) is similar to an RAS. However, CAPs are usually corrective actions made manually by local system dispatchers and are intended to control local problems. In contrast, an RAS is typically administered automatically to control regional issues in the power system.

According to NERC, CAPs are temporary until a permanent solution is put in place. For a solution to be viable, no additional CAPs can be needed because they only complicate the operation of the existing system and do not provide a long-term solution.

#### 2.2.1.13 Must address all relevant PSE equipment violations

PSE will only accept solutions that will solve any existing or future anticipated loading issues of PSE equipment. PSE's normal and emergency thermal operating limits, and potential consequences of violating those limits, are discussed earlier in this section.

#### 2.2.1.14 Must not cause any adverse impacts to the reliability or operating characteristic of PSE's or surrounding systems

Under NERC and WECC guidelines, PSE cannot propose a project that will adversely affect the region, and it would be counterproductive for PSE to introduce a solution that raises other issues within its own system.

#### 2.2.1.15 Must meet performance criteria listed above for 10 or more years after construction with up to 100 percent of the emergency limit for lines or transformers

If the proposed solution is needed by the winter of 2017 - 2018 and the solution is only viable until the end of the study period (2024), then PSE would need to start its next system improvement within a couple of years after the solution is put into service. PSE does not see this as realistic or prudent. A long-term solution must last through 2028, which is considered to be 10 years past the estimated 2018 in-service date. Additionally, the solution must not exceed 100 percent of the emergency limit for lines and transformers. Exceeding the 100 percent emergency limit will incur mandatory performance violations and equipment loss of life.

This criterion is established as a minimum period of time for a solution to be considered a long-term solution. Because of the standardized steps in voltage and equipment sizes (e.g., 115 kV and 230 kV), an alternative may exceed the 10-year minimum. Ideally, the best

solution would exceed these minimum longevity requirements by providing options for future needed electric system reinforcements, such as an additional transformer, which could accommodate future growth beyond the 2028 timeframe.

### 2.2.2 Non-electrical Criteria

The criteria listed below reflect PSE's preferences regarding environmental concerns, project timing, degree of control and reliability of any solutions, and project cost. While these objectives are acknowledged as important, under SEPA and other permitting authority, the partner Cities generally did not weigh these equally with electrical criteria in selecting alternatives. This is because electrical criteria are generally non-discretionary, except in certain cases, such as system security. In contrast, non-electrical criteria are more discretionary. The partner Cities applied their own discretion in determining if an alternative was environmentally acceptable to carry forward in this Phase 1 Draft EIS, and did not eliminate any alternatives because of timing, unproven technology, controllability by PSE, or cost. These criteria, which are explained in greater detail below, may be considered in the project-level Draft EIS in Phase 2 of this EIS process.

#### *2.2.2.1 Environmentally acceptable to PSE and communities*

For PSE, environmentally acceptable means a solution that, through the environmental review process, would be found to minimize, to the extent practicable, the environmental impacts on the affected communities. This Phase 1 Draft EIS provides an evaluation of impacts for the range of alternatives so that citizens and decision-makers can understand the environmental tradeoffs.

#### *2.2.2.2 Constructible by winter of 2017 - 2018*

PSE studies show that Eastside customer demand will reach a point when the Eastside's electric transmission system capacity could experience a deficiency as early as winter 2017 - 2018. To be a viable solution, a project must be completed and in service by the identified target need date. For example, PSE's current schedule for the proposed 230 kV transformer and transmission line installation targets construction to begin in 2017, with project completion in 2018. Any delay in the schedule would push the in-service date beyond the 2018 winter timeframe, which would increase PSE's reliance on the use of CAPs and load shedding. PSE must prepare for project construction several years in advance because some specialized equipment can take up to 3 years to procure. Alternatives must be reviewed to ensure they are reasonably constructible by the in-service target date of 2018.

#### *2.2.2.3 Utilize proven technology which can be controlled and operated at a system level*

To PSE, *proven technology* means technology that has been successfully operated with acceptable performance and reliability within a set of predefined criteria. Proven technology must have a documented track record for a defined environment, meaning there are multiple examples of installations with a history of reliable operations. Such documentation must provide confidence in the technology from practical operations, with respect to the ability of the technology to meet the specified requirements.

"Controlled and operated at a system level" means a dispatcher at a local control center can turn resources on/off or reroute resources either manually or automatically from the dispatch center, or a dispatcher can instruct field personnel to do the same. This criterion rules out independent "behind-the-meter" resources that PSE could not call on as needed. Further, it means that PSE would need to conduct maintenance on, or inspections of, the resources to ensure that they are:

- Operational;
- Providing the capacity they are designed and intended to provide (referred to as *nameplate capacity*); and
- Available to be used when needed.

#### 2.2.2.4 Reasonable project cost

PSE has a legal obligation to deliver safe, dependable power, and an obligation to do so at a reasonable cost. PSE continually balances these obligations in determining the best solutions to solve problems facing the electric system. The Washington Utilities and Transportation Commission (UTC) also has an obligation to review all PSE projects to determine if the solution is reasonable and prudent. After a project is complete and before the costs are allowed to be placed into the *rate base*, PSE must prove to the UTC that the cost to build a project is prudent and reasonable to ratepayers. This means PSE must research and compare costs and benefits of multiple alternatives that can accomplish the desired objectives. This is not a simple lowest project cost test; it is a holistic review and analysis of factors such as projected duration of solution, risk to the electric system associated with the type of solution (e.g., is the solution an untested technology), and impacts to the community, as well as the dollar cost of the project. PSE has completed some of this evaluation already, and will continue to evaluate costs through the design and permitting phase of the project.

What is a **rate base**? A rate base is a set of costs that PSE is allowed to recover over time through rates and fees charged to its customers. See the UTC website for more information: http://www.utc.wa.gov/regulatedIndustries/utilities/energy/Pages/financialDataForElectricCompanies.aspx

### 2.2.3 Understanding System Contingencies and their Frequencies

To understand the nature of the issue that PSE is proposing to address with the Energize Eastside Project, it is helpful to know about the frequency of conditions that produce the deficiency in transmission capacity that PSE has identified. This includes an understanding of how often there are equipment outages that affect the transmission system.

The PSE bulk electric transmission system includes approximately 2,100 components[1] that are included in its system model. Not all of these components affect the systems on the Eastside, but many components that are outside of the Eastside do affect how and where power flows into the Eastside. When everything is operating normally, the system is said to

[1] Transmission system elements include transmission lines 115 kV and above, transformers whose low side is 115 kV or above, generators connected to transmission, generator stepup transformers, reactive devices connected to transmission, substation bus sections at 115 kV and above, and circuit breakers at 115 kV and above.

be in an N-0 state. An N-1 outage condition can occur at any time when a single component trips or is taken offline. This occurs when a problem is detected or because some damage has occurred. It can also be a result of routine maintenance when a system component must be taken out of service (if possible, routine maintenance would not be scheduled during peak load periods or during bad weather). In a typical year, the PSE system operates in an N-1 condition about 350 - 360 days per year (almost every day). These conditions persist for approximately 60 percent of the time each year[2].

An N-1-1 outage condition is an N-1 outage followed by a period of time to manually adjust the system to a secure state, followed by a second N-1 outage. This occurs when a problem is detected or some damage occurs followed by an additional problem or damage event. However, it can also be a result of routine maintenance when a system component must be taken out of service, and the second N-1 outage occurs unexpectedly. Most days PSE operates in a mode where multiple elements are taken out of service across PSE's service territory. Most of these combinations do not cause customer outages the way the "N-1-1" outages do. In a typical year, the PSE system operates in an N-1-1 condition that causes customer outages about 15 to 30 times per year, each of which persists for approximately 4 to 12 hours[3], or less than 2 percent of the year[2].

An N-2 outage is when a single event trips multiple facilities, such as certain instances when all the breakers in a substation trip offline, leaving several circuits without power, or a problem occurs that affects both circuits of a double circuit transmission line (two transmission circuits located on one structure). This occurs when a problem is detected, or some sort of damage has occurred. It can also be a result of routine maintenance when multiple system components must be taken out of service. However, if at all possible, routine maintenance avoids multiple elements, and if necessary, would most likely not be scheduled during peak load periods or poor weather. In a typical year, the PSE system operates in an N-2 condition about 10 to 20 days per year, and persists for approximately 4 to 12 hours, or less than 1 percent of the year[2].

### 2.2.4 Understanding Normal Winter and Summer Load Forecasting

The normal peak weather events that PSE uses in its model to test its system are typical extended periods of either cold winter temperatures or hot summer temperatures, temperatures that have a 50 percent likelihood of occurring in a given year. For winter, this means a temperature of 23 degrees Fahrenheit or lower at the time of the system peak. For summer, this means a temperature of 86 degrees Fahrenheit or higher at the time of the system peak.

## 2.3 PROJECT ALTERNATIVES

This Phase 1 Draft EIS evaluates PSE's proposed Energize Eastside Project (a 230 kV overhead line), a No Action Alternative (as required by SEPA), and two other "action alternatives." These alternatives were developed by the partner Cities in cooperation with PSE, with the intent of providing options that could attain or approximate PSE objectives for

[2] These are estimates; PSE does not track outages in this format.
[3] This duration is an average and storm events can run much longer than 12 hours or shorter than 4 hours.

the project at a lower environmental cost. The **No Action Alternative** provides a benchmark against which the proposed project and other action alternatives can be compared. **Alternative 1** includes the 230 kV overhead lines but also includes options for locations, including underground and underwater options. **Alternative 2** includes a variety of solutions that would require very limited new transmission lines next to existing substations and would need to be implemented in combination in order to meet the project objectives. **Alternative 3** would involve installing enough 115 kV lines and transformers to address the project objectives without building 230 kV lines. Each alternative is described in more detail below.

### 2.3.1 No Action Alternative

The No Action Alternative is defined as those actions PSE would undertake to serve the project objectives without requiring issuance of state or local permits (something PSE could build or undertake immediately if the proposed project is not approved). The No Action Alternative represents the most likely outcome if the proposed project is not implemented, and it is considered the baseline condition.

The study area for the No Action Alternative is shown on Figure 1-4, which is the combined study area for all alternatives. The combined study area was used to describe the affected environment for this Phase 1 Draft EIS. The alternatives are located collectively within the following public land survey system townships and ranges: T25N / R6E, T25N / R5E, T24N / R6E, T24N / R5E, and T23N / R5E.

Based on U.S. Census and *Puget Sound Regional Council* population forecast data, PSE's analysis concluded that the population in PSE's service area on the Eastside is projected to grow by approximately 1.2 percent per year over the next 10 years and employment is expected to grow by 2.1 percent per year, resulting in additional electrical demand (Gentile et al., 2015).

**How does PSE's conservation compare to other utilities?** PSE's level of conservation is higher than other nearby utilities. For example, PSE expects to conserve about 500 MW cumulatively from 2013 to 2023, which represents approximately 15 percent of their projected average demand (load) of about 3,300 MW for that year (PSE, 2013). Seattle City Light (SCL) expects slower load growth than PSE, and total cumulative conservation from 2014 through 2023 to represent approximately 9 percent of average load (SCL, 2014). Snohomish Public Utility District (PUD), which expects load growth of approximately 2 percent per year, projects its total cumulative conservation since 2014 to represent approximately 9 percent of average load in 2024 (Snohomish PUD, 2013).

If electrical load growth occurs as PSE has projected, PSE's system would likely experience loads on the Eastside that would place the local and regional system at risk of damage if no system modifications are made. To address this risk in the near term, PSE would use CAPs (described in Section 2.2.1.12), which are a series of operational steps used to prevent system overloads or large-scale loss of customers' power. CAPs generally involve shutting off or reducing load on overloaded equipment and rerouting the load to other equipment. The CAPs are seen as temporary measures used to keep the entire system operating, but they can place large numbers of customers at risk of a power outage if anything else on the system begins to fail.

Under the No Action Alternative, PSE would continue to manage its system as at present. This includes maintenance programs to reduce the likelihood of equipment failure, and stockpiling additional equipment so that in the event of a failure, repairs could be made as quickly as possible.

Under the No Action Alternative, this EIS assumes that PSE would continue to achieve 100 percent of the company's conservation goals as outlined in its *2013 Integrated Resource Plan* (PSE, 2013), systemwide and for the Eastside. Conservation goals are achieved through a variety of energy efficiency improvements implemented by PSE and its customers. Conservation refers to electrical energy savings above and beyond state or local energy code requirements.

Table 2-1 shows PSE's projected conservation for its entire system and for the Eastside. For the Eastside in 2024, PSE projected that proposed conservation measures would address approximately 110 MW of peak usage, leaving a remaining Eastside load of 764 MW needing to be served during projected peak periods. The conservation measures would address approximately 13 percent of the peak load. PSE currently conserves approximately 21 MW, or 3 percent of the Eastside baseline peak load. For comparison, systemwide, PSE is estimated to have achieved system peak conservation of approximately 91 MW or approximately 1.9 percent of the system peak of 4,803 MW (peak load without conservation) in 2014 through 2015.

**Table 2-1. Peak Load Addressed Through Conservation Measures by PSE Service Area and Year**

| PSE Service Area and Year | Peak Load Addressed Through Conservation Measures | Remaining Peak Load | Percent of Peak Load Addressed Through Conservation Measures |
|---|---|---|---|
| **Eastside** | | | |
| 2015 | 21 MW | 679 MW | 3% |
| 2024 | 110 MW | 764 MW | 13% |
| **Systemwide** | | | |
| 2014-2015 | 91 MW | 4,712 MW | 1.9% |

To achieve its electrical conservation goals, PSE expects to incentivize the following types of measures:

- Energy Efficiency: weatherization, efficient lighting, etc.;
- Fuel Conversion: converting from electric to natural gas;
- *Distribution Efficiency*: implemented on PSE *distribution systems*;
- Distributed Generation: customer *combined heat and power* (CHP), solar, wind, etc.; and

- Demand Response: *capacity savings programs*.

Energy efficiency is the largest contributor to total energy savings in PSE's conservation program, accounting for approximately 90 percent of total energy savings systemwide by 2024. Fuel conversion (from electric to natural gas) and distributed generation (smaller sources of power such as solar, wind, and other generation types) represent a small but growing component of PSE's conservation program, jointly comprising less than 10 percent of existing energy savings but projected to increase to approximately 14 percent of energy savings by 2024. Figure A-1 in Appendix A provides additional detail.

Distribution efficiency can include *conductor* replacement and *conservation voltage reduction*. Conductor replacement on existing lines could occur under the No Action Alternative as part of normal maintenance. However, these improvements would not substantially increase overall system capacity because capacity issues driving this project are typically associated with transformer overloads rather than conductor overloads. PSE would continue the current practice of using advanced systems, such as conservation voltage reduction, to improve system efficiency and reduce overall loading. Conservation voltage reduction refers to controlling PSE's distribution voltage at slightly reduced levels to conserve energy.

The other components of PSE's conservation program comprise relatively small percentages of their conservation target at present. Distributed generation and demand response are two of the components that are included in Alternative 2 and are discussed in further detail in Section 2.3.3.

There are no currently known new technologies that PSE would employ that could substantially affect the transmission capacity deficiency on the Eastside. Under the No Action Alternative, PSE would not be precluded from seeking out new technologies, however.

#### 2.3.1.1 Construction

Under the No Action Alternative, construction activities would likely be limited to occasional conductor replacement, implementation of new technologies not requiring discretionary permits, and installation of distributed generation facilities under PSE's conservation program (e.g., solar panels, *wind turbines*, or rooftop generators). While conductor replacement could occur under the No Action Alternative, installation methods would likely involve the use of a single-man lift.

### 2.3.2 Alternative 1: New Substation and 230 kV Transmission Lines (Puget Sound Energy Proposal)

Under this alternative, PSE would install a new transformer somewhere near the center of the Eastside to convert 230 kV bulk power to 115 kV to feed the Eastside distribution system. The new transformer would be installed at or near one of three properties that are either adjacent to existing substations or have been purchased by PSE for future substations.

The study areas for each action alternative correspond to the areas where the project components would be constructed and operated. The Alternative 1 study area includes portions of Bellevue, Kirkland, Newcastle, Redmond, and Renton, and unincorporated King County (Figure 2-1). Alternative 1, Option D assumes in-water work within a portion of Lake Washington, including waterside areas along the shorelines of Beaux Arts Village, Bellevue, Clyde Hill, Hunts Point, Kirkland, Medina, Mercer Island, Renton, and Yarrow Point (Figure 2-1).

To supply the new transformer, two new 230 kV transmission lines would be constructed to bring power from existing 230 kV sources. PSE's Talbot Hill substation in Renton and Sammamish substation in Redmond are the closest existing 230 kV sources to the center of the Eastside, and are considered the southern and northern ends of this alternative. The Phase 1 Draft EIS considers that transmission lines could be placed in existing or new corridors, including adjacent to roads or highways. Because of the density of development on the Eastside, any new overland corridor would be likely to entail acquisition and removal of buildings.

For the Phase 1 Draft EIS, three basic types of 230 kV transmission lines are considered capable of meeting the project objectives: overhead (new as well as existing transmission lines), underground, and underwater (also referred to as submerged or submarine). The new 230 kV line could also be a combination of these types.

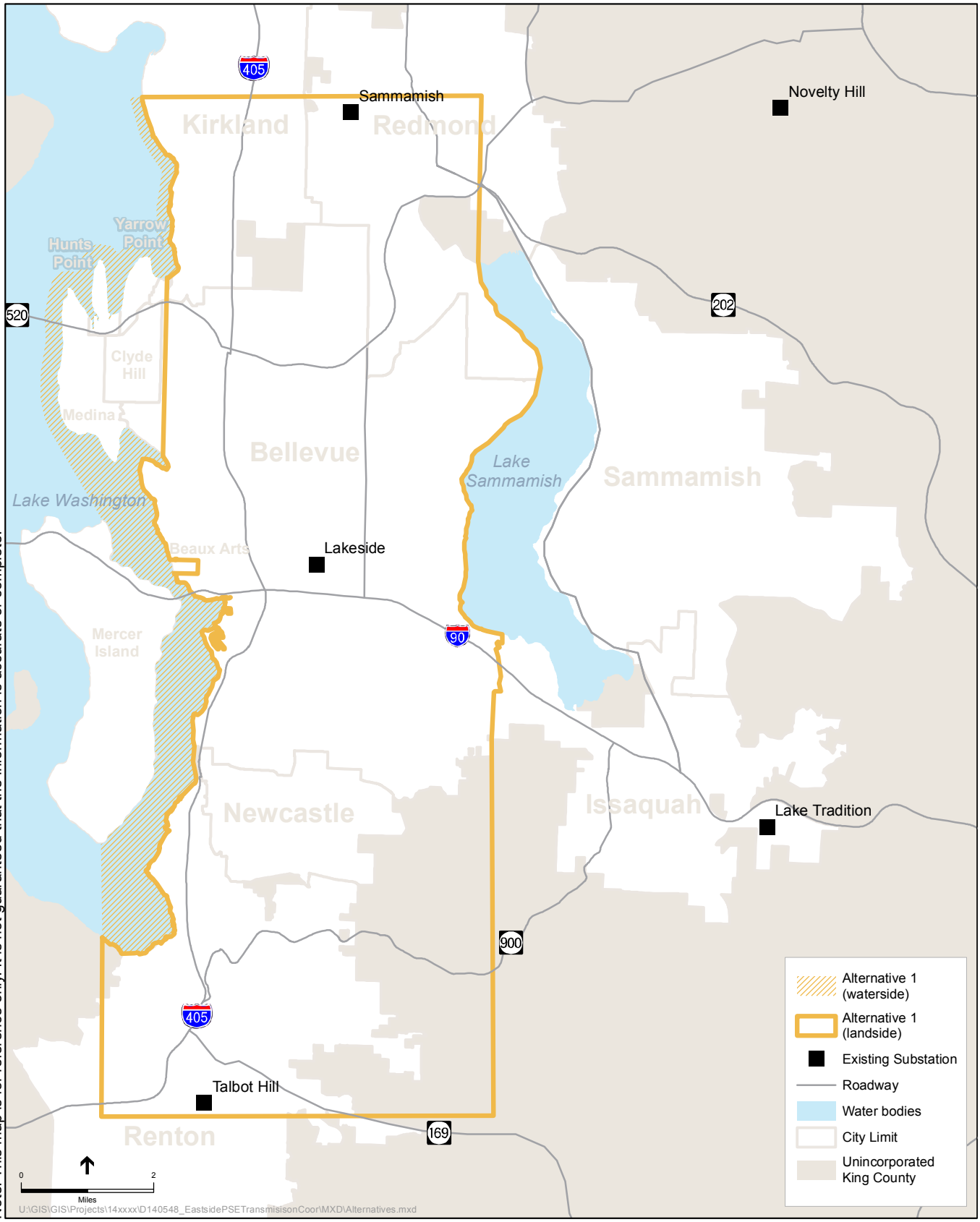
Solutions considered part of this alternative include "single circuit" lines as well as solutions that would allow for addition of a second 230 kV circuit on the same poles, in the same corridor, or in the same underground or underwater facility.

A single circuit transmission line includes three conductors (wires). A double circuit includes six conductors (See Figure 2-2 for a depiction of typical poles for single and double circuit transmission lines).

Operation of Alternative 1 would involve limited but regular maintenance along the transmission lines. Substation operation would involve regular site inspection and maintenance. All proposed equipment is subject to wearing out and would need to be replaced when this occurs, typically after several years of use. Replacement of conductors would be similar to the final steps of installation. Replacement of substation equipment would be similar to the final stages of construction, involving heavy trucks delivering equipment and cranes to remove and replace equipment.

The types of lines being considered for Alternative 1 have been categorized into four options as follows: **Option A**—new overhead transmission lines; **Option B** –use existing Seattle City Light (SCL) overhead transmission lines; **Option C**–underground transmission lines; and **Option D**–underwater transmission lines. These options are described in Sections 2.3.2.2 through 2.3.2.5.

For the Phase 1 Draft EIS, a study area was selected that assumes the 230 kV lines could be installed anywhere from Lake Sammamish to Lake Washington, plus a portion of Lake Washington for Option D (Figure 2-1).




Note: This map is for reference only. It is not guaranteed that the information is accurate or complete.

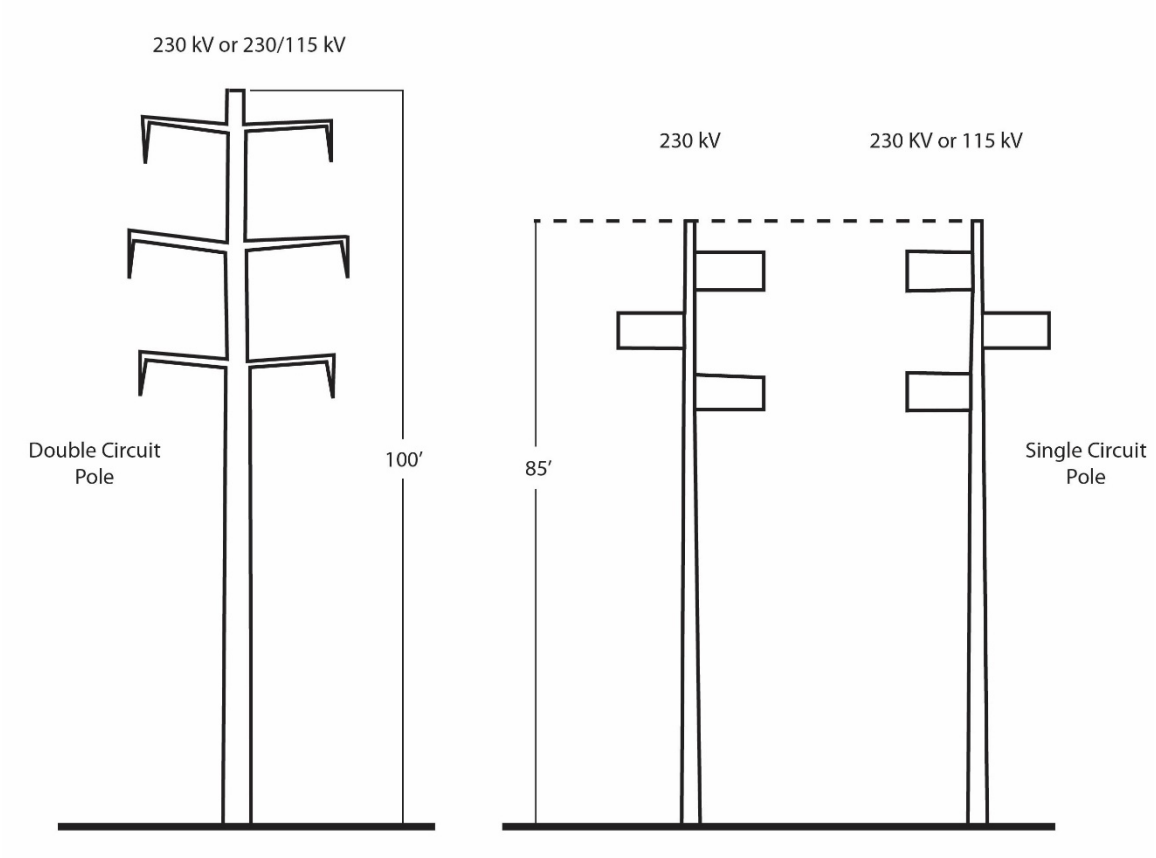
SOURCE: King County 2015; ESA 2015;
Puget Sound Energy 2015; WA Ecology 2014.

Energize Eastside EIS 140548

**Figure 2-1**

Alternative 1 Study Area

**Figure 2-2. Typical Pole Dimensions for 230 kV Overhead Transmission Lines**




### 2.3.2.1 Features Common to All Options

#### 2.3.2.1.1 New Transformer

PSE currently owns three properties that have been designated as possible locations for future substations in the central portion of the Eastside. These substations could potentially serve the project objectives with a new 230 kV to 115 kV transformer (Figure 2-3).

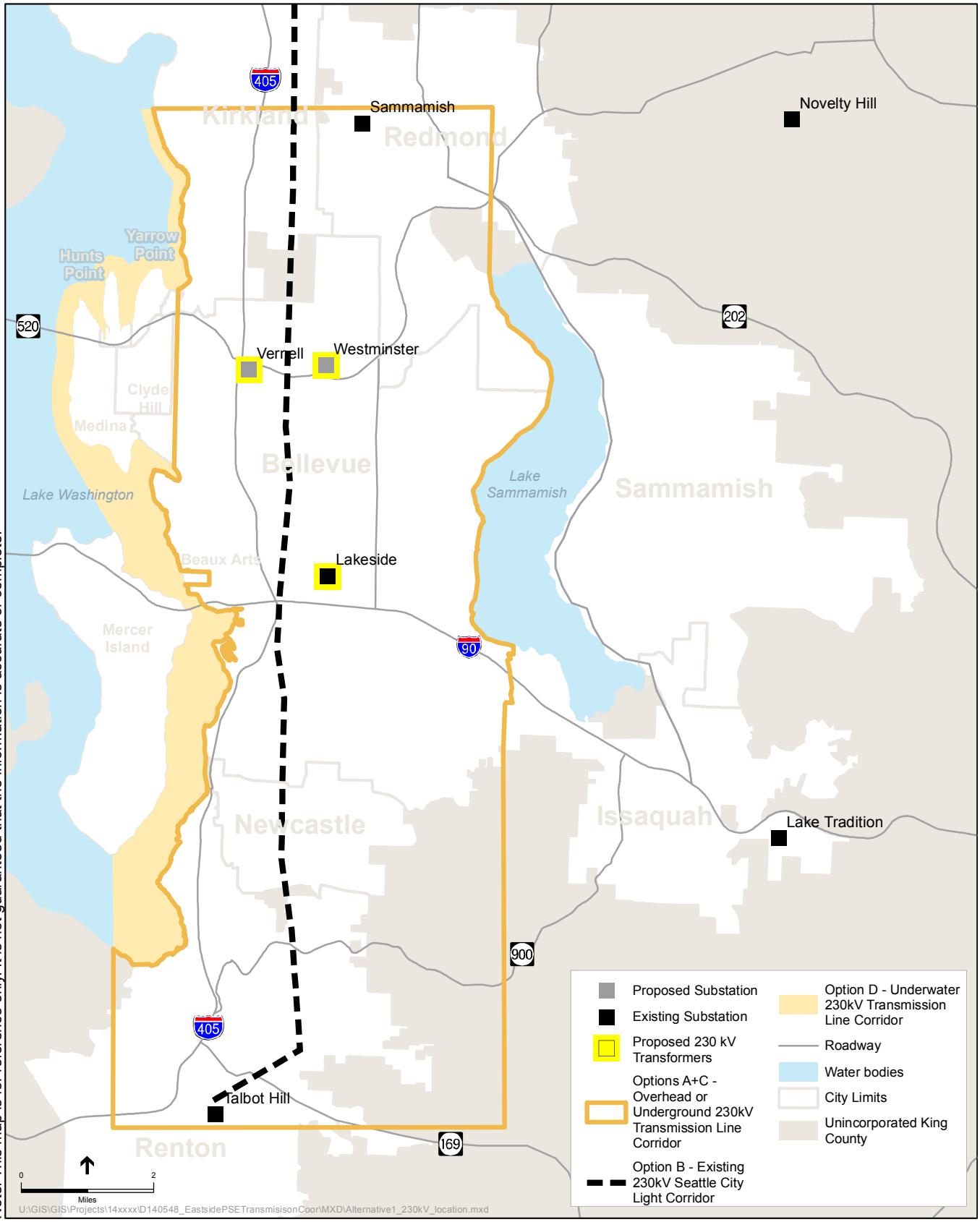
**Figure 2-3. Transformer**

Potential locations could be adjacent to the existing Lakeside substation (Figure 2-4), or at one of two possible new substation sites referred to as Westminster and Vernell, all within Bellevue city limits (Figure 2-5). These sites are near multiple 115 kV lines, which would allow them the most efficient location to inject additional power to the Eastside. The property

adjacent to the existing Lakeside 115 kV substation presents the most effective location from a systemwide perspective because of its immediate proximity to the existing 115 kV substation and multiple existing 115 kV lines. Both the Westminster and Vernell sites would require the addition of one or more new 115 kV lines.

**Figure 2-4. Lakeside Substation**

At any of these sites, development of a new 230 kV substation yard would be required. The substation yard would need to be large enough to accommodate the new transformer and associated electrical equipment such as circuit breakers, bus, and connections to the new transmission lines. The gravel yard would include the necessary foundations, access ways, stormwater drainage, and security fencing (typically 8-foot-tall chainlink, but other types of fencing may be used). In order to accommodate a new transformer and associated equipment, acquisition of property adjacent to the Lakeside substation site could be required. Both the Westminster and Vernell sites are owned by PSE, vacant and large enough for a new substation.




Note: This map is for reference only. It is not guaranteed that the information is accurate or complete.

SOURCE: King County 2015; ESA 2015; WA Ecology 2014; Puget Sound Energy 2015.

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**Figure 2-5**

Alternative 1 - New Substation and 230 kV Transmission Line

#### 2.3.2.1.2 Construction

Construction of a new substation would require clearing and grading to prepare the area for foundations to support the new transformer that converts the bulk power into the distribution system. The new transformer would also require supporting equipment that would be placed on a concrete pad in accordance with regulatory requirements and industry standards. The expansion of the substations would require construction of underground foundations to support the new transformer.

Construction for transformers would require delivery of the transformers to the site; grading of the site and creation of a foundation; and placement of the transformer on the foundation. Construction equipment required would include:

- Specialized oversize trucks and trailers;
- *Backhoes* or *excavators;*
- Concrete trucks; and
- Cranes or other specialty equipment to place transformers.

Use of oversize trucks would be restricted to certain hours to avoid or minimize traffic impacts. Additional information on construction equipment is included in Appendix B.

Construction of transformers would take up to 18 months. The duration of transformer construction would depend on location. Installation in a new facility with construction of a new substation yard would require the longest duration. Transformers and transmission lines could be constructed concurrently. Depending on site access and configuration, construction activities could require temporary street closures and detours.

Construction would also be required for new 230 kV transmission lines. Construction activities would vary by option and are described below. Temporary construction easements may be needed to build any of the options, and PSE would execute an agreement with the property owner for site access and site restoration during any such use.

### 2.3.2.2 Option A: New Overhead Transmission Lines

New overhead transmission lines may be located entirely within existing utility easements, or partially in new locations currently not dedicated to utility operations (such as along roadways or rail corridors, over or through private or other public property). This option would include a minimum of 18 miles of new overhead transmission lines (connecting in the most direct manner using PSE right-of-way from the Lakeside substation to the Talbot Hill and Sammamish substations). Additional transmission lines could be needed depending on the substation chosen and other route possibilities.

In the near term, one of the existing 115 kV lines between the Lakeside substation and the Talbot Hill substation may need to be rebuilt with a 115 kV line that provides a higher capacity. There would be little difference in conductor type (including size and appearance) between a high-capacity 115 kV line and a 230 kV line; therefore, the same line could potentially be used for a future 230 kV line. While there is not an immediate need for a second 230 kV circuit through the Eastside, there are cost efficiencies with installing a

second circuit transmission facility in the same corridor as the proposed 230 kV line. PSE will consider this as part of efforts to identify the least costly infrastructure to serve its customers.

For overhead lines, an additional wire would be installed on top of the new poles for lightning protection. Any existing fiber-optic cable would need to be transferred to the new poles.

#### 2.3.2.2.1 Overhead Transmission Line Locations

Figure 2-5 shows the area where installing a new 230 kV transformer and transmission line under Alternative 1, Option A would meet PSE's project objectives. Within this area, overhead lines could be constructed anywhere. PSE policy is to use its existing easements or rights-of-way wherever possible, but road and other utility right-of-way corridors (such as city streets, state and interstate highways, and some sections of the SCL corridor) are also possible locations. PSE may need to obtain new right-of-way to extend the transmission lines to a desired substation, or to avoid an area of potential impact elsewhere. Additionally, relocation of existing distribution or 115 kV lines may be needed in order to accommodate the new 230 kV line.

Specific pole locations would be determined based on site engineering. Pole locations would generally be based on tensioning needs for the wire (including where turns are needed along the route), underground obstacles at pole foundation locations, and allowable structural heights, all while attempting to use as few poles as possible. Consideration is also made to avoid placing poles in environmentally critical areas like wetlands and unstable slopes.

#### 2.3.2.2.2 Pole Types and Heights for Overhead Lines

Poles would likely be steel or laminated wood monopoles; however, other designs such as H-frames using wood or steel poles could be used in some locations. Concrete poles are not commonly used in this region because they are more expensive than wood or steel. The diameter of the poles depends on height and would be greatest at the base. Typical in-line (tangent) poles would be 2 to 4 feet in diameter at the base, while typical corner and termination poles may need to be 4 to 6 feet in diameter at the base depending on the angle and the terrain. Termination poles and poles where the transmission line changes direction need to be larger than tangent poles to handle the asymmetrical weight and tension from the lines they are holding.

In order to meet *National Electric Safety Code* (NESC) and FERC/NERC requirements to prevent contact with the lines, adequate clearances must be maintained between each conductor, the ground, adjacent buildings, and trees. Pole height therefore would vary depending on the number of circuits, the arrangement of the circuits on the poles, topography, and surrounding land cover. Figure 2-2 shows the typical range of pole dimensions for 230 kV transmission lines. Generally, for a double circuit system, pole heights would range from 85 to 100 feet. In some configurations that could occur under Alternative 1, Option A, a double circuit would incorporate an existing 115 kV line with a new 230 kV line on poles similar to those shown in Figure 2-2. In special cases, such as crossing a ravine or highway, pole heights could be shorter or taller.

#### 2.3.2.2.3 Construction

Under Alternative 1, Option A, new 230 kV transmission lines would be constructed along a minimum of 18 miles of corridor. Construction could occur within existing transmission or other utility easements, or in new locations currently not dedicated to transmission such as areas along road rights-of-way, rail corridors, or over or through private or other public property.

**Clear zones.** To ensure safe and reliable operation of overhead or underground transmission lines, the NESC specifies minimum horizontal and vertical clearance requirements for overhead lines, where trees and overhanging branches must be removed, and structures are generally prohibited (the *clear zone*). Existing 115 kV corridors on the Eastside vary in width, as do standards for 230 kV corridors. Because of this variability, generic assumptions were made based on standard practice in the industry (AEPOhio, 2014). These clear zone requirements typically determine transmission right-of-way (or easement) widths. Specific easement agreements may require more clearance.

For this Phase 1 Draft EIS, if a range of corridor widths is possible, the impact analysis assumes the worst case. In practice, PSE may be able to reduce the required clear zone, in which case impacts would be less than those assumed for this phase of the EIS.

The clear zone for an overhead 230 kV line could be approximately 120 to 150 feet wide. The transmission line could be located along existing 115 kV easements, which are typically 70 to 100 feet wide. Therefore, this analysis assumes that use of a 115 kV corridor could require the corridor to be widened by up to 50 feet. Section 2.3.5 summarizes the clear zone widths and other assumptions used for all alternatives in this EIS.

**Coordination with Olympic Pipeline.** If located along the existing 115 kV easement, construction of a 230 kV line has the potential to disrupt the Olympic Pipeline. Extensive coordination with the Olympic Pipe Line Company would be required during project design and construction to avoid disruption to the two lines, or to establish relocation procedures.

**Pole installation.** During construction, existing wooden poles and conductors would be removed, if present. The methods used to install new steel poles will depend on the type of pole used and both its physical and functional location. Poles can be directly embedded in the ground or utilize an anchor bolt cage, which is a drilled pier foundation that involves setting the anchor bolt cage in a poured column of concrete. Foundations for new 230 kV poles are typically *augered* (drilled) 4 to 8 feet in diameter with steel reinforcements that could extend 25 to 50 feet deep depending on the structure type. Steel poles are set and anchored to the foundations. In some cases, a caisson foundation is used for greater stability. (No foundations are used for wooden poles.) Approximately 100 pole foundations would need to be installed with a typical spacing between poles of 1,000 feet to extend the 18-mile distance between the Sammamish and Talbot Hill substations.

**Transmission line installation.** Once the pole is set in place, the transmission line (wire) would be installed (Figures 2-6, 2-7, 2-8, and 2-9). The wire-stringing operation requires equipment at each end of the section being strung. Wire would be pulled between these temporary pulling sites through pulleys at each structure. These pulling sites would be set up

at various intervals along the right-of-way, typically 1 to 3 miles apart. Specific pulling sites would be determined close to the time the stringing activity takes place. Once the wire is strung, the stringing blocks (i.e., guide rollers) would be removed and the wire clipped into its final hardware attachment. Once poles are installed, surfaces around the new poles and in work areas would be restored.

**Figure 2-6. Workers prepare to energize a transmission line (Gulf Power, 2015)**

**Figure 2-7. Workers Rebuilding a Transmission Line (Fischbach, 2014)**

**Figure 2-8. Installation of Transmission Line (Transelect, 2015)**

**Figure 2-9. Workers Rebuilding a Transmission Line (Fischbach, 2014)**

**Ground disturbance.** Disturbance of site soils would be necessary for clearing and grading to prepare foundation pads as well as potentially a staging area and equipment access depending on the location of the transmission line. Construction would require temporary construction access roads. Installation of transmission lines under existing roadways could require excavation, construction, backfill, and pavement restoration within roadway rights-of-way.

**Equipment.** Construction equipment required for overhead transmission lines would include the following:

- Bulldozers;
- Backhoes;
- Trackhoes;
- Bucket trucks;
- Auxiliary rubber tire vehicles;
- Auger or vacuum trucks;
- Dump trucks;
- Concrete trucks or concrete pump trucks;
- Cranes;
- Line trucks;
- Conductor reel trailer for hauling conductor reels;
- Tensioner for applying tension to conductor coming off reels during pull; and
- Puller for pulling rope/hard line with attached conductor.

**Length of Construction Period.** Construction of overhead transmission lines would take approximately 12 to 18 months and could be constructed concurrently with the substation. If a new corridor were to be developed, the duration would likely be longer due to the need for more extensive clearing. Construction of a new corridor is also more likely to require demolition or removal of buildings, which would extend the duration of construction and could also result in temporary stockpiles of demolition debris.

Typically, the foundation for a steel transmission line pole involves work at a site for 1 to 3 days; setting the pole occurs in a day; and stringing the wires across the pole occurs within a day. These three stages of work can be separated by up to a month. Therefore, in any given location, construction activity would take place over 3 to 5 days within a period of up to 2 months. For wood poles, no foundation is set. Typically, the hole is prepared and the pole is set in a single day, with the wires installed up to a month later.

**Other activities.** Installation of new overhead transmission lines would require other construction activities that may include boring holes for geotechnical investigations, or relocating existing distribution and telecommunications facilities.

#### 2.3.2.3 Option B: Use Seattle City Light 230 kV Overhead Transmission Lines

Alternative 1, Option B makes use of an overhead 230 kV transmission line belonging to SCL (see Figure 2-5). PSE has explored the idea of using the SCL line as an option; however, the SCL facility is not under PSE ownership, and SCL stated that it needs this line to serve its customers (Gentile et al., 2014). This option is included in this Phase 1 Draft EIS so that, if conditions change, this option will remain open.

System operational studies by PSE have shown that Option B would require significant modifications of the SCL line, including replacing most of the existing structures and all conductors, to provide the necessary capacity to meet PSE's identified need for the Energize Eastside Project. The present emergency ratings of the SCL lines are 426 megavolt amperes (MVA) in the summer and 526 MVA in the winter. In order for PSE to utilize these lines as the source for an additional 230 kV transformer on the Eastside, the present ratings are insufficient. If lines were upgraded by replacing only the conductor, then the assumed ratings for the reconductored lines are 692 MVA in the summer and 771 MVA in the winter. This would not be adequate to meet both SCL's needs and PSE's project objectives (Strauch, personal communication, 2015c). Therefore, if SCL were to grant use of this line, PSE would need to both tie into it and upgrade it. The next incremental increase in capacity would be to rebuild the SCL lines (replace structures and conductors), which could provide a line capacity of approximately 1,139 MVA in the summer and 1,366 MVA in the winter.

Option B would involve both of the SCL SnoKing-Maple Valley 230 kV transmission lines. It would also require connecting one double circuit 230 kV line to the Lakeside substation and connecting another double circuit 230 kV line to the Sammamish substation. The exact length of that alignment is not known, but the proximity of the Lakeside and Sammamish substations to the line suggests that each connection would be approximately 1 mile or less (Figure 2-5). This option would also require modifications to and expansion of several substations.

The rebuild of the SCL line was estimated by PSE to provide sufficient capacity for a period of less than 10 years, failing to meet electrical criteria #2 and #15 (Section 2.2.1), but it could otherwise attain or approximate PSE's objectives (Strauch, personal communication, 2015c).

##### 2.3.2.3.1 Construction

Alternative 1, Option B would require replacing most of the existing structures of the SCL 230 kV lines. The SCL lines may need to remain in service; therefore, the replacement line may need to be constructed adjacent to the existing line and placed into service prior to removing the existing structures and conductor.

Construction activities needed would be similar to Alternative 1, Option A, except that it is assumed that the only new corridor needed would be the connection to the Lakeside substation. It is assumed that no additional clear zone would be required for the existing SCL 230 KV corridor. Activities would be concentrated along an approximately 15-mile-long corridor.

Due to the added complexity of rebuilding the SCL system while in operation, construction of transmission lines would last up to 24 months (Strauch, personal communication, 2015c).

Construction equipment required for Option B would be the same as described for Option A.

#### 2.3.2.4 Option C: Underground Transmission Lines

Under Alternative 1, Option C, any portion of the alignments of new transmission lines considered for Option A could be placed underground.

The route alignment for new 230 kV underground transmission lines under Option C requires additional study because construction and operation of underground lines has different considerations than aboveground lines. It is possible that underground lines could be placed within PSE's existing 115 kV overhead line rights-of-way, public road right-of-way, or other right-of-way that PSE owns, purchases, or obtains rights to, when topography and operational considerations would allow it. PSE would maintain permanent access to the underground lines in order to make necessary inspections and repairs.

An underground transmission line would likely be a cross-linked polyethylene cable system consisting of stranded copper or aluminum conductor surrounded by insulation and a series of protective barriers. The outermost barriers are typically concrete or steel. Access *vaults* are needed periodically along an underground route to facilitate cable installation, maintenance, and repairs. Underground, reinforced concrete vaults (typically approximately 8 feet wide by 26 feet long) are usually spaced approximately every 1,500 to 2,500 feet along the route.

##### 2.3.2.4.1 Construction

Underground transmission lines could be constructed through existing PSE 115 kV overhead transmission line rights-of-way, other utility rights-of-way (such as roadway or rail corridors), or new rights-of-way.

**Installation techniques**. Most underground installations are open-cut *trench* construction. The trench width for trench excavation would vary from 2 to 6 feet, plus temporary clearing for access roads and staging. The total work area would be approximately 30 feet wide. Trench depth is determined by future use of the area, location of other utilities, obstructions, and other factors. Additional excavation is done to construct access and splice vaults. Installation techniques for open-cut placement of transmission lines would likely include clearing and grading, excavation, and operation of large equipment. *Trenchless* methods could also be used.

Construction techniques for underground transmission lines largely depend upon the type of terrain and surface conditions:

- **Flat terrain** – Typically a temporary road is constructed along the full length of the trenching operation to provide the necessary construction access.
- **Rolling hills** – Where slopes are less than 10 percent, open trench construction is typically used. Slopes greater than 10 percent can limit access for construction equipment. In some cases access roads are cut into the hill or switchbacks are used to

climb steeper slopes. Horizontal directional drilling (HDD) or trenchless construction can sometimes be utilized to cross a series of hills.

- **Rock** - If bedrock is encountered, only trenchless methods such as directional boring would be used. PSE has indicated that explosives would not be used in urban areas or adjacent to the Olympic Pipeline. Because the project area is all considered urban, no blasting would occur.
- **Wetlands** – Open cutting can sometimes be used to cross wetlands; however, significant environmental controls are applied. In some cases, HDD can be used to span a wetland area.
- **Other obstructions** – There are other situations where open trenching is not practical. This includes crossing of streams, rivers, waterways, highways, railroad tracks, and other situations where open cutting is not allowed or practical. Various trenchless techniques or routing changes may be needed in these cases.

**Equipment.** Construction equipment required for excavation of trenches and cable pulling for underground transmission lines would include the following:

- Excavators or backhoes;
- Dump trucks;
- Bulldozers;
- Concrete mixers;
- Cranes;
- Conductor reel trailer for hauling conductor reels;
- Tensioner for applying tension to conductor coming off reels during pull; and
- Puller for pulling rope/hard line with attached conductor.

Construction of underground transmission lines would last 28 to 36 months. Construction of underground transmission lines would move in a linear fashion so that, in any given location, the duration of construction would be approximately 2 months.

#### 2.3.2.5 Option D: Underwater Transmission Lines

Alternative 1, Option D involves constructing an underwater transmission line in Lake Washington. For the Phase 1 Draft EIS, a study area was selected that assumes cables could be installed within 1,000 feet of the eastern shoreline of Lake Washington from Kirkland to Renton, including the entire channel along Mercer Island (Figure 2-5). Underwater cable could be installed in Lake Washington provided that the appropriate equipment and materials could be transported to the lake.

Overland connections would be required to connect a submerged line to the Sammamish and Talbot Hill substations, and to a new transformer near the center of the Eastside. The underwater line would need to cross existing submarine cables in Lake Washington,

requiring adequate spacing. Appropriate design steps would need to be taken to protect both existing and new cable systems.

#### 2.3.2.5.1 Construction

Alternative 1, Option D would include installation of underwater transmission lines and overhead or underground transmission lines on land that would connect to the underwater portion of the line. In the south end of the underwater line, an overland connection could be accomplished in an existing transmission corridor. However, connecting the underwater line to the Sammamish substation or a new substation in the middle of the Eastside would require new corridors. For construction of overhead lines, refer to Option A, and for underground lines refer to Option C.

**Underwater cables.** PSE commissioned Power Engineers to prepare a report on an underwater option in one segment of Lake Washington. The report provides details and recommendations about what this option would entail (Power Engineers, 2015). The underwater cable system would likely be composed of three to six conductors spaced at least 16.5 feet apart from one another. Because of system demands, it was assumed that six cables would be needed. These cables could be buried 3 to 5 feet below the lake bottom, although in some areas that are deep enough to avoid potential conflicts with deep-draft vessels, cables may be laid directly on the lake bottom. Depending on the underlying conditions present, the installation of underwater transmission lines could be completed using trenchless methods such as horizontal directional drilling or trenching methods using special vessels to dredge the trenches.

In order to avoid potential impacts to the lake from inadvertent leaks, the cable would not be of the type that uses high pressure fluid-filled pipe. Additional information about laying submarine cable in Lake Washington can be found in the *Eastside 230 kV Project Lake Washington Submarine Cable Alternative Feasibility Report* prepared for PSE (Power Engineers, 2015).

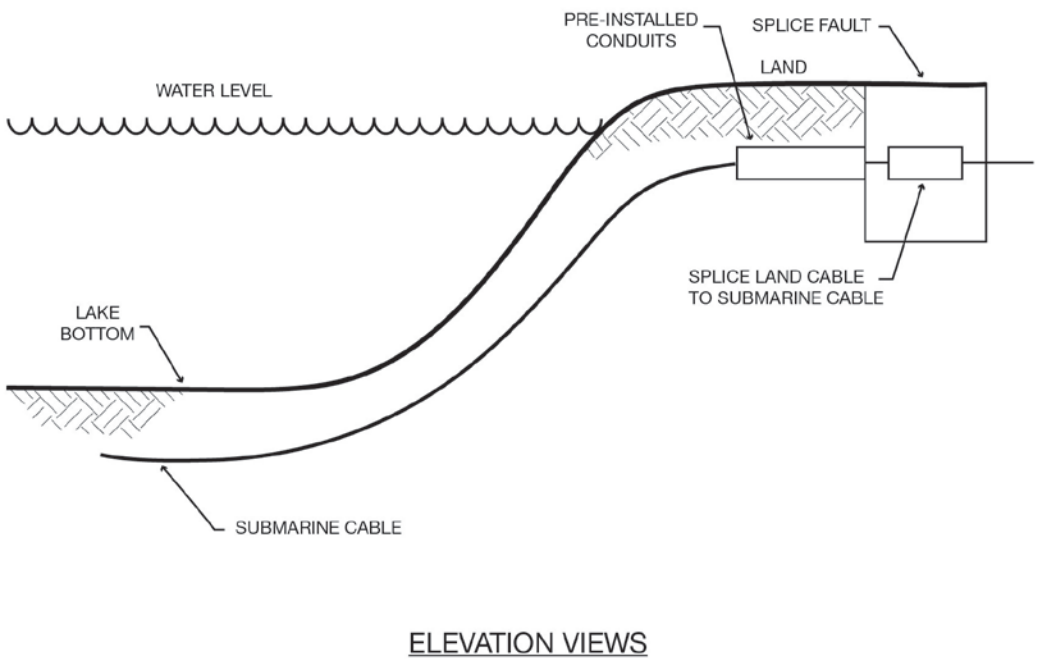
**Overland lines.** For Alternative 1, Option D, east-west overland transmission lines would be required at up to three locations:

- At the south end, extending from Talbot Hill to Lake Washington;
- From Lake Washington to a substation near the center of the Eastside; and
- At the north end, from the Sammamish substation to Lake Washington.

Overland connections could be via overhead lines as described for Alternative 1, Option A or underground as described for Option C.

**Transition between underwater and overland lines.** Shore landings where the underwater cables transition onto land would be constructed using *open-cut trenching*, *sheet piling*, and *dredging*. (Trenchless installation is possible but requires larger cable sizes and higher costs.) On the shoreline, splicing vaults are needed to connect the submerged cable to the overland portion of the transmission system. Figure 2-10 shows how a submarine cable would typically be attached to a land-based transmission line in a *splicing* vault.

**Figure 2-10. Submarine Cable Landing via Open Trench (Power Engineers, 2015)**




The number of splicing vaults is dependent on the design and the maximum length of cable that can be transported to and installed in Lake Washington. For a submerged transmission line that runs from Renton to Redmond, a minimum of three landing points for vaults would be needed, and it could be necessary to have one or more additional splice points on land, each of which would be similar in size to those described for underground cable in Alternative 1, Option C. At each landing point, up to six vaults would be needed to connect the underwater cables to the land cables (Power Engineers, 2015). Each of the cable runs would be physically separated with individual vaults and termination structures so that any two cables in a circuit could continue to operate if the third were taken down (de-energized) for maintenance activities. PSE would have to acquire property, remove vegetation and structures, install the vaults, and maintain access to the vault via a road that could accommodate commercial trucks. Since it is unknown exactly where or how submarine cables would be installed, worst-case assumptions have been used for installing the cables and shore landings.

Installation of upland cable transition points could require sheet or *soldier pile* driving and *cofferdams* in shoreline or nearshore areas, if trenchless techniques are not feasible or practicable to accomplish the offshore-to-upland transitions. It is expected that vibratory pile driving techniques would be adequate to install piles, which would substantially reduce the potential effects compared to impact pile driving methods.

**Equipment.** Construction equipment required for installation of underwater cables would include the following:

- Excavator or backhoe for open-cut and vault area trenching and loading dump truck;
- Dump truck for hauling spoils;

- Pile driver for sheet piles;
- Dredge for in-water conduit near shoreline;
- Concrete truck for poured-in-place vaults;
- Crane for lifting miscellaneous materials;
- Mixer truck and compaction grout pump to inject thermal backfill;
- Vacuum truck for site and street cleanup;
- Heavy-duty trucks for site deliveries of equipment and materials;
- Conductor reel trailer for hauling conductor reels;
- Tensioner for applying tension to conductor coming off reels during pull;
- Puller for pulling rope/hard line with attached conductor;
- Submarine cable laying barge designed to lay the cable in one continuous piece.

Additional information on construction equipment is included in Appendix B.

Installation of underwater transmission lines would require special vessels to dredge trenches in the lake bottom and lay cable (Figure 2-11) (Power Engineers, 2015). Because of the limitations on the size of vessels capable of passing under the I-90 floating bridge, multiple passes with a smaller vessel may be required for the complete installation of the cable system. Use of special vessels to dredge trenches in the lake bottom and lay cables in the trenches could restrict boat access in the work areas.

Materials would likely be transported via ship or barge from marine waters (via the Hiram M. Chittenden Locks) due to the size of transmission cables that would be needed. Truck delivery is considered infeasible because the longest cable segment that could be transported by truck is approximately 1,100 feet, due to highway weight limits.

**Length of Construction Period.** Construction of underwater transmission lines would take approximately 8 months. Additional time would be required to construct overhead or underground lines to connect to substations.

**Figure 2-11. Typical Barge for 230 kV Cable Installation (Power Engineers, 2015)**

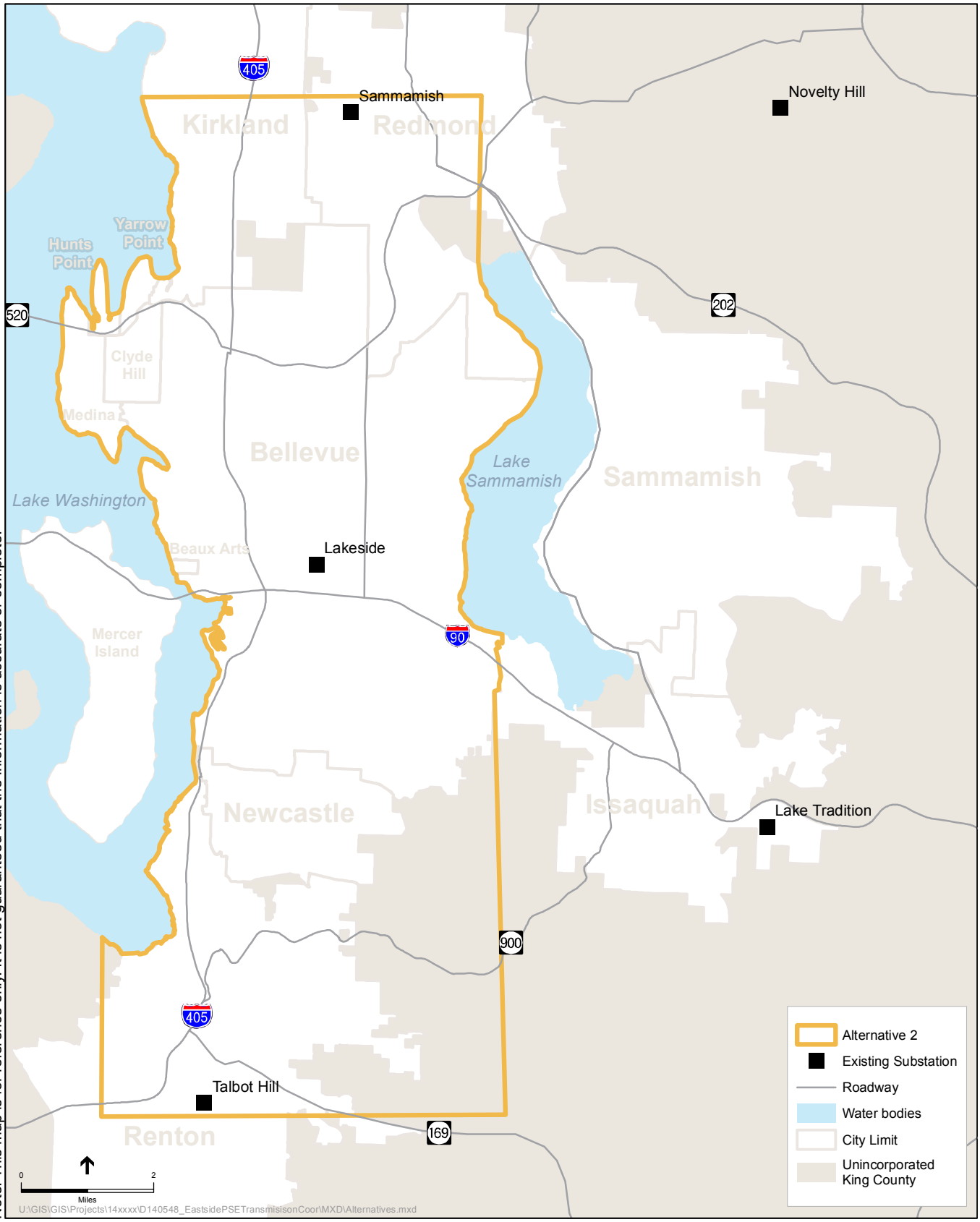
#### 2.3.2.6 Conservation

Under Alternative 1, PSE would continue the conservation efforts called out in its *2013 Integrated Resource Plan* (PSE, 2013), as described in the No Action Alternative. Alternative 1 is expected to result in the same levels of conservation as the No Action Alternative.

### 2.3.3 Alternative 2: Integrated Resource Approach

The focus of Alternative 2 is on energy conservation and use of technologies other than transmission lines to address the project objectives. Alternative 2 would address the projected deficiency in transmission capacity on the Eastside by reducing the growth in peak period demand through energy efficiency, storing and releasing energy when needed to address peak demand, and providing reliable additional peak period energy sources in the area where the transmission capacity is deficient.

The study area for Alternative 2 is shown on Figure 2-12. The Alternative 2 study area excludes in-water work, but includes potential project activity anywhere from the east side of Lake Washington to west side of Lake Sammamish. As described below, some components would need to be close to the center of this area to be effective.




Note: This map is for reference only. It is not guaranteed that the information is accurate or complete.

SOURCE: King County 2015; ESA 2015;
Puget Sound Energy 2015; WA Ecology 2014.

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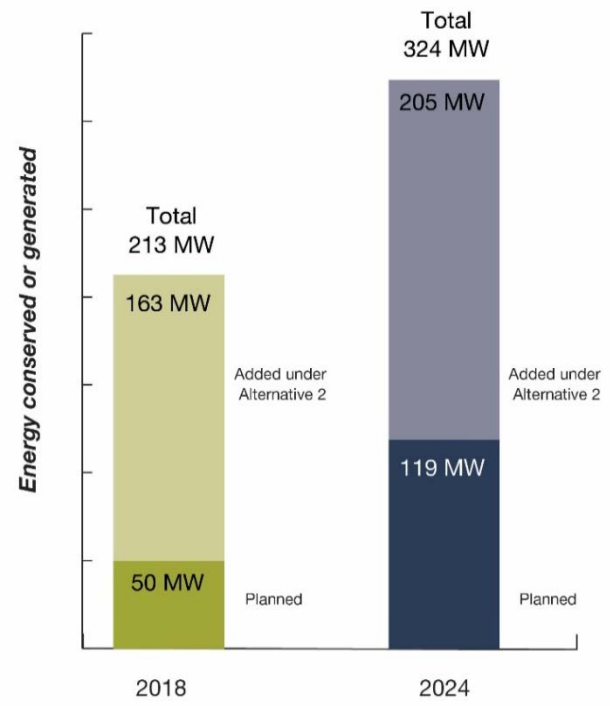
**Figure 2-12**

Alternative 2 Study Area

Determining the amount of non-transmission resources that would be needed to address the capacity deficiency that PSE has identified is complex because every solution has a different degree of effectiveness and reliability. For these reasons, it is not sufficient to look at the transmission capacity deficiency and replace that with an equal amount of non-transmission resources, such as energy efficiency or new generation. According to PSE projections, it would take 74 MW of additional transmission capacity to marginally meet the demand through 2018 (Gentile et al., 2015). However, to address the capacity deficiency in 2018 with non-transmission resources would take approximately 163 MW of additional conservation, storage, and new generation within the Eastside beyond the 50 MW of conservation planned in 2013 *Integrated Resource Plan* (Nedrud, personal communication, 2015; PSE, 2013) (Figure 2-13). To address the capacity deficiency in winter 2024 with non-transmission resources would take approximately 205 MW of additional conservation, storage, and new generation within the Eastside beyond the currently planned 119 MW of conservation (Figure 2-13). If growth continues as predicted, additional conservation or a system upgrade would be necessary to reliably serve the area beyond 2024.

**Figure 2-13. Additional Non-Transmission Resources Needed to Meet Project Objectives in 2018 and 2024**

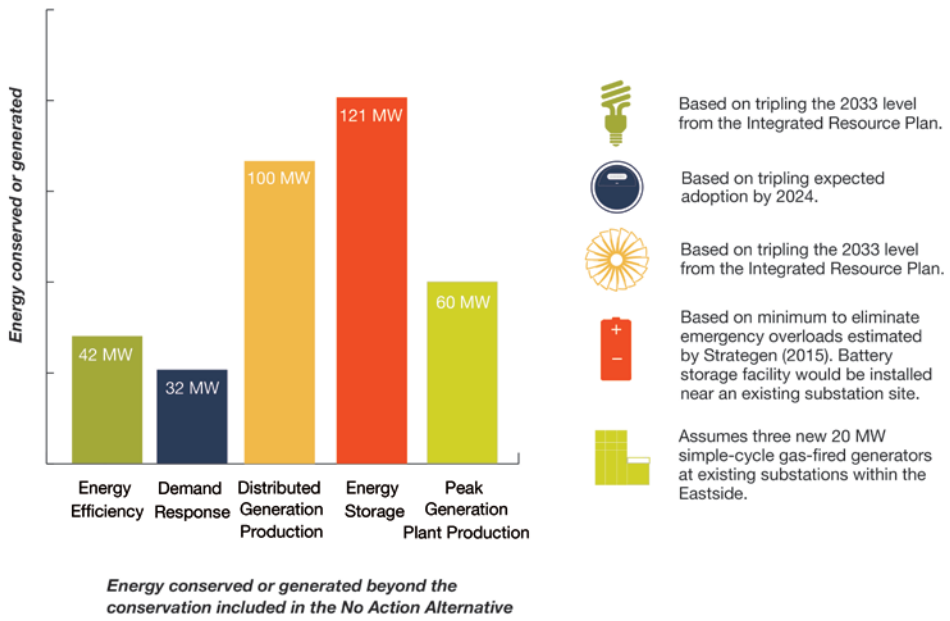



For comparison, PSE's current plan for the entire PSE service area (Figure 1-3) is to implement 852 MW of conservation by 2024. The Eastside represents approximately 14 percent of the total load for the PSE system, and therefore 14 percent of the total projected conservation (119 MW of conservation).

Alternative 2 would require close monitoring and management because it is based on the assumption that just enough conservation and new energy supply would be accomplished within the Eastside each year throughout the study period (2015 - 2024; electrical criterion #2) to avoid needing additional transmission capacity. This alternative could address the project need but results in uncertainty about how much infrastructure would be installed and how much additional supply would be needed each year. This alternative assumes that at the end of the 10-year study period, additional measures or facilities would be required to address future growth. The approach could be continued conservation efforts, but because of strict building codes already in place and the acceleration of retrofitting assumed under this alternative, the availability of additional capacity for conservation is uncertain. If conservation cannot address identified capacity needs, additional transmission or generation infrastructure could be required.

Alternative 2 assumes a mix of measures to accomplish conservation savings. In order to fully address the identified capacity need, Alternative 2 would include a combination of energy storage units, demand response devices, distributed generation, peak generation production, and energy efficiency improvements. These measures are described below. Figure 2-14 summarizes a theoretical mix of measures and anticipated energy conservation for each component. This figure is provided to illustrate the approximate magnitude of the effort required to meet the project need. The actual mix would depend on the success of each component adopted. Some, like energy storage, could be built by PSE, while others require voluntary participation by customers. The technical feasibility of each option within this approach would require further study to determine how much of each component is feasible, economical, and sufficiently reliable. For example, it could be more economical for PSE to install more peak generator plants than to incentivize customers to install as much distributed generation as is shown.

**Figure 2-14. Example Mix of Energy Conservation, Storage, and Generation for Components of Alternative 2**




### 2.3.3.1 Energy Efficiency Component

The energy efficiency measures under Alternative 2 would be the same as those described for the No Action Alternative, such as replacing older, inefficient appliances and lighting, and adding insulation and weatherproofing. Energy efficiency would reduce the total demand, thus lowering the peak load requirements. However, to meet the project objectives for Energize Eastside, these efforts would need to be substantially accelerated and expanded on the Eastside. The potential for additional energy efficiency on the Eastside is not currently known and would require additional evaluation. Stricter building energy code standards could accomplish part of the project objective but are not within the control of PSE. Therefore, building codes are not part of this alternative, but they could be considered by study area communities as a means to help ensure the success of this alternative.

Additional promotion and incentives would be necessary to encourage this higher level of conservation. For the Phase 1 Draft EIS analysis, it was assumed that the current energy efficiency incentive program could be accelerated and expanded for the Eastside (Figure 2-15). This analysis assumes PSE would need to accomplish approximately 42 MW of additional energy efficiency within the Eastside by 2024, over and above the approximately 45 MW of energy efficiency gains in the Eastside that PSE expects for that time period. It is recognized that this is an aggressive goal. PSE's *Integrated Resource Plan* (2013a) estimated PSE could achieve approximately 100 MW of additional energy efficiency during the period from 2024 to 2033 systemwide, which would equate to approximately 14 MW of energy efficiency gains on the Eastside during that time period. The additional energy efficiency assumed for Alternative 2 would be triple the amount that PSE estimated is achievable after 2024, and that additional energy efficiency would have to be accomplished before 2024.

**Figure 2-15. Adding Insulation in an Existing Home (U.S. DOE, 2015a)**

### 2.3.3.2 Demand Response Component

Demand response involves end-use electric customers reducing their electricity usage typically during peak load times, and sometimes involves shifting that usage to another time period. Typically this is done in response to a price consideration, a financial incentive, an environmental condition, or a reliability issue. Demand response requires special meters and control equipment that can be used to adjust electricity usage, usually adjusting automatically according to pre-agreed parameters (Figure 2-16). Some of the features of a demand response system could include the following:

**Figure 2-16. Example Energy Monitoring System (Clauser, 2016)**


- Meters that provide customers and PSE information about when and how much energy each customer is using, including on-line real-time information;
- Installation of in-home monitoring and control equipment that would allow PSE to control heating and cooling systems;
- Programmatic options to reduce peak demand during system emergencies, improve system reliability, and balance *variable-load resources*;
- Incentives for customers to curtail loads during specified events or pricing structures to induce customers to shift load away from peak periods; and
- Capability of sending a continuous wireless signal to the utility.

The *Integrated Resource Plan* (PSE, 2013) estimated that demand response systems would result in 116 MW systemwide reduction in capacity needed by 2024. Because the Eastside represents approximately 14 percent of the systemwide load, and assuming that adoption of demand response would be proportional on the Eastside to the rest of PSE service areas, it is assumed that approximately 14 percent of the systemwide reduction (16 MW of conservation by 2024) would occur on the Eastside under the No Action Alternative. In order to address the capacity deficiency projected for the Eastside, the program would need to be substantially accelerated and expanded within the Eastside in the next 10 years, at a rate that exceeds the rest of the system. For the Phase 1 Draft EIS, it is assumed that an additional 32 MW of demand reduction would need to be accomplished in the Eastside by 2024 (Figure 2-14). This would triple the expected rate of adoption of demand response in PSE's *Integrated Resource Plan* (2013a) to a total of 48 MW.

#### 2.3.3.3 Distributed Generation Component

Distributed generation involves generating power on a customer's site. By producing power within the Eastside, distributed generation reduces the need for transmission of power through substations serving the Eastside. Distributed generation reduces costs and interdependencies associated with transmission and distribution and can shift control to the consumer.

##### 2.3.3.3.1 Types of Facilities Included in EIS Analysis

In order to address the Eastside transmission deficiency with distributed generation alone, approximately 300 to 400 MW of capacity would be needed by 2024 depending on the geographic location of the generation (PSE, 2013; Strauch, personal communication, 2015a). While all distributed sources reduce the total amount of electricity that needs to be supplied through the transmission system, only a limited set of these resources, those that can be relied upon to produce power during periods of peak demand, would help to address the Eastside transmission capacity deficiency. For this analysis, distributed generation facilities were assumed to consist primarily of *gas turbines*, *anaerobic digesters*, *reciprocating engines*, *microturbines*, and fuel cells, with each system generating less than 10 MW. These types of facilities are discussed below, and are shown in Figures 2-17, 2-18, 2-19, 2-20, and 2-21).

New distributed generation resources would need to be capable of producing power when needed at peak times, such as during a winter cold snap or a summer warm spell, or they would need to be associated with an energy storage system that would allow use of the energy during peak periods. For an energy generating resource to be effective, it also has to be reliable, which means it must be well maintained and capable of producing a specified amount of energy when needed. To ensure adequate capacity even when some equipment is not working, a substantial degree of redundancy is needed in distributed generation resources. In addition, the distributed generation needs to be located at or near the load in order to be effective. This also contributes to the need for an overall higher capacity requirement. As with energy code requirements, cities could require these types of installations, but PSE must rely on voluntary installation.

Although these conditions suggest there could be difficulty implementing a robust distributed generation system sufficient to meet a substantial portion of the need, it is included in the Phase 1 Draft EIS because it is technically feasible and could address a portion of the need.

**Figure 2-17. Gas Turbine (Simens, 2015)**

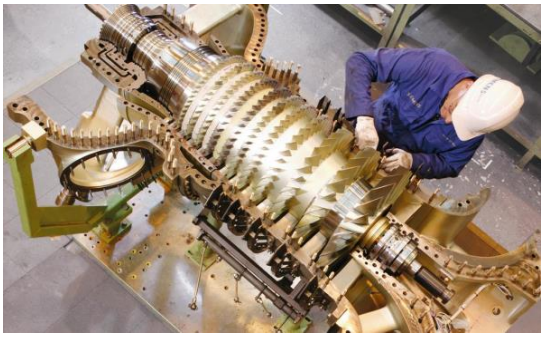


**Figure 2-18. Anaerobic Digester (Biomass Energy Centre, 2015)**

**Figure 2-19. Reciprocating Engine (Madison Gas and Electric, 2015)**

**Figure 2-20. Microturbine (Capstone Turbine Corporation, 2015)**

**Figure 2-21. Fuel Cell (Soutter, 2012)**

**Gas Turbines.** Gas turbines are machines that use hot gas to generate rotary mechanical power. They include a compressor, a combustion system, and a turbine. The compressor pulls air into the engine, pressurizes it, and moves it through to the combustion system. The combustion system injects fuel into the air to produce a hot, high-pressure gas. The high-pressure gas expands, moving through the turbine and causing the blades of the turbine to spin. This spinning action causes the connected generator to produce energy (Department of Energy, 2015).

**Anaerobic Digesters.** Anaerobic digesters use a collection of processes by which microorganisms break down biodegradable material (such as sewage, animal manure, and food waste) in the absence of oxygen, resulting in the production of biogas and digestate fuel. Biogas is a mixture of approximately 60 percent methane and 40 percent carbon dioxide that can be burned in a CHP unit to produce heat and electricity (Department for Environment, Food & Rural Affairs and Department of Energy & Climate Change, 2015).

**Reciprocating Engines.** Reciprocating engines are composed of an internal combustion engine and an electrical generator. The internal combustion engine burns fuel (diesel, propane, natural gas, or gasoline) to power the generator, which converts the power of the engine into electricity (Madison Gas and Electric, 2015).

**Microturbines.** Microturbines are small combustion turbines approximately the size of a refrigerator, with outputs of 25 kW to 500 kW. They are often composed of a compressor, combustor, turbine, alternator, recuperator (a device that captures waste heat to improve the efficiency of the compressor stage), and generator. They work much like a gas turbine, only on a smaller scale (Capehart, 2014).

**Fuel Cells.** Fuel cells are electrochemical devices that combine hydrogen and oxygen to produce electricity.

#### 2.3.3.3.2 Generation Facilities Not Included in EIS Analysis

On-site energy generation can also include solar photovoltaic systems, wind turbines, and *small hydroelectric facilities*. These technologies were not included in Alternative 2 because they would contribute minimally to addressing the identified capacity deficiency.

Solar and wind power are typically less effective at addressing peak power needs because wind and sun may not be at their full potential during periods of peak demand.

A typical 6 kW rooftop solar photovoltaic system installed on a single-family residence generates 6,000 kWh per year. Currently, wind turbines on the Eastside are limited to two small-scale (approximately 1 MW) turbines, due to a lack of consistent wind.

Typically, winter peak system loading occurs in the morning and evening, when solar is less effective because of shorter daylight hours. Solar could help reduce summer peak loads but because additional capacity would continue to be needed for winter, the use of solar generation to address the transmission capacity deficiency would need to be matched by winter generation capacity and therefore would be redundant.

Because there are no identified locations on the Eastside where small hydroelectric facilities would be feasible, it was assumed that small-scale hydroelectric would not contribute to addressing capacity.

#### 2.3.3.4 Energy Storage Component

The energy storage component considers the use of batteries installed within the Eastside that would charge during off-peak periods and discharge to the power supply system during peak demand times (Figure 2-22). Like distributed generation, energy storage would reduce the amount of electricity that must be delivered to the Eastside through the transmission system. While it is possible that home battery storage could occur in homes using technology that is currently being developed, this analysis considers a PSE-controlled facility capable of storing 121 MW, which would be adequate to eliminate emergency overloads (Strategen, 2015). This would require a site of approximately 6 acres and would need to be close to the center of the Eastside, ideally adjacent to an existing substation. Battery storage could be developed at one or more substations, but for this analysis, a total of 6 acres is assumed.

**Figure 2-22. Battery Storage (Wood, 2014)**


The feasibility of using energy storage combined with other previously identified alternatives was studied in March 2015 by Strategen Consulting, LLC. Results of this study can be found in the *Eastside System Energy Storage Alternatives Screening Study* (Strategen, 2015). Conclusions from that study stated the following:

- An energy storage system with power and energy storage ratings large enough to reduce normal overloads has not yet been installed anywhere in the world. For comparison, the largest operational transmission scale battery facility in the U.S. can provide 32 MW of power for about 40 minutes (Strategen, 2015). However, larger facilities are being developed in California and elsewhere.
- The Eastside system has significant constraints during off-peak periods that could prevent an energy storage system from maintaining sufficient charge to eliminate or sufficiently reduce normal overloads over multiple days.
- A system large enough to address the entire transmission capacity deficiency would need to deliver approximately 328 MW of electricity and store 2,338 (MWh) of power. A storage system of this size is not technically feasible because the existing Eastside transmission system does not have sufficient capacity to fully charge the system.
- Summer requirements were not evaluated because the limitations identified during the winter study indicated that energy storage would not be a feasible stand-alone alternative.

For these reasons, energy storage was considered a partial solution that would be implemented together with other demand-side reduction strategies.

#### 2.3.3.1 Peak Generation Plant Component

Peak generation located within the Eastside would provide a source of electricity controlled by PSE that could be used to provide power at peak demand times to reduce the demands on the transmission system. This component would involve installing three 20 MW generators at existing substations within the Eastside. These could be any type of generator but the most likely type would be a *simple-cycle gas-fired generator* (Figure 2-23). These systems typically burn natural gas to turn a turbine that powers a generator, and are sometimes designed to also work with an alternate fuel that can be stored on-site. They can also be combined with heat recovery units to improve overall efficiency. These generators are referred to as peak generation plants.

**Figure 2-23. Simple-Cycle Peak Generation Plant with 3 Gas-Fired Generators (Energy Capital Partners, 2015)**

PSE evaluated using these types of generators alone to meet the project objective. PSE determined that 20 such generators (totaling 400 MW) would be needed because the farther the generator is located from the center of the Eastside, the less effective it becomes at addressing the identified capacity deficiency. Most of the substations on the Eastside are in residential areas, and these types of generators produce a high noise level that would be incompatible with those surroundings. For this reason PSE had eliminated this option from consideration. However, these are proven technologies that could possibly be sited in some locations and be compatible with adjacent uses, addressing a portion of the identified need. Therefore, Alternative 2 includes three 20 MW generators to be implemented in combination with the other components described for Alternative 2.

#### 2.3.3.2 Construction

Construction of energy efficiency measures (such as weatherization and efficient lighting) would be limited and primarily focused on existing building upgrades.

Demand response is an end-user strategy that pertains more to customer usage patterns and requires little construction of new infrastructure. Construction would be limited to installation of meters and in-home monitoring systems and control equipment.

Distributed generation facilities (gas turbines, anaerobic digesters, reciprocating engines, microturbines, and fuel cells) would require minor construction activities primarily on residential and commercial sites. Some would be constructed at the same time as new buildings are being built, while others would be constructed independently. Facilities would

range in size from small rooftop installations to larger facilities requiring up to 1 acre of space. Construction activities for larger facilities could require clearing and grading. Construction duration would vary depending on scale and technology.

The component of Alternative 2 that would require the most construction activity would be the energy storage component. Construction of battery storage facilities would last approximately 6 months and would require standard construction equipment similar to what is required for construction of a substation under Alternative 1. Construction for a battery storage facility would require clearing and grading adjacent to one or more existing substations. The battery storage facility or facilities would occupy approximately 6 acres in total.

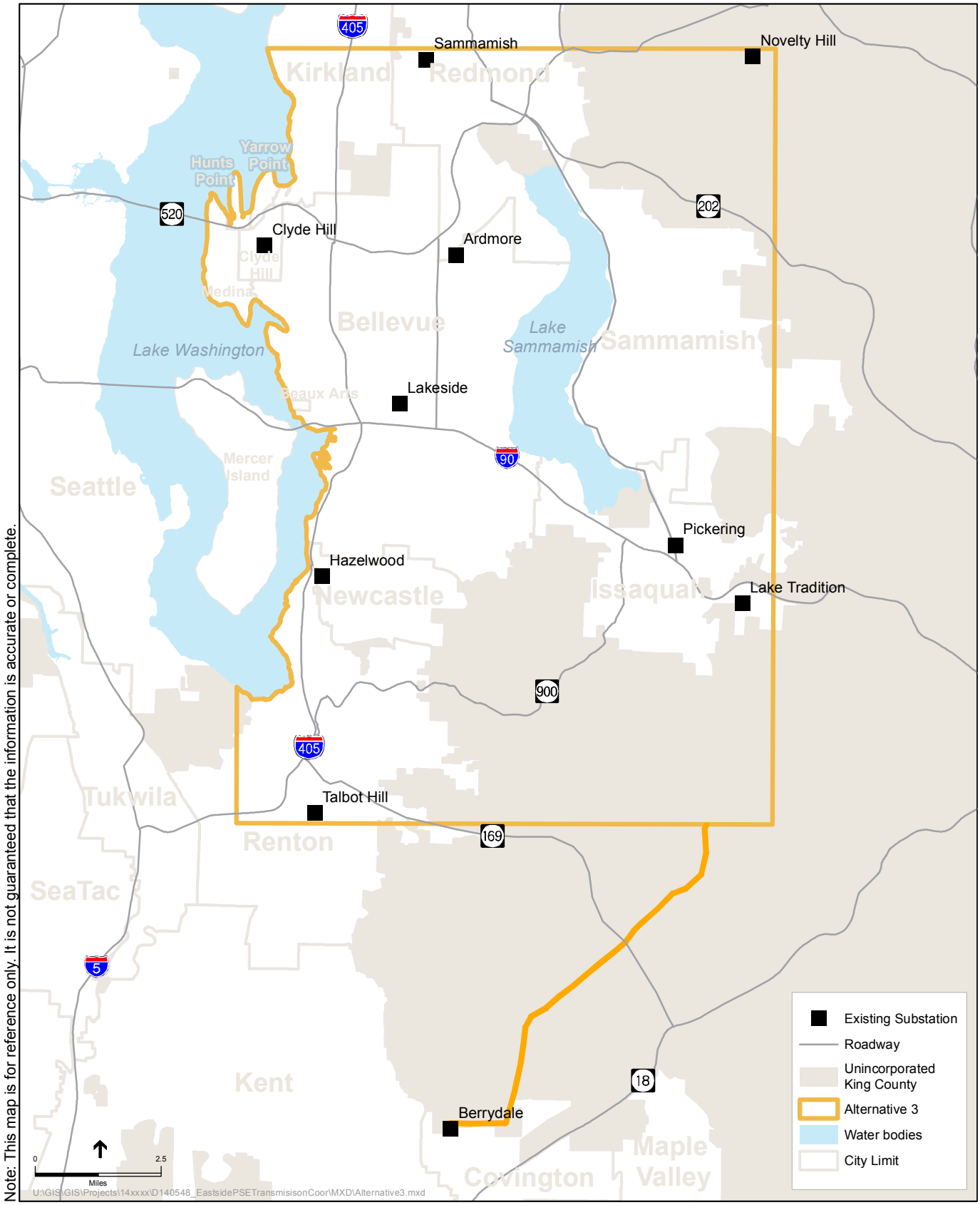
Construction of three gas-fired simple-cycle generators for the peak generation plant component would require construction similar to a substation, including trenching to access upgraded natural gas, water, and wastewater utility lines. Construction would occur within or adjacent to existing PSE substations. The construction duration would be approximately 12 months.

### 2.3.4 Alternative 3: New 115 kV Lines and Transformers

Under Alternative 3, new 115 kV transmission lines would be constructed in existing or new rights-of-way around a broad portion of the Eastside. Figure 2-24 shows the study area for Alternative 3. The Alternative 3 study area includes the same western boundary as Alternative 2 but extends eastward beyond Lake Sammamish and into the foothills of the Cascade Mountains. Portions of the cities of Sammamish and Issaquah are within the Alternative 3 study area.

The transmission lines would be similar to those described for Alternative 1, Option A, except that Alternative 3 would involve shorter poles, smaller foundations, and narrower rights-of-way. The corridor for the 115 kV transmission lines would be in existing corridors such as along roadways, requiring a clear zone 30 to 40 feet wide (refer to Table 2-3, in Section 2.3.5). Alternative 3 would involve construction of approximately 60 miles of new transmission line. Most of the corridor for Alternative 3 would be co-located or constructed adjacent to existing PSE transmission lines or other utility rights-of-way (roadways, rail corridors). New 115 kV transmission lines could be built along existing road rights-of-way that currently do not have overhead transmission lines. Figure 2-25 shows a conceptual routing of lines that PSE developed to estimate the extent of additional 115 kV transmission lines that would be need to meet the project objectives. In instances where there is not an adequate existing transmission corridor, construction would include vegetation clearing to ensure adequate clearance for the new overhead lines.

Operation of Alternative 3 would be similar to Alternative 1 and would involve limited but regular maintenance along the transmission lines. Substation operation would involve regular site inspection and maintenance. All proposed equipment is subject to wearing out and would need to be replaced when this occurs, typically after several years of use. Replacement of conductors would be similar to the final steps of installation. Replacement of substation equipment would be similar to the final stages of construction, involving heavy trucks delivering equipment and cranes to remove and replace equipment.




Note: This map is for reference only. It is not guaranteed that the information is accurate or complete.

SOURCE: King County 2015; ESA 2015; Puget Sound Energy 2015; WA Ecology 2014.

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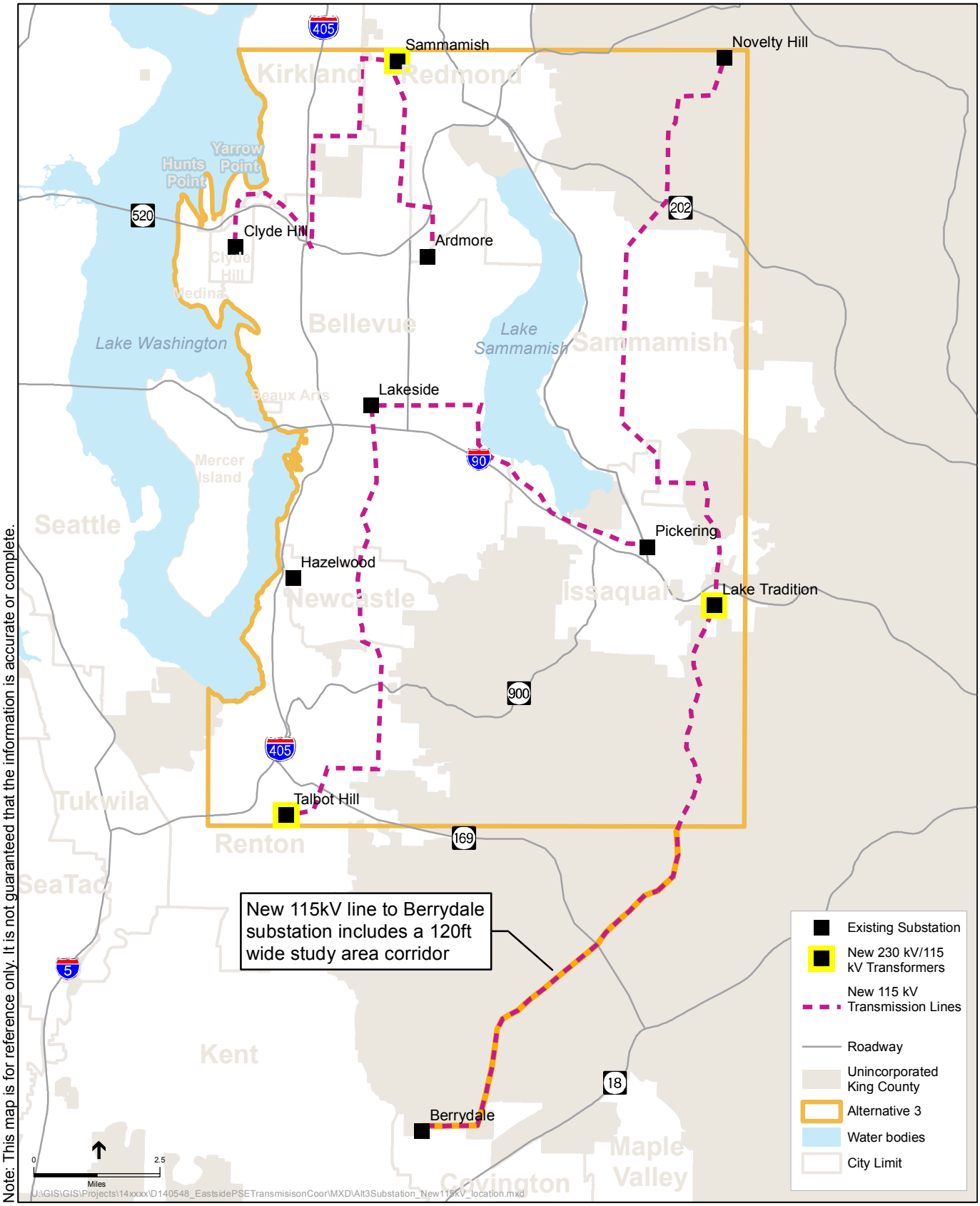
**Figure 2-24**

Alternative 3 Study Area




SOURCE: King County 2015; ESA 2015; WA Ecology 2014; Puget Sound Energy 2015.

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**Figure 2-25**

Alternative 3 - New 115 kV Lines and Transformers

Under Alternative 3, three new 230 kV to 115 kV transformers would be installed, one at each of the existing Lake Tradition, Talbot Hill, and Sammamish substations. In order to accommodate the additional transformers it is assumed, at a minimum, that the Talbot Hill substation would need to be expanded, and that additional security measures would be required at all three substations. At Sammamish and Talbot Hill, this would result in three 230 kV to 115 kV transformers being located in the same substation. PSE considers more than two transformers at a substation to be a high risk because damage to one substation with more than two transformers could take out a substantial portion of the capacity, so this alternative would not strictly meet PSE's current standards for substation design (electrical criterion #1). However, other utilities have developed and safely operated substations with three transformers, so this alternative has been included for the Phase 1 Draft EIS.

#### 2.3.4.1 Construction

**Substation.** The construction methods for substation expansions and improvements would be the same as described in Alternative 1 (Section 2.3.2). Delivery of equipment would require special trucks and space for special equipment such as a crane. Table 2-2 provides a summary of the substation modifications that would be required to accommodate the new 115 kV lines. Some substations could accommodate the new lines, while five substations would require complete rebuilds and expansion for this alternative.

**Table 2-2. Substation Modifications Required for Alternative 3**

| Substation | New 230/115 kV Transformer Required | New 115 kV Line Connections Required to: | Fits in Existing Substation Footprint | Notes |
|---|---|---|---|---|
| Sammamish | Install 3rd 230/115kV Transformer | Ardmore and Clyde Hill | No | Would need to expand the substation footprint by approximately 10 to 20%. |
| Lakeside 115 kV | | Pickering and Talbot Hill | No | Requires substation yard expansion to fit additional buswork. Would not likely need to buy property, but would need to extend approximately 10 to 20% of the existing fence footprint. |
| Lake Tradition | Install 1st 230/115kV Transformer | Novelty Hill and Berrydale | Yes | Requires existing Bonneville Power Administration (BPA) 230 kV line to be extended to bring 230 kV to Lake Tradition substation. |
| Talbot Hill | Install 3rd 230/115kV Transformer | Lakeside and Hazelwood | No | Only enough space for one 115 kV line bay and three would be needed. Would need to expand the yard by approximately 5 to 10%. |

| Substation | New 230/115 kV Transformer Required | New 115 kV Line Connections Required to: | Fits in Existing Substation Footprint | Notes |
|---|---|---|---|---|
| Ardmore | | Sammamish | Yes | Requires fourth line; should fit within the existing substation footprint. |
| Clyde Hill | | Sammamish | No | Requires reconfiguring the substation. Preliminary rebuild designs have the substation increasing about 50 to 60% larger than existing yard. |
| Pickering | | Lakeside 115 kV | Yes | |
| Berrydale | | Lake Tradition | Yes | |
| Novelty Hill | | Lake Tradition | Yes | |
| Hazelwood | | Talbot Hill | No | Requires rebuilding the substation. A preliminary layout has the substation increasing about 200% larger than the existing yard. Additional property potentially needed. |

Source: Strauch, personal communication, 2015a and 2015c

**Transmission poles and lines.** The exact number and locations of lines have not been determined. Figure 2-25 provides a conceptual layout of where new 115 kV lines would be required. A complete routing study would be done to evaluate the feasibility of any potential route. It is assumed that these lines would follow existing utility or road rights-of-way, and would either replace or be co-located with existing transmission and distribution lines wherever possible. This represents approximately 60 miles of new 115 kV lines. It is assumed these lines would be overhead lines. Additionally, an existing Bonneville Power Administration (BPA) 230 kV line would have to be extended to bring 230 kV to the Lake Tradition substation.

For a typical single circuit 115 kV system, without any distribution lines on the same poles, pole heights would generally vary from 60 feet to 75 feet depending on span length, structure configuration, and topography. However, in some instances taller poles may be required to span obstacles, meet right-of-way constraints, and address topographic variations. If co-location is required with existing 115 kV lines (a likely scenario, creating a double circuit), then pole heights would likely need to be up to 40 feet taller (approximately 100 feet total) in order to meet NESC requirements and right-of-way constraints.

Standard single circuit 115 kV lines are constructed on wood poles that are embedded directly in the ground and supported by guy wires as necessary. A hole is augured or created

using a vacuum truck. The pole is placed, and the hole is backfilled with crushed rock. For locations that lack space or right-of-way for adequate guying, self-supporting poles may be utilized that are typically steel or laminated wood. *Insulators* are usually installed directly on the poles, followed by the conductor using the same general methodology as described earlier for the 230 kV system (Alternative 1).

Selection of appropriate pole material for 115 kV or 230 kV lines depends on height requirements, available space for guying, and location along the corridor. NESC requirements dictate the minimum separation between conductors. Turning and termination structures are typically under heavier structural loading and may require the use of down guys or self-supporting structures (i.e., glue-laminate or steel). The conductors for 115 kV would typically be smaller in diameter, but they would not be noticeably different in appearance from those used for 230 kV.

**Length of Construction Period.** Construction sequencing for overhead transmission lines would be similar to construction of Alternative 1, Option A, although some poles may be wood, which require less construction time than steel poles. Construction of transmission lines would last for 24 to 28 months. Along the transmission line, any given location would only see 3 to 5 days of construction activity spread over a period of 2 months. Three to four crews would each install an average of three poles per day.

**Equipment.** Construction equipment required for Alternative 3 would be similar to Alternative 1, Option A (see Appendix B).

#### 2.3.4.2 Conservation

Under Alternative 3, PSE would continue the conservation efforts called out in its *Integrated Resource Plan* (PSE, 2013), as described in the No Action Alternative. Alternative 3 is expected to result in the same levels of conservation as the No Action Alternative.

### 2.3.5 Construction Summary Table

Table 2-3 shows a summary of construction details for each alternative, option, and component. See Appendix B for a list of construction equipment associated with all project alternatives.

**Table 2-3. Construction Summary Table**

| Alternative/ Component | Construction Features | Construction Footprint | Construction Duration |
|---|---|---|---|
| No Action Alternative | Occasional conductor replacement, implementation of new technologies not requiring discretionary permits, and installation of distributed generation facilities under PSE's conservation program | N/A | N/A |
| Alternative 1 – New Substation (all options) | New substation yard with a new transformer and associated electrical equipment | • 3 to 4 acres | Up to 18 months |
| Alternative 1 – Option A: New Overhead Transmission Lines | New 230 kV transmission lines | • 18-mile corridor<br>• 120- to 150-foot-wide clear zone<br>• If located along existing easement, clear zone could be widened by 50 feet | • In any given location, 3 to 5 days within a period of up to 2 months<br>• 12 to 18 months total |
| Alternative 1 – Option B: Existing SCL 230 kV Transmission Corridor | Complete rebuild of existing 230 kV transmission lines | • 15-mile corridor<br>• Up to 2 miles for connector transmission corridors<br>• No new clear zone along existing SCL corridor | Up to 24 months total |
| Alternative 1 – Option C: Underground Transmission Lines | Underground 230 kV transmission lines | • 30-foot-wide work area and permanent clear zone | • Approximately 2 months in any given location<br>• 28 to 36 months total |

| Alternative/ Component | Construction Features | Construction Footprint | Construction Duration |
|---|---|---|---|
| Alternative 1 – Option D: Underwater Transmission Lines | Underwater 230 kV transmission lines | • Cable lines buried 3 to 5 feet below the lake bottom or directly on the lake bottom<br>• Minimum of three landing points for vaults connecting to overland lines<br>• Overland 230 kV transmission lines for approx. 8 miles to connect to substations | 8 months |
| Alternative 2 – Energy Efficiency Component | Existing building upgrades | N/A | Limited |
| Alternative 2 – Demand Response Component | Installation of meters and in-home monitoring systems and control equipment | N/A | Limited |
| Alternative 2 – Distributed Generation Component | Minor construction activities primarily on residential and commercial sites | Facilities ranging from rooftop installations to up to 1 acre | Varying depending on scale and technology |
| Alternative 2 – Energy Storage Component | Installation of battery storage facilities | 6 acres | 6 months |
| Alternative 2 – Peak Generation Plant Component | Three gas-fired simple-cycle power generation facilities | • Construction would occur within or adjacent to existing PSE substations<br>• Up to 1 acre each | 12 months |
| Alternative 3 – New 115 kV Lines and Transformers | 115 kV transmission lines | • 60 miles of corridor<br>• 30- to 40-foot-wide clear zone | • In any given location, 3 to 5 days within a period of up to 2 months<br>• 24 to 28 months total |

## 2.4 ALTERNATIVES CONSIDERED BUT NOT INCLUDED

The following alternatives were identified through scoping but are not included for analysis in the Phase 1 Draft EIS for reasons explained below.

### 2.4.1 Use Existing BPA High-Power Transmission Line

Using the existing BPA line east of Lake Sammamish instead of installing a new 230 kV line in the Eastside is not being included in the Phase 1 Draft EIS because this source is outside the area that PSE has identified as being in need of more electrical power. To connect this source to the deficiency area would require new 115 kV line construction to marginally support the area. PSE considered several scenarios examining this potential solution. These included the following:

- Tapping the BPA Maple Valley – Sammamish 230 kV line and the SCL SnoKing – Maple Valley 230 kV line, and looping a new 230–115 kV Lakeside substation between the tapped lines.
- Using the 230 kV BPA Maple Valley – Sammamish Line to loop into Lake Tradition and installing a new 230–115 kV transformer at Lake Tradition to serve 115 kV load. The solution also included re-conductoring the SCL Maple Valley – SnoKing 230 kV with high-temperature conductors.
- Adding a 230–115 kV transformer at Lake Tradition and looping in BPA Maple Valley –Sammamish 230 kV line. Adding a third 230–115 kV transformer at Sammamish substation and assuming no new 115 kV lines are added to either substation.
- Adding a 230–115 kV transformer at Lake Tradition, looping in BPA Maple Valley – Sammamish 230 kV line, and adding a third 230–115 kV transformer at Talbot Hill substation. It was assumed that no new 115 kV lines were added to either substation.
- Adding a 230–115 kV transformer at Lake Tradition, looping in BPA Maple Valley – Sammamish 230 kV line, and adding a third 230–115 kV transformer at Sammamish substation. This assumed new 115 kV lines would be constructed to both substations.
- Adding a 230–115 kV transformer at Lake Tradition and looping in BPA Maple Valley –Sammamish 230 kV line, and adding a third 230–115 kV transformer at Talbot Hill substation. This assumed new 115 kV lines would be constructed to both substations.

All of these solutions were found to overload either transmission lines or transformers and therefore would not address all relevant PSE equipment violations (electrical criterion #13). See *Eastside Transmission Solutions Report*, October 2013 (updated February 2014), Tables 4.1 and 4.2, and Sections 4.6.3, 4.6.6, 4.6.8, 5.1.1, and 5.1.2 for more information (Gentile et al., 2014).

### 2.4.2 Upgrade/Adjust Existing Electrical System

Several changes and adjustments to the electrical transmission system were proposed as potential solutions. Several related to discontinuing the flow of electricity through the

Eastside to Canada during some peak demand periods. These were described in comments received during scoping regarding renegotiation of the Columbia River Treaty (which relates to river flows and electrical supply across the U.S. - Canada border), diverting power flowing from the south toward Canada to other transmission lines, or simply cutting off power flow to Canada altogether. Disconnecting the system from the region or not providing power to the rest of the region during peak periods is not included as an alternative because it was not considered viable for the following reasons:

- PSE has statutory and regulatory obligations that require being interconnected to the electric grid and that cannot be violated without penalties. Those obligations are with the FERC, NERC, WECC, ColumbiaGrid, and UTC (electrical criterion #1).
- This solution would also compromise PSE's ability to supply power and maintain reliability in an efficient and cost-effective manner; the generation that is owned and contracted for by PSE is generally outside PSE's service area and requires transmission lines to transport that power to PSE's service area. The diversity of the generation mixture provides security in the event that one kind of generation becomes limited (e.g., hydroelectricity in a year with low snowmelt or rainfall). Being part of the regional grid allows the dispatch of the least costly generating units within the interconnected area, providing an overall cost savings to PSE customers. Planned outages of generating and transmission facilities for maintenance can be better coordinated so that overall cost and reliability for the interconnected network is more efficient. Being interconnected also allows economies of scale for both transmission and generation facilities. Finally, this solution could reduce the supply of power to the Eastside, necessitating additional conservation, generation, or storage beyond that considered in the other alternatives in the EIS (electrical criteria #1 and 7).
- Disconnecting the north and south sections of the route at a central Bellevue substation to prevent non-Eastside load from being carried on this line during peak periods of demand on the Eastside would deprive the Eastside of power supply needed during these periods. Separating the system in central Bellevue from the regional grid would also not meet FERC mandatory reliability standards. This could be a CAP, which is temporary in nature and not a long-term solution, and does not bring a new source or new generation into the deficiency area (electrical criteria #1 and 7).
- Relying on BPA projects would not deliver the appropriate amount of power to the Eastside area because the BPA sources are outside the deficiency area and would address only wider regional problems, leaving a deficiency on the Eastside (electrical criterion # 7).
- Renegotiating the Columbia River Treaty is outside the purview of PSE and the Eastside Cities and would not help solve the problem as described previously (electrical criterion #1).

Other suggested solutions made during scoping include converting an existing alternating current (AC) line to a direct current (DC) power line, using "self-healing" lines, and changing conductor types and sizes.

Although switching to DC could potentially address the problem by marginally increasing the capacity of the lines, it would add complexity to the system that would reduce operational flexibility, which could have adverse impacts to the reliability and the operating characteristics of PSE's system. For example, if there was a problem within the DC portion of the system, it would not be possible to switch among other sources, as it is when the entire system is on AC. This alternative has not been included because avoiding such adverse impacts to reliability is one of PSE's stated electrical criteria (electrical criterion #1).

Suggested upgrades to the system (such as self-healing lines, up-conductoring, and installing transformers and inductors) would not improve reliability but would shift electrical load onto other components of the system, causing new deficiencies without addressing the transmission problem. Self-healing lines are automated switching systems that are triggered by adverse events in the system. They do not add capacity to the system, just speed in recovery from an adverse event. Inductors perform similarly, shifting load but not adding capacity. PSE examined up-conductoring in its solutions report and found that increasing capacity of 115 kV conductors led to transformers being overloaded (Gentile et al., 2014). Conversely, adding transformer capacity led to overloading lines. These solutions either do not meet the project objectives, or they offer a short-term solution that would not meet PSE's performance criteria for serving 10 years or more after construction (electrical criterion #1).

### 2.4.3 Larger Generation Facilities

Adding a large generation facility is not included as an alternative. To be effective, PSE found that the facilities would have to be located near the center of the Eastside area, such as near the Lakeside substation. This alternative is not included because the Cities determined that it does not meet SEPA requirements to provide a reasonable alternative that could feasibly attain or approximate a proposal's objectives at a lower environmental cost or decreased level of environmental degradation (WAC 197-11-440(5)(b)). Such a facility would likely have to be gas-fired to be capable of producing power reliably whenever it is needed.

PSE determined that at least 300 MW of power generating capacity would be needed and the most cost-effective way to generate that amount of power would be in a single plant. The 2013 Solutions Report (Gentile et al., 2014) found that small distributed generation and energy storage would have little impact on the problem unless a large number were developed, as described in Alternative 2, Integrated Resource Approach. Generation facilities at the 300 MW size would require gas and/or water infrastructure that is presently unavailable. These types of facilities also generate "atmospheric emissions and noise [that] would be extremely challenging" to permit in a feasible location that would not also require a significant new transmission line (Gentile et al., 2014).

Even if it were economically feasible to create multiple generation facilities of less than 300 MW, such as a series of plants generating 10 MW or more, they would need to be clustered close to the center of the Eastside to be effective, and would likely impose noise, air, and utilities impacts similar to or even greater than a single plant. Therefore multiple generation facilities of greater than 10 MW were not included for the same reason a single large generation plant was not included.

Smaller backup generators within the Eastside could potentially solve the peak demand; however, PSE did not find that there are currently enough generator owners willing to connect to the network to meet the project objectives (Gentile et al., 2014). PSE cannot compel owners of generators to connect to a network. In addition, increased usage of diesel generators would not meet present clean air regulations, and such facilities often have considerable noise impacts. This is not included as a stand-alone alternative because it does not meet PSE's performance criteria of serving 10 years or more after construction (electrical criteria #5, 6, and 15 and non-electrical criterion #3). However, providing a portion of the projected load by this method is examined as part of the distributed generation component of Alternative 2.

Generating more power outside of the Eastside area during peak periods, such as at PSE's existing peak generator plants, would not address the project objectives, because that would still require transmission to deliver power to the load area without risking damage to transmission equipment. This alternative is not included because it would not address the deficiency in the Eastside (electrical criteria #5, 6 and 14). Peak generator plants providing a portion of the projected load within the Eastside are considered under Alternative 2.

### 2.4.4 Submerged 230 kV Transmission Line in Lake Sammamish

The option of using a submerged line in Lake Washington is included in the Phase 1 Draft EIS. Scoping comments also suggested using Lake Sammamish for a submerged line. However, there are a number of technical issues that constrain the feasibility of a Lake Sammamish submerged line. These include the following:

- Submerged cables are typically delivered to a site by ship or barge. Large barges cannot access Lake Sammamish due to the weir at the outlet.
- Weight limits on highways would limit the length of cable reels to 1,100 feet, which would mean approximately 34 splices to reach the length of the lake.
- Highway transport may also be limited due to the 14-foot reel diameter.
- Underwater splices increase the risk of cable failure, while splices on land require construction of a vault at each splice. (Strauch, personal communication, 2015b)

Given these constraints, placing a cable in Lake Sammamish was deemed to not be a viable option.

### 2.4.5 Other Approaches

An alternative addressing a phased approach is not included because it would not address the quickly approaching transmission capacity deficiency during peak periods identified in the Eastside (electrical criterion #10).

Combining alternatives that provide partial solutions was suggested during scoping. Combinations of various solutions were considered. Alternative 2 includes suggested components that would directly address the transmission capacity deficiency in the Eastside that has been identified by PSE. Combinations with other components that would either increase the problem or have little or no effect, such as those listed above, were not carried forward.

Solving the Eastside deficiency requires a reliable alternative composed of one or more of the following:

- A new high-voltage energy source from the outside brought into the deficiency area;
- A new generation source or energy storage of sufficient size and duration installed within the deficiency area; and/or
- Reduction in electrical load during peak demand periods.

Alternatives that would violate PSE's Planning Standards and Guidelines (such as changing a transmission line from AC to DC) or that could harm other utilities in the region (such as disconnecting the Eastside from the regional grid during peak periods) would not become compliant by combining them with other alternatives (electrical criterion #1). Alternatives that would reduce the availability of power to the Eastside (such as limiting the flow of power from sources outside of the Eastside) would require even greater measures to compensate for the reduced power supply to the Eastside (such as new generation or storage, more conservation, or new transmission capacity) and as such would likely have greater impacts than the alternatives that are evaluated in the EIS (electrical criteria #1, 5, 6, and 14). Among the alternatives suggested, this leaves only the alternatives that will be studied and a few alternatives that provide temporary solutions, such as increasing the capacity of wires and transformers, or temporary rerouting of power during peak periods. Combining temporary solutions with the alternatives included in the EIS does not materially change the range of alternatives for the EIS, although such measures could reduce the severity or risk of impacts under the No Action Alternative.

Reducing the scope to include only Bellevue would require a generation facility within the Bellevue city limits, which is not included for the same reasons as indicated earlier under Larger Generation Facilities, or a solution similar to the Integrated Resource Approach (Alternative 2). Therefore, narrowing the scope to include only Bellevue will not be considered as a separate alternative.

## 2.5 BENEFITS AND DISADVANTAGES OF DELAYING THE PROPOSAL

Delaying the project would have the benefit of avoiding the impacts in the near future for the action alternatives described in the EIS. It is possible that by delaying the project, some of the expanded conservation measures described in Alternative 2 would be incorporated into development, reducing energy demand further than PSE has projected. Additional conservation could have the benefit of reducing greenhouse gas generation from electrical consumption on the Eastside. Delaying the project could allow technological advancements to occur in areas such as battery storage or generation, providing additional feasible alternatives to increased transmission capacity in the near term.

The disadvantages of delaying the project are that the risks of power outages (described in Chapter 1) that would be associated with the No Action Alternative could develop over time. It is also possible that the awareness of such risks would discourage development within the Eastside.

# CHAPTER 3. EARTH

## 3.1 HOW WERE EARTH RESOURCES IN THE STUDY AREAS EVALUATED?

This chapter describes earth resources in the combined study area (Alternatives 1, 2, and 3 as depicted on Figure 1-4 in Chapter 1) at a programmatic level. Geology and soils information was obtained from U.S. Geological Survey (USGS) data (including GEOMapNW)[1], and *critical areas* mapping was obtained from study area communities. No site visits were conducted at this stage, largely due to the vast geographical extent of the study area and the programmatic approach to the analysis. In addition to the USGS data, the following sources were reviewed to obtain the data presented in this chapter:

**Earth Key Findings**

Seismic and geotechnical hazards including ground shaking, liquefaction, landsliding, coal mines and other hazards are present throughout the area. Impacts under all alternatives would be minor with implementation of BMPs, geotechnical recommendations, regulatory requirements, and industry standards.

- Natural Resources Conservation Service's soil surveys for King County (NRCS, 2015);
- King County geographic information systems (GIS) web portal (King County, 2015); and
- Information from the Cascadia Region Earthquake Workgroup (City of Seattle, 2015).

## 3.2 WHAT ARE THE RELEVANT PLANS, POLICIES, AND REGULATIONS?

This section provides the relevant regulatory framework including plans, policies, and regulations related to geology and soil resources that would apply to the alternatives proposed in Chapter 2. The National Electric Safety Code (NESC) establishes basic provisions for safeguarding of persons from hazards arising from the installation, operation, or maintenance of (1) conductors and equipment in electric substations, and (2) overhead and underground electric supply and communication lines. The NESC is adopted by the state public utility commission (in Washington it is the Utilities and Transportation Commission or UTC), and utility providers must adhere to it. The NESC also includes work rules for the construction, maintenance, and operation of electric supply and communication lines and equipment. The standards are applicable to the systems and equipment operated by utilities, or similar systems and equipment, of an industrial establishment or complex under the

[1] Geologic mapping in the Pacific Northwest urban corridor is a cooperative effort among the USGS, Washington Division of Geology and Earth Resources, Oregon Department of Geology and Mineral Industries, University of Washington (GeoMapNW), Oregon State University, and Portland State University.

control of qualified persons. This standard consists of the introduction, definitions, *grounding rules*, list of referenced and bibliographic documents, and Parts 1, 2, 3, and 4 of the 2012 Edition of the National Electrical Safety Code (IEEE, 2012).

**Grounding** is a means to provide safety to electrical workers and any people who may come in contact with structures such as streetlights, mast arms, metal poles, and guy wires. The NESC provides rules on grounding components as a means to safeguard any person from injury that could be caused by electrical potential.

*Washington State's Growth Management Act* (GMA) requires all cities and counties to identify critical areas within their jurisdictions and to formulate development regulations to protect these areas (Chapter 36.70A RCW). Among the critical areas designated by the GMA are *geologic hazard areas*, which are areas susceptible to erosion, sliding, earthquake, or other geologic events. These hazards could affect the design, construction, and operation of the project and, if not considered appropriately, could pose a risk to public safety.

As required by the GMA, each city and most of the towns in the combined study area have codes regulating development in or near geologic hazard areas (including building codes). These codes and local policies require measures to address hazards such as slope instability, largely through avoidance by adhering to setbacks (unless a geotechnical slope stability investigation can demonstrate feasibility). Projects are not allowed to increase the potential for slope failure, and they must adhere to performance standards for construction in geologically hazardous areas. Other hazards, such as *liquefaction* and ground shaking, are addressed through implementation of building code standards that include seismic design measures. Feasibility is typically demonstrated through a site-specific geotechnical investigation that identifies underlying soil and bedrock properties, geotechnical hazards, and whether identified hazards can be overcome through application of geotechnical engineering recommendations.

The Washington State Building Code Council (SBCC) was created to advise the Legislature on building code issues and to develop the building codes used in Washington State. These codes help to ensure buildings and facilities constructed in the state are safe and healthy for building occupants, workers, and the public and provide regulations to address various geologic and soils conditions. The state building code is modeled on the 2012 International Building Code and is combined with Washington State amendments. The building code includes requirements for site preparation and foundations for aboveground improvements that represent new loadings (i.e., placement of new structures that require bearing more weight than previously).

Petroleum pipelines are regulated by the U.S. Department of Transportation under the Pipeline and Hazardous Materials Safety Administration (PHMSA). PHMSA's mission is to protect people and the environment from the risks of *hazardous materials* transportation by setting national policy, enforcing standards, and conducting research to prevent incidents. Pipeline safety regulations are contained in Code of Federal Regulations (CFR), Title 49 Parts 190 to 199. In the state of Washington, the UTC is responsible for developing and enforcing safety standards for natural gas and hazardous liquid pipelines located within the state.

*Erosion hazards* are typically addressed through drainage control requirements both during and after construction. Typically, local jurisdictions have clearing and grading requirements within the grading permit process to ensure that earth-disturbing construction activities are conducted in a manner that protects topsoil and minimizes the potential for erosion. Following the construction period, local drainage control requirements include design measures to ensure that stormwater runoff is managed in a way that also minimizes the potential for erosion.

## 3.3 WHAT EARTH RESOURCES AND GEOLOGIC HAZARDS ARE PRESENT IN THE COMBINED STUDY AREA?

### 3.3.1 Regional Geology and Topography

The combined study area is located in the central portion of the *Puget Sound basin*, an elongated, north-south trending depression in western Washington between the Olympic Mountain Range to the west and the Cascade Mountain Range to the east. The regional topography is characterized by a series of north-south trending ridges separated by deep troughs that are now known as Puget Sound, Elliott Bay, Lake Washington, and Lake Sammamish. Land elevations range from about zero up to approximately 3,000 feet above mean sea level at Tiger Mountain (National Geodetic Vertical Datum 29).

The regional topography was formed by the movement of glaciers over thousands of years. The glaciers were up to several thousand feet thick, and soils that were present beneath them are generally very hard and compacted as a result of the weight of the glaciers. More recently, erosional processes and landform changes resulting from human development have modified the regional topography. Geology in the region generally includes recent, surficial soils over a thick sequence of glacially consolidated soils and then bedrock. Subsurface conditions may vary greatly and unpredictably over short distances, and project planners frequently must contend with multiple geological concerns (e.g., expansive soils, artificial fills, corrosive soils, and liquefiable soils) for linear projects such as transmission lines.

### 3.3.2 Soils

The EIS Consultant Team reviewed soils data available from the Natural Resources Conservation Service (NRCS) Soil Survey Data (NRCS, 2015). The NRCS categorizes soils of similar composition into what are called soil series. Table 3-1 provides the soil series identified and their approximate portion of the combined study area.[2]

[2] Table 3-1 only provides soil series that were quantified above 0.2 percent because of the number of series that were identified in smaller percentages. The table also does not include the amount of surface water in the study area, which was calculated at approximately 5.5 percent.

**Table 3-1. Soils in Combined Study Area**

| Soil Series | Percent of Study Areas |
|---|---|
| Alderwood | 44.7 |
| Everett | 10.7 |
| Arents | 8.0 |
| Beausite | 6.3 |
| Ovall | 3.4 |
| Kitsap | 2.7 |
| Urban Land | 2.6 |
| Seattle Muck | 2.2 |
| Indianola | 2.2 |
| Bellingham | 1.3 |
| Neilton | 1.0 |
| Sammamish | 0.9 |
| Puyallup | 0.9 |
| Briscot | 0.8 |
| Ragnar | 0.8 |
| Norma | 0.6 |
| Pits | 0.5 |
| Puget | 0.5 |
| Earlmont | 0.5 |
| Mixed Alluvial Land | 0.4 |
| Pilchuck | 0.4 |
| Tukwila Muck | 0.3 |
| Riverwash | 0.2 |
| Shalcar Muck | 0.2 |
| Snohomish | 0.2 |
| Sultan | 0.2 |

Source: NRCS, 2015.

As shown in Table 3-1, the Alderwood series makes up the soil in almost half of the combined study area. It consists of Alderwood gravelly sandy loam on zero to 8 percent

slopes (1.4 percent), Alderwood gravelly sandy loam on 8 to 15 percent slopes (32.2 percent), Alderwood gravelly sandy loam on 15 to 30 percent slopes (5.8 percent), and Alderwood combined with Kitsap soils on very steep slopes (5.3 percent). The Alderwood series is derived from glacial drift or outwash and is moderately well drained. Erosion hazard (also discussed below) for the Alderwood series is slight on slopes of zero to 6 percent, slight to moderate on slopes of 6 to 15 percent, and severe to very severe on slopes greater than 15 percent. Slippage potential along the geologic contact between the till deposits and the underlying native deposits is moderate to severe on slopes greater than 15 percent (NRCS, 2015).

The Everett soils series is the next most prominent group of soils mapped in the combined study area. It consists of gravelly sandy loam on zero to 5 percent slopes (3.1 percent), gravelly sandy loam on 5 to 15 percent slopes (5.5 percent), gravelly sandy loam on 15 to 30 percent slopes (1.2 percent), and gravelly sandy loams mixed with Alderwood series soils (0.9 percent). Erosion hazard for Everett soils is slight on slopes of zero to 6 percent, slight to moderate on slopes of 6 to 15 percent, and severe to very severe on slopes greater than 15 percent (NRCS, 2015).

The Arents series is also fairly prominent and consists of till plains derived from basal till. Runoff on Arents soils is generally slow, and the erosion hazard is slight (NRCS, 2015).

## 3.3.3 Geologic Hazards

An important consideration for the construction and operation of the alternatives would be the potential to encounter geologic hazards, including steep slopes, erosion, landslides, seismic hazards, and other hazards such as soft soils.

### *3.3.3.1 Steep Slope Hazards*

Steep slope hazards are generally characterized as areas where slopes are steeper than 15 percent or have shown evidence of past slope failure. The state legislature (WAC 365-190-120) defines landslide hazard areas as areas of historic failures, inclines of 15 percent or more containing a geologic contact or groundwater seepage, and bedrock slopes of greater than 40 percent. However, steep slope hazards can occur wherever the force of gravity becomes greater than either friction forces or the internal strength of the rock, soil, or sediment. Slope hazard areas are considered hazards because they are prone to landslides, either during periods of wet weather which reduces friction, as a result of human activities such as grading, or during seismic events. *Landslide hazard areas* are identified in Figure 3-1.

### *3.3.3.2 Erosion Hazards*

Erosion hazards occur where soils may experience severe to very severe erosion from construction activities or through changes in surficial conditions that expose soils to new erosive forces. Erosive forces can come from precipitation, changes in drainage patterns, removal of vegetation, wind, or wave action. Certain types of soil, such as silts, are generally more prone to erosion hazards. The potential for erosion also increases as the slope steepness increases. Surficial soils and topographic maps can be used to identify areas that are particularly susceptible to erosion.

The NRCS rates soils based on an erosion factor "K," which indicates the susceptibility of a soil to *sheet* and *rill erosion* by water (NRCS, 2015). Factor K is one of six factors used to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic m atter and on soil structure and s*aturated hydraulic conductivity* (Ksat). Values of K range from 0.02 to 0.69. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water. The Factor K values for the soils within the study areas range from 0.05 (Everett series on zero to 5 percent slopes) up to 0.43 (Earlmont series and Ellwell series on 30 to 60 percent slopes). Figure 3-1 illustrates areas of high erosion hazard mapped by local jurisdictions in accordance with the GMA.

**Sheet erosion** is the uniform removal of soil in thin layers by the forces of overland stormwater flow.

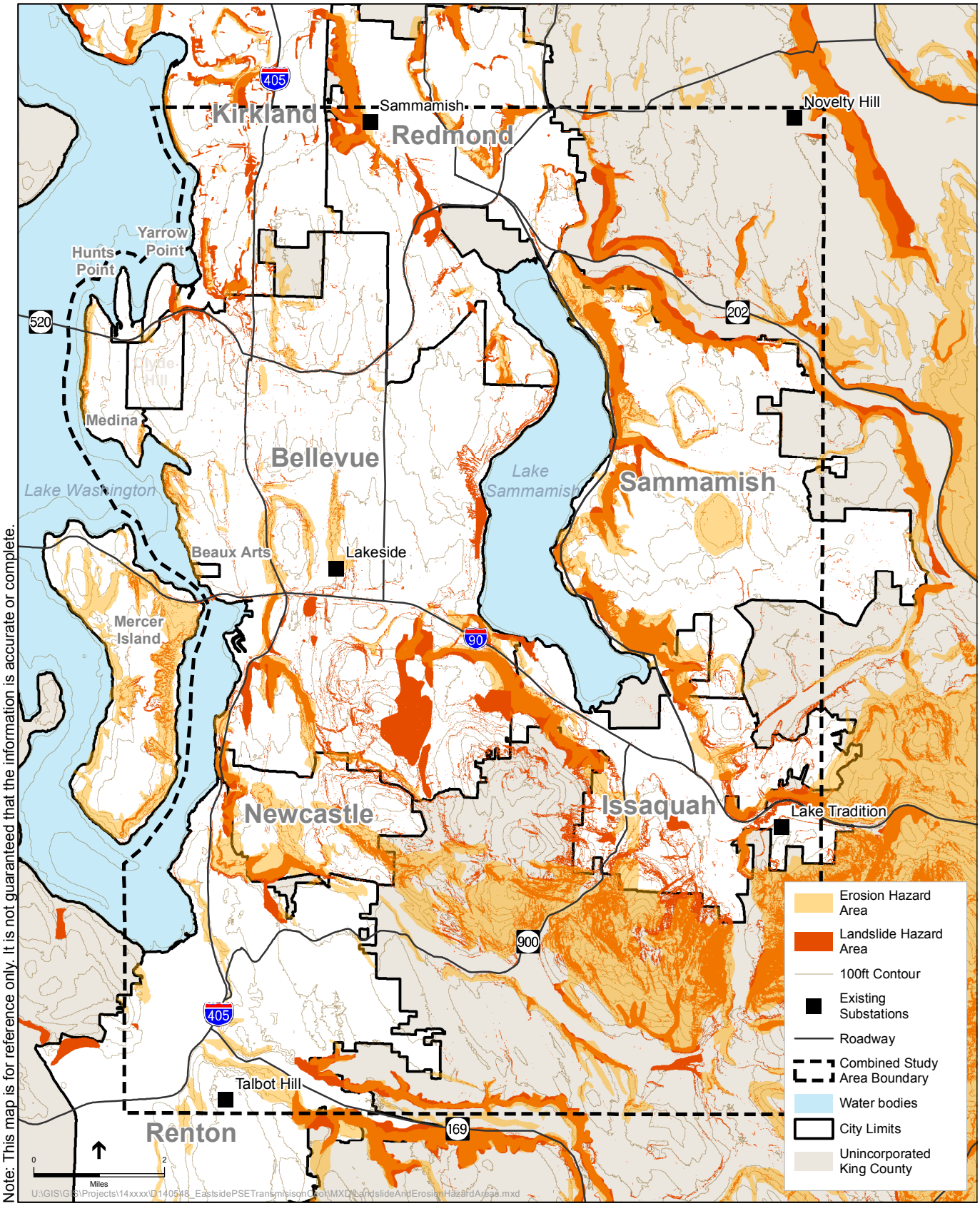
**Rill erosion** is the removal of soil by concentrated water running through little streamlets, or headcuts.

**Saturated hydraulic conductivity** is a property that describes the ease with which a fluid (usually water) can move through saturated media such as soil.

A **perched water table** occurs above the regional water table, in the vadose zone, when there is an impermeable layer of rock or sediment that can suspend the water there.

#### 3.3.3.3 Landslide Hazards

Landslide hazard areas are mapped by local jurisdictions in accordance with the GMA. They include areas where there is evidence of past landslides, where the slope is 15 percent to 40 percent and the soils are underlain by silt or clay that can *perch* groundwater, or where the slope is steeper than 40 percent, regardless of soil type. This type of hazard is closely associated with the steep slope hazard. Landslide hazard areas identified within the combined study area are shown in Figure 3-1.




Note: This map is for reference only. It is not guaranteed that the information is accurate or complete.

SOURCE: King County 2015; Sammamish 2015; Issaquah 2015; Bellevue 2015; Kirkland 2015; Redmond 2015; ESA 2015; WA Ecology 2014.
For more info visit www.energizeeastsideeis.org/map-landslide-erosion

Energize Eastside EIS 140548

**Figure 3-1**

Landslide and Erosion Hazard Areas

### 3.3.3.4 Seismic Hazards

The Puget Sound basin is located within a seismically active area dominated by the Cascadia *subduction zone*, which forms the boundary between two tectonic plates: the North American plate and the Juan de Fuca plate. The project vicinity has been subject to earthquakes in the historic past and will undoubtedly undergo shaking again in the future.

**Subduction** is the process when one tectonic plate moves under another and sinks into the mantle as the plates converge.

**Crustal faults** refer to the deformation caused by tectonic forces that are accumulated in the earth's crust (generally the upper 20 to 30 miles of the earth's surface).

Earthquakes in the Puget Sound region result from one of three sources: the Cascadia subduction zone off the coast of Washington, the deep intraslab subduction zone located approximately 20 to 40 miles below the Puget Sound area, or shallow *crustal faults*.

1. The Cascadia subduction zone shapes the geography of northern California, Oregon, Washington, and southern British Columbia, where the North American plate collides with a number of smaller plates. The largest of these is the Juan de Fuca plate, flanked by the Explorer plate to the north and the Gorda plate to the south. These smaller plates "subduct" (descend) beneath the North American plate as they converge along a 700-mile-long boundary. A large portion of the boundary between the subducting and overriding plates resists the convergent motion, until this part of the boundary releases the stored energy in an earthquake.

2. The closest active crustal source is the Seattle Fault Zone which runs roughly east-west in south Bellevue and roughly parallel to *Interstate 90* (see Figure 3-2). A fault is considered active when it has shown evidence of displacement within the last 11,000 years. An earthquake on the Seattle Fault poses the greatest risk to the Seattle urban region (City of Seattle, 2015).

3. Deep quakes are the most common large earthquakes that have occurred in the Puget Sound region. Quakes larger than magnitude 6.0 occurred in 1909, 1939, 1946, 1949, 1965, and 2001 (City of Seattle, 2015). However, shallow quakes are the type expected on the Seattle Fault Zone, which can create more damage than deep quakes because of the proximity to the epicenter. Damage from earthquakes depends on many factors including distance to epicenter, soil and bedrock properties, and duration of shaking.

*Seismic hazards* include the primary effects of earthquakes, such as ground displacement from fault rupture and ground shaking, as well as secondary effects including liquefaction, *settlement*, tsunamis, and *seiche waves*. These scenarios are defined below.

#### 3.3.3.4.1 Earthquake-induced ground rupture

Defined as the physical displacement of surface deposits in response to an earthquake's seismic waves. The magnitude, characteristics, and nature of fault rupture can vary for different faults or even along different strands of the same fault. Strong ground shaking from a major earthquake can produce a range of intensities experienced at any one location.

Ground shaking may affect areas hundreds of miles distant from the earthquake's epicenter. The ground shaking can result in slope failure, settlement, soil liquefaction, tsunamis, or seiches, all of which pose a risk to the public. Areas considered to be of high seismic risk are depicted in Figure 3-2.

#### 3.3.3.4.2 Liquefaction

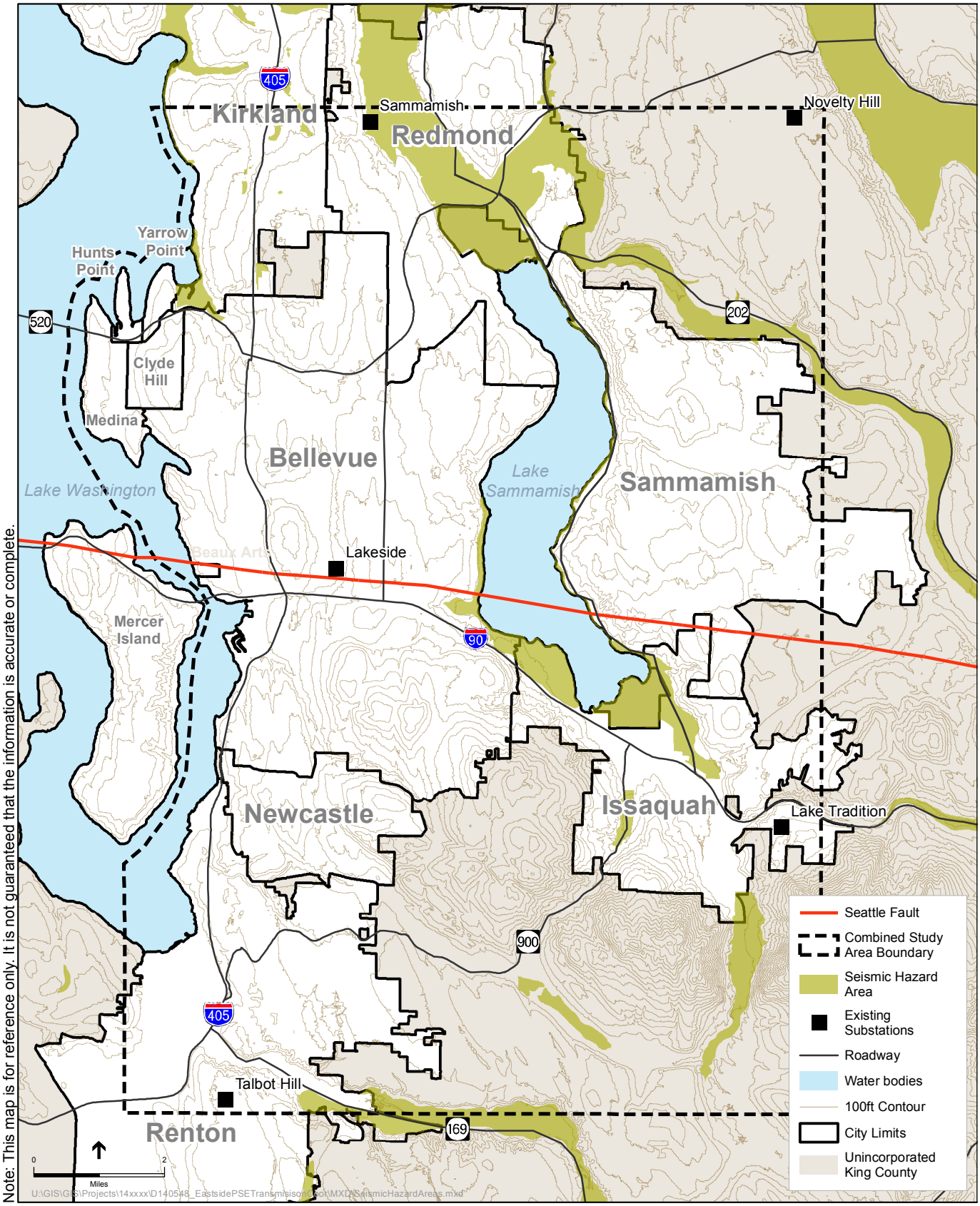
Of particular concern because it has often been the cause of damage to structures during past earthquakes. Liquefaction occurs where soils are primarily loose and granular in consistency and located below the water table. Saturated loose soils that are found within 50 feet of the ground surface are considered at most risk of liquefaction. The consequences of liquefaction include loss in the strength and settlement of the soil. The loss of strength can result in lateral spreading, bearing failures, or flotation of buried utility vaults and pipes. Seismic hazard areas identified in Figure 3-2 are those areas where the foundation soils are considered to be subject to liquefaction or lateral spreading during an earthquake (but could also be susceptible to seismically induced settlement). Typically, these soils are found in low-lying areas near bodies of water, such as along the larger streams and around lakes where is a high probability of loose saturated alluvial soils. In the combined study area, areas such as lowland lakeside areas of the northern and southern tips of Lake Sammamish, as well as the floodplains of the Cedar River and Evans Creek, contain areas considered susceptible to liquefaction.

#### 3.3.3.4.3 Tsunamis or seiches

Possible secondary effects from seismic events. Tsunamis, often incorrectly described as tidal waves, are sea waves usually caused by displacement of the ocean floor. Typically generated by seismic or volcanic activity or by underwater landslides, a tsunami consists of a series of high-energy waves that radiate outward like pond ripples from the area in which the generating event occurred. For the Puget Sound region, either a large subduction zone quake off the coast or along the Seattle Fault could produce a tsunami. However, while a tsunami generated by a distant or Cascadia subduction earthquake could result in much damage to the coast, the impact in King County would not be as great. In the case of a subduction zone quake, a tsunami would travel from the coast through the Strait of Juan de Fuca into Puget Sound, and then south to Seattle. As a result, primary concerns lie with a tsunami or seiche generated by a land movement originating on the Seattle Fault (King County, 2009). A tsunami from the Seattle Fault could create tsunamic waves affecting areas of the shoreline along Elliott Bay which is outside of the study area.

#### 3.3.3.4.4 Seiche waves

Consist of a series of standing waves in an enclosed or partially enclosed body of water caused by earthquake shaking, similar to what could be described as sloshing action. Seiche waves can affect harbors, bays, lakes, rivers, and canals. Both Puget Sound and Lake Washington could experience a seiche as they did in 1891, 1949, and 1964 as well as on Lake Sammamish. A seiche could affect a larger area than a tsunami because of King County's extensive shoreline (King County, 2009). The "sloshing" effect of a seiche could cause damage to facilities close to the water.




Note: This map is for reference only. It is not guaranteed that the information is accurate or complete.

SOURCE: King County 2015; Kirkland 2015; Redmond 2015; Bellevue 2015(fault line); ESA 2015; WA Ecology 2014.

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**Figure 3-2**

Seismic Hazard Areas

#### 3.3.3.1 Other Hazards

Soft soil conditions or soils that cannot support new improvements can also be a form of geologic hazard, causing subsidence or settlement over the short or long term. Soft soils can consist of undocumented fill materials or natural soils that have not been subject to overburden forces and thus have low strengths and are compressible. Other hazards could include coal mining areas and tunnels such as those present in southern Bellevue and Newcastle. Without appropriate design consideration, soft soils can lead to embankment failures during construction or long-term settlement after construction if left unaddressed. The presence of soft soils or soils that are not suitable to support new loadings (i.e., placement of buildings or towers) can only be determined on a site-specific basis through observation and laboratory testing of subsurface materials.

## 3.4 WHAT GEOLOGIC RISKS ARE PRESENT FOR EXISTING ELECTRICAL INFRASTRUCTURE?

PSE is not aware of any past major geological incidents affecting power facilities on the Eastside. Following the Nisqually Earthquake in 2001, PSE reported 200,000 customers without power due to tripped circuit breakers immediately after the earthquake, which was restored to all but 8,000 customers by the end of the day (Nisqually Earthquake Clearinghouse Group, 2001). Systemwide, there have been no structure failures of steel transmission poles due to geologic hazards, and failures of wood poles have been rare, involving extenuating circumstances like placement in a bog or being impacted by a landslide in a remote mountain setting (Strauch, personal communication, 2016).

Although it is possible that the Cascadia subduction zone could move in a way that causes a series of large earthquakes (each measuring magnitude 8.0 to 8.5) over a period of years, the earthquake that many scientists and emergency planners anticipate is modeled on the zone's last major quake in 1700 that caused ruptures from end to end, causing one great earthquake measuring magnitude 9.0 (CREW, 2013). The shaking that results from this type of abrupt shifting of the earth's crust would be felt throughout the Pacific Northwest, causing shaking for 4 to 6 minutes. In general, the intensity and destructiveness of the shaking will be greater at locations closer to the plate interface, with coastal areas experiencing the highest intensities and the level of shaking diminishing farther inland. Distance, however, is not the only factor: local geologic conditions, including soil type, can increase or decrease the intensity of the shaking and produce a range of secondary effects, including landslides and liquefaction (the latter occurs when certain types of soil lose cohesion and behave like a liquid). Widespread power outages are expected throughout the Pacific Northwest, including the combined study area, from downed power lines or damage to substations as a result of an earthquake. Slope failure, soil erosion, etc. could also impact electrical infrastructure by causing downed power lines or other damage to infrastructure that would interrupt service.

## 3.5 HOW WERE POTENTIAL EARTH IMPACTS ASSESSED?

Geology and soil considerations important to the Energize Eastside Project include general topography, underlying geological characteristics and properties, and soil characteristics, as well as seismic and other related geologic hazards. These considerations affect the type of construction methods used for the project and, if not adequately considered during project design, could affect the long-term safety of the proposed improvements. Regional geology and seismicity would not change as a result of the project, but they would have an important influence on how the project is designed and constructed.

Potential impacts were determined by identifying the range of geologic hazard areas and soil types present within the study area associated with each alternative.

**Minor** - If implementation of regulatory requirements and project design would address potential adverse impacts such that there would be little likelihood of adverse or even noticeable effects. While some damage might be anticipated during a seismic event, provided that there is protection of human health and limited disruption to power supply capabilities, impacts would be considered minor.

**Moderate** - If implementation of regulatory requirements and project design would address most potential adverse impacts, but some reasonable potential for adverse or substantive effects would remain such that risks to human health or structural improvements would remain above acceptable levels[3].

**Significant** – Even with implementation of regulatory requirements and design measures, if substantive damage, injury, death, or widespread or long-term interruption of power supply would likely occur, then impacts would be considered significant. With regard to seismic hazards, these impacts would be considered significant even if the probability is remote.

## 3.6 WHAT ARE THE LIKELY CONSTRUCTION IMPACTS RELATED TO EARTH?

Construction activities involve varying degrees of earthwork, including grading, excavation, and stockpiling of soils. Soils formerly protected by vegetation or covered by asphalt or concrete can become exposed to winds and water flows that can result in soil erosion or loss of topsoil. As detailed in Chapter 5, projects that disturb more than 1 acre would be required to obtain a General Construction Permit through the *National Pollutant Discharge Elimination System* (NPDES) program. Such projects must include construction *best management practices* (BMPs), as detailed in a *Stormwater Pollution Prevention Plan*

[3] The use of "acceptable levels of risk" is used here to acknowledge that eliminating all risk from geotechnical hazards such as seismic groundshaking and landslides is technically not feasible, and due to the inherit uncertainties regarding the timing and severity of natural disasters, some risk will inevitably remain. However, the basis for regulatory requirements including those set by the National Electric Safety Code (NESC), Federal Energy Regulatory Commission (FERC), and the North American Electric Reliability Corporation (NERC) requirements take into account a variety of risk factors that are protective of human health.

(SWPPP). These BMPs are developed on a project-specific basis and may vary depending on the activities involved. Typical examples of construction BMPs could include installation of silt fences, use of straw bales, or application of soil stabilization measures that are designed to minimize the potential for erosion to occur on exposed areas. In general, these water quality BMPs are effective in minimizing erosion and loss of topsoil such that additional protection measures are not necessary, and with implementation the BMPs would result in a minor impact for all construction activities.

## 3.6.1 Construction Impacts Considered

Construction activities common to all action alternatives have the potential to cause a number of short-term impacts on the environment related to geology and soils, including the following:

### 3.6.1.1 Erosion Hazards

Clearing of protective vegetation, fill placement, and spoils removal or stockpiling during construction allows rainfall and runoff to erode soil particles. The severity of potential erosion depends on the quantity of vegetation removed, site topography, rainfall, types of soils, and the volume and configuration of soils stockpiled. BMPs that could help minimize erosion hazards include, but are not limited to, the following:

- Maintaining vegetation cover and providing adequate surface water runoff systems;
- Constructing silt fences downslope of all exposed soil and using plastic covers over exposed earth; and
- Using temporary erosion control blankets and mulching to minimize erosion prior to vegetation establishment.

### 3.6.1.2 Slope Instability and Landslide Hazards

Construction of the proposed infrastructure could involve grade changes, cuts and fills, and installation of bridge and retaining wall structures in areas susceptible to landsliding or slumping of hillsides. Geotechnical evaluations and slope stability analysis, where necessary, would be completed to limit the risk of impacts resulting from constructing in landslide hazard areas. Construction in landslide hazard areas is more likely to occur under Alternatives 1 and 3 than Alternative 2.

All grading and cut-and-fill activities would be done in accordance with a grading plan that would be developed following a final geotechnical evaluation for the proposed improvements. Construction specifications would include quality assurance programs that prohibit construction in oversteepened slopes in accordance with local and state building code requirements.

### 3.6.1.3 Seismic Hazards

An earthquake could occur during construction, resulting in embankment slope failures, liquefaction, ground settlement, or equipment destabilization. The risk of seismic hazards to construction is considered low because of the relatively low probability that an earthquake

would coincide with the actual limited construction period. If a large earthquake were to occur, the major risk would be to the ongoing construction activities although injury to workers is also possible. Work schedules would likely be delayed as efforts are made to repair damaged components of the work. Damage to exposed cuts or fills could disrupt utilities or nearby structures.

#### 3.6.1.4 Construction-Induced Vibrations

The use of heavy equipment during construction causes ground vibrations. The level of vibrations depends on the type of heavy equipment, distance from the source, and ability of the soil to transmit vibrations. The main concern for construction vibration is potential damage to structures. Most construction processes do not generate high enough vibration levels to approach damage criteria because ground vibrations tend to dissipate quickly with distance. The major sources of construction vibration include impact pile driving, augered piling, vibratory rollers, and horizontal directional drilling.

#### 3.6.1.5 Olympic Pipeline

In addition to the aforementioned hazards, portions of the existing 115 kV overhead easement corridor are shared with the Olympic Pipe Line Company (OPLC) which operates two steel pipelines that transport petroleum products. The pipelines are 16 inches and 20 inches in diameter and buried approximately 3 to 4 feet below the ground surface. Construction of new transmission lines in the vicinity of the petroleum pipelines or other earthwork activities in or near these pipelines could represent potential hazards from inadvertent contact, causing excessive ground vibrations, or result in damage from erosion. Although a significant adverse impact could occur during construction near petroleum pipelines, these potential hazards do not constitute a probable impact due to existing regulations and practices in place for pipeline safety. OPLC has stringent construction requirements in the area of its pipelines and would continue close coordination with PSE for all construction activities located adjacent to these pipelines. Therefore, no potentially significant adverse impacts related to work near pipelines are expected under any of the alternatives. See also Chapter 8 for a discussion of potential rupture hazards.

### 3.6.2 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, no construction impacts related to geologic and seismic hazards are anticipated.

### 3.6.3 Alternative 1: New Substation and 230 kV Transmission Lines

Impacts are described according to the major components associated with Alternative 1. The substation impacts are described first, followed by transmission line options.

The expansion of the substations or construction of a new substation would require clearing and grading to prepare the area for foundations to support the new transformer. The new transformer would also require supporting equipment that would be placed on a concrete pad in accordance with regulatory requirements and industry standards. All construction activities

for the expansion of the substations would be done in accordance with identified BMPs to minimize erosion, resulting in minor effects.

The transmission lines considered under this alternative fall under four different options, and they all involve some disturbance of surface soils or submerged soils. Disturbance of site soils would be necessary for clearing and grading to prepare foundation pads, as well as potentially a staging area and equipment access depending on the location of the transmission line.

#### 3.6.3.1 Option A: New Overhead Transmission Lines

Under this option, a minimum of 18 miles of new overhead transmission lines would be constructed. Most construction would occur within existing easements but could also occur in new locations that might need more extensive grading and clearing activities. As noted above, construction activities would be conducted in accordance with BMPs outlined in the SWPPP prepared for the NPDES construction permitting. These erosion control BMPs would cover all construction activities and provide protection of any disturbed soils. Implementation of these BMPs would ensure that the potential for erosion during construction is minimized such that impacts would be minor.

In addition, prior to construction, geotechnical evaluations would be completed to identify and limit potential impacts resulting from constructing in landslide hazard areas. Construction specifications would include quality assurance programs that prohibit construction in oversteepened slopes in accordance with local and state building code requirements.

#### 3.6.3.2 Option B: Existing Seattle City Light 230 kV Transmission Corridor

This option includes rebuilding both of the Seattle City Light SnoKing-Maple Valley 230 kV transmission lines and constructing a new transmission substation. This option would result in less disturbed area and a reduced potential for erosion and other hazards compared to Alternative 1, Option A. Implementation of required BMPs in accordance with NPDES Construction General Permit requirements would be effective in ensuring that the erosion potential is minor.

#### 3.6.3.3 Option C: Underground Transmission Lines

Placement of the new transmission lines underground would require the most disturbance of surface soils and have the greatest potential for erosion compared to the other options. This is because of the amount of earthwork required to create trenches and potentially the need for imported fill in cases where the natural soils are not suitable for reuse. Adherence to the NPDES Construction General Permit would be effective in reducing the erosion potential to the point it would be considered minor.

#### 3.6.3.4 Option D: Underwater Transmission Lines

Depending on the underlying conditions present, the installation of underwater transmission lines could be completed using trenchless methods, such as horizontal directional drilling, or

trenching methods using special vessels to dredge the trenches. Trenchless methods would disturb soils at the entry and exit points (where the splicing *vaults* would be located landside) to enable the horizontal drilling equipment to reach desired depths. Ultimately, trenchless methods would result in less disturbance than conventional methods, and BMPs would also be required at the entry and exit points to ensure that erosion potential is minimized. Underwater dredging using conventional methods would result in localized disruption of sediments during construction, however, they would likely be reused to bury the line (water quality impacts associated with *turbidity* are discussed in the Chapter 5). Nonetheless, both trenchless and conventional methods would require implementation of BMPs for all landside disturbances, ensuring that erosion potential is minimized and impacts reduced to minor levels consistent with applicable in-water permit requirements.

### 3.6.4 Alternative 2: Integrated Resource Approach

Potential construction impacts under Alternative 2 would be much more limited than Alternative 1 because less construction of new infrastructure would be necessary. Clearing and grading would be necessary for the battery storage site and peak generator plants. Depending on location, this could include replacing major gas mains to increase natural gas supply capacity. Construction BMPs would be implemented to address potential erosion impacts. Earthwork activities would be done in accordance with design plans supervised by a state-licensed geotechnical engineer, and thus potential impacts would be minor.

### 3.6.5 Alternative 3: New 115 kV Lines and Transformers

Alternative 3 would replace or co-locate over 60 miles of new 115 kV transmission and distribution lines. The lines would be constructed overhead and would generally have similar potential construction impacts to Alternative 1 although the amount of construction would be greater. By covering a greater area there would likely be more probability of encountering critical areas such as steep slopes or unstable soils. As noted above for Alternative 1, geotechnical evaluations would identify and limit potential impacts resulting from constructing in landslide hazard areas. Construction specifications would prohibit construction in oversteepened slopes in accordance with local and state building code requirements.

During construction, erosion control BMPs would be implemented during all earthwork activities to address potential erosion impacts. Earthwork activities would be done in accordance with design plans supervised by a state-licensed geotechnical engineer.

Therefore, with implementation of required erosion control BMPs and other applicable permit requirements, construction impacts would be minor.

## 3.7 HOW COULD OPERATION OF THE PROJECT AFFECT EARTH RESOURCES?

### 3.7.1 Operation Impacts Considered

All of the alternatives would rely on an electrical system that crosses seismic and other geologic hazard areas. In general, Alternative 2 would have a more limited geographic

coverage than Alternatives 1 and 3, but facility footprints for energy storage and peak generation plant components could be large (similar in size to a substation). The study areas cover relatively large geographical areas that contain a range of geologic conditions and potential hazard areas, from flat lowland areas of the floodplains to upland areas with steep topography. In general, potential impacts would likely include the following:

#### 3.7.1.1 Erosion Hazards

Clearing of protective vegetation or asphalt/concrete, fill placement, and spoils removal or stockpiling during construction allows exposed soils to be susceptible to the erosive effects of wind and water. However, once the project is constructed, revegetation or replacement with asphalt or concrete would reduce the potential for erosion. As noted above, the project would be required to adhere to the NPDES Construction General Permit. This permit includes postconstruction BMP requirements to ensure that drainage is managed during project operation to protect soils from erosion.

#### 3.7.1.2 Slope Instability and Landslide Hazards

Proposed improvements would consist primarily of new or expanded substations or development of storage or generation facilities, as well as construction of new transmission lines that would have a relatively limited footprint. These facilities would be in developed areas and would be subject to building codes that require geotechnical investigations and an evaluation of slope stability where necessary.

In addition, transmission poles and towers constructed under Alternatives 1 and 3 would adhere to construction standards as outlined in National Electric Safety Code (NESC), Federal Energy Regulatory Commission (FERC), and North American Electric Reliability Corporation (NERC) requirements including foundation designs to ensure long-term stability. Also, the American Society of Civil Engineers (ASCE) produces Manual No. 74 that provides Guidelines for Electrical Transmission Line Structural Loading, including standards for reliability-based design to prevent cascading types of failures.

#### 3.7.1.3 Seismic Hazards

Seismic activity is likely to occur during the life of the proposed improvements[4] and could be substantial, resulting in significant damage, power outages, injury, and death, if the facilities are not designed appropriately. Catastrophic failures of circuit breakers, transformer bushings, and disconnect switches at substations or downed power lines can result in widespread power outages. For the substation expansions under Alternatives 1 and 3, prior to the issuance of grading permits, PSE would be required to retain a Washington-licensed geotechnical engineer to design the project facilities to withstand probable seismically induced ground shaking at each location. All grading and construction would adhere to the specifications, procedures, and site conditions contained in the final design plans, which would be fully compliant with the seismic recommendations of the Washington State Building Code and any local building code amendments. The required measures would encompass site preparation and foundation specifications.

[4] In general, the design life of improvements is considered to be very roughly 50 years.

The final structural design would comply with NESC 2012 as adopted by the UTC, which also includes seismic standards. For the transmission lines, NESC 2012 states that the structural requirements necessary for wind/ice loadings are more stringent than seismic requirements and sufficient to resist anticipated earthquake ground motions. In addition, according to ASCE Manual No. 74, "transmission structures need not be designed for ground-induced vibrations caused by earthquake motion because historically, transmission structures have performed well under earthquake events, and transmission structure loadings caused by wind/ice combinations and broken wire forces exceed earthquake loads." Nonetheless, load comparisons would be performed between a seismic event and extreme weather conditions to ensure that the appropriate structural design would be able to withstand either of these conditions.

#### 3.7.1.4 Liquefaction

Liquefaction of soils during an earthquake could result in vertical and lateral displacements of structures, embankments, and paved areas, potentially resulting in substantial damage or injury and system outages. The liquefaction potential of each project site would be confirmed during the design stage as required by law. Design of structures to resist seismic forces and secondary effects such as liquefaction would be required.

#### 3.7.1.5 Unstable or Unsuitable Soils

Existing soils that cannot support proposed improvements, cannot be reused as structural fill or landscape material, or could cause corrosion of subsurface improvements could be a source of damage to new facilities. Geotechnical investigations would identify underlying materials and their engineering properties including the presence of unique geotechnical conditions such as areas with shallow soils over bedrock or the presence of former coal mining tunnels. Soils unsuitable for use as structural fill, such as expansive soils or compressible soils, would be replaced such that foundation soils would be able to meet building code specifications.

See also Chapter 8 for discussion of other potential health effects such as seismic safety related to the proposed improvements.

### 3.7.2 No Action Alternative

Under the No Action Alternative, PSE's existing maintenance activities and programs would continue. No utility line or facility construction is likely and there would be no additional loss of vegetation or disturbance to animals from new permanent structures. However, there will be continued loss or disturbance of vegetation as a result of PSE's Transmission Vegetation Management Program; trees would be trimmed, managed with herbicides or removed under existing transmission lines to limit vegetation to low-growing height species.

The types of conservation measures PSE expects to implement to achieve its goals would occur on customers' properties. No permanent impacts are likely from operation since new infrastructure would be minimal and not require substantial clearing or result in other habitat impacts.

Under the No Action Alternative, PSE would use Corrective Action Plans instead of building new infrastructure to address risk in the near term. With no new improvements, there would be no operational impacts related to geologic and seismic hazards. However, it is possible that PSE would implement new technologies and there would be continued maintenance activities. These would likely represent very minor physical improvements that would have negligible potential geologic and seismic hazard impacts.

## 3.7.3 Alternative 1: New Substation and 230 kV Transmission Lines

Following construction, the new facilities could be subject to or contribute to impacts from erosion, slope instability, seismic hazards, liquefaction, unstable soils, and ground vibrations. However, with proper facility design measures in accordance with regulatory requirements discussed earlier and appropriate maintenance, the potential for these impacts would be minor for the substation and as described for each transmission line option below.

### *3.7.3.1 Option A: New Overhead Transmission Lines*

Under this option, a minimum of 18 miles of new overhead transmission lines would be constructed. As noted above, the transmission lines would be constructed in accordance with the standards outlined by NESC, FERC, NERC, and ASCE Manual No. 74. In areas of common utility corridors, coordination with other utility providers would be conducted as appropriate. Site-specific geotechnical investigations would be required to define the underlying engineering properties and identify any geotechnical hazards that may be present. Geotechnical engineering methods, such as use of engineered fill or foundation design, would be used to ensure that the effects of any identified hazards are minimized and impacts during operation would be minor.

### *3.7.3.2 Option B: Existing Seattle City Light 230 kV Transmission Corridor*

This option includes rebuilding the Seattle City Light SnoKing-Maple Valley 230 kV transmission line and constructing a new transmission substation. The three potential sites for the new substation, referred to as Vernell, Westminister, and Lakeside, are all located within areas that are not identified as landslide or seismic hazard areas but are within areas considered an erosion hazard (Figure 3-1). Of note, the Lakeside substation is located relatively close to the Seattle Fault trace and therefore could potentially be subject to higher ground shaking hazards. However, site-specific geotechnical investigations would identify any geologic or seismic hazards such as unstable soils, liquefaction, landslides, or others and provide geotechnical engineering recommendations to minimize any adverse effects. Impacts would be minor with implementation of geotechnical recommendations in accordance with regulatory requirements.

### *3.7.3.3 Option C: Underground Transmission Lines*

Placement of the new transmission lines underground removes many of the geotechnical considerations for safe design such as structural loading and seismic ground shaking. In general, buried improvements perform well during a seismic event, although they can be subject to damage from liquefiable soils, if present. Sand boils or lateral spreading, both related to liquefaction, can cause substantial damage in underground improvements if not

designed appropriately. However, as mentioned above, all improvements including underground transmission lines would require geotechnical investigations to determine the geotechnical engineering properties of site-specific materials prior to construction. Engineering approaches such as treatment of liquefiable soils or replacement with engineered fills can reduce these potential impacts such that they would be considered minor.

#### 3.7.3.4 Option D: Underwater Transmission Lines

Once completed, underwater transmission lines would generally be expected to perform very well in an earthquake event, although they could be susceptible to liquefaction hazards if not designed appropriately. However, with incorporation of geotechnical recommendations in accordance with regulatory requirements, potential impacts would be reduced to minor levels.

### 3.7.4 Alternative 2: Integrated Resource Approach

Alternative 2 includes energy efficiency methods, end-user strategies, and small-scale distributed generation improvements (gas turbines, anaerobic digesters, and others) that would require less new construction than Alternatives 1 or 3. There would still be some relatively large-scale facilities such as the battery storage and peak generation plants and any future improvements after the end of the 10-year target period when additional solutions are required to address future growth. These facilities would have seismic considerations similar to substation expansion under Alternative 1. As a result, operational impacts would generally be the same as Alternative 1. Conformance with industry standards and regulatory requirements, including building code requirements enforced by local jurisdictions and the UTC, would ensure that geotechnical and seismic hazards are identified and design plans developed to minimize adverse effects from these hazards to minor levels.

#### 3.7.4.1 Energy Efficiency Component

Energy efficiency strategies would not involve much new construction. Impacts related to earth resources would be negligible.

#### 3.7.4.2 Demand Response Component

Demand response is an end-use strategy that pertains more to customer usage patterns and requires little construction of new infrastructure. Impacts related to earth resources would be negligible.

#### 3.7.4.3 Distributed Generation Component

On-site energy generation could involve the construction of gas turbines, anaerobic digesters, reciprocating engines (e.g., diesel generators), microturbines, and fuel cells. In general, these on-site facilities would entail relatively small footprints. Similar to Alternative 1, new facilities would require compliance with existing regulatory requirements. As a result, there would be little likelihood for these improvements to result in adverse effects related to earth resources, and the potential impacts would be considered minor.

#### 3.7.4.4 Energy Storage Component

Energy storage units would consist of relatively large battery sites constructed on sites approximately 6 acres in size (Strategen, 2015). The battery sites would receive geotechnical evaluations to identify any site-specific hazards and geotechnical recommendations to ensure that the new improvements can withstand the anticipated new loadings (i.e., weight of the batteries and *appurtenances*). Incorporation of geotechnical recommendations including site preparation methods and foundation design would ensure that any identified geologic hazards are minimized, resulting in minor impacts.

#### 3.7.4.5 Peak Generation Plant Component

Simple-cycle gas-fired generators would be installed at existing substations within the Eastside and would require substation expansion at each location. Similar to energy storage sites, but at a much smaller scale (footprint is 2,000 square feet); generator sites would receive geotechnical evaluations to identify any site-specific hazards and recommendations to ensure that the new improvements can withstand the anticipated new loadings (i.e., weight of the batteries and appurtenances). Incorporation of geotechnical recommendations including site preparation methods and foundation design would ensure that any identified geologic hazards are minimized, resulting in minor impacts.

### 3.7.5 Alternative 3: New 115 kV Lines and Transformers

Alternative 3 involves the most new construction and covers the widest area of the alternatives considered. These new improvements would likely encounter a range of geotechnical and seismic hazards that would be identified in site-specific geotechnical investigations. Similarly, the proposed transmission line from Lake Tradition to Berrydale would also encounter a range of geotechnical and seismic hazards such as the seismic hazard areas (liquefaction) associated with the Cedar River floodplain.

As noted in Chapter 2, five substations would require complete rebuilds and expansion for this alternative including Sammamish, Lakeside, Talbot Hill, Clyde Hill, and Hazelwood. The Sammamish and Hazelwood substations are adjacent to a mapped landslide hazard area. The Lakeside and Hazelwood substations are adjacent to mapped erosion hazards. In addition, the Lakeside substation is relatively close to the Seattle Fault. The remaining two substations, Talbot Hill and Clyde Hill, are not within or near any identified hazard areas.

The location of these substations relative to hazard areas does not necessarily preclude the feasibility of developing the improvements in a way that minimizes any hazards that may be present. With incorporation of regulatory requirements such as NESC 2012 and NERC/FERC standards and requirements, the proposed improvements would be designed and constructed to minimize hazards such as seismic ground shaking, liquefaction, and unstable soils. As a result, the potential impacts would be minor.

## 3.8 WHAT MITIGATION MEASURES ARE AVAILABLE FOR POTENTIAL IMPACTS TO EARTH RESOURCES?

### 3.8.1 Construction Measures

Use of the following measures during construction would reduce or minimize the potential for erosion, slope failure, unsuitable soils, or settling impacts for all alternatives that involve earthwork:

- Avoid construction on steep slopes, known and potential landslide zones, and areas with organic or liquefiable soils, where feasible.
- Use appropriate shoring during construction.
- Use erosion and runoff control measures, including retention of vegetation, replanting, ground cover, etc.
- Comply with relevant state and local critical areas codes and other applicable requirements.
- Dispose of soils at approved disposal sites.
- Coordinate with other utility providers, as appropriate, to determine how best to avoid or minimize any impacts. PSE would work with other utility service providers during design of the project to coordinate the placement of new facilities and ensure protection of other utilities.
- Conduct settlement and vibration monitoring, as applicable, during construction to identify potential adverse conditions to critical structures and local facilities.

If site-specific earth impacts are identified during future review of individual projects, additional measures to reduce or minimize those impacts may be identified.

### 3.8.2 Operation Measures

Use of the following measures during operation would reduce or minimize the potential for erosion, slope failure, unsuitable soils, or settling impacts for all alternatives that involve earthwork:

- Monitor all improvements for changes in conditions such as cracking foundations, slumping slopes, or loss of vegetative cover.
- Implement inspection and maintenance programs for all improvements to ensure consistent performance and stability.
- Comply with relevant state and local critical areas codes.

If changes are identified during future inspection and monitoring of conditions, additional measures to reduce or minimize those impacts may be identified.

## 3.9 ARE THERE ANY CUMULATIVE IMPACTS TO EARTH RESOURCES AND CAN THEY BE MITIGATED?

Although the entire region is a seismically active area, geologic and soil conditions vary widely within a relatively short distance. Other projects in the area would also be required to adhere to the same Washington state and local building codes as the Energize Eastside Project, which would reduce the risk to people and property in the region. While future seismic events cannot be predicted, adherence to federal, state, and local programs, requirements, and policies pertaining to building safety and construction would limit the potential for injury or damage. Therefore, the Energize Eastside Project, combined with past, present, and other foreseeable development in the area, would not result in a cumulatively significant impact by exposing people or structures to risks related to geologic hazards, soils, or seismic conditions.

## 3.10 ARE THERE ANY SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS TO EARTH RESOURCES?

While damage and potential injury or death from a significant seismic event is never completely avoidable, the probability is substantially reduced when new improvements are constructed in accordance with current seismic standards and building code requirements that incorporate the most recent scientifically based design standards. As a result, there would be no probable significant adverse impacts related to earth resources under any of the alternatives analyzed.

# CHAPTER 4. GREENHOUSE GAS EMISSIONS

## 4.1 HOW WERE GREENHOUSE GAS EMISSIONS IN THE COMBINED STUDY AREA EVALUATED?

This chapter evaluates *greenhouse gas (GHG) emissions*, a component of air quality, at a programmatic level. GHG emissions are inventoried as part of GHG reduction efforts to minimize *climate change*. Unlike air pollutant emissions, which have local or regional effects, GHG emissions contribute to cumulative carbon dioxide ($CO_2$) concentrations on a global scale.

Because the Phase 1 Draft EIS is programmatic and is not a project-level analysis, it is not possible to quantify differences among alternatives with regard to GHG given the lack of detail about materials and sources that would be used. However, this chapter provides a qualitative comparison to indicate the likely range of impacts among the alternatives. This analysis is conducted in light of the fact that Washington State regulations (Revised Code of Washington Chapter 80.80) address GHG emissions from baseload electrical generation and direct utilities to consider both achievement of GHG emission limits and economic impacts to ratepayers.

The EIS Consultant Team used available data for carbon *sequestration* to estimate GHG contributions associated with vegetation removal during construction, and to compare how the loss of $CO_2$ absorption would relate to state and federal reporting thresholds for GHGs. Likewise, available data for lifecycle GHG emissions were used to estimate GHG contributions associated with traditional and non-wire technologies (such as demand response components included in Alternative 2) for electricity transmission.

**Greenhouse Gas Emissions Key Findings**

The primary differences among alternatives with regard to GHGs are the degree to which trees would need to be removed (resulting in a loss of carbon storage or *sequestration*) and the lifecycle GHG cost of materials from which the projects would be constructed.

Construction of new overhead lines that require new corridors and a larger amount of clearing (Alternative 1, Option A, and Alternative 3) could result in significant impacts. However, impacts could be mitigated to a less-than-significant level through engineering controls, purchase offsets, vegetation replacement, or offset acquisition.

Peak generation plants (Alternative 2, Option D) have the potential to generate operational GHG emissions, resulting in a moderate impact.

Continuous emissions from operation of stationary sources such as peak generation plants are qualitatively considered. It is not possible to quantify these emissions without specific data on the operational characteristics of such sources.

This chapter describes GHG emissions, carbon sequestration, and lifecycle emissions.

### 4.1.1 Greenhouse Gases Defined

Gases that trap heat in the atmosphere are referred to as greenhouse gases (GHGs) because, like a greenhouse, they capture heat radiated from the earth. The accumulation of GHGs has been identified as a driving force in global climate change. Definitions of climate change vary among regulatory authorities and the scientific community. In general, however, climate change can be described as the changing of the earth's climate caused by natural fluctuations and human activities that alter the composition of the global atmosphere.

The principal GHGs of concern include the following:

- Carbon dioxide ($CO_2$);
- Methane ($CH_4$);
- Nitrous oxide ($N_2O$);
- Sulfur hexafluoride ($SF_6$);
- Perfluorocarbons (PFCs); and
- Hydrofluorocarbons (HFCs).

Conventionally, GHGs have been reported as $CO_2$ equivalents ($CO_2e$). $CO_2e$ takes into account the relative potency of GHGs other than $CO_2$ and converts their quantities to an equivalent amount of $CO_2$.

Electric utilities, including PSE, often use $SF_6$ in electric equipment at substations, because of its effectiveness as an insulating gas.

Each of the principal GHGs has a long atmospheric lifetime, existing in the atmosphere for one year to several thousand years. In addition, the potential heat-trapping ability of each of these gases varies significantly. For example, $CH_4$ is 28 times as potent as $CO_2$ at trapping heat, while $SF_6$ is 23,500 times more potent than $CO_2$ (IPCC, 2013). The ability of these gases to trap heat is called global warming potential (GWP).

In emissions inventories, GHG emissions are typically reported in terms of metric tons of $CO_2$ equivalents ($CO_2e$). $CO_2e$ are calculated as the product of the mass emitted of a given GHG and its specific GWP. While $CH_4$ and $N_2O$ have much higher GWPs than $CO_2$, $CO_2$ is emitted in such vastly higher quantities that it accounts for the majority of GHG emissions in $CO_2e$, both from residential developments and human activity in general.

The primary human activities that release GHGs include combustion of *fossil fuels* for transportation, heating, and electricity; agricultural practices that release $CH_4$, such as livestock production and decomposition of crop residue; and industrial processes that release smaller amounts of gases with high global warming potential such as $SF_6$, PFCs, and HFCs. Deforestation and land cover conversion have also been identified as contributing to global warming by reducing the earth's capacity to remove $CO_2$ from the air and altering the earth's albedo (surface reflectance), thus allowing more solar radiation to be absorbed.

### 4.1.2 Carbon Sequestration

Terrestrial carbon sequestration is the process in which atmospheric $CO_2$ is taken up into plants or soil and subsequently "trapped." Terrestrial sequestration can occur through planting trees, restoring wetlands, land management, and forest fire management. This

analysis focuses on the terrestrial sequestration associated specifically with trees and shrubs, as related to the proposed project.

> A **carbon sink** is a natural environment that absorbs more $CO_2$ than it releases.

Trees and shrubs act as both *carbon sinks* and carbon sources. Vegetation can act as a carbon sink by absorbing $CO_2$ from the atmosphere, releasing oxygen through photosynthesis, and retaining the carbon within the vegetation. Trees also act as a carbon source when they are dying and decomposing; the carbon that was stored in the trees is released and reacts with oxygen in the air to form $CO_2$. Younger trees that are growing rapidly can store more carbon in their leaves than older trees. However, the total amount of carbon sequestered annually by healthy, large trees is greater than younger trees because the greater number of leaves compensates for the lower productivity of larger trees (USDA, 2011; N.L. Stephenson et al., 2014).

Trees suffering from disease will slow and eventually arrest the process of photosynthesis, thus limiting the ability of the affected tree to act as a carbon sink. Therefore, maintaining healthy trees keeps carbon stored in trees; however, some landscape maintenance activities result in GHG emissions (USDA, 2011). For example, water use, fertilizer use, exhaust from gas- and diesel-powered landscape equipment, and vehicle trips for maintenance crews result in $CO_2$ emissions.

### 4.1.3 Lifecycle Emissions

Although there is no regulatory definition for *lifecycle emissions*, the term is generally used to refer to all emissions associated with the creation and existence of a project, including emissions from the manufacture and transportation of component materials, and even from the manufacture of the machines required to produce those materials. However, since it is impossible to accurately estimate the entire chain of emissions associated with any given project, lifecycle analyses have limited effectiveness in assessing emissions for this SEPA analysis.

The federal Council on Environmental Quality (CEQ) has updated its *Draft Guidance for Greenhouse Gas Emissions and Climate Change Impacts*, which makes no reference to lifecycle emissions (CEQ, 2014). CEQ recommends that agencies rely on basic National Environmental Policy Act (NEPA) principles and consider all reasonably foreseeable effects that may result from proposed actions, using reasonable temporal and spatial parameters, rather than engaging in analyses that focus on speculative emissions (CEQ, 2014).

However, the CEQ recognizes that proposed land and resource management actions evaluated under NEPA can result in both carbon emissions and carbon sequestration. Agencies should compare net GHG emissions and changes in sequestered carbon that are relevant in light of the proposed actions and timeframes under consideration. Agencies have substantial experience estimating GHG emissions and sequestration, and numerous tools and methods are available. CEQ encourages agencies to use quantitative tools when it would be useful for informing decision-makers and the public. When a quantitative analysis would not be useful, a qualitative analysis should be completed, and an agency should explain its basis for doing so.

## 4.2 WHAT ARE THE RELEVANT PLANS, POLICIES, AND REGULATIONS?

Air quality in the Puget Sound region is regulated and enforced by federal and state agencies—the U.S. Environmental Protection Agency (EPA) and Washington State Department of Ecology (Ecology). Several local study area communities have plans or policies addressing GHG emissions. King County provides overarching guidance policy for the region on GHGs and climate change through implementation of its Strategic Climate Action Plan, discussed below.

### 4.2.1 U.S. Environmental Protection Agency

The EPA is the federal agency responsible for implementing the Clean Air Act (CAA). The U.S. Supreme Court ruled on April 2, 2007, that $CO_2$ is an air pollutant as defined under the CAA, and that the EPA has the authority to regulate emissions of GHGs.

On December 9, 2009, the EPA Administrator signed two distinct findings regarding GHGs under Section 202(a) of the CAA, which states that the EPA Administrator should regulate and develop standards for "emission[s] of air pollution from any class or classes of new motor vehicles or new motor vehicle engines, which in [its] judgment cause, or contribute to, air pollution which may reasonably be anticipated to endanger public health or welfare." The final rule was effective January 14, 2010. The rule addresses two distinct findings: Endangerment Finding and Cause or Contribute Finding.

Under the Endangerment Finding, the Administrator found that the current and projected concentrations of the six key GHGs ($CO_2$, $CH_4$, $N_2O$, HFCs, PFCs, and $SF_6$) in the atmosphere threaten the public health and welfare of current and future generations. Under the Cause or Contribute Finding, the Administrator found that the combined emissions of these GHGs from new motor vehicles and new motor vehicle engines contribute to GHG pollution, which threatens public health and welfare.

### 4.2.2 Washington State Department of Ecology

At the state level, in December 2010, Ecology adopted Chapter 173-441 Washington Administrative Code – Reporting of Emissions of Greenhouse Gases. This rule institutes mandatory GHG reporting for the following:

- Facilities that emit at least 10,000 metric tons of GHGs per year in Washington; or
- Suppliers of liquid motor vehicle fuel, special fuel, or aircraft fuel that supply products equivalent to at least 10,000 metric tons of $CO_2$ per year in Washington.

In 2007, voters in Washington passed Initiative 937, the Energy Independence Act. The Energy Independence Act requires electric utilities in Washington, serving at least 25,000 retail customers, to use renewable energy and energy conservation in serving those customers. There are 17 utilities which qualify under the Act, including Puget Sound Energy, which provide 81 percent of the electricity sold to retail customers in Washington State.

### 4.2.3 King County

Regionally, King County recently released its 2015 Strategic Climate Action Plan (SCAP), which is a comprehensive update to the 2012 SCAP (King County, 2015). The SCAP is King County's blueprint for climate action. It provides a resource for county decision-makers, employees, and the general public to learn about the County's climate change commitments. King County has committed to reduce countywide sources of GHG emissions, compared to a 2007 baseline, by 25 percent by 2020, 50 percent by 2030, and 80 percent by 2050 (King County, 2015).

### 4.2.4 City Governments

Of the 12 cities in the combined study area, 8 have signed the *U.S. Conference of Mayors Climate Protection Agreement*[1], which promotes participation of U.S. cities in the goals of the *Kyoto Protocol* (U.S. Conference of Mayors, 2007). Most of these cities have integrated GHG reduction goals into their comprehensive plans, and/or a specific climate plan, which identify and develop targets, strategies, policies, and regulations to limit the community's impact on climate change.

**The Kyoto Protocol** is an international agreement linked to the United Nations Framework Convention on Climate Change, which commits its Parties by setting internationally binding emission reduction targets. The Protocol places a heavier burden on developed nations and was adopted in Kyoto, Japan, on December 11, 1997, and entered into force on February 16, 2005. The United States never ratified the protocol.

Signatories of the U.S. Conference of Mayors Climate Protection Agreement seek to reduce GHG emissions by 7 percent from 1990 levels. This has resulted in the creation of climate action plans at the municipal level that inventory baseline GHG emissions and suggest improvements in government operations and throughout the community that can assist the cities with meeting their reduction goals.

More recently, King County implemented the King County-Cities Climate Collaboration (K4C). King County and 11 cities (Bellevue, Burien, Issaquah, Kirkland, Mercer Island, Redmond, Renton, Seattle, Shoreline, Snoqualmie, and Tukwila), representing 75 percent of the county's population base, have partnered to coordinate and enhance the effectiveness of local government climate and sustainability actions. There are three shared K4C commitments that parallel the Conference of Mayors.

1. Collaborating through the Growth Management Planning Council, Sound Cities Association, and other partners to adopt countywide GHG emissions reduction targets, including mid-term milestones needed to support long-term reduction goals;

2. Building on King County's commitment to measure and report on countywide GHG emissions by sharing this data between cities and partners, establishing a public dashboard for tracking progress, and using the information to inform regional climate action; and

[1] Cities include Bellevue, Clyde Hill, Issaquah, Kirkland, Redmond, Renton, Sammamish, and Yarrow Point.

3. Developing and adopting near-term and long-term government operational GHG reduction targets that support countywide goals, and implementing actions to reduce each local government's GHG footprint.

#### 4.2.4.1 City of Bellevue

The City of Bellevue formally joined K4C in August 2014 and has taken action on all of the three shared K4 commitments to date. The City's climate actions to date include the following:

1. In 2007 Bellevue joined over 1,000 cities nationwide in signing the Mayors' Climate Protection Agreement, establishing a target to reduce communitywide and municipal emissions to 7 percent below 1990 emissions by 2012. Bellevue did not reach this goal.

2. Bellevue formally completed an emissions inventory for the interim years 2006 and 2011, and established a baseline for 2001.

3. Bellevue Department Directors agreed to a renewal of the Environmental Stewardship Initiative Strategic Plan (2013 - 2018).

4. Since 2012, Bellevue has measured GHG emissions on a public dashboard (called Scope 5) that uses transparent emission factors and could be used to report to the Climate Disclosure Project if desired with some additional resources.

5. In July 2014 Bellevue and other cities adopted GHG emission reduction targets of 25 percent by 2020, 50 percent by 2030, and 80 percent by 2050, compared to a 2007 baseline.

6. In November 2014 Bellevue entered into a community energy reduction campaign, the Georgetown University Energy Prize (GUEP), which awards a $5 million prize to the small or medium sized U.S. city that can save the most residential and municipal energy over a two year period. The Community Energy Efficiency Plan is guiding Bellevue's energy reduction efforts.

Additionally, the City of Bellevue addresses climate change and GHG emissions reductions by promoting resources available to residents through PSE (City of Bellevue, 2015). In addition, the City implemented "Solarize Bellevue," a campaign to reduce the cost of solar electricity for Bellevue residents and businesses. The City has also pursued the following six natural resource conservation projects:

- Electric vehicle charging stations;
- Replacement of 90 gas vehicles in the City fleet with hybrids;
- Traffic demand management services for Bellevue businesses and residents;
- Retrofit of lighting fixtures at recreation facilities;

- Home energy reports for residents, in partnership with PSE and the C-7 New Energy Partnership;[2] and
- Sustainability web portal, an information and education tool.

#### 4.2.4.2 City of Kirkland

The City of Kirkland addresses climate change and GHG emissions primarily by reducing emissions associated with government operations. Similar to Bellevue, the City of Kirkland also purchases green power from PSE for "a substantial percentage of its operations" and encourages its residents to do the same in partnership with PSE and the C-7 New Energy Partnership. The City also has a similar "Solarize Kirkland" program. The City recycles food waste, uses paper products with recycled content, and created a commute trip reduction program to meet GHG reduction goals.

#### 4.2.4.3 City of Redmond

The City of Redmond ratified a climate action implementation plan in September 2014. The plan addresses climate change by reducing GHG emissions associated with transportation, heating or cooling buildings, reducing waste production, restoring natural resources, and educating the public about climate change and encouraging actions that reduce impacts on the environment. The plan suggests that comprehensive inventories and assessments of GHG emissions associated with government operations as well as emissions associated with the community are to be conducted (City of Redmond, 2013). GHG inventories were collected from 2008 through 2011 for different City operations and sectors of the community as a whole.

#### 4.2.4.4 City of Renton

The City of Renton completed a GHG inventory in 2011. The City proposes the following actions to achieve the Mayors Climate Protection Agreement target (City of Renton, 2011)

- Conducting energy audits on all City buildings;
- Implementing energy efficiency management and performance monitoring systems;
- Targeting efficiency upgrades on energy-intensive buildings;
- Installing motion sensor-controlled lighting in all municipal building spaces;
- Decreasing the amount of water that needs to be treated (such as through low impact development techniques);
- Minimizing water demand through conservation measures;
- Increasing the efficiency of equipment to treat, store, and transport water;
- Purchasing the most fuel-efficient City vehicles; and

[2] In 2010, seven cities in King County, Washington — known as the C-7 New Energy Partnership — joined with PSE and energy management software company OPOWER to help nearly 100,000 residents reduce their home energy consumption. The C-7 New Energy Partnership includes the Cities of Bellevue, Issaquah, Kirkland, Mercer Island, Redmond, Renton and Sammamish.

- Creating policies for employees to limit idling and use the most fuel-efficient vehicles whenever possible.

Since 2011, the City has not updated its GHG inventory.

#### 4.2.4.5 City of Sammamish

In 2011, the City of Sammamish published a sustainability strategy that suggested that reductions in GHG emissions could be achieved through the following:

- Reducing City energy use to 3 percent below 2007 consumption rates by 2012, in alignment with the U.S. Conference of Mayors Climate Protection Agreement;[3]
- Investigating municipal purchase of green power from *PSE's Green Power program* by applying savings from energy conservation to purchasing green power;
- Increasing use of transportation alternatives to single-occupancy and/or fossil-fueled vehicles for City staff commutes and work-related travel, and promoting use of transportation alternatives by the public;
- Reducing energy used by non-City building operations, including residential dwellings, businesses and industry; and

Since 2011, the City has not updated its GHG inventory.

### 4.2.5 Puget Sound Energy

In its Greenhouse Gas Policy Statement (2015), PSE identifies the following specific, near-term strategies that it continues to pursue:

1. Ongoing development and investment in PSE's customer energy efficiency program;
2. Pursuit of a diverse energy portfolio mix of resources including renewable generation that will lower PSE's GHG emissions consistent with least-cost planning principles;
3. Customer or community-based generation of renewable energy;
4. Opportunities to reduce GHG emissions with partners in the utility industry, local communities, and state and national governments;
5. Ongoing development and investment in PSE's green fleet and low emission vehicle programs;
6. Customer choice through the Green Power and Carbon Balance programs to reduce their carbon footprint while supporting local projects;
7. Transparency with PSE's GHG emissions footprint reporting; and
8. Coordination with customers to help them minimize their GHG emissions footprint.

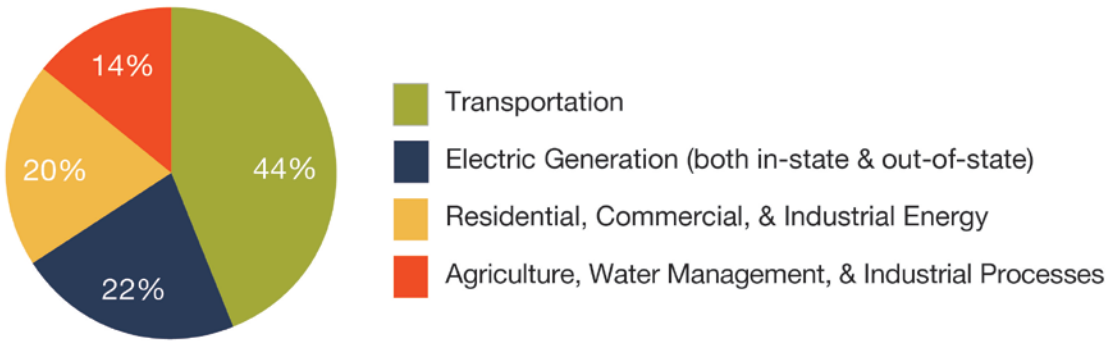
[3] The City of Sammamish is a signatory of the U.S. Conference of Mayors Climate Protection Agreement, which calls for reducing emissions by 7 percent less than 1990 levels by 2012. Because the City was not incorporated until 2000, this objective calls for reducing emissions by 3 percent of 2005 emissions levels (City of Sammamish, 2013).

The most recent (2014) inventory of PSE emissions indicates that emissions from all sources totaled approximately 14.4 million metric tons of $CO_2$; 2,980 metric tons of $CH_4$; 161 metric tons of $N_2O$; and 0.58 metric tons of $SF_6$. Most of the $CO_2$ emissions were from generated and purchased electricity (71.1 percent), while the remaining emissions were from natural gas supply to end users (28.9 percent). For $CH_4$, the majority of emissions were fugitive from natural gas operations (79.2 percent). Generated and purchased electricity also accounted for all $N_2O$ emissions and all $SF_6$ emissions.

## 4.3 WHAT IS THE STATUS OF GREENHOUSE GAS EMISSIONS IN THE COMBINED STUDY AREA?

Ecology estimated that in 2010, Washington produced about 96 million gross metric tons (about 106 million U.S. tons) of $CO_2e$ (Adelsman, 2014). Sources of GHG emissions in the state are shown in Figure 4-1.

**Figure 4-1. Sources of GHG Emissions in Washington State**




King County last inventoried countywide GHG emissions for the year 2012. Community consumption-based emissions (which include some lifecycle emissions associated with food consumption within the county but grown elsewhere) totaled 55 million metric tons of $CO_2e$ (King County, 2015).

The City of Bellevue updates its GHG inventory yearly. Emissions remained virtually equal to 2007 levels across the whole community in 2012. As of 2013, municipal emissions from City operations were reduced 21 percent compared to 2007. The City has not reached its Mayors Climate Protection Agreement target (Resolution 7517) to reduce emissions to 7 percent below 1990 levels by 2012 (City of Bellevue, 2015).

In 2009, the Renton community generated an estimated 1,216,300 metric tons of $CO_2e$. Transportation contributed the largest share of these GHG emissions (49 percent), followed by commercial (21 percent) and residential (20 percent). Solid waste accounted for a small portion (0.3 percent) of total community GHG emissions. It is unknown whether the City achieved the goals in the Mayors Climate Protection Agreement.

The City of Kirkland updates its GHG inventory for government operations annually and those associated with the city as a whole every 3 years. A community inventory is not

available at this time (City of Kirkland, 2013). As of 2012, municipal emissions from City operations were reduced 10 percent compared to 2005; however, the City has not reached its Mayors Climate Protection Agreement target (Resolution 7517) to reduce emissions to 7 percent below 1990 levels by 2012.

None of the other cities in the combined study area have publicly available GHG inventory estimates.

**The Climate Registry** is a nonprofit collaboration between North American states, provinces, territories, and Native Sovereign Nations to record and track the greenhouse gas emissions of businesses, municipalities and other organizations. The Climate Registry's Board of Directors is made up of 31 states of the USA, 13 provinces/territories of Canada, six states of Mexico, and three Native Sovereign Nations.[1] The data is to be independently verified to ensure accuracy, however participation by organizations is voluntary.

## 4.4 HOW WERE POTENTIAL IMPACTS TO GREENHOUSE GAS EMISSIONS ASSESSED?

The potential loss of carbon sequestration from tree removal is based on sequestration rates of the Climate Registry. This analysis compares the associated change in GHG emissions for each alternative to the State of Washington GHG reporting thresholds. A qualitative discussion of lifecycle emissions associated with each project alternative is also included. Lifecycle GHG emissions are roughly estimated based on publically available research data. Emissions from the operation of construction equipment are also qualitatively discussed relative to each of the other project alternatives.

## 4.5 WHAT ARE THE LIKELY CONSTRUCTION IMPACTS RELATED TO GREENHOUSE GAS EMISSIONS?

### 4.5.1 Construction Impacts Considered

The alternatives could generate GHG emissions from the operation of vehicles and equipment (off-road equipment, vendor and hauling truck trips, and construction worker trips), lifecycle emissions from construction materials (e.g., GHGs generated at the batch plant during production of concrete used in foundations or street work), and from release of sequestered GHGs as a result of tree removal. While vegetation could be replanted in cleared *transmission* alignment corridors, replanting was not included in the assessment of sequestration impacts in order to provide a worst-case estimate. Additionally, construction materials would have lifecycle emissions associated with their procurement. Project-related GHG emissions from construction would be temporary and would not represent a continuing burden on the statewide inventory. Both GHG emissions from construction equipment and lifecycle emissions are somewhat speculative at the programmatic level so a general qualitative comparison among the alternatives and options is provided.

This chapter conservatively quantifies and assesses impacts from losses of carbon sequestration according to the following criteria:

**Minor** – Project would result in construction-related GHG emissions below the State of Washington reporting threshold[4] of 10,000 metric tons.

**Moderate** – If the project would result in construction-related GHG emissions at or above the State of Washington reporting threshold of 10,000 metric tons in a given year but would implement best management practices[5] to reduce GHG emissions.

**Significant** – If the project would result in construction-related GHG emissions at or above the State of Washington reporting threshold of 10,000 metric tons in a given year and would not implement best management practices to reduce GHG emissions, or would result in construction-related GHG emissions at or above 25,000 metric tons in a given year even if BMPs are implemented.

## 4.5.2 No Action Alternative

The No Action Alternative would not result in construction activities or changes to maintenance activities. While conductor replacement could occur under the No Action Alternative, GHG emissions associated with truck operations and fabrication of new conductors would be negligible. Similarly, there would be no change in energy efficiency improvements implemented to achieve PSE's conservation goals, which involves a negligible amount of construction.

## 4.5.3 Alternative 1: New Substation and 230 kV Transmission Lines

Construction impacts are discussed below for each transmission line option. Construction of the substation would be the same under each option and occur simultaneously. Therefore, substation construction is considered as part of each option.

### *4.5.3.1 Option A: New Overhead Transmission Lines*

#### 4.5.3.1.1 GHG Emissions from Construction Vehicles and Equipment

Construction truck trips, off-road equipment, and worker trips would generate GHG emissions. The equipment likely to be used for construction under Alternative 1, Option A is presented in Appendix B. Most of this equipment would operate on diesel fuel which has an emission factor of 10.15 kilograms of $CO_2$ per gallon.

Of all the options under Alternative 1, Option A would potentially have the shortest construction period (approximately 12 to 18 months). Installing transformers under Option A would be performed concurrently with the transmission line and poles. Consequently, although Option A would involve a relatively large amount of construction equipment as

[4] In practice, the reporting threshold applies to emissions from a facility and not to temporary construction activities. However it is being applied in this EIS to assessment of construction impacts as a tool for determining relative significance.
[5] Best management practices to minimize GHG emissions could take the form of a number of measures, depending on whether it is a construction-related emission or an operational emission source.

indicated in Appendix B, its relatively short duration would result in lower direct construction GHG emissions than those associated with Option C, and emissions would likely be similar to Options B and D.

#### 4.5.3.1.2 Lifecycle GHGs

The primary material resources required for Alternative 1, Option A are concrete for pier and transformer foundations, steel or laminated wood poles for towers, and conductors. Of these materials, concrete is likely the most GHG-intensive to produce. Production of 1 cubic meter of concrete generates approximately 101 kilograms (222 pounds) of $CO_2$ (Kjellsen et al., 2005) which accounts for cement production, aggregate production, water, and transport. With an alignment of approximately 18 miles and a typical spacing between poles of 1,000 feet, approximately 100 pole foundations would need to be installed. Assuming caisson foundations 35 feet deep and 6 feet in diameter, each foundation would require approximately 6 cubic meters of concrete, yielding a minimum GHG estimate for all towers of 60.6 metric tons of $CO_2$. This value is a rough estimate for comparative purposes only and is not intended for use as a component of a GHG emission inventory.

#### 4.5.3.1.3 Loss of Sequestered $CO_2$ (Tree Removal)

Removal of existing vegetation would result in the loss of sequestered (stored) $CO_2$ as well as the loss of continued sequestration in the future by this vegetation. If a new corridor is used, there would be more intensive vegetation removal than other options. The amount of sequestered $CO_2$ per unit area (expressed as metric tons of $CO_2$ per acre) depends on the specific vegetation type. Table 4-1 presents $CO_2$ sequestration values from the California Climate Action Registry (now known as the Climate Action Registry).[6] As shown in the table, trees can sequester the largest amount of $CO_2$ per acre compared to other types of vegetation.

**Table 4-1. $CO_2$ Sequestration by Vegetation Type**

| Land Use | Sub-Category | $CO_2$ Sequestration (metric tons $CO_2$/ acre) |
|---|---|---|
| Forest Land | Scrub | 14.3 |
| | Trees | 111 |
| Cropland | -- | 6.20 |
| Grassland | -- | 4.31 |

Source: CAPCOA, 2013

Using an existing 115 kV corridor for Alternative 1, Option A could require up to an additional 50 feet of lateral clearing along the length of the alignment. This would result in removal of up to 44 acres of forested land under a worst-case scenario which could result in up to 4,900 metric tons of $CO_2$ sequestration losses (loss of active $CO_2$ intake by trees acting

[6] Data from the CAR Forest Protocol and Urban Forest Research Tree Carbon Calculator are not used since their main focus is annual emissions for carbon offset considerations. As such they are designed to work with very specific details of the vegetation that are not available at a SEPA level of analysis.

as a carbon sink). This would not exceed the state's GHG reporting threshold and would be a minor impact with respect to GHG emissions.

Assuming a new right-of-way alignment of approximately 18 miles and a maximum 150-foot-wide clear zone under a worst-case scenario, up to 327 acres could be cleared under Option A if the corridor had 100% tree coverage. Because most likely corridors include existing rights of way or other utility corridors, an average tree coverage of 40 percent throughout the project alignment was considered a conservative assumption (see Chapter 6). With this assumption a worst-case estimate of up to approximately 131 acres of forested land could be removed under Option A, which could result in up to 14,500 metric tons of $CO_2$ sequestration losses (loss of active $CO_2$ intake by trees acting as a carbon sink). This estimate exceeds that of Alternative 1, Option C (Underground Transmission Lines), below, due to the substantially wider corridor needed for overhead lines. This impact would exceed the state's GHG reporting threshold and, without best management practices or mitigation, it would be a significant adverse impact with respect to GHG emissions. Installation of the new transformer at a new or expanded substation would be unlikely to meaningfully contribute to further loss of $CO_2$ sequestration. It should be noted that, unlike Option C, trees could be replanted along the corridor under Option A after construction of the utility lines.

### 4.5.3.2 Option B: Existing Seattle City Light 230 kV Transmission Corridor

#### 4.5.3.2.1 GHG Emissions from Construction Vehicles and Equipment and Lifecycle GHGs

Alternative 1, Option B would require a complete rebuild of the Seattle City Light lines, including replacing most of the existing structures. However, some of the existing structures may be adequate and not require replacement, thus reducing the amount of construction equipment and materials needed. Construction duration would be somewhat longer than Option A: up to 24 months for overhead lines with concurrent substation construction. Construction-related GHG impacts would likely be somewhat higher than those described above for Option A.

#### 4.5.3.2.2 Loss of Sequestered $CO_2$ (Tree Removal)

While Alternative 1, Option B could require a complete rebuild of the Seattle City Light lines, including replacing most of the existing structure, the land for these structures within the SCL right-of-way would already have largely been cleared. Therefore, the impacts from loss of sequestration described for Option A would not occur, or would be substantially less. However, this option would require a segment of new transmission to connect the SCL line to the Lakeside substation. The exact length of that alignment is not known, but the proximity of the Lakeside substation to the line suggests it would be approximately 1 mile or less, meaning the impact would be approximately 800 metric tons of $CO_2$ sequestration losses. This would be a minor impact with respect to GHG emissions.

### 4.5.3.3 Option C: Underground Transmission Lines

#### 4.5.3.3.1 GHG Emissions from Construction Vehicles and Equipment

The equipment involved for construction under Alternative 1, Option C is presented in Appendix B. Most of this equipment would operate on diesel fuel which has an emission factor of 10.15 kilograms of $CO_2$ per gallon.

Of all the options under Alterative 1, underground transmission line construction would have the longest construction period (approximately 28 to 36 months). Construction for the transformer installations under Option C would be performed concurrently with the transmission line. Additionally, excavation and removal of soils throughout the construction route would require many more truck trips than the other options. Consequently, direct construction-related GHG emissions of Option C would be the greatest of all the options.

#### 4.5.3.3.2 Lifecycle GHGs

The primary material required for Alternative 1, Option C would be concrete to construct an outermost barrier in the excavated trench and for access vaults. With an alignment corridor length of 18 miles and assuming a trench width of 5 feet, and a concrete layer of 3 feet encasing the lines, approximately 40,400 cubic meters of concrete would be required, yielding approximately 4,080 metric tons of $CO_2$. This value is a rough estimate to be used for comparative purposes only, not as a component of a GHG emission inventory.

#### 4.5.3.3.3 Loss of Sequestered $CO_2$ (Tree Removal)

With an alignment corridor length of 18 miles and a cleared work area of 30 feet for a new corridor under a worst-case scenario, Alternative 1, Option C could require a clearance area up to 66 acres in total, assuming tree coverage of 40 percent throughout the project alignment. The reduced width of the cleared work area compared with Option A results in a relatively lower loss of sequestered $CO_2$. Conservatively assuming that lost sequestration would entirely be in the form of forestland (trees), Option C could result in over 7,300 metric tons of lost $CO_2$ sequestration. This projected loss would not exceed the State's GHG reporting threshold and would be considered a minor impact with respect to GHG emissions. However, unlike Option A, replacement trees could not be planted in the corridor after construction due to the buried utilities. If an existing utility or roadway corridor were used, there may be no clearing necessary and thus no $CO_2$ sequestration losses, although there could be some losses of street trees. It is also possible that only a portion of the line would be placed underground, and the rest would be as described for Option A or B. On a per mile basis, Option B would have less $CO_2$ sequestration losses than Option A, while use of the SCL corridor under Option B would have lower $CO_2$ sequestration losses than Option C.

### 4.5.3.4 Option D: Underwater Transmission Lines

#### 4.5.3.4.1 GHG Emissions from Construction Vehicles and Equipment

The types of construction equipment likely to be needed under Alternative 1, Option D are presented in Appendix B. Most of this equipment would operate on diesel fuel which has an emission factor of 10.15 kilograms of $CO_2$ per gallon. Installing underwater transmission lines would have the shortest construction period of approximately 8 months. Consequently,

although Option D would involve a relatively large amount of construction equipment as indicated in Appendix B, its relatively short duration would result in direct construction GHG emissions less than those associated with Option A, Option B or Option C.

#### 4.5.3.4.2 Lifecycle GHGs

The primary material required for Alternative 1, Option D would be concrete for cable landings and for foundations of any poles needed for transition to on-land transmission. There would be two cable landing points requiring a modest amount of concrete for the landing vaults. An estimate of concrete volume is speculative at this programmatic review, but Option D is likely to have the lowest lifecycle emissions of the four Alternative 1 options or any of the other alternatives.

#### 4.5.3.4.3 Loss of Sequestered $CO_2$ (Tree Removal)

East-west connections to Talbot Hill or Lakeside substation and to Sammamish substation necessary under Alternative 1, Option D would require vegetation removal and associated loss of sequestration impacts. Assuming new right-of-way would be necessary for all three connections, with a combined alignment of approximately 7.8 miles and a maximum 150-foot-wide clear zone (worst-case), up to 143 acres could be cleared under Option D. Conservatively assuming an average tree coverage of 40 percent throughout the project alignment (see Chapter 6), a worst-case estimate of up to 57 acres of forested land could be removed under Option D.

Option D could result in a loss of up to 6,330 metric tons of $CO_2$ sequestration. This would not exceed the state's GHG reporting threshold. Installation of the new transformer at a new or expanded substation would be unlikely to meaningfully contribute to further loss of $CO_2$ sequestration.

Installation of cable landing points may require clearing of wetlands on the lake shore, but this would be unlikely to contribute meaningfully to loss of sequestration and would be considered a minor impact with respect to GHG emissions.

### 4.5.4 Alternative 2: Integrated Resource Approach

#### *4.5.4.1 Energy Efficiency Component*

Energy efficiency improvements would entail implementing accelerated measures and incentives to reduce demand. This component would not involve infrastructure improvements, changes to maintenance activities, or construction of new or relocated maintenance yards. Consequently, energy efficiency improvements would have no impact with regard to direct GHG emissions, lifecycle GHG emissions, or sequestration loss.

#### *4.5.4.2 Demand Response Component*

Demand response measures would entail implementing measures to reduce and/or shift electrical demand and would not involve infrastructure improvements, changes to maintenance activities, or construction of new or relocated maintenance yards. Consequently, implementation of demand response systems would have no impact with regard to direct GHG emissions, lifecycle GHG emissions, or sequestration loss.

#### 4.5.4.3 Distributed Generation Component

##### 4.5.4.3.1 GHG Emissions from Construction Vehicles and Equipment

Construction of distributed generation facilities could result in direct GHG emissions, such as from gas turbines or diesel reciprocating engines. The amount of GHG released would vary with the type and number of facilities constructed, making it speculative to quantify direct construction emissions at this programmatic level of analysis. In addition, the number of hours that such facilities would need to operate in direct response to the need identified by PSE for the Energize Eastside Project would be relatively small (see Chapter 7 for additional discussion of energy consumption). Therefore, the quantities of GHG generated to address the project need would be negligible.

##### 4.5.4.3.2 Lifecycle GHGs

The lifecycle emissions for distributed generation facilities would be speculative to quantify without a precise estimate of the number and size of facilities to be constructed. However, lifecycle emissions could be greater than those associated with either Option A, Option B, or Option D of Alternative 1 primarily due to the potential for ongoing combustion of natural gas associated with peak generation plants or other combustion turbines or engines.

##### 4.5.4.3.3 Loss of Sequestered $CO_2$ (Tree Removal)

Loss of sequestration would depend on the condition of sites selected for distributed generation facilities (i.e., whether the sites are currently vegetated and the type of vegetation present). Since most of this equipment is anticipated to be on or adjacent to buildings, the amount of vegetation removed would be negligible.

#### 4.5.4.4 Energy Storage Component

##### 4.5.4.4.1 GHG Emissions from Construction Vehicles and Equipment

Like the distributed generation component, construction of the energy storage component would generate GHG emissions that are not possible to quantify at this programmatic level of analysis. However, given that a battery storage facility would resemble an open yard of containers, a surface parking lot represents a reasonable approximation of such a land use. Construction of a 10-acre surface parking lot could generate an estimated 302 metric tons of $CO_2$. This assumes a 6-month construction period, no demolition, and cut and fill balanced on-site[7]. This would be considered a minor impact with respect to GHG emissions.

##### 4.5.4.4.2 Lifecycle GHGs

Lifecycle GHG emissions associated with battery storage technologies can be high because some of the materials used in their manufacture are scarce. For example, the energy demand for the manufacture of new lithium-ion batteries for plug-in hybrid motor vehicles has been estimated to be 1,700 megajoules of primary energy to produce 1 kilowatt-hour of lithium-ion battery capacity (Samaras et al., 2008). This energy demand would also have lifecycle emissions that would be in addition to the materials used for construction of any required structures. However, battery lifecycle emissions can be reduced by as much as 70 percent

[7] Calculated using the California Emissions Estimator Model Version 2013.2.2.

with recycling techniques that would be reflected in operational emissions as batteries are replaced.

#### 4.5.4.1 Peak Power Generation Component

This component would involve installing three 20 MW generators at existing substations within the Eastside. These could be any type of generator but the most likely type would be a simple-cycle gas-fired generator. Construction of three gas-fired simple-cycle generators would be similar to a substation, including trenching to access upgraded natural gas, water, and wastewater utility lines. Construction would occur within or adjacent to existing PSE substations over 12 months. Construction emissions would be similar to those identified above for the battery storage component, approximately 750 metric tons of $CO_2$.

### 4.5.5 Alternative 3: New 115 kV Lines and Transformers

#### 4.5.5.1 GHG Emissions from Construction Vehicles and Equipment and Lifecycle GHGs

Alternative 3 would develop 115 kV transmission lines that would require a more narrow clearing area than a 230 kV alignment, from 40 feet up to 100 feet wide under a worst-case scenario, compared with 150 feet for the 230 kV corridor. However, the 115 kV alternative would require up to 60 miles of transmission alignment, resulting in more vegetation removal. Alternative 3 construction would have the second longest construction period (approximately 24 to 28 months). Substation improvements would occur simultaneously with construction along the alignment. GHG emissions from construction equipment and potentially loss of sequestration would incrementally increase, but these contributions would be negligible compared to work for the alignment. Consequently, the longer construction duration for Alternative 3 would result in higher direct construction GHG emissions than those associated with Alternative 1. Additionally the increased number of support towers would require more concrete, and lifecycle emissions would also be greater than Alternative 1.

#### 4.5.5.2 Loss of Sequestered $CO_2$ (Tree Removal)

Assuming a new right-of-way alignment of approximately 60 miles and a 40-foot-wide clear zone under a worst-case scenario, Alternative 3 could require clearing up to 291 acres. Conservatively assuming an average tree coverage of 40 percent throughout the project alignment (see Chapter 6), a worst-case estimate of up to 116 acres of forested land could be removed under Alternative 3, resulting in up to 12,900 metric tons of $CO_2$ sequestration losses (loss of active $CO_2$ intake by trees acting as a carbon sink). This is a worst-case estimate because it conservatively assumes that additional clearance would be required over the entirety of the existing alignment. This impact would exceed the state's GHG reporting threshold and, without best management practices or mitigation, would be a significant adverse impact with respect to GHG emissions.

## 4.6 HOW COULD OPERATION OF THE PROJECT AFFECT GREENHOUSE GAS EMISSIONS?

### 4.6.1 Operation Impacts Considered

Operational GHG impacts would result primarily from employee vehicle trips to maintain the new facilities. However, some distributed energy components and peak generation plants would have operational emissions associated with fuel combustion.

### 4.6.2 No Action Alternative

Demand response programs, the primary component of the No Action Alternative, would implement operational measures to reduce and/or shift electrical demand. No infrastructure improvements, changes to maintenance activities, or new or relocated maintenance yards would be required. No new employee vehicle trips are envisioned under the No Action Alternative. Consequently there would be no operational GHG impacts associated with the No Action Alternative.

### 4.6.3 Alternative 1: New Substation and 230 kV Transmission Lines

Potential operational GHG impacts associated with all of the Alternative 1 options would result from vehicle travel associated with occasional maintenance of the electrical facilities. Such trips would be infrequent and would not result in appreciable GHG emissions. Therefore, Alterative 1 would have a minor impact with regard to operational GHG emissions.

### 4.6.4 Alternative 2: Integrated Resource Approach

#### *4.6.4.1 Energy Efficiency and Demand Response Components*

Energy efficiency and demand response components would not involve infrastructure improvements, changes to maintenance activities, or new or relocated transformers, substations, or maintenance yards. These components would have no impact with regard to operational GHG emissions. There may be an indirect beneficial impact because conservation measures would reduce energy demand and associated GHG emissions associated with the mix of energy generation.

#### *4.6.4.2 Distributed Generation Component*

Distributed generation facilities could result in operational GHG impacts that would vary with the type and magnitude of facility. Because of the limitations of distributed generation systems described in Chapter 2, the Phase 1 evaluation assumed that these sources would contribute minimally to addressing the identified deficiency in capacity by 2024.

Certain types of distributed generation facilities, specifically gas turbines and reciprocating engines, have the potential to generate operational GHG emissions associated with fuel combustion, which would vary depending on the frequency of operation, size of engine, and type of fuel used. For this analysis, it is assumed that distributed generation facilities could result in negligible to moderate adverse impacts.

#### 4.6.4.3 Energy Storage Component

Operation of a battery storage facility would be similar to that of a small office building, with worker vehicle trips and vendor trips to perform periodic replacement of degraded cells. Such trips would be infrequent and not result in appreciable GHG emissions. Lifecycle GHG Emissions associated with battery storage technologies can be high because some of the materials used in their manufacture are scarce. For example, the energy demand for the manufacture of new lithium-ion batteries for plug-in hybrid motor vehicles has been estimated to be 1,700 megajoules of primary energy to produce 1 kilowatt-hour of lithium-ion battery capacity (Samaras et al., 2008). This energy demand would have lifecycle emissions. However, battery lifecycle emissions can be reduced by as much as 70 percent with recycling techniques that would be reflected in operational emissions as batteries are replaced. Therefore, the energy storage component would have a minor impact with regard to operational GHG emissions.

#### 4.6.4.4 Peak Power Generation Component

This component would involve operation of three 20 MW generators at existing substations within the Eastside, likely simple-cycle gas-fired generators called peak generation plants. In 2013, the overall mix of fuels used by PSE to provide all electricity to all of its customers was led by hydropower (32 percent), followed closely by coal, natural gas, and wind energy (PSE, 2015). While hydropower is considered to be renewable and to have negligible GHG emissions, coal is a relatively carbon-intensive energy source, producing between 205 and 230 pounds of $CO_2$ per million British thermal units (Btus). Natural gas is relatively less carbon intensive, producing 117 pounds of $CO_2$ per million Btu. Because peak generation plants would be powered by natural gas, their operational GHG emissions would be similar to the average of overall carbon intensity of PSE's current mix of resources.

Peak generation plants would be operated to provide power at peak demand times to reduce the demands on the transmission system. These plants would also need to be operated for maintenance purposes at least monthly (typically permitted for weekly operation of an hour, or 50 hours per year). Because operational GHG emissions would be a function of operational frequency (including peak power demand situations), quantitative estimates of operational GHG emissions would be speculative, but they are likely to be the highest of any distributed generation source. Such power plants can be required to report GHG emissions pursuant to Chapter 173-441 Washington Administrative Code – Reporting of Emissions of Greenhouse Gases. This could be considered a moderate GHG impact, warranting mitigation.

### 4.6.5 Alternative 3: New 115 kV Lines and Transformers

Potential operational impacts of 115 kV overhead power lines would be the same as those identified above for maintenance-related vehicle trips for 230 kV power lines. Such trips would be infrequent and not result in appreciable GHG emissions. Therefore, Alterative 3 would have a minor impact with regard to operational GHG emissions.

## 4.7 WHAT MITIGATION MEASURES ARE AVAILABLE FOR POTENTIAL IMPACTS TO GREENHOUSE GAS EMISSIONS?

If gas turbines or reciprocating engines are selected as distributed energy components, air quality permits may require installation of a fuel flow meter to restrict the use of fuel and associated GHG emissions over a given time period. A vegetation replacement program could be implemented to reduce sequestration losses under Alternative 1, Option A, and Alternative 3 to a moderate level. Alternative 1, Options B and C would also involve vegetation clearing for alignments, although to a lesser extent. Additionally, carbon credits may be purchased to offset operational emissions generated by permitted sources.

## 4.8 ARE THERE ANY CUMULATIVE IMPACTS TO GREENHOUSE GAS EMISSIONS AND CAN THEY BE MITIGATED?

By definition, GHG impacts are cumulative impacts. The sum of all emission sources throughout the globe drives planet-wide GHG concentrations that result in climate change. Emission sources exceeding 10,000 metric tons per year of $CO_2e$ are required to report their emissions to the state; they could be considered cumulatively considerable contributions and may require mitigation. There are two project elements that could potentially result in GHG emissions of this magnitude. The first is operational emissions from gas turbines or reciprocating engines, if they are selected as distributed energy components.

The second potentially significant adverse GHG impact would involve the substantial loss of sequestration associated with clearing for transmission alignments that could accompany Alternative 1, Option A, and Alternative 3. Given the substantial size of areas to be cleared and the relatively high tree canopy cover in the area, loss of sequestration could exceed 10,000 metric tons annually. A vegetation replacement program could be implemented to reduce sequestration losses to a moderate level.

## 4.9 ARE THERE ANY SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS TO GREENHOUSE GAS EMISSIONS?

There would be no significant and unavoidable adverse impacts related to GHG emissions associated with any of the project alternatives, with implementation of mitigation measures. Potential significant impacts from operational GHG emissions of gas turbines or reciprocating engines, if they are selected as distributed energy components, could be mitigated by a combination of engineering controls and the purchase of offsets. Significant impacts related to sequestration losses associated with clearing activities for transmission alignments that could accompany Alternative 1, Option A, and Alternative 3 could be mitigated to a less-than-significant level through vegetation replacement or offset acquisition.

# 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.

**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.

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.

## 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.<br>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.<br>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** | | |
| 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 RCW[1]) | Ecology | 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.<br>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. |
| National Pollutant Discharge Elimination System (NPDES) – Clean Water Act 33 USC Sections 1251 et seq. and WAC[2] 197-11-200 through 240 | Ecology and local governments through NPDES Municipal Stormwater Permits | 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.<br>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.<br>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. |

| 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 *critical areas* (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:<br>King County Code Chapter 21A.24<br>Bellevue City Code Chapter 20.25H Section IX<br>Renton Municipal Code 4.3.050<br>Kirkland Municipal Code Chapter 21.56<br>Newcastle Municipal Code Chapter 18.24<br>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. |

[1]Code of Federal Regulations
[2]Revised Code of Washington
[3]Washington 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),

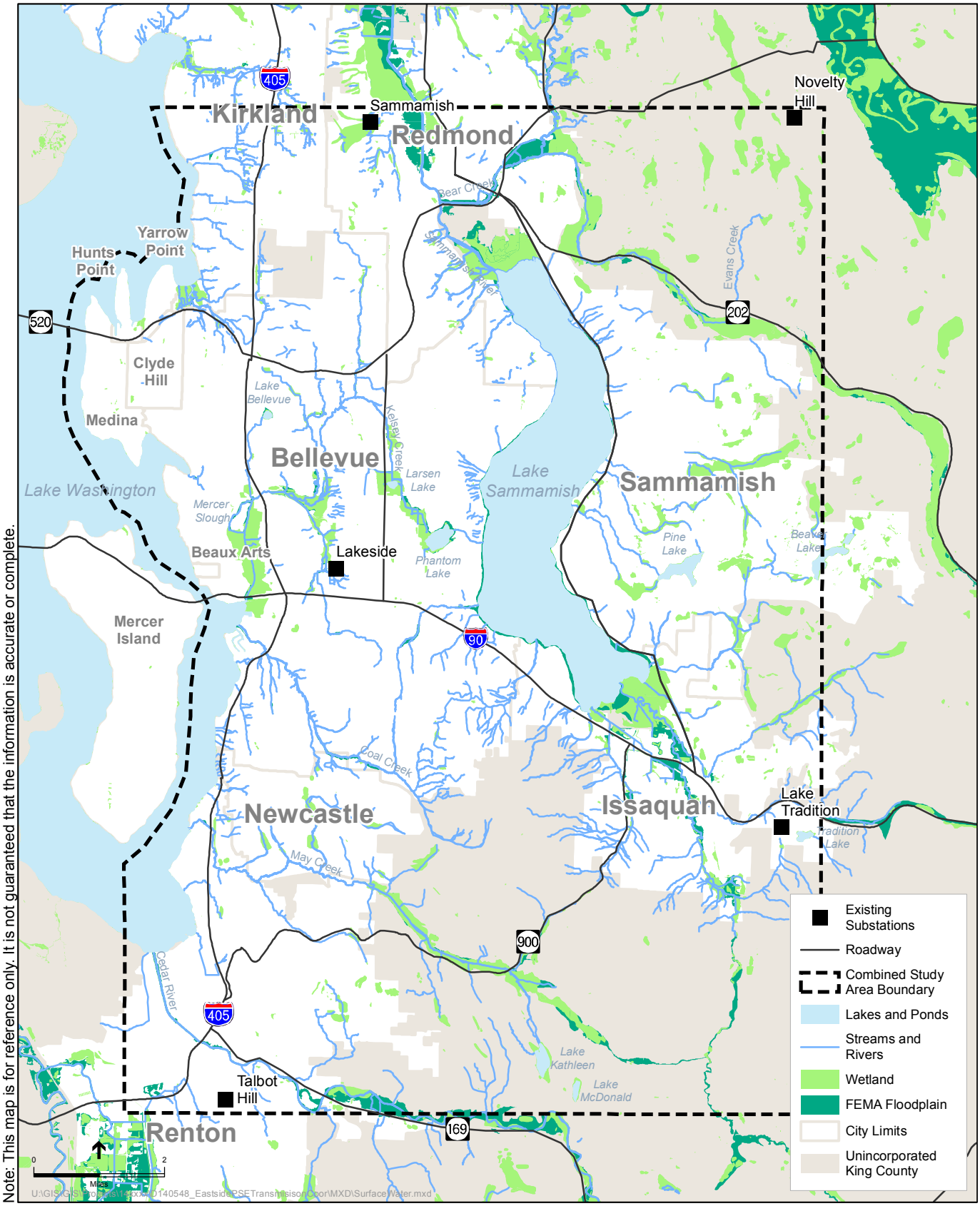
and hydrophytic (water-loving) vegetation. Wetlands can be associated with lake edges, streams, and riparian corridors as well as scattered, low-lying places. They provide a suite of ecosystem functions and services, such as fish and wildlife habitat, floodwater control, *groundwater recharge*, pollutant 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.




Note: This map is for reference only. It is not guaranteed that the information is accurate or complete.

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 requirement, 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 accidently 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 accidently 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 accidently 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.

# CHAPTER 6. PLANTS AND ANIMALS

## 6.1 HOW WERE PLANTS AND ANIMALS IN THE COMBINED STUDY AREA EVALUATED?

Several sources of information were used to characterize the known vegetation and wildlife habitat 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 Fish and Wildlife (WDFW), Priority Habitat and Species (PHS) database (WDFW, 2015);
- Washington Department of Natural Resources (DNR), National Heritage Program GIS dataset (WNHP, 2015);
- U.S. Fish and Wildlife Service (USFWS), species database (USFWS, 2015);
- U.S. Geological Survey (USGS), National Land Cover database (Homer et al., 2015);
- WDFW SalmonScape database (WDFW, 2007);
- City of Bellevue, Urban Wildlife Habitat Literature Review (The Watershed Company, 2009);
- Critical areas GIS datasets for the study area communities;
- Tree inventory reports and other technical reports; and
- Aerial imagery.

These information sources can only indicate the resources that may be present in the combined study area. This analysis is programmatic and no site surveys have been performed. A site-specific analysis and fieldwork would be required to verify the occurrence of sensitive or protected wildlife, fish, plants, or habitat.

**Plants and Animals Key Findings**

Alternatives 1 and 3 could cause minor to significant impacts from habitat alteration; interference with critical survival activities; or direct injury, death or harassment of some species. Impacts would depend on the scale of habitat alteration or species disturbance, and the species affected.

Alternative 1 (Option A) and Alternative 3 have the most potential to cause significant impacts on plants and animals – severity of impacts will depend on location of project and adjacent habitat and species that use it.

Construction and operation of a submerged line (Alternative 1, Option D) could result in moderate to significant impacts on aquatic species, depending on the type and amount of in-water work.

The energy storage and peak generator plant components of Alternative 2 could have the lowest impacts on plants and animals.

## 6.2 WHAT ARE THE RELEVANT PLANS, POLICIES, AND REGULATIONS?

Several federal, state, and local government policies, regulations, and ordinances relating to the protection of plants and animals apply to this project. Such regulations and policies influence planning, land use, and management activities that can impact fish and wildlife species and their habitats within the combined study area.

### 6.2.1 Federal and Washington State

Table 6-1 summarizes federal and state regulations and programs for fish, wildlife, plants, and habitats.

**Table 6-1. Federal and State Regulations and Programs**

| Statute | Lead Agency | Regulated Activities / Program |
|---|---|---|
| **Federal** | | |
| Endangered Species Act (50 CFR[1] Part 17) | National Marine Fisheries Service (NMFS) and USFWS | Protects species identified as endangered or threatened along with designated critical habitat required for the conservation of those species. NMFS has authority over most anadromous fishes, marine mammals, marine reptiles, and other marine fish species, while the USFWS has authority over terrestrial wildlife and resident fish species that inhabit inland waters. Requires that federal actions (such as issuing a permit for wetland fill) do not jeopardize the continued existence of any *threatened, endangered*, or proposed *species* or result in the destruction or adverse modification of critical habitat. |
| Magnuson-Stevens Fishery Conservation Act, as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267) | NMFS | Requires federal agencies to consult with NMFS on federal actions that may adversely affect designated Essential Fish Habitat for federally managed fish species. |
| Bald and Golden Eagle Protection Act (50 CFR Part 22) | USFWS | Protects bald and golden eagles and makes it unlawful to take, import, export, sell, purchase, or barter any bald or golden eagles, their parts, products, nests, or eggs. *Take* means pursuing, shooting, poisoning, wounding, killing, capturing, trapping, collecting, molesting, or disturbing eagles. To avoid potential disturbance to bald eagles, the National Bald Eagle Management Guidelines (USFWS, 2007) provide recommendations that will likely avoid take for a list of activities. |

| Statute | Lead Agency | Regulated Activities / Program |
|---|---|---|
| Migratory Bird Treaty Act (50 CFR Part 21) | USFWS | Protects many common native birds as well as birds that are listed as threatened or endangered. USFWS regulates most aspects of the taking, possession, transportation, sale, purchase, barter, exportation, and importation of migratory birds. Of particular concern are activities that affect birds nesting on bridges, buildings, signs, illumination poles, and other structures in areas planned for construction. |
| **State** | | |
| Growth Management Act (Chapter 36.70A RCW[2]) | Department of Commerce | Requires county and local municipalities to manage Washington's growth through the identification and protection of critical areas and natural resource lands; the designation of *urban growth areas*; and the preparation and implementation of comprehensive plans. Critical areas include: geologic hazard areas, frequently flooded areas, wetlands, streams, fish and wildlife habitat conservation areas (FWHCAs), and critical aquifer recharge areas. FWHCAs are wildlife habitats that are mapped or designated by WDFW, corridors connecting priority habitats, or areas that support species of local importance. |
| Shoreline Management Act (Chapter 90.58 RCW) | Department of Ecology (Ecology) | Regulates water bodies above a threshold size as well as lands within 200 feet of the ordinary high water mark of those water bodies. Includes policies and regulations to protect shoreline habitat, preserve public access, and allow for water-dependent uses. Regulations include restrictions on development in the shoreline zone, requirements for maintaining native vegetation, and development standards. Implemented by local jurisdictions through shoreline master programs. |
| State Hydraulic Code (Chapter 220-110 WAC[3]) | WDFW | Protects fish and their habitat through regulation of activities in streams and lakes. WDFW administers state rules through its Hydraulic Project Approval (HPA) program. An HPA must be obtained from WDFW before work can be conducted that uses, obstructs, diverts, or changes the natural flow or bed of state waters. The conditions of an HPA can be designed to protect fish, shellfish, and their habitat. |
| Priority Habitats and Species Program | WDFW | Nonregulatory program that provides information on documented locations of fish and aquatic resources, terrestrial plants and animals, and habitats listed or defined as priority. Priority species include state endangered, threatened, sensitive, or candidate species; animal aggregations considered vulnerable; and species of recreational, commercial, or tribal importance that are vulnerable (WDFW, 2015). Priority habitats are habitat types or elements of habitat with |

| Statute | Lead Agency | Regulated Activities / Program |
|---|---|---|
| | | unique or significant value to a diverse assemblage of species. A priority habitat may consist of a unique vegetation type (e.g., shrub-steppe) or dominant plant species, a described successional stage (e.g., old-growth forest), or a specific habitat feature (e.g., cliffs). |
| Natural Heritage Program | DNR | Nonregulatory program that provides information for listed plant species or those defined as rare. Also maintains information on rare ecological communities and priority species. |

Definitions:
[1]Code of Federal Regulations
[2]Revised Code of Washington
[3]Washington Administrative Code

### 6.2.2 Local Regulations

Table 6-2 describes the regulatory programs implemented by the study area communities.

**Table 6-2. Local Regulations and Programs**

| Regulatory Program | Jurisdiction | Regulated Activities/Program |
|---|---|---|
| Critical Areas Ordinances/Regulations – required under the Growth Management Act (Chapter 36.70A RCW) | King County and all cities except Clyde Hill[1] | Protect and regulate activities on or adjacent to designated critical areas. Establish allowed uses, buffers, setback requirements, and mitigation requirements for regulated critical areas. |
| Shoreline Master Programs/Plans – required under the Shoreline Management Act (Chapter 90.58 RCW) | King County and all cities except Clyde Hill | Establish allowed uses, buffers, setback requirements, and mitigation requirements for shorelines of regulated waterways. |
| Local codes for tree protection or preservation including:<br>King County Code Chapter 21A.16<br>Bellevue City Code 20.20.900<br>Beaux Arts Municipal Code 16.25<br>Issaquah Municipal Code 18.12<br>Kirkland Municipal Code 95.30, 95.34<br>Redmond Municipal Code 20D.80.20<br>Renton Municipal Code 4-4-130<br>Sammamish Municipal Code 21A.35<br>Yarrow Point Municipal Code 12.26 | King County and all study area cities | Regulate the protection of trees in addition to the critical areas code. *Significant trees* are specifically protected and defined for their unique ecological and aesthetic value. A review and site plan may be required for any proposed alterations to significant trees. |

[1]When Clyde Hill was incorporated as a city there was no evidence of critical areas as defined under GMA. Therefore it was determined that Clyde Hill is not required to develop a Critical Areas Ordinance (City of Clyde Hill, 2014).

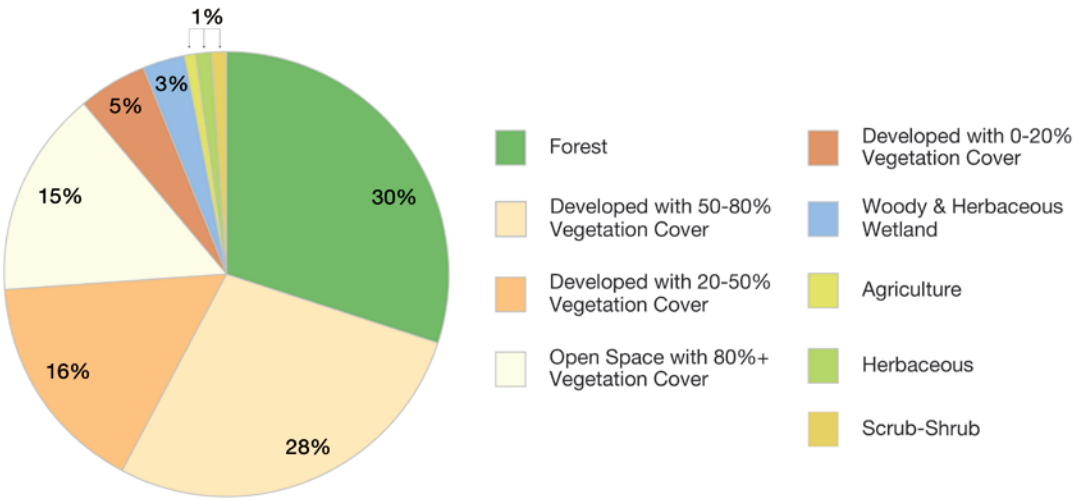
Comprehensive plans for the study area communities have policies associated with plants and animals, including: restoration of natural features, tree retention, targets for tree canopy cover, and/or protection of ecological processes and functions of natural features (e.g., wetlands, streams).

## 6.3 WHAT TYPES OF VEGETATION ARE FOUND IN THE COMBINED STUDY AREA?

### 6.3.1 Vegetation Cover Types

Although substantial portions of the combined study area are already developed to varying degrees, a variety of vegetation cover types occur including herbaceous, scrub-shrub, forest, agriculture, and woody and herbaceous wetland vegetation types (Figures 6-1 and 6-2). Most of the combined study area is developed (59 percent total), but has varying amounts of vegetation cover (Figure 6-1). Forest (30 percent), open space (15 percent), and other vegetation cover types make up the remaining vegetation cover found in the combined study area (Figure 6-1). The largest patches of forested vegetation cover are found in state parks, open space areas, and undeveloped areas. Section 6.4 describes these vegetation cover types in more detail, including common plant species and associated wildlife.

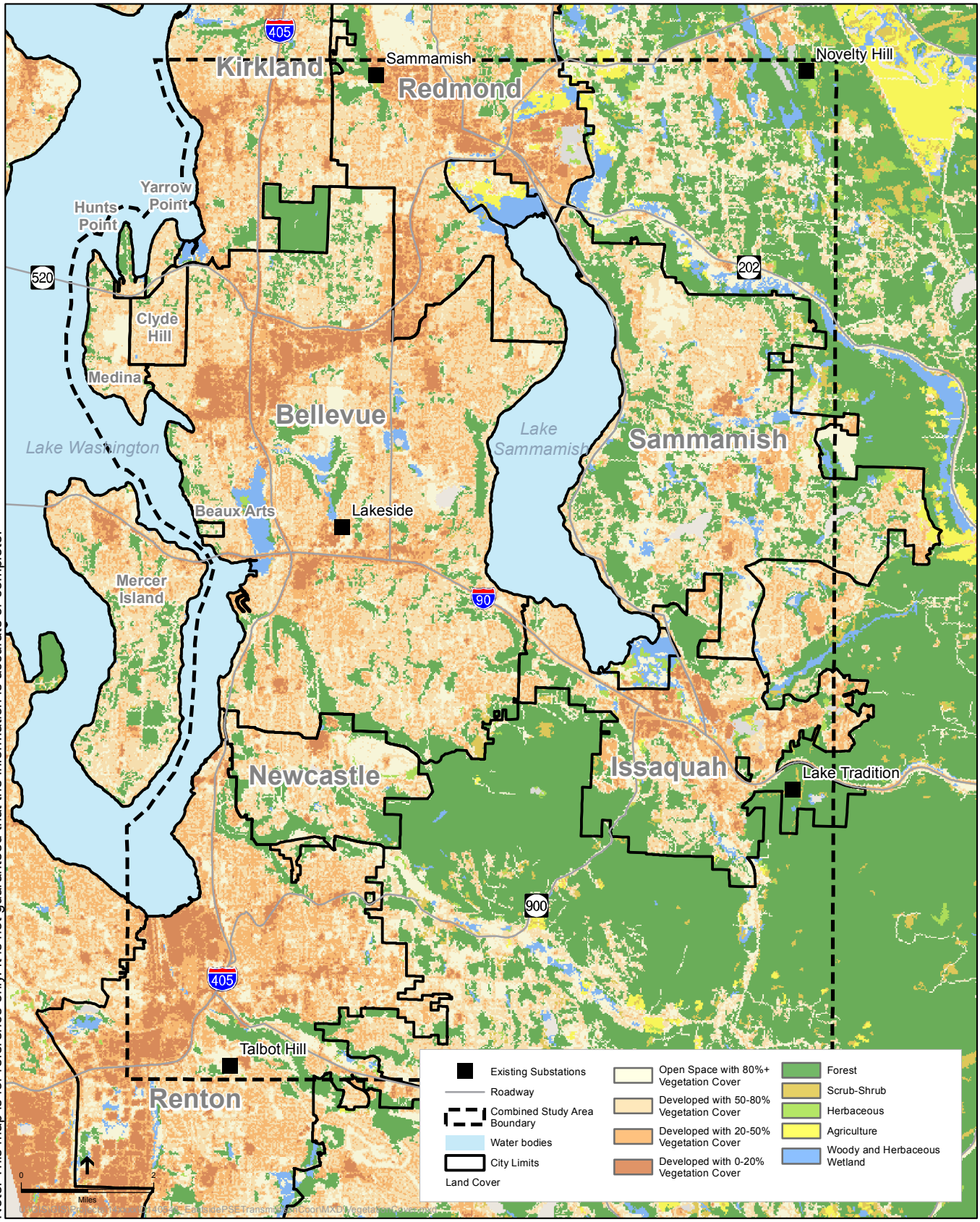
**Figure 6-1. Vegetation Cover by Type**




Source: Homer et al., 2015

### 6.3.2 Rare Plants and High-Quality Vegetation Communities

The Washington Natural Heritage Program (WNHP) database, managed by WDNR, identifies one rare plant occurrence in the combined study area: Vancouver ground-cone *(Boschniakia hookeri)* in Bridle Trails State Park. The WHNP database also identifies two high-quality vegetation types between Squak Mountain and Tiger Mountain: Douglas fir-madrone/salal forest, and a forested sphagnum bog. Because these are sensitive resources subject to collection and vandalism, their precise locations are not disclosed to the public.




Note: This map is for reference only. It is not guaranteed that the information is accurate or complete.

SOURCE: King County 2015; ESA 2015; WA Ecology 2014; NOAA 2011.
For more info visit www.energizeeastsideeis.org/map-vegetationcover

Energize Eastside EIS 140548

**Figure 6-2**

Vegetation Cover

### 6.3.3 Trees

Trees provide numerous functions and benefits. For instance, tree canopy cover helps to reduce stormwater runoff by intercepting and taking up water; this can improve water quality and reduce stream erosion. Canopy cover also provides shade to help maintain stream temperatures to benefit aquatic species, as well as provide important carbon sequestration functions. Snags and den trees provide habitat for cavity-nesting animals such as birds and raccoons. Forested areas also provide wildlife corridors to enhance population connectivity to various habitat types that support such activities as breeding, rearing and foraging.

Typical tree species in the combined study area include both deciduous and coniferous species such as Douglas fir, big-leaf maple, red alder, black cottonwood, Pacific madrone, pines, western red cedar, and western hemlock. Existing tree canopy cover in the combined study area is shown in Table 6-3 based on information from study area communities that have completed tree inventory reports.

**Table 6-3. Tree Canopy Cover in Study Area Communities with Tree Inventory Reports[1]**

| Jurisdiction | Tree Canopy Cover |
|---|---|
| Bellevue | 36% |
| Issaquah | 47% |
| Kirkland | 36% |
| Redmond | 39% |
| Renton | 29% |
| Sammamish | 46% |

[1] Newcastle, Medina, Clyde Hill, Yarrow Point, Hunts Point, and Beaux Arts do not currently have tree inventories available.

## 6.4 WHAT ANIMAL SPECIES AND HABITATS CAN BE FOUND IN THE COMBINED STUDY AREA?

This section provides a general description of the wildlife habitats and species likely occurring in the combined study area and describes threatened and endangered species and species of concern that may occur in this area.

### 6.4.1 Habitat Types and Associated Species

As indicated above, about 59 percent of the combined study area is developed as urban, suburban and exurban areas. As a result a substantial portion of the combined study area consists of substantially modified wildlife habitat, including extensive landscaped or maintained areas. Animal species typically found in landscape areas have a high tolerance for human disturbance, and include crows, squirrels, raccoons, sparrows, and rats. Landscape areas can include backyards, golf courses, and recreational parks that provide cover and

foraging for animal species, such as the Bellevue Municipal Golf Course, Glendale Country Club, and Tam O'Shanter Park in Bellevue.

Although typically small and disconnected, urban habitat is identified by the City of Bellevue as important for wildlife (The Watershed Company, 2009). Urban habitat includes areas where commercial, industrial, or dense residential land use dominates; habitat is limited to small city parks and residential and commercial landscaping. Common habitat features used by animal species found in these habitats include man-made structures such as bridges, chimneys, abandoned buildings, ledges, and telephone poles and wires (The Watershed Company, 2009). Suburban habitat is dominated by single-family homes on residential lots and includes parks, riparian corridors, residential landscapes, and critical areas and their buffers. Exurban habitat is found in areas of low-density residential development located in rural areas and includes many of the same habitat features as suburban habitat, but also includes forest communities.

Despite the extensive development in the combined study area, important aquatic and terrestrial habitat is also present, including WDFW designated priority habitats. Table 6-4 provides an overview of the general distribution of these habitat types within the different jurisdictions in the combined study area, based on a coarse interpretation of the data presented in Figure 6-1. Therefore, the table primarily represents concentrations of similar habitat, while small or disperse patches are not represented. These habitat types also tend to overlap in many areas. For example, freshwater wetlands and forest habitat can also be found in biodiversity areas and corridors. A short description of each habitat and species that typically use the habitat follows the table.

**Table 6-4. Aquatic and Terrestrial Habitats within the Combined Study Area**

| Jurisdiction | Bellevue | Clyde Hill | Hunts Point | King County[1] | Kirkland | Medina | Newcastle | Redmond | Renton | Sammamish | Yarrow Point |
|---|---|---|---|---|---|---|---|---|---|---|---|
| ***Habitats*** | | | | | | | | | | | |
| Lakes and Ponds[2] | ● | | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| Biodiversity Areas and Corridors[2] | ● | | | ● | ● | | ● | | ● | | |
| Freshwater Wetlands[2] | ● | | | ● | ● | | ● | ● | ● | ● | ● |
| Forest | ● | | | ● | | | | | | | |
| Natural Areas | ● | | | ● | ● | ● | | | ● | | |

[1]Unincorporated areas of King County
[2]WDFW designated priority habitats
Source: WDFW, 2015 and The Watershed Company, 2009

#### 6.4.1.1 Lakes and Ponds

Lake Washington, Lake Sammamish, and other aquatic systems provide important resources for fish and other aquatic species. Priority aquatic species designated by WDFW and species of local importance likely to occur in lakes or ponds in the combined study area include Chinook, coho, and sockeye salmon; steelhead; rainbow, cutthroat, and potentially bull trout; reptiles (Pacific pond turtle); and numerous bird species that forage in these areas (gulls, terns, cormorants, and waterfowl) (Figure 6-3). The WDFW priority terrestrial species or species of concern expected to occur in these areas include bald eagles, peregrine falcon, and great blue heron. All of the communities in the combined study area have lake and pond habitat; (see Chapter 5 and Figure 5-1 for further discussion of lake and pond habitat).

**Figure 6-3. Great Blue Heron in Lake and Pond Habitat**

#### 6.4.1.2 Biodiversity Areas and Corridors

Biodiversity areas are terrestrial areas that are either identified by a scientifically based assessment on a landscape scale, or contain valuable habitat for fish and wildlife within a city or urban growth area (UGA) where the vegetation is vertically diverse (e.g., snags, downed woody debris) and horizontally diverse (e.g., mosaic of habitat types). Corridors are areas of moderately undisturbed and unbroken tracts of vegetation that connect habitats to support wildlife movement and migration (WDFW, 2008).

Corridors also include riparian areas, which are vegetated areas adjacent to streams, commonly found throughout low-lying areas east and southeast of Lake Washington and into the foothills (WDFW, 2008). Riparian corridors in the combined study area include Mercer Slough, and Coal, Issaquah, Kelsey, Lewis, and May creeks. These corridors and the associated stream habitat are discussed in more detail in Chapter 5.

**Figure 6-4. Path through Marymoor Park**

Photo credit: Eastside Audubon

Native plant species commonly found in habitat corridors include big-leaf maple, red alder, conifers, Indian plum, and oceanspray. Typical aquatic plants include sedges, rushes, duckweed, and common cattail. Corridors support a range of both terrestrial and aquatic animal species such as small mammals, songbirds, and raptors. Corridors in the combined study area range in size and vegetative cover.

Major corridors in the combined study area, designated by WDFW as biodiversity and corridor areas include Marymoor Park, Bridle Trails Park, and the Cedar River Open Space areas. Marymoor Park, a 640-acre recreational and nature park, is located at the north end of Lake Sammamish (Figure 6-4), and contains extensive scrub-shrub and emergent wetland habitat for a range of species including fish, waterfowl, and other bird species. Bridle Trails State Park is an approximately 500-acre primarily forested park in Kirkland. The Cedar River Valley Open Space Area in Renton consists of steep forested slopes and riparian areas that provide habitat for many birds, other terrestrial species, and fish.

The other major habitat corridor is found in the southeast corner of the combined study area, connecting Cougar Mountain Regional Wildlands Park, Squak Mountain State Park, and Tiger Mountain Natural Resource Conservation Area (WDFW, 2015). This area consists of mixed forest (predominantly older second-growth trees), streams, and wetlands. It provides habitat for resident and migratory wildlife such as black bear, bobcat, cougar, deer, eagle, waterfowl, reptiles, fish, and amphibians as well as small animals and birds.

Other habitat connectivity corridors occurring in the combined study area follow transmission lines, such as the Seattle City Light (SCL) transmission line that bisects the Bridle Trails State Park biodiversity area and corridor. Many small and large mammal species likely use such utility corridors for breeding, rearing, foraging and migration purposes.

#### 6.4.1.3 Freshwater Wetlands

Over 1,000 wetlands are mapped in the combined study area (see Figure 5-1 for locations of major wetlands) (King County, 2015). Figure 6-5 shows a typical freshwater wetland in this region. The plant species commonly associated with wetlands in the combined study area include soft rush, common cattail, willow, dogwood, and reed canarygrass (a nonnative grass), among others. Freshwater wetlands support habitat for songbirds, amphibians, and other terrestrial and aquatic species. Most of the study area communities have this type of WDFW designated priority habitat (see Table 6-4). One major freshwater wetland complex is Mercer Slough Nature Park in Bellevue, a

**Figure 6-5. Freshwater Wetland Habitat**

large (about 450-acre) mixed wetland system associated with Lake Washington. A complex of open water, emergent, and forested wetland vegetation provides habitat for migrating salmon, great blue heron, waterfowl, and other priority species (WDFW, 2015). Other major wetland complexes include the Larsen and Phantom Lake complex, and wetlands adjacent to the north and south ends of Lake Sammamish (see Figure 6-1).

**Figure 6-6. Forest Habitat**

#### 6.4.1.4 Forests

Patches of forest habitat are scattered throughout the combined study area, although the largest patches are found in unincorporated King County (Squak Mountain, Cougar Mountain Wildlands Park, Tiger Mountain Forest) (Figure 6-1). Common plant species in forest communities include western red cedar, Douglas fir, western hemlock, big-leaf maple, sword fern, and vine maple. Forests provide habitat for small and large mammals, songbirds, raptors, and many other bird species. Figure 6-6 shows typical forest habitat with a large wildlife snag.

Bridle Trails State Park provides about 500 acres of primarily forested habitat for a variety of species, including coyotes, raccoons, other small mammals, and many birds. It is designated by WDFW as a biodiversity area and corridor.

#### 6.4.1.5 Natural Areas

Natural areas include unmaintained parks and other public lands that support native plants and animals. These areas can consist of a variety of habitat types, including wetlands, forest communities, riparian corridors, and shrub and herbaceous areas. Natural areas can provide important habitat for animal species and are found throughout the combined study area. The Kelsey Creek Open Space Area is a forested open space in the Kelsey Creek basin in Bellevue. Kelsey Creek Park, named after Kelsey Creek which runs through the park to Mercer Slough, provides 150 acres of forested riparian and wetland habitat.

Coal Creek Park Natural Area provides about a 3-mile-long forested riparian corridor, adjacent to Coal Creek, extending from Lake Washington to Cougar Mountain Wildlands Park. This park provides diverse fish and wildlife habitat, and enhances habitat connectivity through the area. May Creek Park provides similar functions, although this corridor consists of smaller and lower density forested areas.

### 6.4.2 Federal, State, and Local Listed Species

The combined study area provides potential habitat for several bird, mammal, reptile, amphibian, and fish species that are listed or designated as Species of Concern under the

federal Endangered Species Act, or that have a Washington state designation (for example, state threatened). A list of these species and their federal/state designation is provided in Appendix C. The only federal or state listed endangered or threatened species expected to typically occur in the combined study area are aquatic species. The critical areas ordinances of King County and some of the other communities list species of local concern in addition to those under federal and state designation. The following paragraphs summarize additional species of local concern:

- *Chapter 21A.24.382 of the King County Zoning Cod*e requires the County to protect the following species: bald eagle, great blue heron, osprey, peregrine falcon, northern spotted owl, marbled murrelet, Townsend's big-eared bat, Vaux's swift, red-tailed hawk, and goshawk.
- *The City of Bellevue's Land Use Code 20.25H.150* designates the following species of local importance: great blue heron, red-tailed hawk, bald eagle, peregrine falcon, osprey, pileated woodpecker, purple martin, common loon, western grebe, merlin, great egret, green heron, Vaux's swift, Townsend's big-eared bat, and western toad.
- *The City of Redmond's Critical Areas Ordinance (Ordinance #2259)* designates great blue heron as a locally important species.

## 6.5 HOW WERE POTENTIAL IMPACTS TO PLANTS AND ANIMALS ASSESSED?

Because specific locations of proposed facilities have not yet been determined, potential impacts to plants and animals were evaluated conceptually for this programmatic phase of the EIS. A range of potential impacts identified during the scoping process were evaluated in this assessment, including noise disturbance, habitat loss (including plant and tree loss), and the introduction of invasive plant species (City of Bellevue, 2015). A site-specific analysis of impacts will be completed during Phase 2 of the EIS process.

## 6.6 WHAT ARE THE LIKELY CONSTRUCTION IMPACTS RELATED TO PLANTS AND ANIMALS?

### 6.6.1 Construction Impacts Considered

Although construction details for each alternative have yet to be developed, general construction activities are understood for these types of projects. To evaluate impacts at a programmatic level, the overall size of the construction footprint (amount of surface area disturbance) associated with each alternative was used to compare the potential for impacts associated with the proposed project. Most of the alternatives would require site clearing for infrastructure and operation of heavy equipment. The scale and proximity of construction activities would determine the intensity of potential impacts on plants and animals. Site-specific studies to document plant and animal species in the area and potential impacts on those species would be conducted prior to facility placement and construction.

**Minor** - Impacts would be minor where construction occurs over a short duration in developed areas with minimal or poor quality habitat; there is temporary habitat alterations or

construction activities (such as noise) with the potential to disrupt or disturb wildlife movement or critical survival activities of native species; or when impacts are mitigated through compliance with tree protection or critical areas ordinances.

**Moderate** - Impacts are moderate where construction activities would cause injury, death, or harassment of native resident or migratory fish, bird, amphibian, or mammal species; or there is moderate interference with the breeding, feeding, or movement of native resident or migratory fish, bird, amphibian, or mammal species.

**Significant** - Impacts are considered significant where construction activities would cause the following: injury, death, or harassment of federal and state listed endangered or threatened species, or bald eagle and peregrine falcon (state sensitive and federal species of concern); a reduction of habitat quality or quantity that can substantially affect the critical survival activities (breeding, rearing, and foraging) of listed species; substantial interference with the breeding, feeding, or movement of native resident or migratory fish, bird, amphibian, or mammal species; or noncompliance with tree protection ordinances or critical areas ordinances.

#### 6.6.1.1 Direct Loss of Habitat

Construction would require grading or permanent removal of vegetation or trees that currently provides habitat for animals. Impacts resulting from direct losses of terrestrial habitat would vary depending upon the location of construction. Impacts would be minor, moderate, or significant as defined above. The significance of an impact would be further defined by the extent of the impact (how much area is affected) and if listed species, species of concern, or priority habitats are affected.

#### 6.6.1.2 Disturbance from Construction Noise and Human Activity

Increased noise and human activity associated with construction could impact plants and animals. Some animal species living in urban areas are generally tolerant of high noise levels and likely would not be disturbed. Other species could be displaced and relocate to surrounding habitats. Because available habitat is likely to be already inhabited by wildlife, some individual animals may not be able to successfully relocate, resulting in increased mortality of some species. This would be a significant adverse impact if listed species are lost. Construction activities that disturb the vegetation and soil can leave areas susceptible to invasive plant species, which would decrease the value of the habitat for wildlife.

#### 6.6.1.3 Sedimentation of Aquatic Habitats

As described in Chapter 5, sedimentation of aquatic habitats due to runoff from disturbed areas or turbidity from in-water work may occur during construction. Aquatic species, including threatened and endangered fish, could be impacted if sedimentation resulted from uncontrolled runoff in aquatic habitats. In order to comply with state and local stormwater permit requirements, best management practices to control surface water runoff would be implemented, minimizing the potential for uncontrolled runoff. Similarly, best management practices during in-water work would be used to control turbidity.

#### 6.6.1.4 Contamination of Aquatic Habitats

As described in Chapter 5, there is a risk for accidental spills of oils, solvents, and other chemicals from construction equipment. If not controlled, such spills could flow into nearby surface waters and contaminate aquatic habitats and species. The potential for spills would be minimized by fulfilling permit requirements and implementing Spill Prevention and Control Plans. Contaminated sediments could also be disturbed during dredging or other in-water work, and released into the aquatic habitat. Contamination of lake-bottom sediments is known to exist in some locations in Lake Washington as discussed in Chapter 5. PSE would need to determine the likelihood of encountering hazardous materials prior to construction, and implement best management practices to minimize potential effects on aquatic species.

### 6.6.2 No Action Alternative

Under the No Action Alternative, PSE's existing maintenance activities and programs would continue. Utility line or facility construction would be limited to that described in Chapter 2. As a result, there would be negligible loss of vegetation or disturbance to animals from permanent structures.

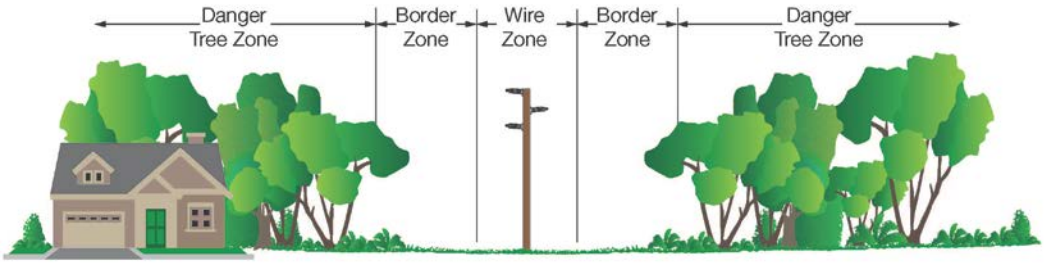
The types of conservation measures PSE expects to implement as part of achieving its conservation goals would occur mostly on a smaller scale. Since minimal construction would be required to achieve these goals, short-term impacts on plants and animals are anticipated to be minor.

PSE's Vegetation Management Program would continue under the No Action Alternative (Figure 6-6). This program includes removal of mature trees greater than 15 feet tall that are located within the transmission right-of-way, (typically including the area directly under the wires (the wire zone), and 10 feet from the outer transmission wires (border zones). Therefore, the overall size of the right-of-way typically varies, by the wire zone width. Trees within the transmission right-of-way would be trimmed or removed, as needed. In addition, trees at risk of falling and likely to come in contact with nearby wires are proactively removed outside of the border zones (the danger tree zone), which also varies by the height of the trees in this zone. PSE selectively uses herbicides, in combination with tree removal and pruning, for vegetation management in accordance with best management practices.

PSE's policy is to restore vegetation other than trees within transmission corridors to "as like or better" condition. Outside of the required zones, tree replacement is agreed upon with the property owner (in some cases the owner may prefer tree removal). Tree replacement would also comply with local code requirements.

PSE would continue to achieve 100 percent of the company's conservation goals as outlined in its Integrated Resource Plan (PSE, 2013a). The types of conservation PSE expects to implement would occur mostly on a smaller scale (small projects on individual homes and businesses), including energy efficiency (weatherization, efficient lighting, etc.), fuel conversion (electric to gas), distributed generation (solar, wind, etc.), distribution efficiency, and demand response (capacity savings programs). Since minimal construction would be required to achieve these goals, short-term impacts on plants and animals are anticipated to be minor.

**Figure 6-6. PSE Vegetation Management Program Zones**




Source: PSE, 2015

### 6.6.3 Alternative 1: New Substation and 230 kV Transmission Lines

Impacts are described according to the major components associated with Alternative 1. The substation impacts are described first, followed by transmission line options.

In general, construction would occur largely in developed areas on or adjacent to existing PSE utility easements and rights-of-way or roadways and other utility corridors. It is less likely that construction would occur through undeveloped areas, where wetlands and other priority habitats are more likely to occur. Transmission lines, new transformers, and substations would be located in developed areas to the extent feasible. Potential transmission line locations could be constructed across or adjacent to any of the habitats described above.

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). The Lakeside substation and the proposed Westminster substation are located within existing transmission rights-of-way. Vernell and Westminster are located in urban areas with limited habitat value on the properties themselves; Lakeside is adjacent to a larger greenspace (including critical areas) but listed species are not anticipated to be present because of the urbanized nature of these areas. Species of concern or native resident or migratory species may use the adjacent greenspace. Construction could take up to 18 months, resulting in short-term temporary construction impacts on plants and animals in the vicinity. Animals would likely avoid these substation and transformer locations during construction because of noise and human activities. Habitat loss and disturbance from construction would be moderate to significant if listed species, species of concern, or native resident or migratory species are harmed or displaced. The potential for these species to be present is low, as noted above. Similarly, impacts to critical survival activities of threatened or endangered species or species of concern, or interference with the breeding, feeding, or movement of native resident or migratory species could also result in moderate to significant impacts caused by habitat loss and disturbance, but these species are not likely to be present in these areas. Site specific evaluations during the Phase 2 EIS process will determine the potential for these species to be present in the potentially affected areas.

### 6.6.3.1 Option A: New Overhead Transmission Lines

#### 6.6.3.1.1 Direct Loss of Habitat

Construction of a new overhead transmission line under this option could result in permanent impacts on plants and animals and their habitats. Although most of the corridor would be constructed through existing PSE easements or other utility rights-of-way (roadways, rail corridors), transmission lines could also be constructed through new utility corridors that are currently vegetated, where wetlands and other priority habitats are more likely to occur. If the corridor is located along the existing PSE easement it would be widened by up to 50 feet. The new corridor for a 230 kV line would be approximately 120 to 150 feet wide, wider than a 115 kV line (30 to 40 feet) (see Figure 6-6). Trees would be removed for the construction of overhead transmission lines according to PSE's Vegetation Management Program. Trees posing a threat to transmission lines outside of the corridor would also be removed. As discussed under No Action, PSE has a policy regarding revegetation and replacement of trees, which includes compliance with local tree replacement and critical areas regulations.

If a new transmission line corridor were located entirely in currently vegetated areas, up to 327 acres of vegetation could be removed, assuming an 18-mile corridor up to 150 feet in width, with 100% vegetation coverage. Because the corridor includes areas of existing rights-of-way, it is not likely to be 100% vegetated. Assuming an average tree canopy coverage of 40 percent within the corridor (see Section 6.3.3), up to 131 acres of canopy cover could be removed under Alternative 1, Option A, in a worst-case scenario. Those species using forested areas for nesting, foraging, movement or shelter could be displaced by species preferring less forest cover and open spaces. Habitat connectivity would be reduced or disrupted in some areas. For these reasons, Option A could result in moderate to significant adverse impacts to habitat and listed species, species of concern, or native resident or migratory species. However, a new transmission line corridor is likely to be located in existing PSE easements and other utility rights-of-way, where the habitat is already disturbed. In this scenario, up to about 109 acres of vegetation (including about 43 acres of forested habitat) could be removed, assuming an 18-mile corridor widened 50 feet with 40 percent tree canopy cover. The actual impact of a new transmission line corridor would likely be somewhere between these two scenarios (entirely new corridor or entirely within existing rights-of-way), as some combination of these areas would likely be used, and would be determined more specifically in Phase 2. Federal, state, and local regulations (critical areas and tree protection ordinances) would require protection and mitigation for impacts to species, habitat, or vegetation removal during construction.

#### 6.6.3.1.2 Disturbance from Construction Noise and Human Activity

New access roads could also be installed for construction of overhead transmission lines. Animals in the vicinity of construction activities could experience increased noise and human activity for up to 18 months, if the new overhead transmission line and transformer and substation facilities are constructed concurrently. Individual locations along the transmission line corridor would have construction-related activity for up to a week over a period of up to 2 months. Many animal species would likely avoid the area during construction periods, although species living in urban areas are generally tolerant of high noise levels and likely would not be substantially disturbed. Species in the combined study area that are more

sensitive to human activity, such as bald eagle or peregrine falcon, could be temporarily displaced and relocate to surrounding habitats if disturbed. Impacts could be significant depending on the timing and species present if the project disturbs or substantially disrupts critical survival activities (nesting, foraging, and migration) of threatened or endangered listed species or species of concern. However, impacts would likely be short-term and minor, and mitigation would follow local, state, and federal environmental review and permit requirements.

#### 6.6.3.1.3 Sedimentation of Aquatic Habitats

As indicated in Section 6.6.1.3, sedimentation of aquatic habitats is expected to be minimized, and thus minor, with the implementation of best management practices. Potential impacts would also be reduced if construction activities are limited to existing rights-of-way, utility corridors, or other previously disturbed or developed areas. Refer to Chapter 5 for more information.

#### 6.6.3.1.4 Contamination of Aquatic Habitats

As discussed in Section 6.6.1.4, potential contamination or aquatic habitats is expected to be avoided or minimized with the implementation of best management practices. Impacts would be negligible or minor.

### 6.6.3.2 Option B: Existing Seattle City Light 230 kV Transmission Corridor

#### 6.6.3.2.1 Direct Loss of Habitat and Disturbance from Construction Noise and Human Activity

Some construction activities for this option would disturb wildlife or remove vegetation. The SCL 230 kV transmission line currently crosses WDFW designated biodiversity corridors or natural habitat areas such as Bridle Trails State Park, Coal Creek Natural Area, and May Creek Park. If construction activities in Bridle Trails State Park occur in or near where the rare Vancouver ground-cone plant species occurs, there could be significant impacts to the species. In general, construction activities would be less intense than with new overhead lines and would potentially involve substantially less vegetation clearing, because existing corridors would primarily be used (and not widened), and a shorter (1-mile-long) new transmission corridor would be required to connect the SCL corridor line to the Lakeside substation. Activities would be concentrated along an approximately 15-mile corridor similar to transmission lines for Alternative 1, Option A. Animals in the vicinity of construction areas could experience noise and human activity and would likely avoid the area during construction periods.

Rebuilding transmission lines is expected to take longer than installing new lines (up to 24 months) and would have the greatest potential to disrupt wildlife in the vicinity. Impacts from construction activities would be similar to Option A. Alternative 1, Option B would be primarily constructed along corridors already being used for transmission, where wildlife may be more adapted to human activity, and potentially less affected by construction activities. Impacts from Option B could range from minor to significant.

#### 6.6.3.2.2 Sedimentation of Aquatic Habitats

As discussed above for Alternative 1, Option A, sedimentation of aquatic habitats is expected to be minimized, and thus minor, with the implementation of best management practices. Potential impacts would also be reduced if construction activities are largely limited to existing rights-of-way, utility corridors, or other previously disturbed or developed areas. Refer to Chapter 5 for more information.

#### 6.6.3.2.3 Contamination of Aquatic Habitats

As discussed above for Alternative 1, Option A, potential contamination or aquatic habitats is expected to be avoided or eliminated with the implementation of best management practices. Impacts would be negligible or minor. Refer to Chapter 5 for more information.

### *6.6.3.3 Option C: Underground Transmission Lines*

#### 6.6.3.3.1 Direct Loss of Habitat

Construction of new underground transmission lines would result in temporary impacts, and could result in some permanent impacts, on plants and animals. Most new underground transmission lines would likely be constructed through existing PSE 115 kV overhead transmission line rights-of-way, other utility rights-of-way (roadways, rail corridors), or new rights-of-way. Installation techniques for open-cut placement of transmission lines would likely include clearing and grading, excavation, and operation of large equipment. The trench width for trench excavation would vary from 2 to 6 feet, plus temporary clearing for access roads and staging (approximately 30 feet wide). These impacts would be temporary but establishment of a maintenance zone, where only certain types of vegetation would be allowed to grow, would be a permanent impact. Street trees and other roadside vegetation would be removed. This option results in  a narrower clear zone, compared with up to 150 feet of clear zone needed for a 230 kV overhead transmission line (under Alternative 1, Option A), but may have more permanent vegetation removal.

It is less likely that the new underground line would be constructed through undeveloped areas, where wetlands and other priority habitats are more likely to occur. However, if a new underground line were located in currently forested areas, a worst case estimate of up to 66 acres of tree canopy cover could be lost, assuming at least an 18-mile-long corridor with a 30-foot-wide work area and 100% vegetation cover. Impacts from construction would be significant if habitat loss resulted in harm to threatened or endangered species, species of concern, or their critical survival activities. In the absence of these species or their suitable habitat, impacts would be considered moderate to significant if the project harmed or interfered with the breeding, feeding, or movement of native resident or migratory species. Alternative 1, Option C would be subject to the same regulations as those described for Option A.

#### 6.6.3.3.2 Disturbance from Construction Noise and Human Activity

Noise and construction activity could disturb animals in the vicinity. If the affected wildlife includes threatened or endangered species, species of concern, or native resident or migratory species these impacts could be significant; however other construction activities are expected to result in minor to moderate impacts, depending on the ambient background noise levels, or

the tolerance of the species to such activities. The duration of construction for underground transmission lines, if the entire line was placed underground, would be the longest of the options under Alternative 1. Construction would take approximately 28 to 36 months. Construction of new transmission lines would move in a linear fashion so that in any given location, the duration of construction would be approximately 2 months.

#### 6.6.3.3.3 Sedimentation of Aquatic Habitats

As discussed above for Alternative 1, Option A, sedimentation of aquatic habitats is expected to be minimized, and thus minor, with the implementation of best management practices. Potential impacts would also be reduced if construction activities are largely limited to existing rights-of-way, utility corridors, or other previously disturbed or developed areas. Refer to Chapter 5 for more information.

#### 6.6.3.3.4 Contamination of Aquatic Habitats

As discussed above for Alternative 1, Option A, potential contamination or aquatic habitats is expected to be avoided or minimized with the implementation of best management practices. Impacts would be negligible or minor. Refer to Chapter 5 for more information.

### *6.6.3.4 Option D: Underwater Transmission Lines*

#### 6.6.3.4.1 Direct Loss of Habitat

A new underwater transmission line would require east-west overhead and/or underground transmission lines to connect it to a substation on land. Permanent and temporary impacts on plants and animals as well as associated habitats under this option would be similar to those described for Alternative 1, Options A and C, depending upon the chosen upland connection alignment. Impacts would be minor to significant.

#### 6.6.3.4.2 Disturbance from Construction Noise and Human Activity, Sedimentation, and Contamination of Aquatic Habitats

Under Alternative 1, Option D, construction of a new underwater transmission line in Lake Washington would introduce noise and human activity and require in-water work. The primary impacts to plants and animals would be the potential for affecting water quality and underwater noise conditions in the lake. These potential impacts would be substantially greater for conventional trenching operations in the nearshore environment, compared to trenchless techniques. Conventional trenching would require the installation of sheet pile isolation structures, which would shore up the sides of the in-water and/or nearshore trench. Localized turbidity could occur, potentially altering the behavior of aquatic species, such as the ability to avoid predation or to capture prey, or causing physical harm if aquatic species are present close to the disturbance. Best management practices would limit the effects from turbidity, and the project would meet applicable water quality standards and in-water work permit conditions.

Construction in Lake Washington would occur in habitat for Chinook salmon, Puget Sound steelhead trout, and Coastal-Puget Sound bull trout, which are all federally listed threatened species. If sheet or soldier pile driving is required for construction, either in the nearshore or

in-water locations, the resulting underwater noise could negatively affect these species, as well as other aquatic species. Noise could alter their behavior and, at close proximity, noise could cause physical harm or death, potentially resulting in significant impacts to federally listed fish species and moderate impacts to native resident or migratory species. However, it is expected that vibratory pile driving techniques would be adequate to install such piles, which would reduce the potential effects, compared to impact pile driving methods. Vibratory methods do not produce concussive sound waves, like impact pile driving, that have been shown to injure or kill fish and other aquatic species. Potential impacts to fish can be reduced by employing noise attenuation measures such as using a bubble curtain around the pile driving locations. Specific measures and pile driving restrictions will be provided in the project-specific permits from WDFW, Corps of Engineers, U.S. Fish and Wildlife Service, and National Marine Fisheries Service. In-water work and ground disturbing activities would be conducted in accordance with timing windows intended to avoid breeding or spawning seasons for sensitive aquatic species, along with other mitigation measures to reduce short-term impacts.

## 6.6.4 Alternative 2: Integrated Resource Approach

Substantially less construction would be required for some components of Alternative 2 than Alternative 1 because activities would occur on a smaller scale (small projects at individual homes and businesses). Other components, such as energy storage and peak generator plants, would have similar construction impacts as transformer/substation work in Alternative 1. As a result, impacts on plants and animals with Alternative 2 could be minor for the smaller components to potentially significant for a large component such as a large battery storage system. Larger components such as a 6-acre battery storage yard and three peak generation plants, if constructed in vegetated areas, could result in potentially significant impacts as described in Section 6.6.1.

### *6.6.4.1 Energy Efficiency and Demand Response Component*

Energy efficiency and demand response improvements would not involve infrastructure improvements. As a result, these components would have no impacts on plants and animals.

### *6.6.4.2 Distributed Generation Component*

Construction of distributed generation facilities could result in short-term minor impacts on plants and animals within the vicinity of each facility. Impacts would vary in intensity and duration with the type and extent of facility.

Distributed generation facilities would be constructed throughout the combined study area, requiring construction activities such as clearing, grading, and new infrastructure. However, construction activities for distributed generation facilities would remain lower than for construction of any options under Alternative 1. Distributed generation facilities would likely be located on rooftops or inside buildings, with minor impacts to plants and animals.

Construction of distributed generation facilities would vary in duration depending on scale and technology. Some would occur at the same time new buildings are being built, while others would be constructed independently. Construction activities and noise would result in a minor impact.

#### 6.6.4.3 Energy Storage Component

Construction of a battery energy storage system would likely occur on currently developed sites and would be approximately 6 acres in size (Strategen, 2015). However, if a battery energy storage system is constructed in an undeveloped area, in or adjacent to habitat used by threatened or endangered species, species of concern or that supports critical survival activities of these species, then impacts could be significant. Impacts would be moderate to significant if the project interfered with the breeding, feeding, or movement of native resident or migratory species. Human activity and noise from construction would have similar impacts as those described under Option A of Alternative 1, although the construction period would be much shorter (6 months).

#### 6.6.4.4 Peak Generation Plant Component

Construction of three peak generation plants would occur within or adjacent to existing PSE substations, possibly including the Lakeside substation. Impacts to plants and animals from construction would be similar to those described in Section 6.6.4.3.

### 6.6.5 Alternative 3: New 115 kV Lines and Transformers

##### 6.6.5.1.1 Direct Loss of Habitat

Most of the corridor for Alternative 3 would be co-located or constructed adjacent to existing PSE corridors or other utility rights-of-way (roadways, rail corridors), but extensions for new transmission lines could also be constructed through new areas that are currently vegetated. The types of construction impacts for Alternative 3 would be the same as those described for Option A of Alternative 1. The extension of shared rights-of-way needed for Alternative 3 would likely be narrower, approximately 40 feet, and involve less construction activity than for a 230 kV transmission line. However, the transmission corridor for Alternative 3 would be much longer (60 miles) compared to Alternative 1, Option A (18 miles).

If a new transmission line corridor extension were located entirely in currently vegetated areas, up to 728 acres of vegetation could be removed, assuming a 60-mile corridor and a clear zone up to 100 feet in width. This is not likely to occur, because the corridor would include some portions in existing developed rights-of-way and would not be 100% vegetated. Assuming an average tree canopy coverage of 40 percent throughout the corridor (see Section 6.3.3), up to 291 acres of tree canopy could be removed under Alternative 3, in a worst-case scenario. The impacts would be the same (loss of habitat connectivity, displacement of species, etc.) as those described for Alternative 1, Option A, but greater in scale since more acres of vegetation and tree cover could be lost. For these reasons, Alternative 3 would have the greatest potential to disturb animal species and eliminate habitat (forest, wetlands, migratory corridors, etc.) of all the options and alternatives. Alternative 3 could result in significant adverse impacts to threatened or endangered species or species of concern, if their critical survival activities are negatively affected. Impacts would be moderate to significant if Alternative 3 harmed or interfered with the breeding, feeding, or movement of native resident or migratory species. However, a new transmission line corridor would be likely co-located or constructed adjacent to existing PSE easements or other utility rights-of-way, rather than an entirely new corridor. In this scenario, up to 291 acres of vegetation could be removed, of which 116 acres could be tree canopy cover, assuming a 60-

mile corridor with a clear zone up to 40 feet in width, with 40 percent tree cover. The actual impact of a new transmission line corridor would be somewhere between 291 and 116 acres of trees removed, and would be determined more specifically in Phase 2.

Tree removal for the construction of overhead transmission lines would follow parameters set by PSE's Vegetation Management Program, described under the No Action Alternative. This would be offset by tree planting conducted by PSE within its service area and if new transmission lines are located along roadways, street trees would be replaced with smaller trees that remain below the overhead lines. Resulting impacts to habitat or removal of trees would be subject to the same applicable regulations related to critical areas and tree protection as described for Alternative 1.

#### 6.6.5.1.2 Disturbance from Construction Noise and Human Activity

Animals in the vicinity of construction areas could experience noise and human activity for 24 to 28 months, if the new 115 kV transmission line, transformer, and substations are constructed concurrently. Many animal species would likely avoid the area during construction periods. Because Alternative 3 would be located in existing corridors, species in the vicinity are expected to have a tolerance for noise and human activity. Similar to Alternative 1, Option A, in any given location there would likely be up to a week of construction activity spread over a period of 2 months. Therefore, in most areas, short-term impacts are expected to be minor. However, like Alternative 1, impacts could be significant depending on the timing and species present if the project disturbs or substantially disrupts critical survival activities (nesting, foraging, and migration) of threatened or endangered listed species or species of concern.

#### 6.6.5.1.3 Sedimentation of Aquatic Habitats

As discussed above for Alternative 1, Option A, sedimentation of aquatic habitats is expected to be minimized, and thus minor, with the implementation of best management practices. Potential impacts would also be reduced if construction activities are largely limited to existing rights-of-way, utility corridors, or other previously disturbed or developed areas. Refer to Chapter 5 for more information.

#### 6.6.5.1.4 Contamination of Aquatic Habitats

As discussed above for Alternative 1, Option A, potential contamination or aquatic habitats is expected to be minimized or eliminated with the implementation of best management practices. Impacts would be negligible to minor. Refer to Chapter 5 for more information.

## 6.7 HOW COULD OPERATION OF THE PROJECT AFFECT PLANTS AND ANIMALS?

### 6.7.1 Operation Impacts Considered

This section describes how long-term project operation and maintenance could affect plants and animals within the combined study area. Operational impacts could result from routine vegetation management around overhead transmission lines; bird electrocution or collisions with overhead transmission lines or towers; and disturbance of wildlife during maintenance

activities. Operational impacts would be considered significant, moderate, or minor based on the same criteria described for construction impacts in Section 6.6.1.

### 6.7.2 No Action Alternative

Under the No Action Alternative, PSE's existing maintenance activities and programs would continue. No utility line or facility construction is likely and there would be no additional loss of vegetation or disturbance to animals from new permanent structures. However, there will be continued loss or disturbance of vegetation as a result of PSE's Transmission Vegetation Management Program; trees would be trimmed or removed under existing transmission lines to limit vegetation to low-growing height species. Herbicides would also continue to be selectively used as part of the program and in accordance with best management practices, with expected minor impacts on plants and animals.

The types of conservation measures PSE expects to implement to achieve its goals would occur on customers' properties. No permanent impacts are likely from operation since new infrastructure would be minimal and not require substantial clearing or result in other habitat impacts.

### 6.7.3 Alternative 1: New Substation and 230 kV Transmission Lines

In general, all four of the options under Alternative 1 would have similar types of operational impacts. Indirect impacts would occur along new transmission lines, substations, and access roads as a result of human activity and noise associated with operations and maintenance (such as vegetation management). Impacts could include displacement of local birds and other species using the right-of-way or the surrounding area. However, noise impacts are expected to be minor because species in the combined study area are generally tolerant of some level of human activity and the duration of noise associated with maintenance is anticipated to be minimal.

Differences in operational impacts for each transmission line option are discussed below. Impacts for the substation would be the same for all options.

#### *6.7.3.1 Option A: New Overhead Transmission Line*

In addition to the impacts common to all the options described above, transmission towers and power lines under Alternative 1, Option A could have moderate to significant impacts on threatened or endangered species, species of concern, or native resident or migratory species. Depending on the terrain and positioning, transmission towers would range from 85 to 100 feet tall. The presence of transmission towers and power lines could potentially result in an increase in bird collisions, electrocution, and mortality (PSE, 2013). While there are no federally listed threatened or endangered bird species with critical habitat in the combined study area, species such as marbled murrelet and northern spotted owl could occasionally occur or pass through the corridor. Therefore there would be a potential, although a low probability, for significant impacts to some threatened or endangered species, through collisions or electrocution with transmission lines and towers. In addition, there could also be significant impacts to some species of concern (bald eagles and peregrine falcons), as well as a potential for similar impacts to other avian species due to injury or mortality caused by electrocution or collisions with transmission lines and towers. PSE implements an Avian

Protection Program to address avian issues and concerns with electrical systems, including methods and equipment to reduce avian *collisions*, *electrocution*, and *problem nests* (PSE, 2013).

**Electrocutions** happen when birds directly contact energized and grounded conductors or equipment.
**Collisions** happen when birds fly directly into conductors, resulting in injury or mortality from impact.
**Problem nests** occur when nest material on utility towers touches energized equipment, potentially conducting electricity when wet and igniting, resulting in outages and hazards to the nesting birds. (PSE, 2013)

#### 6.7.3.2 Option B: Existing Seattle City Light 230 kV Transmission Corridor

Impacts resulting from maintenance of existing transmission lines would be similar to those for maintenance of new lines (Alternative 1, Option A). Because this option would primarily occupy a corridor that already has 230 kV overhead lines, there would fewer new impacts. In the areas where this option would require new transmission corridor, impacts would be similar to those described for Option A.

#### 6.7.3.3 Option C: Underground Transmission Lines

Repairs to the transmission line associated with maintenance, system malfunction, or accident could result in minor impacts to plants and animals in the vicinity of the line, if additional access points are required. Vaults along the transmission route would likely provide access to the line, but trenching could be necessary depending upon the location and nature of the issue. The severity of impacts from these repair activities would depend upon the extent of repair needed and the alignment of the underground transmission line, but is expected to be minor. Maintenance activities are expected to be less extensive and less frequent, compared to the alternatives with above ground transmission lines.

#### 6.7.3.4 Option D: Underwater Transmission Lines

Impacts on plants and animals from operation of underwater transmission lines in Lake Washington are expected to be minor since the lines would be buried or laid on the lake bottom below where threatened or endangered aquatic species occur. If the underwater line were damaged by activities in the lake, it would need to be repaired or replaced, resulting in temporary impacts similar to those described for construction impacts.

Aboveground and/or underground transmission lines would be required for this option to connect the underwater transmission line to a substation, as would access roads and aboveground vaults. The potential operational impacts on plants and animals for aboveground and underground transmission lines under Alternative 1, Option D would be similar to those for Options A and C. However, Option D could have fewer operational impacts on plants and animals since long corridors of upland habitats would be avoided altogether by the underwater transmission line.

### 6.7.4 Alternative 2: Integrated Resource Approach

No permanent impacts on plants and animals are likely from operation of energy efficiency, demand response, or distributed generation components since the infrastructure would be small and likely located on private properties. Components requiring a larger footprint

(energy storage and simple-cycle peak generators) would have the same operational impacts as those described for substations under Alternative 1. In addition to requiring a larger footprint, peak generators would also produce increased noise levels. Noise disturbance from peak generators located in or adjacent to wildlife habitats could be moderate to significant if mitigation is not effective and if threatened or endangered species, species of concern, or their critical survival activities were substantially affected, or if the component interferes with the breeding, feeding, or movement of native resident or migratory species.

### 6.7.5 Alternative 3: New 115 kV Lines and Transformers

Impacts on plants and animals from Alternative 3 would be similar to those anticipated for Alternative 1, Option A (moderate to significant). Operational impacts would result from continued maintenance of vegetation through PSE's Vegetation Management Program; potential bird collisions with overhead lines or towers; and human disturbance during maintenance activities. However, because the length of the corridor proposed for Alternative 3 is substantially longer, the potential for the corridor to cross or be in the vicinity of functional wildlife habitat, listed species, or species of concern is greater. Therefore, there would be a greater likelihood of operational impacts to plants and animals.

## 6.8 WHAT MITIGATION MEASURES ARE AVAILABLE FOR POTENTIAL IMPACTS TO PLANTS AND ANIMALS?

Short-term impacts on vegetation and habitat caused by development of facilities and infrastructure would be mitigated through site and facility design to minimize the need for vegetation and tree removal to the extent feasible. Facilities, access roads, and staging areas should be located in areas of disturbed vegetation cover if possible. Removal of mature trees should be avoided where possible in all construction areas. If intact vegetation or habitat is present, the footprint of the facility should be minimized and situated to result in the least amount of disturbance. Where possible, vegetation that is removed for construction would be replaced with appropriate native plant species. PSE has vegetation management permits for their right-of-way in Bellevue that minimize tree removal in transmission line clear zones that are located in critical areas in favor of tree pruning where feasible. Revegetated areas would be monitored to ensure success and invasive species would be controlled.

No specific mitigation is proposed for the temporary displacement of animals because this is expected to be a minor impact. Wildlife is expected to return following construction except in areas replaced by facilities. Measures to reduce noise and human activity should be implemented for construction activities located near undisturbed or functional wildlife habitat areas such as forests and wetlands, riparian zones, and Lake Washington. During construction, best management practices would be used to minimize potential impacts from noise, dust, and turbidity, and established water quality standards and in-water work permit conditions would be met.

The impacts on animals, including listed species, caused by the development of facilities and infrastructure would be mitigated through site and facility design to minimize the need for habitat removal and construction activity. Habitat that is determined to be of significant importance (e.g., presence of listed species, priority habitats) will be avoided to the greatest

extent possible. Timing of construction work would occur outside of critical time periods for listed species such as nesting and spawning seasons. Specific measures and pile driving restrictions will be provided in the project-specific permits from WDFW, Corps of Engineers, U.S. Fish and Wildlife Service, and National Marine Fisheries Service. The PSE Avian Protection Program would also be implemented to address avian issues and concerns with electrical systems, including methods and equipment to reduce avian collisions, electrocution, and problem nests.

Additional specific mitigation measures would likely be developed as part of the Phase 2 environmental analysis, depending on the exact location, design, and timing of project elements.

## 6.9 ARE THERE ANY CUMULATIVE IMPACTS TO PLANTS AND ANIMALS AND CAN THEY BE MITIGATED?

Urbanization is resulting in overall habitat loss in the combined study area. The proposed project would contribute to that trend directly by removing trees and habitat for some alternatives, and indirectly by continuing to supply energy to a growing, developing region. Of the alternatives for the proposed project that contribute most to this trend are Options A and C under Alternative 1 and Alternative 3. Mitigation would help to reduce cumulative impacts, but it would not be able to replace all habitat lost. Other large projects, such as Sound Transit's East Link project, overlap with the proposed Energize Eastside Project. The East Link project will impact plants and animals by continuing to contribute to the trend of reducing habitat (forested areas) in Bellevue, Redmond, and King County (Sound Transit, 2011).

## 6.10 ARE THERE ANY SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS TO PLANTS AND ANIMALS?

Depending on the alignment selected, Alternative 1 could result in significant unavoidable adverse impacts to plants and animals, especially if a new corridor is created (Option A).

A new corridor under Alternative 1, Options A and C, located in or adjacent to habitats used by listed species, could result in permanent habitat alteration and disturbance to these species, along with species of concern, or native resident or migratory species. Depending on the scale of habitat alteration and level of disturbance, impacts could be significant. The overhead or underground lines would be located in existing developed corridors to the extent possible, but there is a chance that it could be located in undeveloped habitat areas, resulting in a greater potential for significant impacts. Reconstruction activities under Option B in or near the location of the rare Vancouver ground cone in Bridle Trails State Park could also result in significant impacts to the species. Avoidance of habitat used by listed or threatened species, or species of concern would reduce this impact to a minor or moderate impact.

Underwater noise levels produced during construction of the submerged line under Alternative 1, Option D could potentially result in injury or death of listed aquatic species, with potentially significant impacts. Applicable work windows and noise attenuation

measures will be implemented to mitigate for these potential impacts, and vibratory pile driving methods will also be used to the extent feasible to further minimize potential underwater noise effects to a level of non-significance.

The construction impacts from the battery energy storage system component and peak generators under Alternative 2 could result in similar unavoidable impacts as Alternative 1, Options A and C if located in or adjacent to habitats used by listed species, species of concern, or native resident or migratory species. The operation of the peak generators produces elevated noise levels which could disturb or disrupt listed species, species of concern, or native resident or migratory species, and could result in significant impacts. However, these components would be located in currently developed areas to the extent feasible, and avoidance of habitats used by listed or threatened species, or species of concern would reduce the magnitude of the impact to non-significant levels.

Alternative 3 could have similar unavoidable impacts as Options A and C under Alternative 1 if a new corridor is located in or adjacent to habitats used by listed species, species of concern, or native resident or migratory species. However, the corridor would be primarily co-located or constructed adjacent to an existing, developed corridor, minimizing the potential for significant impacts.

# CHAPTER 7. ENERGY AND NATURAL RESOURCES

## 7.1. HOW WERE ENERGY AND NATURAL RESOURCES IN THE COMBINED STUDY AREA EVALUATED?

This chapter describes at a programmatic level the types of energy resources used by PSE to generate or provide electrical power to its customers. This chapter describes the regulatory context in which PSE operates, including federal, state, and local government policies and regulations. See Chapter 1 for a discussion of the overall process by which electrical energy is generated, transferred, and delivered.

**Energy and Natural Resources Key Findings**

None of the alternatives would likely have adverse impacts to energy or natural resources.

Alternative 2 would not substantially change the overall mix of resources used by PSE to deliver power to its customers, but would lead to more local (Eastside) use of resources for power generation, some of which would not be renewable.

## 7.2. WHAT ARE THE ENERGY DELIVERY POLICIES AND REQUIREMENTS THAT APPLY TO PSE?

There are no federal policies or regulations that govern what types of energy resources PSE should consume. The Energy Independence Act of Washington State affects both the types of resources to be used and the level of conservation to be implemented. PSE operates under the regulatory framework described in Chapter 1 to deliver power to the Eastside.

None of the study area communities (Figure 1-4 in Chapter 1) have control over how PSE uses energy to provide power. However, all of the study area communities have comprehensive plan energy goals or policies that lead them to encourage, facilitate, promote, or participate in actions addressing climate change, sustainability, or energy conservation and efficiency, or reduction of greenhouse gases (which would indirectly lead to changes in types of energy resources used). Examples are as follows:

- **Bellevue Policy UT-70:** Facilitate the conversion to cost-effective and environmentally sensitive alternative technologies and energy sources.
- **Newcastle Policy UT-P6:** The City shall promote conservation measures to reduce the need for additional utility distribution facilities in the future.
- **King County Policy F-311**: King County should encourage its energy utilities to provide energy efficiency services and renewable energy options to all their customers. Additionally, the County should encourage the state and energy utilities to mitigate the environmental and greenhouse gas emissions impacts of energy and, as conservation and alternative energy sources demonstrate capacity to address energy

needs, phase out existing fossil fuel based power plants, especially coal based sources.

- **Issaquah LU Policy F2:** Encourage all development and infrastructure in the public and private sectors which: a. Use less energy and have a lower climate impact, and incorporate into developments, where possible.
- **Redmond Policy FW-10:** Additionally, promote efficient energy performance and use of energy sources that move beyond fossil fuels.

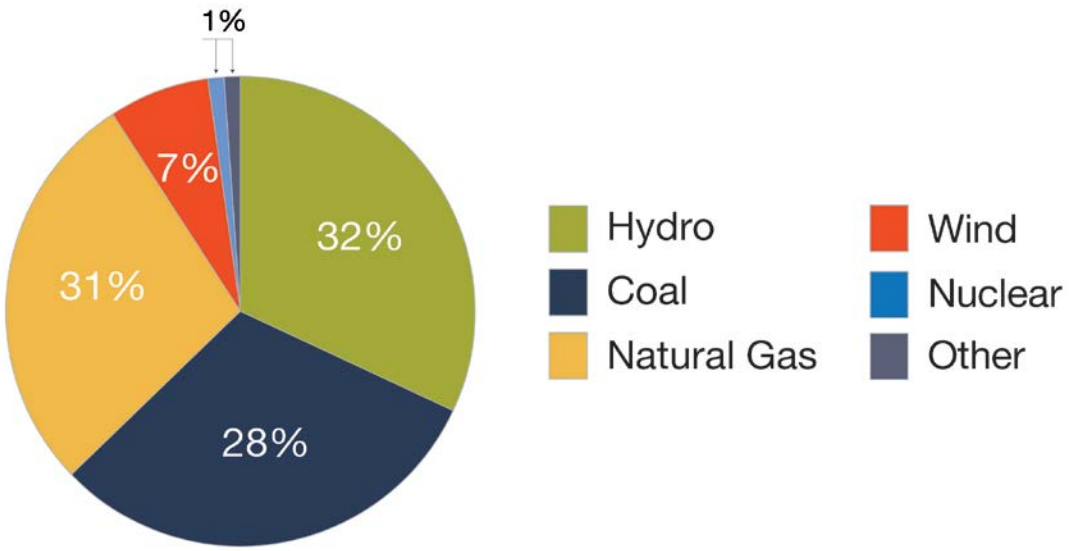
Appendix F lists the currently identified local energy policies.

## 7.3. WHAT NATURAL RESOURCES ARE USED TO GENERATE THE ELECTRICAL ENERGY PROVIDED BY PSE?

As discussed in Chapter 1, PSE expects peak winter electrical power demand on the Eastside to grow from 619 MW in 2014 to 783 MW in 2024. The power supply to serve this growth in demand derives from a variety of sources.

In 2013, the overall mix of fuels used by PSE to provide all electricity to all of its customers was led by hydropower, followed closely by coal, natural gas, and wind energy. Nuclear and other sources (biomass, landfill gas, petroleum, and waste) each contributed 1 percent or less (Figure 7-1) (PSE, 2015a). Hydropower and wind are considered to be renewable types of resources, as opposed to the finite or nonrenewable resources of coal, nuclear, and natural gas.

**Figure 7-1. Energy Sources for PSE Power**




Source: PSE, 2015a

The resources used for energy production change over time and PSE updates its projected mix of energy sources in its *Integrated Resource Plan* (IRP) (PSE, 2013) every two years.

The Energy Independence Act of Washington State requires that PSE must obtain 15 percent of its electricity from new renewable resources by 2020, as well as undertaking cost-effective energy conservation. The Act also requires PSE to report on its progress toward achieving renewable energy goals. PSE stated that it was meeting and exceeding its incremental target for renewable resource use by the end of 2015, using PSE's wind power facilities plus power purchased from independent producers (PSE, 2015b). Although water is considered to be a renewable resource, its uses in meeting the targets of the Act are somewhat restricted. In fact, most new water-driven electric generation may not be used to meet the targets.

**PSE's Integrated Resource Plan**, which is updated every 2 years, is a plan for meeting forecasted annual peak and energy demand, plus some established reserve margin, through a combination of supply-side and demand-side resources, into the future. The IRP process considers a full range of power sector investments to meet new demand for electricity, not only in new generation sources, but also in transmission, distribution, and demand-side measures such as energy efficiency on an equal basis.

## 7.4. HOW WERE POTENTIAL IMPACTS TO ENERGY AND NATURAL RESOURCES ASSESSED?

The energy analysis considered how construction of the alternatives would likely use energy (in the form of fuel), as well as the natural resources needed for energy production once the project became operational. The analysis also assessed how operation of each alternative would use or conserve energy. Because the Phase 1 Draft EIS is programmatic, and not a project-level analysis, it is not possible to quantify differences among alternatives with regard to energy usage. However, this chapter provides a qualitative comparison to indicate the likely range of impacts among the alternatives. Chapter 4, Greenhouse Gas, evaluates potential greenhouse gas emissions associated with the alternatives, and the range of potential impacts associated with loss of carbon sequestration associated with vegetation removal.

In evaluating construction impacts, the relative amounts of energy likely to be used for each alternative (in the form of fuel used by equipment) was considered, based on information about likely equipment types and construction durations provided by PSE[1]. Information on equipment usage is contained in Appendix B, and information on duration is found in Chapter 2. Combining these pieces of information provided a sense of the relative extent of energy usage that would be likely for construction of each alternative and option.

On the operational side, the analysis considered the types of energy the alternatives would use to operate and how efficient the alternatives would be in providing energy to customers. The specific energy conservation features included with each alternative are described in Chapter 2.

[1] These durations are high-level estimates that would need to be refined for project-specific analysis.

The alternatives were evaluated to determine whether they would be consistent with energy policies of local jurisdictions regarding energy and natural resource conservation.

The magnitude of potential energy impacts during construction is classified as minor, moderate, or significant, which have been defined for this analysis as follows:

**Minor** – Construction of the project would not likely strain natural resource supplies, but energy used for operation would contribute to a cumulative shortage of supplies of non-renewable natural resources providing energy; however, that shortage would not affect the project over its lifetime or contribute to shortages for other sectors in the foreseeable future.

**Moderate** –Adequate natural resources would be available to serve the project need, but building and operating the project would use a critical supply of any given resource, possibly leading to energy shortages for other sectors or needs.

**Significant** –Natural resources and energy would not be available to build, or to operate the project once constructed.

## 7.5. HOW WOULD CONSTRUCTION OF THE PROJECT AFFECT ENERGY AND NATURAL RESOURCES?

### 7.5.1 Construction Impacts Considered

Constructing any of the action alternatives would entail use of fuel. Most of the alternatives and options would involve use of fossil fuels to power construction equipment, along with some electrical power. Fuel would likely be used by vehicles in transporting materials or workers to project sites for any of the alternatives.

### 7.5.2 No Action Alternative

There would be no construction activities; thus, no related energy or natural resource usage associated with construction would occur.

### 7.5.3 Alternative 1: New Substation and 230 kV Transmission Lines

In general, the construction process may use some electrical power for lighting or other miscellaneous activities, but it would rely primarily on diesel and gasoline fuel, both of which are expected to remain in good supply in the near future. Therefore, negligible impacts to energy and associated natural resources are expected from construction of any of the alternatives.

#### *7.5.3.1. Option A: New Overhead Transmission Lines*

Construction of this option would likely use equipment such as auger trucks, dump trucks, cranes, concrete trucks, backhoes, and bulldozers, as described in Appendix B. Most of this equipment would operate on diesel fuel. Construction of this option would take approximately 12 to 18 months. Although Alternative 1, Option A would involve a more varied type of construction equipment as indicated in Appendix B, its relatively short duration would likely result in lower fuel usage than Options B or C. Overall, the likely

adverse energy impacts for construction of this option would be negligible considering the current and likely continuing availability of fuel resources.

#### 7.5.3.2. Option B: Existing Seattle City Light 230 kV Transmission Corridor

Alternative 1, Option B would require a complete rebuild of the SCL 230 kV lines, including replacing most of the existing structures (although some structures may be adequate and not require replacement, reducing the amount of construction equipment and materials needed). Construction duration would be slightly longer than Option A, approximately 24 months for overhead lines, with concurrent substation construction, although it could be somewhat less if major structural rebuild is not required. In any event, adverse energy impacts in the form of fuel used for construction would be negligible.

#### 7.5.3.3. Option C: Underground Transmission Lines

As with Alternative 1, Options A and B, the equipment involved for construction under Option C would operate on diesel fuel. Of all the options under Alterative 1, underground transmission line construction would have the longest construction period (approximately 28 months). Construction for the transformer installations under Option C would likely be performed concurrently with the transmission line. Additionally, excavation and removal of soils throughout the construction route would require many more truck trips than the other options. Therefore, energy usage for construction of Option C would likely be the greatest of the Alternative 1 options, but would still result in a negligible to minor adverse impact.

#### 7.5.3.4. Option D: Underwater Transmission Lines

As with the other options, the types of construction equipment likely to be needed for this option would mostly operate on diesel fuel. Eight months would be needed for construction, with underwater work likely occurring simultaneously with work on land. Negligible adverse energy impacts are anticipated.

### 7.5.4 Alternative 2: Integrated Resource Approach

#### 7.5.4.1. Energy Efficiency Component

Negligible energy would be used for this component, which would not involve substantial infrastructure improvements, changes to maintenance activities, or construction of new or relocated maintenance yards. Vehicles (gasoline or diesel) would be used to reach job sites for home improvements, with hand tools (electric or battery powered) used to change out windows or install appliances, new weatherproofing, etc.

#### 7.5.4.2. Demand Response Component

Energy usage would be the same (or less) as for the energy efficiency component for the same reason: limited physical site improvements. Vehicles would be used to reach job sites and hand tools used to install meters.

#### 7.5.4.3. Distributed Generation Component

Some of the same types of equipment would likely be used to construct this component as would be used for Alternative 1, Option A (backhoes and dump trucks for site grading,

delivery trucks, cranes to lift equipment into place). Sites for some of the components could be similar in size to the substations of Option A. Overall, less energy would likely be needed for this component than for Option A due to smaller scale of the work. It is not known exactly how many locations would be involved or the specific sizes of sites. However even assuming a similar construction duration and size of work areas as for Alternative 1, Option A, negligible adverse energy impacts would be expected.

#### 7.5.4.4. Energy Storage Component

The site needed to accommodate this component would be essentially a 6-acre paved lot. Some of the same types of equipment would likely be used to construct this component as would be used for Alternative 1, Option A (backhoes and dump trucks for site grading, delivery trucks, cranes to lift equipment into place). The component would take approximately 6 months to construct. The fuel needed for construction (and potential energy impacts) would likely be less than for Alternative 1, Option A and would constitute a negligible adverse impact.

#### 7.5.4.5. Peak Generation Plant Component

This component would involve installing three 20 MW gas-fired simple-cycle generators, called peak generation plants, at existing substations within the Eastside. Construction of these peak generation plants would be similar to a substation, including trenching to access upgraded natural gas, water, and wastewater utility lines. Construction would occur within or adjacent to existing PSE substations over 12 months with a negligible adverse energy impact, the same as Alternative 1.

### 7.5.5 Alternative 3: New 115 kV Transmission Lines and Transformers

In building 60 miles of new transmission line, along with substation improvements, Alternative 3 would be the most fuel-intensive of the alternatives. The alternative would be most similar in duration to Alternative 1, Option C, likely taking between 24 and 28 months to construct. The same types of equipment would be used to build this alternative as for Alternative 1 and as with that alternative, the adverse energy impacts would likely be negligible due to easy availability of fuel resources.

## 7.6. WHAT ARE THE LIKELY IMPACTS TO ENERGY AND NATURAL RESOURCES FROM OPERATION OF THE PROJECT?

### 7.6.1 Operation Impacts Considered

An increase in the amount of energy needed to operate the project could be considered an adverse impact, if availability of natural resources needed to generate that energy were to become more limited. All alternatives require energy (provided by natural resources) to operate. Depending on the alternative, this could include hydropower, coal, natural gas,

wind[2], nuclear, gasoline or diesel fuel, and waste. None of these resources are anticipated to be in short supply in the foreseeable future.

All alternatives would involve consumption of small amounts of energy for operational controls and maintenance. For example, some PSE facilities are lighted (using electrical energy), and PSE vehicles operating on diesel, gas, electricity, or compressed natural gas would visit sites for maintenance or repairs as needed. Heating and cooling equipment is also needed for some facilities. None of these facilities use significant amounts of energy for these purposes.

Relatively greater inefficiencies in operating an alternative might make it less favorable than others, but would not necessarily lead to an adverse energy impact given availability of the resources as discussed above. None of the alternatives include any inherent inefficiencies in providing power, other than minor losses of electricity that occur over distance along high-voltage power lines. Some electricity transported over transmission lines is lost due to resistive heating of the conducting materials and in the transformers. These losses vary based on the amount of electricity transmitted over the line at any given time relative to the size of the line. This loss is likely minimal and would not affect the overall efficiency of energy transmission or the amount of energy that needs to be generated to meet the demand.

An inconsistency with applicable energy policies would likely constitute an adverse impact. All alternatives would likely be consistent (or at least not inconsistent) with the energy conservation policies of study area communities described in Section 7.2. This would be true for Alternatives 1 and 3 due to their inclusion of PSE's ongoing conservation measures, and for Alternative 2 due to its increased reliance on such measures.

### 7.6.2 No Action Alternative

Negligible adverse energy impacts would occur with this alternative. Under this alternative, with no new infrastructure added, PSE would continue to manage its energy portfolio as described in its *2013 Integrated Resource Plan* (PSE, 2013). Natural resources used to provide energy for the region could shift as described in Section 7.3, but would be expected to continue in good supply for the foreseeable future. Because this alternative would not expand transmission capacity (as PSE indicates is needed), the amount of energy that could be used on the Eastside during peak periods would be somewhat limited. Therefore, the alternative could result in slightly lower overall consumption of electricity than the demand PSE has projected; however, on a broad scale, power generation and use of resources to generate energy would not likely change. Power generated by existing facilities would likely be sold to other utilities if available. This alternative would not change PSE's current conservation program.

The energy used for operation and maintenance of facilities and equipment under this alternative would be primarily fuel for vehicles, lighting, and heating and cooling equipment, the same as currently occurs. Typical vehicles include light- and medium-duty trucks running

[2]According to the American Wind Energy Association, PSE is the second-largest utility producer of wind power in the United States (PSE, 2015a).

on either diesel fuel or gasoline. PSE's vehicle fleet also includes some hybrid vehicles, as well as some vehicles using compressed natural gas (PSE, 2015c).

### 7.6.3 Alternative 1: New Substation and 230 kV Transmission Lines

Operation of this alternative would not be expected to lead to additional need for power generation or additional use of resources in power generation. The resources used to generate power would be the same as those discussed in Section 7.3. As noted in that discussion, types and percentage of energy resources used can change over time. Conservation and use of alternative energy would likely be at the same levels as under the No Action Alternative as described in Chapter 2. Alternative 1 would not change PSE's current conservation program and is expected to be consistent with PSE's legally mandated energy delivery requirements.

#### *7.6.3.1. Option A: New Overhead Transmission Lines*

This option would involve the same types of energy usage as the No Action Alternative, primarily in the form of fuel for vehicles, lighting, and heating and cooling equipment. Adverse energy impacts from this option would be negligible.

#### *7.6.3.2. Option B: Existing Seattle City Light 230 kV Transmission Corridor*

This option would have the same operational characteristics as the No Action Alternative and Alternative 1, Option A. Negligible adverse energy impacts would occur.

#### *7.6.3.3. Option C: Underground Transmission Lines*

This option would have the same operational characteristics as the No Action Alternative and Alternative 1, Options A and B, with negligible adverse energy impacts.

#### *7.6.3.4. Option D: Underwater Transmission Lines*

This option would have the same operational characteristics as the No Action Alternative and the other options, with negligible adverse energy impacts.

### 7.6.4 Alternative 2: Integrated Resource Approach

With its energy efficiency and demand response components, Alternative 2 would increase use of conservation on the Eastside. The alternative would also lead to slightly less use of regional energy than the No Action Alternative, or Alternatives 1 or 3. As described in Chapter 2, Alternative 2 could result in a reduction in demand of power provided via PSE's proposed energy sources of approximately 74 MW, assuming the conservation targets described in Chapter 2 were met.

Although Alternative 2 could lead to less demand for regional power on the Eastside during peak periods due to increased conservation measures and local power production, that change in demand is negligible in the overall context of power generation and distribution since the power needed on the Eastside is a small part of the overall system of power that PSE provides. In implementing distributed generation and peak power generation locally, the alternative would lead to a slightly different energy mix than is used for regional power supply.

#### 7.6.4.1. Energy Efficiency Component

Operation of the energy efficiency component would not use energy over and above No Action Alternative levels and should lead to less energy usage overall, with more efficient appliances, better weather proofing, etc. Little fuel would be regularly used by service vehicles to maintain new features (such as new windows or appliances). The measures installed with this component would likely incrementally reduce the usage of regionally produced energy by individual customers, and would have a negligible adverse energy impact.

#### 7.6.4.2. Demand Response Component

This component would have the same operational characteristics with regard to energy usage as the energy efficiency component, contributing to some reduction in regional energy usage by the Eastside, with negligible adverse energy impacts.

#### 7.6.4.3. Distributed Generation Component

As defined for this EIS, the small-scale energy generation facilities that would be constructed around the Eastside could use waste (a renewable energy resources) in anaerobic digesters or would rely on non-renewable resources (fossil fuels in the form of diesel or natural gas), to generate electrical power. Because natural gas and diesel-fueled generators are more readily controlled[3], these were considered the most likely types of new generation facilities for this analysis, possibly increasing overall use of petroleum products in the region incrementally. Natural gas that could be needed for this alternative is expected to remain in good supply for at least the next 100 years, with a strong supply available in the United States (AGA, 2015) and diesel fuel would also be expected to remain available. Ability to use waste products to operate generation facilities would depend in part on location of source material and logistics of transport, but could be considered a practically inexhaustible resource.

The IRP notes that expanded use of natural gas across the region could strain its gas infrastructure, and that ensuring sufficient gas supply regionally could require expansion of the Northwest's gas transmission pipeline system and more underground gas storage capacity. The IRP also notes that another option for natural gas distribution could involve PSE development of a liquefied natural gas facility to help meet customer peak demands and serve marine and road transportation powered with natural gas.

Although the component would not substantially affect large-scale use of energy resources for power production, this local generation activity would incrementally reduce the usage of regionally produced energy by individual customers. This component of Alternative 2 could also lead to an incrementally greater use of non-renewable energy sources, with fossil fuels as an energy source relied upon for some of the facilities; however, since those energy sources are in good supply, the component would have a negligible adverse energy impact.

#### 7.6.4.4. Energy Storage Component

Operation of a battery storage facility would be similar to that of a small office building, with worker vehicle trips and vendor trips to perform periodic replacement of degraded cells. Such

[3] See Chapter 2 for a discussion of the reliability of the Alternative 2 components for energy production.

trips would be infrequent and not use appreciable amounts of fuel. Operation of this component would have negligible adverse impacts.

#### 7.6.4.5. Peak Generation Plant Component

This component would involve operation of three peak generation plants at existing substations within the Eastside, likely simple-cycle gas-fired generators fueled by natural gas. The plants would be operated to provide power at peak demand times to reduce the demands on the transmission system, but could be used more regularly to provide power once installed. These plants would also need to be operated for maintenance purposes at least monthly (typically permitted for weekly operation of an hour, or 50 hours per year).

As described for the distributed generation component, natural gas is expected to remain in good supply for the foreseeable future, although distribution infrastructure may need to be upgraded to deliver fuel supplies. Some worker vehicle trips (using gasoline or diesel fuel) would also be needed to perform periodic maintenance.

The component could incrementally reduce the usage of regionally produced energy. Operating this type of facility would lead to incrementally greater use of non-renewable energy sources, with fossil fuels as the energy source. Even so, the component would be anticipated to have a negligible adverse energy impact since fossil fuel supplies (natural gas in this case) are expected to be adequate.

### 7.6.5 Alternative 3: New 115 kV Transmission Lines and Transformers

Potential operational impacts of this alternative would be the same as those identified for Alternative 1, with some maintenance-related vehicle trips needed to service the 115 kV powerlines and substations over time. Such trips would be infrequent and not result in appreciable energy usage. Operation of the substation components would also have similar characteristics as Alternative 1 and would not be expected to lead to additional need for power generation or additional use of resources in power generation, and the resources used to generate power would be the same as those discussed in Section 7.3. Conservation and use of alternative energy would be at the same levels as under the No Action Alternative and Alternative 1 and this alternative would not change PSE's current conservation program. Negligible adverse energy impacts would result from operating Alternative 3.

## 7.7. WHAT MITIGATION MEASURES ARE AVAILABLE FOR POTENTIAL IMPACTS TO ENERGY AND NATURAL RESOURCES?

With no negative impacts to energy and natural resources expected with any alternative, no mitigation measures would be warranted.

## 7.8. ARE THERE ANY CUMULATIVE IMPACTS TO ENERGY AND NATURAL RESOURCES AND CAN THEY BE MITIGATED?

No cumulative adverse impacts to energy and natural resources are anticipated from any of the alternatives, including the No Action Alternative. None of the alternatives are expected to substantially change the regional use or mix of natural resources that would be used to generate electrical power or affect availability of energy resources for usage by others. PSE is required to comply with state mandates regarding use of renewable resources and conservation. Implementing this project would not postpone any of those conservation measures. Alternative 2 would accelerate and expand energy efficiency and demand response measures, which would reduce peak demand and also potentially reduce demand throughout the year. However, it is unclear whether Alternative 2 would establish a long-term trend toward more localized and independent power generation that might have implications for reliable power supply to the community in the future.

## 7.9. ARE THERE ANY SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS TO ENERGY AND NATURAL RESOURCES?

No significant adverse impacts to energy or natural resources are expected from any of the alternatives.

# CHAPTER 8. ENVIRONMENTAL HEALTH

## 8.1 HOW WAS ENVIRONMENTAL HEALTH EVALUATED FOR THE COMBINED STUDY AREA?

This chapter provides a high-level discussion of four types of environmental health concerns raised during the scoping period:

1. Hazardous materials and the potential to encounter, handle, or generate them;
2. Public safety risks associated with activities near pipelines (including those carrying flammable petroleum products) during construction or operation;
3. Public safety risks posed by the project related to natural phenomena such as earthquakes or lightning; and
4. Health effects from *electric and magnetic fields* (EMF) and *corona ionization*.

Regulations and policies addressing these topics were investigated to confirm how these issues and materials are managed.
This chapter provides basic descriptive information about EMF and corona ionization, including what they are, how they are generated, and where they can be found in the environment. This topic is included to respond to public concern on the topic. This chapter includes information on the state of the science regarding potential health effects.

**Environmental Health Key Findings**

**Hazardous Materials:** Compliance with federal, state, and local regulations would likely prevent construction or operational impacts related to potential releases of hazardous materials from occurring, resulting in a minor potential for impacts.

**Public Safety:** Compliance with safety policies, regulatory requirements, and industry standards would likely prevent construction or operational impacts related to pipeline proximity or natural phenomena, resulting in a minor potential for impacts. Further, impacts related to natural phenomena have a low probability of occurrence.

**EMF or Corona Ionization:** No impacts are anticipated.

## 8.2 WHAT ARE THE RELEVANT PLANS, POLICIES, AND REGULATIONS?

### 8.2.1 Hazardous Materials

Hazardous materials and wastes, including contaminated soils and groundwater, are addressed through laws and regulations that address handling, transport, storage, and disposal of hazardous materials and wastes, as well as management and cleanup of contaminated sites. Other types of state and local regulations, such as those for stormwater management described in Chapter 5, also indirectly control hazardous materials. The following list of the

primary state and federal regulations that apply to hazardous materials demonstrates the breadth of the overall regulatory framework.

#### 8.2.1.1 Code of Federal Regulations (CFR)

- 40 CFR, Sections 761.60 – 761.79 (Toxic Substances Act Regulations)
- 40 CFR Sections 260 and 280 (Resource Conservation and Recovery Act Regulations)
- 40 CFR Part 300 (CERCLA)
- 40 CFR Part 112 (All Appropriate Inquiries)
- 40 CFR, Part 112 (Oil Pollution Prevention)
- 29 CFR 1910.1200 (Occupational Safety and Health Administration [OSHA] hazard communication standard and requirement for Material Safety Data Sheets for hazardous chemicals)

#### 8.2.1.2 Washington Administrative Code (WAC)

- Chapter 173-303 WAC (Dangerous Waste Regulations)
- Chapter 173-340 WAC (Model Toxics Control Act)
- Chapter 173-204 WAC (Sediment Management Standards)
- Chapter 173-360 WAC (Underground Storage Tank Regulations)
- Chapter 173-200 WAC (Water Quality Standards for Groundwaters of the State of Washington)
- Chapter 173-201A WAC (Water Quality Standards for Surface Waters of the State of Washington)
- Chapter 296-62 WAC (General Occupational Health Standards)

#### 8.2.1.3 Local Codes

Local regulations exist in all of the study area communities that would indirectly address hazardous material management by regulating water pollution or runoff from construction sites and spill containment for operating sites. These types of regulations are discussed in Chapter 5.

### 8.2.2 Public Safety Risks

#### 8.2.2.1 Activities Near Pipelines

Appendix M provides a list of identified regulations that apply to pipelines, along with response plans implemented by the Olympic Pipeline Company (OPLC) in particular, since OPLC's facilities were identified as a source of concern during EIS scoping. Some of the regulations are described here.

Congress passed the *Natural Gas Pipeline Safety Act* in 1968 (now called the Pipeline Safety Law, 49 USC Section 60101 et seq.). The law gave the federal government authority over

pipeline safety for transporting hazardous liquids, natural gas, and other gases. The law left responsibility for intrastate pipeline safety in the hands of the states, with the U.S. Department of Transportation, Research and Special Programs Administration, Office of Pipeline Safety (OPS) (a federal agency) retaining responsibility for interstate pipeline safety. The OPS developed minimum pipeline safety regulations for natural gas transportation (Title 49 CFR, Part 192). Implementing regulations are in Chapter 480-93 WAC.

**Where is the Olympic Pipeline addressed in this EIS?**

A number of chapters in this EIS address potential impacts associated with the Olympic Pipe Line Company's petroleum pipelines through the combined study area. See Chapter 3 (Earth - seismic conditions), Chapter 10 (Land Use – compatibility and policy consistency), Chapter 15 (Public Services - emergency response), and Chapter 16 (Utilities - potential impacts to pipelines and transmission lines).

An explosion related to an OPLC pipeline in Bellingham in 1999 led local governments in Washington to look more closely at pipeline safety issues and led to changes in federal and state regulations (Bellingham Herald, 2009).

In 2000, the Pipeline Safety Act of 2000 was enacted in Washington, enabling the Utilities and Transportation Commission (UTC) as the interstate agent for pipelines. The act made the UTC able to enforce federal laws on pipelines in Washington State. The UTC has authority for inspections of interstate pipelines (UTC, 2015) and oversees the Pipeline Safety Program. This program provides standards for natural gas pipeline operations and inspects natural gas and hazardous liquid pipelines (such as the OPLC pipelines) operating in Washington.

The UTC participates with OPS in the certification program for intrastate gas companies and regulates interstate pipelines under 49 CFR, Part 195. These regulations address safety in design, construction, testing, operation, maintenance, and emergency response for pipeline facilities.

The UTC has adopted the American Standard Association Code for Pressure Pipeline (B31.8), requiring gas companies to have operating and maintenance plan provisions for periodic leak surveys (UTC, 2015).

In 2002 the federal Pipeline Safety Improvement Act (49 USC 60101) was passed. It applies to pipelines transporting both natural gas and hazardous liquids in interstate commerce. Some of the most important aspects of the act are as follows:

- **Federal inspection and safety requirements:** To help prevent leaks and ruptures, mandatory inspections of all U.S. oil and natural gas pipelines within 10 years, with more problematic pipelines to be inspected within the next 5 years and all pipelines re-inspected every 7 years following the 10-year interval.
- **Safety orders:** Secretary of the Department of Transportation is allowed to require corrective action of pipeline facilities.
- **Risk analysis:** Operators of natural gas pipelines required to conduct analysis of their pipeline facilities' risks where located in high-density areas and adopt and implement integrity management programs for such facilities within 2 years.

- **Increase in penalties:** Civil penalty to pipeline operators established for safety violations in an amount between $25,000 and $100,000 for each violation, and between $500,000 and $1,000,000 for a related series of violations.
- **One-call notification program:** Department of Transportation to encourage operators to adopt and implement certain best practices for notification of leaks and ruptures.
- **Public education programs**: Pipeline facilities to establish public education programs within one year to advise municipalities, schools, and other entities on the use of the one-call notification system, possible hazards from unintended releases from a pipeline facility, and what to do in the event of a release.
- **Environmental reviews:** Structure established for development of a coordinated environmental review and permitting process to enable pipeline operators to conduct any necessary pipeline repairs.
- **Research and development:** National Institute of Standards and Technology and Departments of Transportation and Energy directed to work with an advisory committee to develop a plan addressing critical research and development needs to ensure pipeline safety.
- **Whistle-blower protection:** Prohibits pipeline operators from firing or taking adverse action against an employee for providing information regarding pipeline safety to the employer or to the federal government.

Pipeline safety improvements that have been instituted in the past 10 years include the following (Pipeline Safety Trust, 2016):

- Integrity management and inspections;
- Greater transparency in pipeline safety information;
- Increased fines;
- Public pipeline maps;
- Whistle blower protections;
- 811 – Call Before You Dig;
- Community technical assistance grants;
- Excess-flow valves on distribution pipelines;
- Control room management;
- State Pipeline Safety Advisory Committees; and
- Initiatives on local land use and pipelines.

To comply with federal regulations, the Olympic Pipe Line Company has an integrity management program, including requirements to regularly inspect and monitor both natural gas and petroleum pipelines. Inspections are performed using a combination of tools to determine the suitability of the pipeline based on any anomalies detected, including corrosion, dents, or actual *wall loss* (loss of material on the inside or outside of the pipeline due to corrosion) (West, personal communication, 2015).

The State of Washington's Underground Utilities Damage Prevention Law (RCW 19.122) requires pipeline companies, underground facility owners, and excavators to participate in

protecting the public health and safety when excavating, with civil penalties for violation. The law also provides that any excavator who willfully or maliciously damages a field-marked underground facility may be liable for triple the cost incurred in repairing or relocating the facility.

In 2006, the federal government enacted the Pipeline Inspection, Protection, Enforcement and Safety (PIPES) Act, which addresses the following:

- Enhanced communication between operators and excavators;
- Support for and partnership of all stakeholders;
- Operator's use of performance measures for locators;
- Partnership in employee training;
- Partnership in public education;
- Enforcement agencies' role to help resolve issues;
- Fair and consistent enforcement of the law;
- Use of technology to improve the locating process; and
- Data analysis to continually improve program effectiveness.

A federally supported effort brought together a large stakeholder group to make recommendations for procedures and regulations related to land uses and land development near pipelines. That group, known as the Pipelines and Informed Planning Alliance (PIPA), produced a report in 2010 that is available for local governments to consider and use in comprehensive planning and development of land use regulations. The report includes recommended practices for local governments, property developers and owners, transmission pipeline operators, and real estate boards to be aware of and to implement as appropriate.

The combined study area communities (Alternatives 1, 2, and 3 as depicted on Figure 1-4 in Chapter 1) do not directly regulate pipeline safety, but they have the authority to regulate land uses near pipelines within their jurisdictions to protect public health and safety. Some communities encourage co-location of pipelines with other utilities where safe, while others specifically discourage co-location of critical utilities with hazardous fluid pipelines like the Olympic Pipeline.

Appendix F includes some of the planning policies of King County and the Eastside cities that directly address co-location of gas pipelines and other developments. The study area communities would interpret and apply their policies to the project when PSE applies for permits. Some examples of policies that could address co-location are as follows:

- To reduce the likelihood of pipeline-related safety hazards, King County's comprehensive plan restricts land uses within hazardous liquid and gas transmission pipeline rights-of-way (King County, 2013).

- The City of Bellevue's comprehensive plan requires that the City administer regulations and franchise agreement authority over both the Seattle City Light and Olympic Pipeline infrastructure in their jurisdiction (City of Bellevue, 2015).

- The City of Kirkland's comprehensive plan includes policies that: establish standards to minimize pipeline damage, prohibit new high consequence land uses[1] from locating near a hazardous liquid pipeline corridor, support coordination with the pipeline operator when developments are proposed near the pipeline corridor, and require maintenance of the hazardous liquid pipeline corridor through their franchise agreement and other mechanisms (City of Kirkland, 2015).

- The City of Redmond's comprehensive plan has policies related specifically to pipeline safety, addressing required setbacks for adjacent land uses and structures, mitigation for certain types of adjacent land uses, and prohibition of new high consequence land uses near pipelines (City of Redmond, 2015).

- The City of Renton's plan includes a goal promoting safe transport and delivery of fuels and one policy encouraging co-location of utilities with rights-of-way and utility corridors. The City also has a code (RMC 4-3-070) requiring notice on title regarding proximity to hazardous pipelines (City of Renton, 2015).

- The City of Newcastle encourages combining utilities into single corridors where safe (City of Newcastle, 2015).

#### 8.2.2.2 Natural Phenomena

Local governments have regulations in place to address structural design and stability, including earthquakes as discussed in Chapter 3. Each study area community also implements codes conforming to International Building, Mechanical, and Fire Codes, which have been enacted to safeguard public health, safety, and general welfare. These codes address issues such as structural strength, stability, and protection of life and property from fire and other hazards. Projects in known seismic hazard areas require special geotechnical review.

The National Electrical Safety Code (NESC, 2012) provides the safety guidelines that PSE follows during the installation, operation, and maintenance of transmission lines and

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[1] High Consequence Land Use: A land use that if located in the vicinity of a hazardous liquid pipeline represents an unusually high risk in the event of a pipeline failure due to characteristics of the inhabitants or functions of the use. High consequence land uses include:

1. Land uses that involve a high-density on-site population that are more difficult to evacuate. These uses include:
   - Schools (through grade 12).
   - Hospitals, clinics, and other facilities primarily for use by the elderly or handicapped, other than those within single-family residences.
   - Stadiums or arenas.
   - Day care centers, and does not extend to family day care or adult family homes.
2. Land uses that serve critical "lifeline" or emergency functions, such as fire and police facilities, utilities providing regional service, or water supplies if exposed to a significant risk that will curtail its lifeline function for a critical period of time.
3. Uses with similar characteristics as determined by the Planning Official.

associated equipment. The NESC contains the basic provisions considered necessary for worker and public safety under specific conditions, including electrical grounding and protection from lightning strikes.

### 8.2.3 Electric and Magnetic Fields

The City of Bellevue has adopted comprehensive plan policies that encourage City and utility involvement with regional or statewide agencies when and if they are developing policies regarding exposure to EMF. The policies also address intent to stay abreast of new accepted scientific research of potential health impacts, revise policies if the situation warrants, and require a reasonable balance between potential health effects and costs of mitigating for such impacts in the planning, siting, and construction of electrical infrastructure.

Only two states (Florida and New York) have enacted their own standards related to EMF that are applicable to parties other than electrical workers. These two states have standards for magnetic fields from overhead transmission lines. The foundation of these standards was to make the field levels from new overhead transmission lines similar to those from existing overhead lines. Table 8-1 presents a summary of the state standards for magnetic fields permitted (National Institute of Environmental Health Science [NIEHS], 2002).

**Table 8-1. State Transmission Line Magnetic Field Standards and Guidelines**

| State | Magnetic Field at ROW Edge |
|---|---|
| Florida | 150 mG (*max load*)[1] |
| | 200 mG (max load)[2] |
| | 250 mG (max load)[3] |
| New York | 200 mG (max load) |

Notes:
[1]For lines of 69-230 kV.
[2]For >230 and ≤500 kV lines.
[3]For >230 and 500 kV lines on certain existing ROW.
ROW = right-of-way (or in Florida standard, certain additional areas adjoining the right-of-way).
mG = milligauss
max load = maximum load-carrying conditions
Source: NIEHS, 2002

Guidelines and standards have been developed by three organizations for limiting magnetic field exposure for the general public and/or workers (Tables 8-2, 8-3, and 8-4). Guidelines and standards developed for limiting EMF exposure are based on known biological effects from very high fields, such as occur in some occupations.

The guidelines are published by the International Commission on Non-Ionizing Radiation Protection (ICNIRP); the guidelines of the American Council of Governmental Industrial Hygienists (ACGIH), which apply to workers in the United States; and the International Committee on Electromagnetic Safety (ICES), operating under the oversight and rules of the Institute of Electrical and Electronics Engineers (IEEE) Standards Association (IEEE guidelines).

**Table 8-2. Summary of ICNIRP Exposure Guidelines**

| Exposure (60 Hz) | Magnetic Field |
|---|---|
| Occupational | 10 G (10,000 mG) |
| General public | 2.00 G (2,000 mG) |

G = gauss; Hz = hertz; ICNIRP = International Commission on Non-Ionizing Radiation Protection; mG = milligauss
Source: ICNIRP, 2010

**Table 8-3. Summary of ACGIH Exposure Guidelines**

| Exposure (60 Hz) | Magnetic Field |
|---|---|
| Occupational exposure should not exceed: | 10 G (10,000 mG) |
| Prudence dictates the use of protective clothing above: | — |
| Exposure of workers with cardiac pacemakers should not exceed: | 1 G (1,000 mG) |

ACGIH = American Council of Governmental Industrial Hygienists; G = gauss; Hz = hertz; mG = milligauss
Source: ACGIH, 2009

**Table 8-4. IEEE Exposure Levels for 60 Hz Magnetic Fields**

| Exposure (60 Hz) | Magnetic Field |
|---|---|
| General public should not exceed: | 9,040 mG (9.04 G) |
| Controlled environments should not exceed: | 27,100 mG (27.1 G) |

G = gauss; Hz = hertz; IEEE = Institute of Electrical and Electronics Engineers; mG = milligauss
Source: IEEE, 2002

### 8.2.4 Corona Ions

There are no known policies, regulations, or standards addressing corona ionization.

## 8.3 WHAT HAZARDS ARE PRESENT IN THE COMBINED STUDY AREA OR COULD BE ASSOCATED WITH THE PROJECT?

### 8.3.1 Hazardous Materials

Hazardous materials are generally defined as any substance or material that could adversely affect the safety of the public, handlers, or carriers during transportation. Hazardous materials would only be considered to generate environmental impacts if they were spilled or released in an uncontrolled fashion. A range of hazardous materials could be used in the construction and operation of any of the alternatives. Gasoline and oil would be used in construction equipment discussed in Chapter 2, and other chemicals such as solvents or paint may be brought onto and used on the project sites during construction.

Operating and maintaining any of the newly constructed PSE-owned facilities would also involve use of some hazardous materials. Gasoline, paint, or pesticides could be used for site maintenance. The operation of Alternative 1 or 3 would involve transformers with insulating oil or sulfur hexafluoride ($SF_6$) and possibly high-pressure fluid-filled (oil-containing) (HPFF) conductors. (Alternative 1, Option D would likely use only *cross-linked polyethylene (XLPE)* type cable rather than HPFF type.) The transformers would be installed without their insulating oils or $SF_6$, which would be brought onto the site and added to the equipment once it is in place. Energy storage (batteries) installed with Alternative 2 would likely contain some type of acid. Operation of any the distributed generation components would involve gasoline, diesel, or other types of fuel.

It is possible that contaminated soils or groundwater could already exist where the alternatives would be constructed. Historical land uses (logging, agriculture, industry, or others) may have discharged materials now known to be hazardous in nature. These types of materials can accumulate in soils or groundwater. Existing land uses in the combined study area also handle or store hazardous materials, including gas stations or automotive service stations, and residential properties where paints or pesticides may be used.

Electrical infrastructure already existing on the Eastside includes transformers and other electrical equipment and transmission lines. PSE does not operate any HPFF or self-contained fluid filled (SCFF) lines on land through the combined study area. These types of lines contain pressurized gas or fluid (usually nitrogen or synthetic oil) and may contain polychlorinated biphenyls (PCBs). PSE does operate two SCFF marine cables that cross Lake Washington to Mercer Island (Strauch, personal communication, 2015).

Small "distribution" transformers are found on transmission line poles around the Eastside. These devices step down the voltage being sent along distribution lines to the level that can be used by customers. All of these distribution transformers contain some amount of insulating oil (usually highly refined petroleum/mineral oil), and older ones may contain PCBs. The larger transformers at substations also usually contain insulating oil, and there may be some older ones in operation throughout the Eastside with insulating oil containing PCBs. Newer transformers may also contain an insulating gas, sulfur hexafluoride ($SF_6$), rather than oil.

As described in Chapter 16, high-pressure natural gas mains and distribution pipelines are found throughout the area. The Olympic Pipe Line Company (OPLC) operates two underground fuel pipelines carrying petroleum products under pressure. These two petroleum lines traverse the Eastside from north to south and are located primarily in the same corridor as existing 115 kV transmission lines operated by PSE. These types of pipelines are described in Chapter 16 and shown on

**PCBs** were historically widely used as *dielectric (poor conductor of electricity)* and coolant fluids in electrical equipment and by industries such as machining operations. According to the U.S. Environmental Protection Agency, PCBs cause cancer in animals and are probable human carcinogens. The production of PCBs has been banned in the U.S. and elsewhere.

**$SF_6$** is used in the electrical industry as a gaseous dielectric medium for high-voltage circuit breakers, switchgear, and other electrical equipment, often replacing oil filled circuit breakers (OCBs) that can contain harmful PCBs. $SF_6$ is a highly toxic gas.

Figure 16-1. Damage to these pipelines could release materials they carry to the environment. These materials (natural gas, gasoline, diesel, and aviation fuel) have the properties listed in Table 8-5 (the specific properties can vary somewhat depending on formulation and additives).

**Table 8-5. Properties of Materials Carried by Fuel Pipelines**

| Material | Typical Properties and Their Effect on Human and Aquatic Health |
|---|---|
| Diesel | Combustible liquid. Contact with this product may cause skin and eye irritation. Prolonged or repeated contact may cause skin irritation, defatting, drying, and dermatitis. Inhalation of this product may cause respiratory tract irritation and central nervous system depression, symptoms of which may include weakness, dizziness, slurred speech, drowsiness, unconsciousness and, in cases of severe overexposure, coma and death. Ingestion of this product may cause gastrointestinal irritation. Aspiration of this product may result in severe irritation or burns to the respiratory tract. |
| Gasoline | Extremely flammable liquid and vapor. Vapor can cause flash fire. Cancer hazard. Causes skin and eye irritation. Can enter lungs and cause damage. |
| Aviation Fuel | Flammable liquid and vapor. Can be ignited by heat, sparks, flames, or other sources of ignition (e.g., static electricity, pilot lights, mechanical/electrical equipment, and electronic devices such as cell phones, computers, calculators, and pagers that have not been certified as intrinsically safe). Vapors may travel considerable distances to a source of ignition where they can ignite, flash back, or explode. May create vapor/air explosion hazard indoors, in confined spaces, outdoors, or in sewers. This product will float and can be reignited on surface water. Vapors are heavier than air and can accumulate in low areas. If container is not properly cooled, it can rupture in the heat of a fire. Causes skin irritation. May be fatal if swallowed and enters airways. May cause drowsiness or dizziness. Toxic to aquatic life with long-lasting effects. |
| Natural Gas | Extremely flammable gas. Can be ignited by hot surfaces, sparks, vehicles, lights, electronic devices, or other sources of ignition. Overexposure to this gas can result in shortness of breath, drowsiness, headaches, confusion, decreased coordination, visual disturbances and vomiting; these symptoms are reversible if exposure is ended. Continued exposure can lead to inadequate oxygen (hypoxia), rapid breathing, discoloration of the skin (cyanosis), numbness of extremities, unconsciousness, and death. If natural gas leaks underground, it can permeate through the soil and accumulate in confined spaces such as basements or sewers. |

Note: Specific properties can vary somewhat depending on formulation and additives.
Source: Material Safety Data Sheets (MSDSOnline, 2015)

Operation of the project over time could generate hazardous or dangerous[2] wastes needing special management. Site lighting with any of the alternatives could contain mercury ballasts

[2] In Washington, the term "dangerous waste" is used, while the federal rules use the term "*hazardous waste*." The state rules are more protective than the federal rules, so dangerous waste includes more wastes than the federal definition. The Washington Dangerous Waste Regulations (Chapter 303 WAC) are based on the federal Resource Conservation and Recovery Act, but Washington requires businesses to follow additional rules.

that would be regularly changed out and need proper disposal. Mineral oil or $SF_6$ of the transformers in Alternatives 1 or 3 could need to be recharged over time. Operation of anaerobic digesters for the distributed generation component of Alternative 2 leaves a byproduct known as digestate (the solid remnants of the original input material to the digesters) that must be properly characterized for disposal. Operating the engines and turbines of Alternative 2 may generate sludge materials that would be cleaned out. All of these waste materials would need to be characterized and disposed of properly.

### 8.3.2 Public Safety Risks – Activities Near Pipelines

If ruptured or damaged, fuel pipelines mentioned in Section 8.1.1 could pose a risk to public safety and the environment due to high operating pressure and/or the highly flammable, explosive, and toxic properties of the transported products. If damage prevention measures were not employed and any of these pipelines were damaged, and standard pipeline safety protocols and mechanisms were then to fail, there would be a risk of explosion and fire. Other pipelines (natural gas in particular as described in Chapter 16) are found throughout the area and could have some of the same risks as the OPLC pipelines.

### 8.3.3 Public Safety Risks – Natural Phenomena

As described in Chapter 3, the Eastside is located in a seismically active region. Existing infrastructure (substations, transmission and distribution lines) is at risk of damage in the event of an earthquake. New infrastructure constructed for the Energize Eastside Project would be at the same risk. Damage to infrastructure from an earthquake poses a risk of fires, electrocution, and explosion that could potentially endanger nearby populations. Similarly, electrical infrastructure could experience fires after damage by lightning strikes, leading to potential public safety risks. Both earthquakes and lightning strikes could also lead to damage to fuel pipelines described above.

### 8.3.4 Electric and Magnetic Fields and Corona Ionization

There has been substantial research into the possibility of health effects from EMF, as well as potential effects from corona ionization. There is substantial agreement among experts that there are no confirmed adverse health impacts from 60 hertz (Hz) [3] EMF exposure. Scientific evidence remains inconclusive on risk of childhood leukemia in homes with stronger *magnetic fields*, and research on this topic continues. However, while it does not appear that EMF and corona ionization are in fact a hazard, they are discussed in this document due to public concerns raised during EIS scoping.

Transmission lines, electrical wiring, and appliances all produce EMF. Corona ionization is associated with transmission lines. It is the electrical breakdown of air in very strong *electric fields*. Corona ionization can be a source of audible noise, *electromagnetic* radiation, and sometimes visible light from transmission lines. Sections 8.3.5 and 8.3.6 provide background information about these topics.

[3] Electricity is transmitted in North America at 60 cycles per second, or 60 Hz.

### 8.3.5 Electric and Magnetic Fields

Electric and magnetic fields each have different origins and different properties. Electric fields are produced by the voltage in use, and magnetic fields are produced by current. Figure 8-1 demonstrates voltage and current and how they relate.

Most electrical equipment has to be turned on (current must be flowing) for a magnetic field to be produced. Electric fields are often present even when the equipment is switched off, as long as it remains connected to the source of electric power. Brief bursts (sometimes called transients) can also occur when electrical devices are turned on or off.

Electric fields are shielded or weakened by materials that conduct electricity, even materials that conduct poorly, including trees and buildings. Magnetic fields, however, pass through most materials without change.

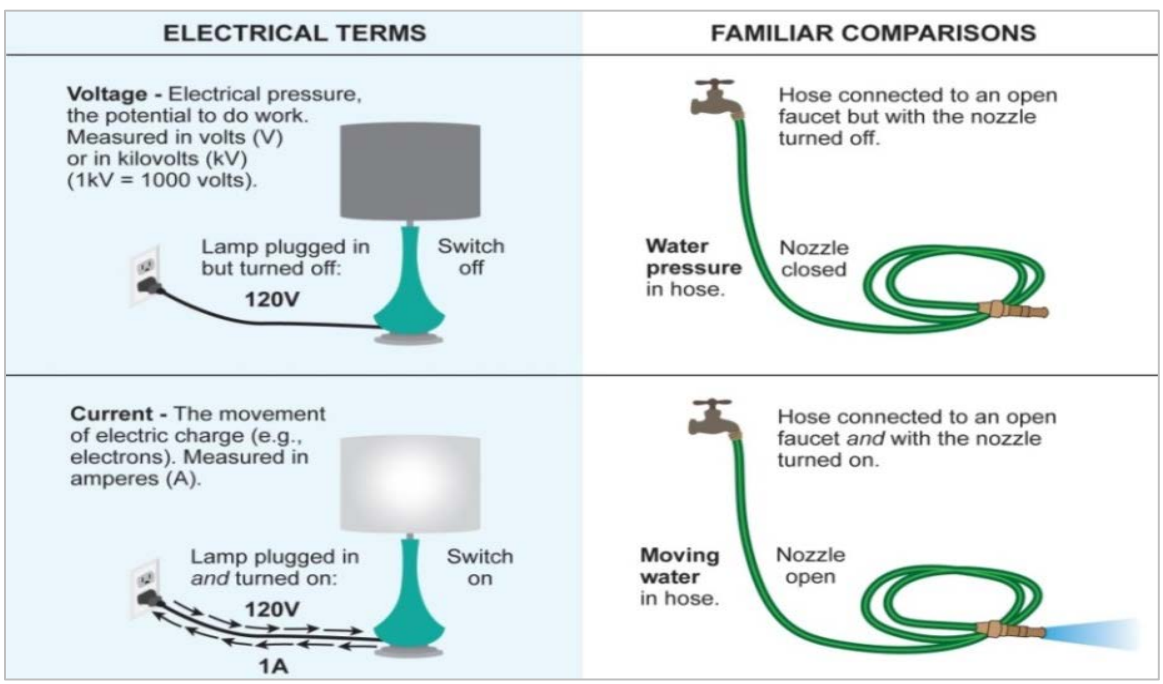
The amount of current, and therefore magnetic field strength, varies with the amount of electrical power being used at any moment (see Figure 8-2). Magnetic fields are commonly measured in milligauss (mG) or gauss (G), and microtesla (µT) or tesla (T). The terms in this chapter include milligauss, gauss, and microtesla. For non-magnetic materials such as air, one tesla is equivalent to 10,000 gauss.

Information on EMF fundamentals provided in this chapter is based primarily on documents prepared by the NIEHS (2002) and the Electric Power Research Institute (EPRI) (2012). Some information about magnetic field levels for specific types of proposed project facilities was also provided by Enertech Consulting as noted in the section.

The NIEHS is one of 27 research institutes and centers that compose the National Institutes of Health (http://www.nih.gov/), U.S. Department of Health and Human Services. The mission of the NIEHS is to discover how the environment affects people in order to promote healthier lives.

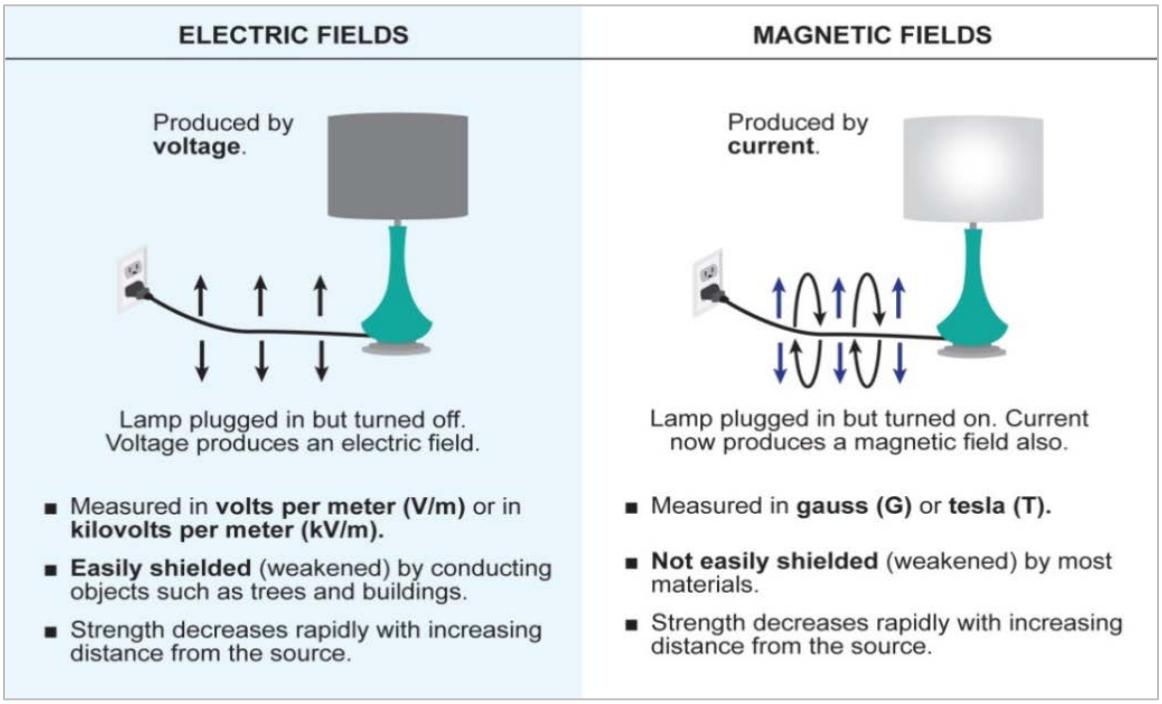
The EPRI is a nonprofit institution that conducts research, development, and demonstration relating to the generation, delivery, and use of electricity.

**Figure 8-1. Two Electrical Terms: Voltage and Current**




Source: NIEHS, 2002

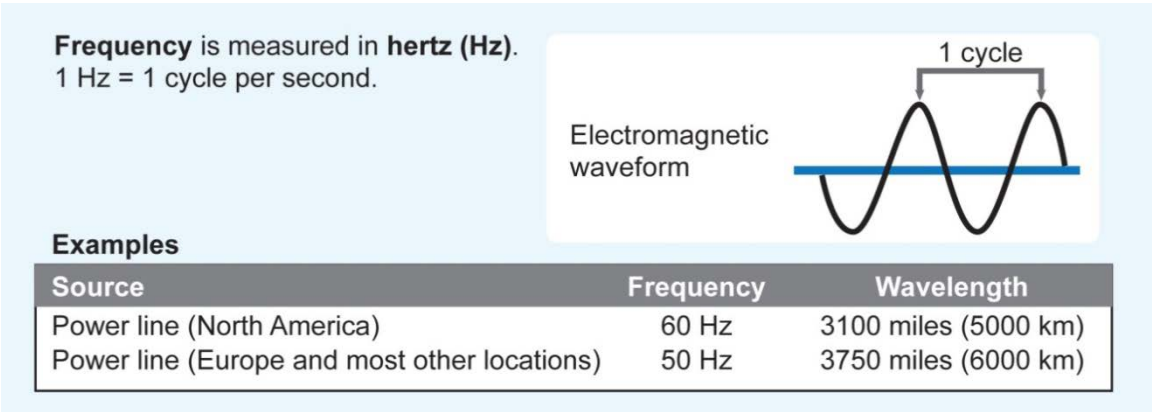
**Figure 8-2. Electrical and Magnetic Fields Produced by Voltage and Currents**




Source: NIEHS, 2002

Electric fields and magnetic fields are characterized by their *wavelength*, *frequency*, and amplitude (strength). Figure 8-3 shows the waveform of an alternating electric or magnetic field[4]. The direction of the field switches from one polarity to the opposite and back to the first polarity in a period of time called one cycle. Wavelength is the distance between a peak on the wave and the next peak of the same polarity. The frequency of the field describes the number of cycles that occur in 1 second and is measured in hertz (Hz).

**Figure 8-3. Frequency and Wavelength**




| Source | Frequency | Wavelength |
|---|---|---|
| Power line (North America) | 60 Hz | 3100 miles (5000 km) |
| Power line (Europe and most other locations) | 50 Hz | 3750 miles (6000 km) |

Source: NIEHS, 2002

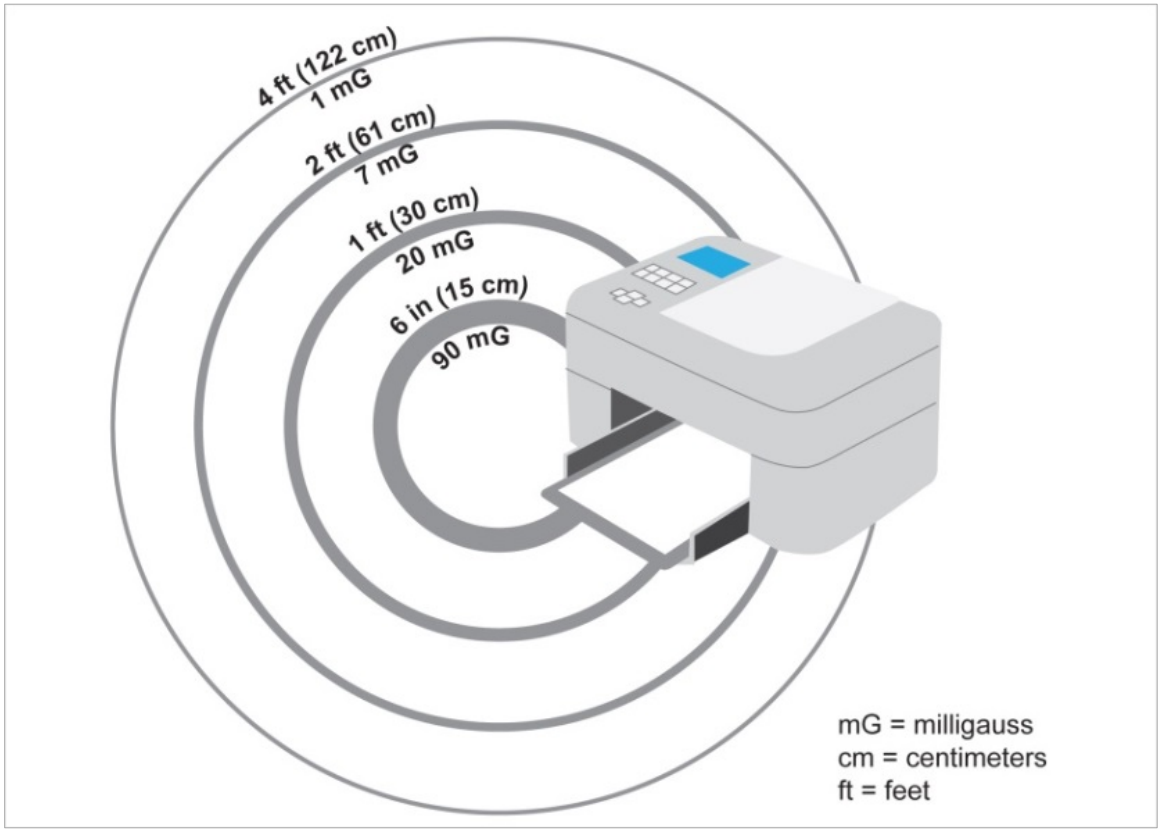
[4] The term electromagnetic is generically used in Figure 8-3. However, this EIS refers to electric fields and magnetic fields separately because they are not coupled or interrelated the same way at extreme low frequencies (60 Hz) as they are at higher frequencies.

A range of frequencies of EMF can occur. The terms EMF and ELF are both used in this discussion. Electricity generation, transmission and use in North America is almost entirely at 60 Hz, a frequency that falls in the extremely low frequency (ELF) range of 3 to 3,000 Hz, at the low end of the overall frequency spectrum. ELFs include the power-frequency fields of 50 or 60 Hz associated with generation, transmission, and use of electric power. The overall term of EMF includes ELFs and higher frequency fields. At the other end of the frequency spectrum from ELF is ionizing radiation, such as x-rays and gamma rays, with frequencies in the range of a billion-billion cycles per second. In the middle of the spectrum (millions to billions of cycles per second) are the radio-frequency fields used for TV, radio, cell phones, and microwaves. The higher frequency or radiofrequency magnetic fields are generated by many different technologies, including broadcast TV and radio, cell phones, and other radio communications.

Even though electrical equipment, appliances, and transmission lines produce both electric and magnetic fields, most recent research has focused on potential health effects of magnetic field exposure. This is because some epidemiological studies have reported an increased cancer risk associated with estimates of magnetic field exposure. No similar associations have been reported for electric fields; many of the studies examining biological effects of electric fields were essentially negative. Since there have been no observed health effects related to electric fields, the discussion of EMF from this point forward focuses on the magnetic field component only.

As noted above, electric fields are easily shielded or weakened by conducting objects such as buildings; as they pass through these objects, their energy is quickly dispersed. Magnetic fields generated by electrical equipment and appliances are not shielded or weakened by such objects. Magnetic fields found very close to electrical appliances and power tools are often much stronger than those near other sources, such as magnetic fields directly under transmission lines. However, the fields surrounding appliances and electric motors decrease in strength with distance more quickly than transmission line fields because of the confined wiring configuration in appliances and motors. Figure 8-4 provides a sample of how a magnetic field related to a common type of household equipment changes over distance (also see Table 8-6).

**Figure 8-4. Magnetic Field Strength Decreases with Distance**



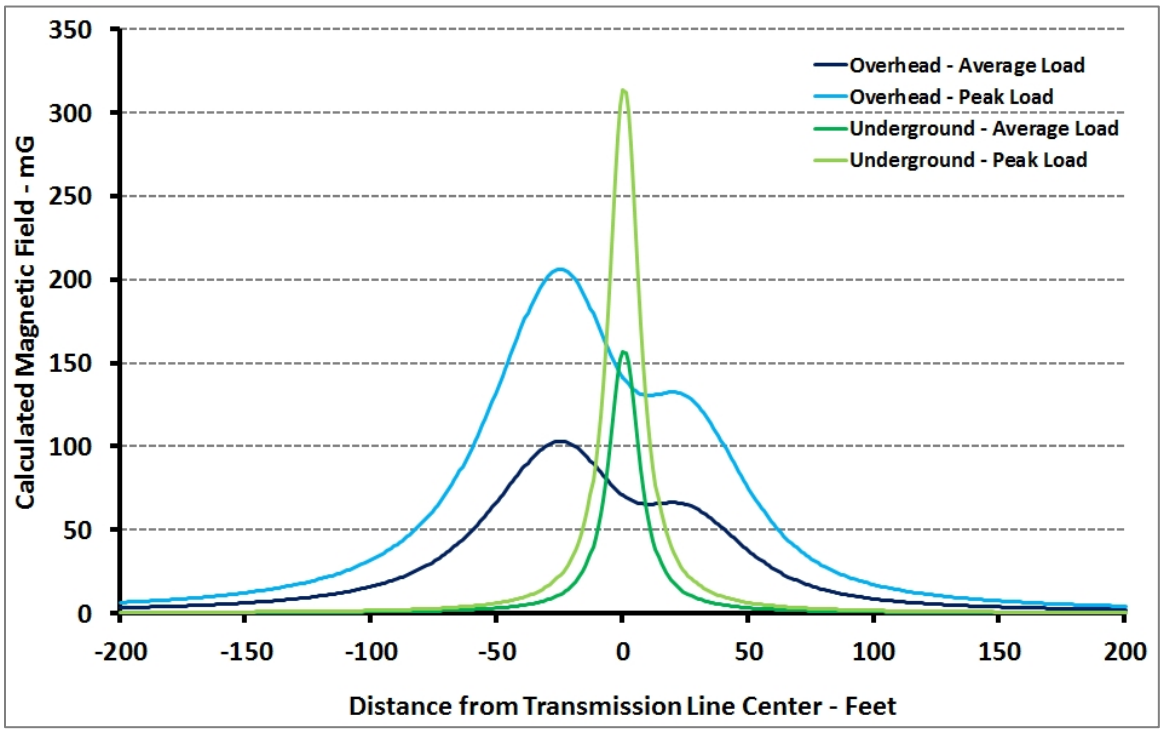

Source: NIEHS, 2002

Magnetic field strength from a transmission line (or other electrical infrastructure) also reduces in strength (attenuates) rapidly with distance. The rate of magnetic field attenuation is different for an overhead line configuration versus an underground (or underwater) line configuration. Figure 8-5 presents a generalized diagram of calculated magnetic field strength as a function of distance away from a transmission line, for both overhead and underground line configurations.

For underground lines, the conductors are encased with insulating material. Conductors can therefore be placed very close to one another (often bundled together within a common pipe or duct). Whenever energized conductors are close together, the magnetic field cancellation between these conductors is increased significantly. For underground lines, the magnetic field typically decreases in strength as a function of $1/d^3$ (where d = distance) in distance from the transmission line (Enertech, 2016).

For overhead lines, the air is used as an insulator between each of the phase conductors, resulting in a larger distance separation between the conductors than with underground lines. Whenever energized conductors are spread farther apart, the magnetic field cancellation between the conductors is diminished. For overhead lines, the magnetic field typically decreases in strength with the square of distance ($1/d^2$) from the transmission line (Enertech, 2016).

**Figure 8-5. Sample of Magnetic Field Diminishing at Distance from Transmission Lines**




Source: Enertech Consulting
Note: This graphic does not include data for underwater lines. Water, like earth, does not reduce magnetic fields; therefore underwater cables can be considered the same as underground lines for purposes of this EIS.

For overhead lines, the conductor (at midspan) is farther away from the ground surface than the underground cables are below ground. Underground cables are potentially closer to people than overhead lines. Therefore, the magnetic field is generally higher directly above an underground cable than it is below an overhead line. However, because the underground cables are close to one another, the magnetic field strength decreases very rapidly with distance away from the cables due to their magnetic field cancellation. This is different from overhead lines, where the magnetic field strength persists farther away from the line since the conductors are spread farther apart than with underground lines, and the magnetic strength decreases more slowly over the distance (Enertech, 2016). People walking directly over the center of underground transmission lines would experience higher magnetic fields than if they were walking directly underneath overhead lines, but if walking several feet away from the center of the line, magnetic fields from underground lines would drop off more quickly.

Underwater transmission line cables have magnetic field attenuation characteristics similar to underground cables. The magnetic field typically decreases in strength as a function of $1/d^3$ in distance from the underwater cable. However, the public is unlikely to be near underwater cables in deep water (at the bottom of Lake Washington). In shallow water, magnetic field levels would be comparable to underground cables.

### 8.3.5.1 Status of Scientific Research on Electric and Magnetic Fields

#### 8.3.5.1.1 Magnetic Field Exposure

Most people in the United States are exposed to magnetic fields that average less than 2 milligauss (mG) in strength, although exposures for each individual vary. Average magnetic field levels within rooms have been found to be approximately 1 mG based on several large surveys, while in the immediate area of appliances, the measured values ranged from 9 to 20 mG (Severson et al., 1988; Silva et al., 1998). Another study of 992 homes reported the average residential magnetic field value at 0.9 mG (Zaffanella, 1993). The closest local participants in this study were the City of Seattle and Seattle City Light.

This section describes the scope and findings of studies published through mid-November 2015 by organizations that continue to examine the possible health effects from power-frequency EMF, such as the World Health Organization (WHO), NIEHS, Advisory Group on Non-Ionizing Radiation of the Health Protection Agency of England, and International Agency for Research on Cancer (IARC) (Sheppard, 2015).

Table 8-6 lists the median magnetic field levels in mG generated by electrical appliances typically found in households. The strength of the magnetic field does not depend on the complexity, size, or power of the appliance. Large appliances often have weaker magnetic fields than small devices.

**Table 8-6. Median Magnetic Fields Generated by Household Appliances in Milligauss (mG)**

| Appliance | Distance from Source | |
|---|---|---|
| | 6 inches | 4 feet |
| ***Bathroom*** | | |
| Hair dryers | 300 | - |
| Electric shavers | 100 | - |
| ***Family Room*** | | |
| Ceiling fans | 3 | - |
| Window air conditioners | 3 | - |
| Televisions[1] | 7 | - |
| ***Bedroom*** | | |
| Digital clock[2] | 1 | - |
| Baby monitor | 6 | - |
| ***Laundry/Utility*** | | |
| Dryer | 3 | - |

| Appliance | Distance from Source | |
|---|---|---|
| Washing machine | 20 | - |
| Iron | 8 | - |
| Portable heaters | 100 | - |
| Vacuum cleaner | 300 | 1 |
| ***Kitchen*** | | |
| Blender | 70 | - |
| Can opener | 600 | 2 |
| Coffee maker | 7 | - |
| Dishwasher | 20 | - |
| Food processer | 30 | - |
| Garbage disposal | 80 | - |
| Microwave oven[3] | 200 | 2 |
| Mixer | 100 | - |
| Electric oven | 9 | - |
| Electric range | 30 | - |
| Refrigerator | 2 | - |
| Toaster | 10 | - |
| ***Workshop*** | | |
| Battery charger | 30 | - |
| Drill | 150 | - |
| Power saw | 200 | - |

Source: *EMF in Your Environment*, U.S. Environmental Protection Agency, 1992, as cited in NIEHS, 2002.

Notes:

Dash (-) means that the magnetic field at this distance from the operating appliance could not be distinguished from background measurements taken before the appliance had been turned on.

[1] Some appliances produce both 60 Hz and higher frequency fields. For example, televisions produce fields at 10,000 to 30,000 Hz (10 to 30 kHz) as well as 60 Hz fields.

[2] Most digital clocks have low magnetic fields. In the example in this table, the clocks are electrically powered using alternating current, as are all the appliances described in this table.

[3] Microwave ovens produce 60 Hz fields of several hundred milligauss, but they also create microwave energy inside the appliance that is at a much higher frequency (about 2.45 billion Hz). Users are shielded from the higher frequency fields but not from the 60 Hz fields.

#### 8.3.5.1.2 Research Background

Over the last 40 years, hundreds of scientific studies have been carried out around the world to determine whether exposure to EMF can have harmful health effects. In order to draw valid scientific conclusions, the same or similar results must be seen by different investigators, who may employ different scientific approaches addressing the same question.

Studies of potential adverse health effects from EMF associated with electric power systems began in the early 1960s as electric power systems moved to higher transmission line voltages of 345 kV and above. Research initially was focused on effects of strong electric fields to which workers could be exposed, though by the 1980s public and scientific interest shifted to weak magnetic fields, the area in which EMF research continues to date. While research on both electric and magnetic fields has answered many questions and brought consensus on certain topics, uncertainty remains as a result of contradictory and inconclusive research results.

#### 8.3.5.1.3 Research Methods

A number of scientific methods and topics in biology, human disease, biophysics, and engineering feed into answering questions bearing on public health. Research falls into these general categories:

- Epidemiology;
- Laboratory studies of humans, animals, tissues, and cells; and
- Theoretical analyses.

Epidemiology is the study of patterns and possible causes of diseases in human populations. Epidemiologists study short-term health conditions, such as outbreaks of food poisoning, as well as long-term diseases such as cancer and heart disease. Results of these studies are reported in terms of statistical associations between various factors and disease. Epidemiological studies often drive public health discussion and risk assessment because the research directly concerns humans.

Epidemiology has the significant challenge of determining whether statistical findings reflect a true causal association or whether other factors (notably, confounders) are involved. To a non-expert the language of epidemiology can appear more precise and definitive than it is. A *statistically significant* finding indicates a probability that the finding occurred above a certain level of chance, and regardless of statistical probability, a positive association does not itself provide proof of a cause-and-effect relationship. Typically, supplemental data are needed from multiple epidemiologic approaches and other study methods before a causal relationship can be established. The other study methods that bear on whether an agent such as EMF causes disease include clinical studies of humans, and laboratory studies with animals, biological tissue, and cells.

A recurrent feature of EMF science is that effects tend to be small and difficult to reproduce even after undertaking considerable effort to match experimental conditions. This is an important limitation that prevents drawing firm conclusions. It is noteworthy that there has been difficulty in replicating animal studies that have reported adverse effects. Taken

together with the inconclusive nature of the epidemiological research, there is consequently a high level of skepticism among many scientists that the positive associations of some epidemiological analyses are scientifically valid. There is therefore skepticism about the role, if any, that ELF magnetic fields play in human health. Skepticism also is promoted by studies indicating that environmental ELF fields are too weak to produce effects in cells, tissues, organs, animals, or humans.

#### 8.3.5.1.4 Ongoing Research and Unresolved Issues

Work is still underway to find answers to questions about EMF and possible health effects. Some examples include the following:

- **Research on childhood leukemia** – Large studies continue, with one being conducted in California sponsored by the Electric Power Research Institute.

- **Research on co-carcinogenesis** – Questioning whether one or more agents, such as EMF plus a biochemical, environmental, chemical, or physical agent, act together to exacerbate the growth and expansion of tumor cells, while alone one such agent may not have an effect.

- **Research on neurodegenerative diseases** – There are suggestive findings of a connection between neurodegenerative diseases, particularly amyotrophic lateral sclerosis (ALS), and magnetic fields, though there is no known mechanism for such an effect. Worker studies are in process to examine the possibility that frequent electric shock may increase the risk of ALS, rather than EMF.

- **Research on EMF interference with implanted medical devices** – Longstanding research has concerned possible interference with the functioning of implanted devices such as cardiac pacemakers, which is of most concern within occupational environments. However, certain devices in use close to very high-voltage electric fields remain a potential concern for the general public. Exposure guidelines have been developed for workers, and manufacturer data sheets provide limitations on device performance during EMF exposure. Work is continuing to develop laboratory bench testing and a more precise understanding of EMF tolerances of these devices.

#### 8.3.5.1.5 Summary of Research Findings on EMF

Conclusions on public impacts of EMF exposure cannot be obtained from a single study or a small number of studies. Such conclusions require a considerable body of evidence placed in the context of biological knowledge, obtained from laboratory experiments and physical principles. To meet the challenge of fairly assessing the information, public health analysts assemble evidence from the entire body of science using established measures and techniques. The methods of the "Weight of the Evidence for *Carcinogenicity*" developed by the U.S. Environmental Protection Agency (EPA) (2005), and a method developed for the International Agency for Research on Cancer (IARC) Monographs Program (IARC, 2006), are prominent mainstream approaches for risk assessment. IARC is an agency of the World Health Organization and draws upon top research scientists throughout the world. Both EPA and IARC methodologies have been used by other agencies worldwide and have been adapted for assessing diseases other than cancer.

After more than 40 years of research, unresolved questions about ELF magnetic field exposure and childhood leukemia that surfaced in 1979 (Wertheimer and Leeper, 1979) continue to drive risk assessment. This is indicated by publications, comments, and conclusions from various scientific bodies including the following:

- IARC (2002) conducted an extensive review of the literature in epidemiology, animal, and cell laboratory studies and a review of biophysical principles. Their conclusion was that power-frequency magnetic fields fell into the category of "possible carcinogens" based on "limited evidence in humans for the carcinogenicity of extremely low-frequency magnetic fields in relation to childhood leukemia." For leukemia and all other cancers among adult populations (both residential and occupational), evidence was not considered sufficient to support classification of EMF as a possible causal factor. More information is available at: http://monographs.iarc.fr/ENG/Monographs/vol80/index.php.

- IARC's conclusions and classifications closely resemble those of an earlier National Institute of Environmental Health Sciences (NIEHS) evaluation that found that ELF magnetic fields were possible carcinogens. NIEHS drew this conclusion based on the "limited evidence" from childhood epidemiology and evidence concerning one type of adult leukemia among workers exposed occupationally. More information is available at: http://www.niehs.nih.gov/health/assets/docs_a_e/emf1.pdf (NIEHS, 1998).

- In response to inquiries on The Health Council of the Netherlands (2008) interpretation of the research, this organization offered the following perspective: "Epidemiological studies showed an increased risk of leukemia among children living in locations where the field strength was higher than 0.3 – 0.4 microtesla (µT). However no indications of a causal mechanism have been found in experimental research. The possibility cannot be excluded that a factor other than exposure to a low-frequency magnetic field could explain the association found in epidemiological research." More information is available at: http://www.gezondheidsraad.nl/en/publications/high-voltage-power-lines-0.

- The Health Protection Agency of the United Kingdom has published opinions on EMF human health effects in recent years. The last full Health Protection Agency report on power-frequency EMF was in 2001. In 2013, the Agency stated: "At present there is insufficient new information that would justify the development of an update to the 2001 report, although it will be needed at some point in the future" (HPA, 2013).

- The most recent update to the European Union position prepared by the Scientific Committee on Emerging and Newly Identified Health Risks (SCENIHR, 2009) presented conclusions similar to those above.

### 8.3.6 Corona Ions

Corona effects are the result of the ionization of the air by the strong electric fields present at the surface of sharp metallic points, such as small-diameter wires, when they are raised to a high voltage. Generation of corona ions is dependent on the strength of the electric field on the transmission line's fittings and conductors—called the surface voltage gradient. Water droplets can cause increases in the conductor's surface voltage gradient, increasing the likelihood of corona discharges occurring. This may occur during very moist atmospheric conditions, such as fog or rain, but the effect is temporary. The corona appears as a faint (filamentary) discharge radiating outward from its source, and is the cause of the faint crackling noise sometimes heard in the vicinity of transmission lines. The corona ions produced by the line are carried by the wind and disappear with distance from the line as the charged particles recombine or are deposited.

The source of information on corona ionization in this section (8.3.6) is information produced by the Energy Networks Association (ENA) (2009).

ENA represents the "wires and pipes" transmission and distribution network operators for gas and electricity in the UK and Ireland. Members are utilities that control and maintain the national energy infrastructure.

The health concern with corona ions is related to how they may combine with airborne pollutants to create health impacts. As airborne pollutants enter the body by inhalation, they may be deposited in the respiratory system. The extent to which inhaled particles deposit in the various regions of the respiratory system depends upon physical factors such as their size, shape, and density, as well as charge. The extent of effects of corona ions on health will depend upon the increase in individuals' exposure to pollutants and the extent to which these pollutants are causes of disease.

Professor Denis Henshaw of Bristol University in the United Kingdom has developed a corona ion hypothesis, based on work proposing a theoretical mechanism involving the effect of electric fields producing corona ions, against an extensive background of research into the effects of magnetic fields on health. However, Professor Henshaw's theoretical mechanisms involving corona ions and pollutant particles have not been proven by health studies on populations near transmission lines.

## 8.4 HOW WERE POTENTIAL ENVIRONMENTAL HEALTH IMPACTS ASSESSED?

The analysis considered the general potential to encounter preexisting site contamination during construction, and how that type of material would be addressed if encountered. The potential to use hazardous materials or generate hazardous waste during project construction and operation was considered, along with how these materials would be managed. The analysis includes the potential for public safety risks related to earthquake, lightning strike, or explosions related to natural gas or petroleum pipelines. Finally, the scientific findings regarding EMF and corona ionization were evaluated to consider what they would mean relative to operation of this project.

# 8.5 WHAT ARE THE LIKELY CONSTRUCTION IMPACTS RELATED TO ENVIRONMENTAL HEALTH?

## 8.5.1 Construction Impacts Considered

As previously described, there are four types of potential environmental health impacts considered in this chapter. Because of the different types of impacts considered, each potential impact category includes a specific set of impact classification criteria.

### *8.5.1.1 Hazardous Materials*

Constructing any of the action alternatives would be likely to involve use of the hazardous materials described in Section 8.3.1 (e.g., gasoline, oil, solvents, paint). Improper management of those materials or accidental spills that are not properly cleaned up could release hazardous materials to air or water, which could create an environmental impact. Construction activities are not expected to generate any hazardous/dangerous wastes.

Each alternative and option or component has the potential to be constructed in or near sites already contaminated with hazardous materials. The types of hazardous materials that could be encountered would depend on previous site uses. When contained in place these materials may pose little active risk to the environment. However, these types of materials may become mobile if they are disturbed during construction, at which point they would be more likely to have a negative impact on human health and the environment. Disturbance of these materials during construction could create an environmental impact by releasing hazardous materials to the air or water, or exposing construction workers to hazardous substances, if proper handling methods were not used. Existing site contamination could occur in water as well as on land.

The magnitude of potential hazardous material related impacts during construction is classified as minor, moderate, or significant and has been defined for this EIS as follows:

**Minor-** If small quantities of hazardous materials could be released but could be cleaned up in accordance with regulations such that sites could be restored to full function with no adverse health impacts to the public, impacts would be considered minor.

**Moderate**–If substantial quantities of hazardous materials could be released to the environment but could be cleaned up and restored to full function in accordance with applicable regulations with no adverse health impacts to the public, impacts would be considered moderate.

**Significant**–If hazardous materials would be likely to be encountered with the potential for uncontrollable chemical releases, or large quantities of hazardous materials could be released in a sensitive environment (such as a water resource, wetland, residential area or near a school) with limited or no ability for cleanup and possible adverse public health impacts, impacts would be considered significant.

#### 8.5.1.2 Public Safety Risks – Activities Near Pipelines

Construction of the project could theoretically damage the hazardous liquid pipelines operated by OPLC and other gas lines mentioned in Section 8.3.2, creating an explosion risk if safety policies and regulations were not implemented as required.

The UTC identifies five major reasons why gas pipelines leak or fail, potentially creating a public safety hazard: (1) third-party excavation damage; (2) corrosion; (3) construction defects; (4) material defects; and (5) outside forces resulting from earth movement, including earthquakes, washouts, landslides, frost, lightning, ice, snow, and damage done by authorized on-site personnel. The UTC also notes that other causes of failure can include cast-iron bell joint leaks and human error (UTC, 2015). Holes in pipelines can also be created by electrical *arcing* from downed transmission lines, leading to gas leaks and potential explosions (UTC, 2012). Construction equipment can create pipe gouges, dents, scrapes, and cracks in the pipeline. This type of damage can grow and lead to a catastrophic failure (UTC, 2015).

The magnitude of potential project construction impacts related to activities near pipelines is classified as follows for this EIS:

**Minor** - If damage to pipelines could lead to leaks of materials that could be cleaned up and sites fully restored in accordance with applicable regulatory requirements, impacts would be considered minor.

**Moderate** - If implementation of regulatory requirements and project design would address most potential adverse impacts, but there is a reasonable potential for some damage to pipelines that could result in impacts to property or human health, impacts would be considered moderate.

**Significant**–Even with implementation of regulatory requirements and design measures, if substantial damage, injury, or death would likely occur associated with pipeline damage, leaks, or explosions, impacts would be considered significant.

#### 8.5.1.3 Public Safety Risks – Natural Phenomena

Lightning strikes would not be a particular concern or lead to adverse impacts to the public during construction. Members of the public would not be allowed to be in the vicinity of the construction site, and therefore, would not be exposed to any additional environmental health risk.

As discussed in Chapter 3, an earthquake could occur during construction, resulting in embankment slope failures, liquefaction, ground settlement, and possibly associated equipment destabilization. The risk of seismic hazards during construction is considered low because of the relatively low probability that an earthquake would coincide with the actual limited construction period. If a large earthquake were to occur, the major risk would be to the ongoing construction activities or injury to workers.

The magnitude of potential construction impacts related to public safety risks from natural phenomena is classified as follows for this EIS:

**Minor** –If earthquakes or seismic activity occurred during construction that could cause disruption of equipment and construction activities, but would not cause risks to human health or property, impacts would be considered minor.

**Moderate -** If an earthquake during construction would have a reasonable potential to disrupt construction activities, and risk human health and property, impacts would be considered moderate.

**Significant** -If an earthquake during construction would result in substantive damage to property, injury, death, or substantive property loss, impacts would be considered significant.

#### *8.5.1.4 EMF and Corona Ionization*

Although small motors in construction equipment generate some level of magnetic fields, these fields are very small and would be indistinguishable from background levels for the public outside of the construction site. Workers within the construction site would experience magnetic fields from this equipment as they would from working on any similar construction site (these fields would be at lower levels than those investigated as potentially causing health impacts). As described above, there is not a consensus in the scientific community on the environmental health risks from EMF, particularly at the frequencies that would be expected to result from the proposed transmission line. EMF is a concern that has been identified by the public, but based on the available scientific information there does not appear to be a potential environmental health impact associated with the proposed transmission line. PSE will continue to comply with all applicable regulations, including requirements that may emerge in the future.

Corona ionization would not be generated by construction. As with EMF, there is no scientific consensus that it is an environmental health risk, and while this issue has been identified as a concern by the public, it is not considered to be an impact to environmental health.

### 8.5.2 No Action Alternative

Under the No Action Alternative, maintenance activities at existing facilities would occur and could intensify, but they would not involve work on new sites or involve use of large quantities of hazardous materials. Occasional conductor replacement, implementation of new technologies not requiring discretionary permits, and installation of distributed generation facilities under PSE's conservation program would require minor construction activities. Construction impacts related to hazardous materials, public safety risks, or EMF and corona ionization would be negligible.

### 8.5.3 Alternative 1: New Substation and 230 kV Transmission Lines

Impacts are discussed associated with transmission line construction, followed by substation construction where differences in impacts could be encountered.

### 8.5.3.1 Option A: New Overhead Transmission Lines

#### 8.5.3.1.1 Hazardous Materials

Construction of Alternative 1, Option A would likely require the types of equipment described in Chapter 2, including those for earth movement (dump trucks, bulldozers, or backhoes), cranes, concrete trucks, and delivery and worker vehicles. Overall construction duration could be up to 18 months (not at all locations). All of these vehicles and types of equipment would use some type of fuel, which if not handled and managed properly could spill or leak.

The transmission lines installed for this alternative could use either the HPFF-type cable or XLPE cable, which does not contain oil. If HPFF cable were chosen and were damaged during installation, oil from the lines could leak. Spills of transformer insulating oil or gas ($SF_6$) could occur during installation of this equipment at one of the three substation sites. Without containment and immediate cleanup, these materials could potentially generate an adverse environmental impact. However, regulations (including those for water quality protection during construction described in Chapter 5) require spill prevention, site containment, and cleanup measures. Compliance with these regulations would reduce impacts to a minor level.

In keeping with applicable regulations, PSE has an Emergency Spill Response Program to ensure that accidentally released substances are contained. This program incorporates a 24-hour contact number for reporting spills. The number is widely distributed to PSE and its contractor's employees through training, facility signs, Spill Prevention, Control, and Countermeasure (SPCC) plans, office bulletin board posters, internal mailings and company vehicle dashboard stickers (Strauch, personal communication, 2016). Upon receiving notification of a release, PSE initiates a spill response process, which includes providing notification of the releases to state or federal agencies. Smaller incidental releases can often be addressed by internal PSE staff. Releases that are larger or more complex or involve regulatory oversight from state or federal agencies are directed by an environmental consultant that is contracted to provide 24-hour emergency spill response services. PSE contracts with a number of emergency response contractors that have the necessary equipment and personnel to remediate the sites per the appropriate state or federal regulations (Strauch, personal communication, 2016). It is acknowledged that unforeseen circumstances can occur during construction. However, compliance with all applicable local, state and federal regulations and adherence with PSE's existing processes would reduce the probability for leaks or spills to occur, and if spills did occur, potential impacts would be reduced to a minor level.

Federal regulations would require PSE to determine the location and types of preexisting soil or groundwater contamination on-site when purchasing property (40 CFR Part 112). If contaminated sites were purchased for either substation improvements (transformer) or transmission lines, they would need to be cleaned up to appropriate standards, with the appropriate cleanup level determined based on likely future use of the site. Once a particular project site or alignment is chosen, an assessment can be conducted of the potential to encounter existing contamination.

Hazardous materials on property already owned by PSE would also need to be addressed if it were likely the hazardous materials would be disturbed. Releases (or threatened releases) of such materials would need to be reported to the Washington State Department of Ecology under the Model Toxics Control Act (MTCA). These notification requirements also apply to historical releases once a property owner is aware they have occurred. Cleanup actions could be initiated under MTCA; the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA); or the Resource Conservation and Recovery Act (RCRA).

If hazardous materials in soils or groundwater were not known to exist prior to the start of construction, but were encountered during the work, federal and state regulations (primarily WAC 173-340) would require PSE to ensure appropriate site management to avoid displacement of the materials and to conduct appropriate cleanup and disposal. The standard practice when a contractor finds previously unknown hazardous materials is to stop work in the immediate area until the materials can be categorized and the extent/nature of the release determined. PSE would also need to report the release of any hazardous substances that may be a threat to human health or the environment to Ecology per WAC 173-340-300. Given the extensive regulatory framework in place for contaminated site management, negligible to minor impacts related to preexisting contamination are expected.

#### 8.5.3.1.2 Public Safety Risks – Activities Near Pipelines

Construction could occur in the vicinity of regional natural gas pipelines or those that supply natural gas to homes and businesses. In addition to distribution gas lines throughout the area, the transmission lines could be constructed near the two OPLC regional pipelines.

Regulations such as those described in Section 8.2 (and Appendix M) require that pipelines must be properly identified and located prior to construction (through review of utility maps, coordination with utilities, or fieldwork to precisely locate them).

In addition to federal and state regulations, local governments in the combined study area have also adopted land use policies or regulations regarding co-location of other development with hazardous material pipelines such as the OPLC pipelines (Section 8.2.2.1). The OPLC pipelines extend through six of the study area communities (Kirkland, Redmond, King County, Bellevue, Newcastle, and Renton) all of which have planning policies addressing such facilities, including safety considerations in siting and co-locating utilities. These communities also have other codes addressing related public safety which would guide facility siting and design.

Careful coordination with potentially affected utilities during the design process, along with compliance with applicable regulatory requirements, will help to avoid potential construction conflicts with existing underground pipelines. Compliance with current safety requirements and regulations would minimize the probability that an existing pipeline could be damaged during construction and spill or leak petroleum products. Should a spill occur, the risk would depend in part on the location of the accident and the amount of product released. Materials could enter area storm drains or watercourses, pool on-site, soak into the ground and potentially reach groundwater, or drain across land onto private property or public rights-of-way. Depending on other activities occurring in the area, in a worst case scenario these materials could possibly ignite, leading to explosion and potential loss of life and property.

Compliance with applicable regulations would be expected to reduce the potential impact to a minor level.

In addition to injuries or loss of life that might result from an explosion of any type of pipeline, human health effects could occur after inhaling smoke from fires or coming in contact with the spilled petroleum materials. If petroleum products were to reach a drinking water aquifer, significant adverse impacts to human health could occur if these materials were ingested.

Although a significant adverse impact to public safety could occur if a leak or an explosion of any of these types of gas lines resulted from the project, this type of event would not be likely to occur because PSE would comply with all applicable regulations and requirements in place for pipeline safety, including local land use requirements for siting facilities of this type. Site-specific investigations would be conducted during design to avoid existing gas lines by maintaining appropriate separation between existing and proposed facilities. Close coordination with potentially affected utilities would also be done, and the design and construction would be conducted consistent with all applicable requirements. Given these safeguards, the probability of a pipeline disruption resulting in an explosion is low, but the potential magnitude of the impact is potentially significant if this unlikely event were to occur. Because compliance with all applicable requirements would help to reduce the probability of an occurrence to a very low likelihood, potential adverse impacts associated with construction of the project are characterized as minor.

**Pipeline Safety**

The UTC has investigated a few gas pipeline incidents that were caused by the failure of underground facility owners to mark, or excavators' failure to call or precisely locate gas pipeline facilities. The UTC has referred violations to the State Attorney General Office for enforcement. The UTC's recommendations for enforcement have included technical assistance, education, training, and penalties (UTC, 2015).

#### 8.5.3.1.3 Public Safety Risks – Natural Phenomena

No public safety impacts related to lightning strikes would be anticipated during construction; however, construction workers could be exposed during tower construction. Transmission pole design includes features to reduce the potential for lightning strikes, described in more detail in Section 8.6.2.3 below. Earthquakes during construction would not be expected to create adverse impacts in terms of public safety risks specific to the project construction. As described in Chapter 3, the risk of seismic hazards during construction is considered low because of the relatively low probability that an earthquake would coincide with the limited construction period. If a large earthquake were to occur, the major risk would be to the ongoing construction activities, and construction workers. Risks to workers on the Energize Eastside project would not be greater than the risks to workers on other construction projects in the region, and would be considered minor.

#### 8.5.3.1.4 EMF and Corona Ionization

As noted in Section 8.5.1.4, corona ionization would not be generated by construction activities, and EMF would not be an issue during construction for Alternative 1, Option A or any of the other options or alternatives.

### 8.5.3.2 Option B: Existing Seattle City Light 230 kV Transmission Corridor

#### 8.5.3.2.1 Hazardous Materials

Alternative 1, Option B would likely use the same types of hazardous materials in construction and mostly similar equipment to Option A (see Appendix B). The construction period for Option B would likely be longer than Option A (24 months), extending the period during which accidental spills of materials could potentially occur. Option B also includes the potential for use of HPFF lines, which could be damaged and spill oil. In addition, for purposes of this evaluation, the potential for preexisting contamination within the Seattle City Light corridor was considered equally likely to that of any other location. Option B is likely to have negligible to minor construction impacts related to hazardous materials, the same as Option A, because PSE would comply with all applicable permit requirements prior to and during construction.

#### 8.5.3.2.2 Public Safety Risks - Activities Near Pipelines

As with Alternative 1, Option A, construction could occur in the vicinity of regional natural gas pipelines or smaller pipelines that supply natural gas to homes and businesses. Although the PSE lines would in large part be located in or near the existing Seattle City Light corridor, that corridor crosses a PSE gas main and the two regional petroleum product pipelines operated by OPLC several times (as described in Chapter 16). Other gas utilities may also be present. As with Option A, in the unlikely event that construction activities result in a rupture, leak, or explosion of a nearby pipeline, impacts could be significant. However, conformance with existing regulations and industry standards would help to ensure that impacts are not likely. Given the low probability of occurrence, the potential impact is considered minor.

#### 8.5.3.2.3 Public Safety Risks – Natural Phenomena

Alternative 1, Option B would have the same potential for minor adverse impacts as described for Option A with regard to lightning strikes and earthquakes during construction.

### 8.5.3.3 Option C: Underground Transmission Lines

#### 8.5.3.3.1 Hazardous Materials

The potential for spills of hazardous materials at substations would be the same as described for Alternative 1, Options A and B although slightly different types of construction equipment would be used (see Appendix B). Duration of construction would also be longer than Option A, at approximately 36 months. The same type of HPFF lines described for Option A could be used, which could leak during construction. The underground transmission lines of Option C could have a higher potential to encounter contaminated materials than the overhead transmission of Option A due to the larger extent of ground disturbance. PSE would perform site-specific evaluations during facility design, including geotechnical evaluations to determine the potential for contaminated materials to be present. Where possible, the facilities would avoid areas of contamination. The potential magnitude of impacts is expected to be minor, because it is anticipated that PSE would attempt to avoid areas of contamination and where that is not possible would comply with all applicable permit requirements, cleaning up any disturbed contaminated sites to meet regulations.

#### 8.5.3.3.2 Public Safety Risks - Activities Near Pipelines

As with Alternative 1, Options A and B, construction could occur in the vicinity of regional natural gas pipelines, or those that supply natural gas to homes and businesses, or near the linear alignment of the two regional petroleum product pipelines operated by OPLC. The potential to encounter these facilities would be higher than described for Options A and B, because more excavation would be required. As noted for Option A, PSE would comply with all applicable requirements during facility design and construction to avoid potential conflicts with these facilities. Due to the increased area of ground disturbance, the probability of impacts would be somewhat higher than described for Options A and B, but still considered low, and anticipated impacts are expected to be minor to moderate.

#### 8.5.3.3.3 Public Safety Risks – Natural Phenomena

This option would have the same or lower potential for minor adverse impacts as described for Alternative 1, Options A and B with regard to lightning strikes and the same potential impacts from earthquakes during construction.

### 8.5.3.4 Option D: Underwater Transmission Lines

#### 8.5.3.4.1 Hazardous Materials

Construction of Alternative 1, Option D would require equipment similar to that described for Option A, plus a submarine cable laying vessel (a specialized type of barge). Spills from the equipment are not considered likely to occur, although if they did occur, they would likely have a minor adverse impact if in water[5]. As described in Chapter 2, approximately 8 months would be needed for the underwater portion plus additional time for the land-based portions of the line and the new transformer.

As with Alternative 1, Option C, the submerged transmission lines of Option D (and possible underground segments on land) have greater potential to encounter contaminated material than the overhead transmission of Option A due to the larger extent of ground disturbance. This option could also encounter contaminated sediments within Lake Washington[6] along the alignment. These sediments could be disturbed through burying the cable at relatively shallow depth underneath the lake bed or by laying cable on the lake bed. Ground disturbance could also occur if the lines were placed underground at the point where they come ashore. As with Options A, B, and C, compliance with permit and regulatory requirements would help to ensure that adverse impacts related to site contamination would likely not occur. Impacts, if they occurred, would be temporary and would be expected to be mitigated in accordance with applicable regulatory requirements.

Potential hazardous material impacts would be the same as described for Alternative 1, Option A (negligible to minor).

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[5] This analysis assumed that neither fluid-filled cable would likely be used in Lake Washington PSE's *Lake Washington Submarine Cable Alternative Feasibility Study* (Power Engineers, 2015) indicates that use of SCFF cable in Lake Washington is not recommended, and HPFF cable was not considered as an option in their feasibility analysis.

[6] Contamination of lake-bottom sediments is known to exist in some locations in Lake Washington (Ecology, 2014).

#### 8.5.3.4.2 Public Safety Risks – Activities Near Pipelines

This option would have lower potential for minor adverse impacts related to construction activities near gas pipelines, compared to Alternative 1, Options A, B and C.

#### 8.5.3.4.3 Public Safety Risks - Natural Phenomena

This option would have the same potential for minor adverse impacts as described for Alternative 1, Options A, B, and C with regard to lightning strikes and earthquakes during construction.

## 8.5.4 Alternative 2: Integrated Resource Approach

### *8.5.4.1 Energy Efficiency and Demand Response Components*

#### 8.5.4.1.1 Hazardous Materials

Hazardous materials are not likely to be used in any quantity, or otherwise encountered or generated, in constructing energy efficiency measures. No adverse impacts related to hazardous materials are likely.

#### 8.5.4.1.2 Public Safety Risks – Activities Near Pipelines and Natural Phenomena

Public safety risks related to proximity to gas lines, earthquakes, or potential for lightning strikes during construction are not likely from this component of Alternative 2. Energy efficiency measures do not involve major infrastructure or substantial construction, and would not likely be located near pipelines or gas lines.

#### 8.5.4.1.3 EMF and Corona Ionization

Construction of all components of Alternative 2 would not likely have any adverse impacts, the same as Alternative 1.

### *8.5.4.2 Distributed Generation Component*

#### 8.5.4.2.1 Hazardous Materials

Some of the same types of equipment and vehicles used to construct portions of Alternative 1 could be used for installation of distributed generation measures. The construction period, during which materials could potentially spill, would likely be shorter than the larger, more complex facilities and sites of the energy storage and peak generation plant components. Adverse impacts related to accidental spills or encounters with previous site contamination are expected to be negligible to minor.

#### 8.5.4.2.2 Public Safety Risks – Activities Near Pipelines

As with Alternative 1, construction of distributed generation facilities could occur in the vicinity of regional natural gas pipelines or those that supply natural gas to homes and businesses. The likelihood of an explosion would be similar to or lower than Alternative 1 (extremely low potential for occurrence). The risks during construction of distributed generation facilities would be lower than with Alternative 1 because there would be greater flexibility in locating the facilities away from pipelines.

#### 8.5.4.2.3 Public Safety Risks – Natural Phenomena

This component would have the same or lower potential for minor adverse impacts as Alternative 1 with regard to lightning strikes and earthquakes during construction.

### 8.5.4.3 Energy Storage Component

#### 8.5.4.3.1 Hazardous Materials

In addition to construction equipment and vehicles, which would contain or use hazardous materials, it is assumed that the battery units would contain some type of acid. Any of these types of materials could spill in the event of an accident during construction, which would potentially take approximately six months to complete. Battery systems would be expected to be shipped in spill-proof containers. Construction of new facilities like this would be expected to comply with local codes for stormwater management and spill prevention and cleanup to avoid impacts to surface waters or groundwater that might occur with accidental spills during construction. Overall, construction impacts related to hazardous materials are expected to be negligible to minor.

#### 8.5.4.3.2 Public Safety Risks – Activities Near Pipelines

As with the distributed generation component, construction could occur in the vicinity of regional natural gas pipelines or those that supply natural gas to homes and businesses, with accompanying potential risks of accidental disruption. The likelihood of this occurrence is low, and potential impacts are considered to be minor.

#### 8.5.4.3.3 Public Safety Risks – Natural Phenomena

This component would have the same potential for minor adverse impacts as Alternative 1 with regard to lightning strikes and earthquakes during construction.

### 8.5.4.4 Peak Generation Plant Component

#### 8.5.4.4.1 Hazardous Materials

In addition to construction equipment and vehicles, which would contain or use hazardous materials for approximately 12 months to build this component, the plant would run on fuel, possibly natural gas, which would be delivered to the site prior to initial startup. Any of these types of materials could spill in the event of an accident during construction. However, as with the energy storage component, construction of this type of facility would be required to comply with local codes for hazardous material transport and storage, as well as construction site stormwater management and spill prevention and cleanup. Compliance with regulations would avoid impacts to surface waters or groundwater that might occur with accidental spills during construction. Therefore, impacts would be negligible to minor.

#### 8.5.4.4.2 Public Safety Risks - Activities Near Pipelines

As with the distributed generation component, construction could occur in the vicinity of regional natural gas pipelines or those that supply natural gas to homes and businesses. As previously described, PSE would coordinate with potentially affected utilities to avoid potential conflicts or disruptions, and would comply with all applicable requirements during facility design and construction. Adverse impacts are not expected to occur.

#### 8.5.4.4.3 Public Safety Risks – Natural Phenomena

This component would have the same or lower potential for minor adverse impacts as Alternative 1 with regard to lightning strikes and earthquakes during construction.

### 8.5.5 Alternative 3: New 115 kV Transmission Lines and Transformers

#### 8.5.5.1.1 Hazardous Materials

Alternative 3 would likely use the same types of hazardous materials during construction as Alternative 1 but because the transmission line would be much longer, the construction area would cover a larger area than Alternative 1 or 2. Alternative 3 would require more transmission line poles to be installed to support a longer line than Alternative 1, potentially increasing the potential to encounter contaminated materials.

New transformers at three substations (many of which would require expansion or other work outside the existing facility footprint as described in Chapter 2) could also increase the potential to encounter contaminated soils. PSE would conduct site-specific investigations during facility siting and design to determine if contaminated soils are present, and would avoid contaminated areas to the extent possible. Should contaminated soils be encountered, PSE would comply with all applicable regulatory requirements regarding containment and cleanup, and impacts would be expected to be minor.

#### 8.5.5.1.2 Public Safety Risks - Activities Near Pipelines

As with Alternative 1, construction could occur in the vicinity of regional natural gas pipelines or those that supply natural gas to homes and businesses. Construction could also occur near the linear alignment of the two regional petroleum product pipelines operated by OPLC. The increased length of Alternative 3 could result in an increased potential for conflicts with existing natural gas providers than described for Alternative 1, depending upon the alignment chosen. If existing pipelines were not properly identified and located prior to construction (through review of utility maps, coordination with utilities, or fieldwork to precisely locate them), or if proper safety precautions required by regulations were not taken during construction, the pipelines could be damaged during construction and leak. If leaked material encountered an ignition source, an explosion could occur. As with Alternative 1, this type of event could be a significant adverse impact (depending on specific size and location of the pipeline and the leak) if it occurred. However, PSE would comply with all applicable requirements during design and construction to avoid potential utility conflicts, and would coordinate closely with all potentially affected utilities, to clearly identify and avoid existing pipelines. Given conformance with existing regulations and industry standards and the low probability of occurrence, the potential impact is considered minor.

#### 8.5.5.1.3 Public Safety Risks - Natural Phenomena

Alternative 3 would have the same potential for minor adverse impacts as described for Alternative 1, Option A with regard to lightning strikes and earthquakes during construction.

#### 8.5.5.1.4 EMF and Corona Ionization

As described for Alternative 1, no impacts related to these issues are likely to occur with construction.

# 8.6 HOW COULD OPERATION OF THE PROJECT AFFECT ENVIRONMENTAL HEALTH?

## 8.6.1 Operation Impacts Considered

### *8.6.1.1 Hazardous Materials*

Operating any of the action alternatives would likely involve use of the hazardous materials described in Section 8.3.1. Operation of some of the alternatives could generate hazardous/dangerous wastes over time. Improper management of any of these types of materials or wastes, or accidental spills that are not properly cleaned up, could potentially release hazardous materials or waste to air or water, creating an adverse environmental impact[7].

The magnitude of potential operational hazardous material related impacts is classified as minor, moderate, or significant and has been defined for this EIS as follows:

**Minor** – If small quantities of hazardous materials or waste could be released during operation but could be cleaned up in accordance with applicable regulatory requirements, with sites restored to full function and no adverse health impacts to the public, impacts would be considered minor.

**Moderate** – If substantial quantities of hazardous materials or waste would likely be released to the environment during operation, but sites could be cleaned up in accordance with applicable regulatory requirements, with no adverse health impacts to the public, impacts would be considered moderate.

**Significant** – If operations would be likely to lead to uncontrollable releases of hazardous materials or wastes, or likely releases of materials or wastes in a sensitive environment (wetlands, residential areas or schools) with no ability to clean up or restore sites if spills occurred and/or possible adverse public health impacts, impacts would be considered significant.

### *8.6.1.2 Public Safety Risks - Activities Near Pipelines*

Ongoing maintenance activities during operation could theoretically damage or break the OPLC pipelines or other pipelines in the area, leading to a chemical release or explosion if safety policies and regulations were not implemented.

If transmission lines were improperly designed or located relative to pipelines, or if pipelines themselves were not properly designed with cathodic protection, pipelines could be damaged by stray electric current, leading to risk of chemical release or explosion.

[7] Possible leaks of fuel from pipeline damage are described as a public safety risk.

The magnitude of potential operational impacts related to activities near pipelines is classified as minor, moderate, or significant and has been defined for this EIS as follows:

**Minor** – If damage to pipelines could occur leading to leaks of materials that could be cleaned up fully in accordance with applicable requirements, with minimal adverse risks to property or human health, impacts would be minor.

**Moderate** –If potentially substantial damage to pipelines could occur, but with no adverse impacts to human health or property damage, impacts would be considered moderate.

**Significant** – If operation of the project resulted in the potential to damage pipelines, leading to explosion or potential releases resulting in adverse impacts to human health or property damage, impacts would be considered significant.

**Pipeline Design to Avoid Stray Current**

In accordance with 49 CFR Part 195, OPLC has cathodic protection on all of its pipelines to protect against corrosion and inspects these systems annually. Criteria to determine the adequacy of cathodic protection are included in 49 CFR Part 195.571, which incorporates by reference industry standards and practices developed by the National Association of Corrosion Engineers (NACE) (2007).

### 8.6.1.3 Public Safety Risks - Natural Phenomena

Lightning strikes directly to electrical infrastructure could occur. Facilities are designed to direct electricity from lightning to the ground according to NESC guidelines. A mechanical means is installed to convey lightning to the ground and avoid equipment damage or fires (such as a system of lightning rods at substations, and static wires and grounding conductors at poles). Although unlikely, it is possible that, even with these protective measures in place, lightning strikes directly to electrical infrastructure could occur. Direct strikes to poles or lines could damage the pole, causing it to topple or drop transmission lines to the ground. Downed transmission lines could pose a safety risk to the public from electrocution or shock due to direct contact, or if electricity from the line were transferred to other metal utilities or structures. Lightning strikes to equipment at substations could create an electrical fault (abnormal electric current) within substation equipment, with subsequent fire or risk of electrocution of workers.

**Static Wires and Grounding Conductors**

The **static wire** is the pole's top wire which bleeds lightning surges off the transmission lines during a storm. Without a static wire, lightning induced voltage would otherwise build up on transmission line conductors during a lightning strike and cause damage. The static wire is connected to the grounding conductor.

The **grounding conductor** is a wire that connects the static wire to the ground rod. Visually recognizable as the wire running the entire length of the pole, top to bottom.

Transmission lines located near gas pipelines (such as in the existing corridor where PSE's 115 kV transmission line coexists with OPLC's petroleum lines) could pose a particular safety concern. Energized transmission lines on the ground after an earthquake, lightning strike (or accidents) could send electric current to anything else metal in the vicinity, such as utilities (including pipelines). In addition to electrocution or

shock potential, this type of electrical contact could create holes in pipelines, leading to a risk of explosion if regulations were not followed by the pipeline (or other utility) owner or if facilities had not been designed properly.

As described in Chapter 3, seismic activity is likely to occur during the life of the project and could be substantial, resulting in significant damage, power outages, injury, and death, if facilities are not designed appropriately. Catastrophic failures of circuit breakers, transformer bushings, and disconnect switches at substations, or downed transmission lines, could result in widespread power outages.

The magnitude of potential operational public safety impacts related to natural phenomena is classified as minor, moderate, or significant and has been defined for this EIS as follows:

**Minor** – If lightning or earthquakes could result in minor damage to infrastructure, but there would be no adverse impacts to property of public safety, impacts would be considered to be minor.

**Moderate** – If lightning or earthquakes resulted in damage to infrastructure, leading to potential releases or safety risks that could be contained to the facility, impacts would be considered moderate.

**Significant** – If lightning or earthquakes caused damage to infrastructure, leading to explosion or electrocution risk on uncontained sites with substantial risk to public safety or property, impacts would be significant.

#### 8.6.1.4 EMF and Corona Ionization

Potential[8] magnetic field strength was assessed for each of the action alternatives. The scientific findings regarding EMF and corona ionization described in Sections 8.3.4, 8.3.5, and 8.3.6 do not lead to a conclusion of a probable significant adverse health impact related to operation of this project. The potential health effects from EMF have been an area of controversy and scientific inquiry for several decades, but at this time, review of available research findings indicates that there are no confirmed adverse health impacts from the types of EMF exposure that electrical infrastructure such as this project generates**.** Scientific evidence remains inconclusive on risk of childhood leukemia in homes with stronger magnetic fields and, as described in Section 8.3.5.1, research on this topic continues. Therefore, impacts from EMF are not further characterized.

There is also no scientific evidence that corona ionization poses a health risk. The results of the available studies mentioned in Section 8.3.6 were inconclusive and do not lead to a finding of a probable significant adverse impact related to corona ionization with operation of this project (Sheppard, 2015) and as such, are not further characterized in this EIS.

[8] Potential magnetic fields were modeled by Enertech Consultants based on a set of design and operational assumptions provided by PSE. Full design of the facilities could lead to different fields; actual field levels will be dependent upon the line geometry and loading.

## 8.6.2 No Action Alternative

### 8.6.2.1 Hazardous Materials

Ongoing use of existing substation facilities would likely involve use of paints, solvents, and other hazardous materials described in Section 8.3.1 during equipment maintenance. Transformer oil or $SF_6$ is used in equipment and may need to be recharged or changed out over time. Accidental spills of any of these materials could occur and, depending on facility age and design[9], could enter the environment, including groundwater or surface waters. Transformer oil (some of which may contain PCBs) and light ballasts are types of hazardous wastes that could possibly be generated during equipment maintenance at existing sites or could spill in case of accident. Existing equipment at PSE's substations is operating on concrete foundations within gravel yards. Where PSE has determined it is required, spill containment structures or other measures are installed to contain potential equipment leaks so that they are not discharged directly to surface water or storm sewers. The same spill response procedures that are described for construction of Alternative 1 above would be used for operation of facilities.

The potential risk of transformer overheating associated with system overload during peak periods would be expected to increase under the No Action alternative, if system capacity is not increased. More frequent system overloading could increase the potential for transformers to catch fire or explode, with accompanying releases of materials and associated potential safety hazards. Under the No Action alternative, these hazards would be addressed through load shedding to avoid damaging the equipment, but the frequency of overloading would be expected to increase as the Eastside area grows.

Given PSE's operational controls, it is anticipated that spilled or leaked hazardous materials would be properly handled under existing regulations, and they would be cleaned up and abated in accordance with applicable regulations.

Transmission corridors would be maintained by PSE (and/or any other entity sharing the corridor with PSE). Maintenance of these areas would primarily involve control of vegetation that may interfere with transmission lines. PSE uses Integrated Vegetation Management (IVM) techniques to control vegetation on transmission line corridors. Selective application of herbicides is included in the IVM. PSE does not broadcast spray herbicides on transmission corridors, and when used, herbicides are applied directly to the vegetation by a Washington State licensed applicator. In general, PSE does not apply herbicides in maintained landscape settings, particularly in urbanized settings. However, in some instances, for example, a tree is removed and stump sprouting occurs, then direct application of herbicides may be used (Strauch, personal communication, 2016). Public health impacts associated with the IVM are not expected to occur, as all herbicides used are approved for use by appropriate regulatory agencies as safe for application.

[9] Newer facilities would be expected to have oil containment or other design features to prevent surface water runoff from rainfall carrying hazardous materials offsite.

If proper management and disposal measures are followed for facility operations as required by federal and state regulations, impacts related to hazardous materials in the event of an accidental release would be expected to be negligible to minor.

#### 8.6.2.2 Public Safety Risks - Activities Near Pipelines

It is possible, but unlikely, that maintenance activities associated with ongoing operation of PSE's existing transmission line in the OPLC corridor could damage or break the pipeline. If this did occur, it could create the same types of significant adverse impacts to public safety described in Section 8.5.3.1.2. An explosion could also affect electrical transmission, and substantial or long-term power outages could occur. These outages could potentially create significant public safety impacts if transportation systems were affected or if large numbers of homes were without power during cold periods (public facilities such as hospitals generally have backup power generators). However, as described in Section 8.5.3.1.2, such impacts are not likely to occur considering the regulatory framework for siting and design, and for post-construction pipeline monitoring, as well as stringent requirements during fieldwork to avoid contact with pipelines. The UTC, for instance, conducts inspections of hazardous liquid and natural gas pipeline companies; works to improve safety laws and regulations; provides technical assistance to pipeline operators, local governments, and communities; and enforces laws and regulations, among other activities (UTC, 2016). Given compliance with all applicable safety requirements during maintenance activities and operation of the facilities, impacts would be considered negligible.

#### 8.6.2.3 Public Safety Risks – Natural Phenomena

With the No Action Alternative, although unlikely, existing transmission lines could fall during a natural disaster such as an earthquake (or accident), or if struck by lightning, creating a safety risk to the public. Downed lines pose a risk of electrocution if still energized and may also arc (send current to other metal structures such as pipelines), possibly damaging those facilities. Power poles include grounding equipment intended to guide electricity into the ground in the event of a strike, to prevent damage to poles or lines. It is possible that where electricity is conducted to ground, it could reach utilities such as pipelines. However, pipelines are designed with cathodic protection to minimize this possibility. Impacts to underground pipelines related to downed lines resulting from lightning strikes to poles are not likely and would be considered minor.

Some research indicates that, where overhead transmission lines share corridors with pipelines, the lightning risk to the pipeline would likely stay the same or be reduced under normal circumstances by the presence of the power lines and poles (Stantec, 2016). The lines would likely absorb any lightning strikes that might occur in an area, rather than lightning striking the pipeline directly. The Pacific Northwest has up to 10 days a year on average when thunderstorms are likely and when they occur, lighting is sparse (Mass, 2016). Since 1999, PSE recorded 23 power outages due to lightning strikes on transmission lines. The proposed 230 kV line would have a shield wire that would reduce the probability of potential outages arising from a lightning strike (Strauch, personal communication, 2016).

Lightning protection is provided at substations via a static mast[10] with shield wires or air terminals. Ground grids are installed for personnel protection, which also act as a grounding mat for lightning strikes. Some potential for fire at substations exists in the unlikely event of direct lightning strikes, or in case of earthquake damage, and the public safety impacts could be significant depending on specific location and size of a fire. At four substations (Hazelwood, Lakeside, Westminster, and Clyde Hill), residences or schools are located within approximately 100 feet of the facility. Chapter 15 discusses emergency response measures that would be employed in the event of fire at substations, whatever the cause.

While the poles used for overhead transmission structures would not likely have been specifically designed for ground-induced vibrations caused by earthquakes, they would have been designed to withstand structure loadings caused by wind/ice combinations and broken wire forces. These types of forces exceed earthquake loads (Chapter 3 provides more information on this topic).

Public safety impacts relating to lightning strikes and earthquakes are a low probability and negligible to minor impacts are expected to occur.

#### 8.6.2.4 Electric and Magnetic Fields and Corona Ionization

With no health effects known from power-frequency EMF or corona ionization, no adverse impacts related to either of these issues would be expected related to existing infrastructure.

### 8.6.3 Alternative 1: New Substation and 230 kV Lines

Impacts are described associated with the major components.

#### 8.6.3.1 Option A: New Overhead Transmission Lines

##### 8.6.3.1.1 Hazardous Materials

Alternative 1 would add approximately 18 miles of new transmission lines, with some reconstruction of distribution power lines (and associated new pole-mounted transformers along the routes). The option would add more equipment containing hazardous materials to one of the three possible substations (Lakeside, Westminster, or Vernell). The transmission lines could be co-located with other utilities including gas pipelines. Chemical means would likely be used by one or more parties for vegetation management in the corridor. New pole-mounted transformers that might be installed would not include PCB-containing oil as required by law. Operation and maintenance of Alternative 1, Option A would carry the same or lower risk than the No Action Alternative. Minor impacts could occur in the event of releases or spills of hazardous materials, which would be expected to be contained in accordance with applicable regulations.

##### 8.6.3.1.2 Public Safety Risks - Activities Near Pipelines

Alternative 1, Option A could be in operation near the OPLC regional pipelines or could share portions of the OPLC corridor or other utilities such as gas lines. Considering the federal and state regulatory framework and safety mechanisms in place (described in Section

[10] Static mast is a single, free-standing pole that creates a shield to protect all of the equipment inside a substation from lightning.

8.2.2.1), negligible adverse impacts related to improper design or pipeline safety are expected with operation of the project.

As described in Section 8.5.3.1.2, local governments have adopted land use policies regarding co-location of utilities and development adjacent to hazardous materials pipelines, which would ensure that the proposed transmission lines would be constructed in areas safe to maintain and operate.

#### 8.6.3.1.3 Public Safety Risks – Natural Phenomena

The impacts of this alternative would be similar to the No Action Alternative. At substations, new equipment would be designed to meet current codes. As described in Chapter 3, for the substation expansions, design of structures to resist seismic forces and secondary effects such as liquefaction would be required by law. Following construction, risks would be very low. The required measures would encompass site preparation and foundation specifications. In addition, the state public utility commission has adopted seismic standards that utilities must follow, with structural requirements for poles that would be sufficient to resist anticipated earthquake ground motions.

Lightning strikes to new poles or substation equipment, leading to downed lines or fires, are not likely to occur. Poles would include the same type of grounding equipment described for the No Action Alternative, with the same issues relative to underground infrastructure such as pipelines. Impacts are not likely.

Either an earthquake or lightning strike could theoretically lead to fires at substations. The impacts would vary depending on specific location and size of the fire. The closest residence to any of the three substations where new equipment could be located with this option occurs at the Westminster substation where the nearest residential structure is approximately 30 feet away from the substation fence line. The distance to residences at the Vernell substation is approximately 1,200 feet and at Lakeside is approximately 90 feet.

Overall, negligible to minor impacts related to natural phenomena from operation of Alternative 1, Option A are anticipated.

#### 8.6.3.1.4 EMF and Corona Ionization

With no health effects known from power-frequency EMF or corona ionization, no adverse impacts related to either of these issues would be expected from any of the options under Alternative 1.

### *8.6.3.1 Option B: Existing Seattle City Light 230 kV Transmission Corridor*

#### 8.6.3.1.1 Hazardous Materials

Operating and maintaining the PSE-owned facilities of this option would carry the same risk and have the same possibly minor impacts as Alternative 1, Option A (and No Action Alternative).

#### 8.6.3.1.2 Public Safety Risks - Activities Near Pipelines

Alternative 1, Option B would be located near the OPLC petroleum pipelines in places and could be in operation near, or share corridors with, other utility infrastructure such as gas

lines. The Seattle City Light corridor parallels the OPLC corridor through much of Newcastle and into Renton, and crosses the corridor in two locations in the Renton/Newcastle area (Figure 16-1). As with Option A, impacts to the OPLC pipelines or other gas lines in the area from operation of the project are not expected.

#### 8.6.3.1.3 Public Safety Risks – Natural Phenomena

The potential safety issues relative to lightning, earthquakes, and accidental damage would be the same as Alternative 1, Option A and the No Action Alternative.

### 8.6.3.2 Option C: Underground Transmission Lines

#### 8.6.3.2.1 Hazardous Materials

Operating and maintaining the PSE-owned facilities of Alternative 1, Option C would have the same types of issues as Options A and B with regard to hazardous materials and hazardous/dangerous wastes. No more than minor impacts would likely occur in the event of spills or other releases of hazardous materials for Option C.

#### 8.6.3.2.2 Public Safety Risks - Activities Near Pipelines

Alternative 1, Option C could also be located near the OPLC petroleum pipelines in places and could be in operation near, or share corridors with, other utility infrastructure such as gas lines. As with Options A and B, impacts to the OPLC pipelines or other gas lines in the area from operation of the project are not expected.

#### 8.6.3.2.3 Public Safety Risks – Natural Phenomena

The potential for lightning, earthquakes, and accidents to lead to fires or other risks would be less than with Alternative 1, Options A and B and the No Action Alternative since the line would be underground with Option C. No impacts are likely to occur.

### 8.6.3.3 Option D: Underwater Transmission Lines

#### 8.6.3.3.1 Hazardous Materials

As with Alternative 1, Options A, B, and C, operating and maintaining Option D could have minor impacts if spills or releases occurred. The PSE transmission lines could be co-located with other utilities in the areas, where chemicals would likely be used for vegetation management. Oil-filled lines would not likely be used in Lake Washington, so no potential impacts related to that type of line are associated with Option D.

#### 8.6.3.3.2 Public Safety Risks - Activities Near Pipelines

With Alternative 1, Option D, the risk of fire or explosion at substations, although unlikely to occur, would be the same as for Option A. The transmission line segments on land would have the same potential risks and impacts as Options A and B. The underwater transmission line would not likely be located near pipelines, so no related impacts could occur.

#### 8.6.3.3.3 Public Safety Risks – Natural Phenomena

The submarine lines of Alternative 1, Option D would not be vulnerable to fires or lightning strikes. The risks and potential impacts on land would be the same as described for Option A (negligible to minor).

## 8.6.4 Alternative 2: Integrated Resource Approach

### 8.6.4.1 Energy Efficiency and Demand Response Components

#### 8.6.4.1.1 Hazardous Materials

Small quantities of hazardous materials might have been used to install some energy efficiency or demand response measures. However, use or release of hazardous materials would be unlikely over time for measures such as windows, appliances, weatherproofing, or insulation once they are in place. There would be no likely operational impact related to hazardous materials.

#### 8.6.4.1.2 Public Safety Risks - Activities Near Pipelines

The activities (changes in energy usage patterns), structural upgrades (windows, insulation, etc.), and meters for these components would not pose a threat to pipeline safety.

#### 8.6.4.1.1 Public Safety Risks – Natural Phenomena

There would not likely be any particular fire or explosion risk or impacts related to lightning strikes or earthquakes with implementation of energy efficiency or demand response components.

#### 8.6.4.1.2 EMF and Corona Ionization

With no health effects known from power-frequency EMF or corona ionization, no adverse impacts related to either of these issues would be expected under any of the components of Alternative 2.

### 8.6.4.2 Distributed Generation Component

#### 8.6.4.2.1 Hazardous Materials

As with Alternative 1, accidental damage or leaks during maintenance of distributed generation equipment could lead to hazardous materials (primarily fuels or lubricants) leaving the site. However, if these facilities contained enough fuel to present a hazard, the facilities would likely be designed and installed with fuel containment to meet local codes. Adverse impacts would likely be minor if spills or leaks did occur.

#### 8.6.4.2.2 Public Safety Risks – Activities Near Pipelines

The small-scale infrastructure installed on discrete sites would not pose a threat to pipeline safety.

#### 8.6.4.2.3 Public Safety Risks – Natural Phenomena

Demand response facilities would not be uniquely susceptible to fire or explosion related to lightning strikes or earthquakes. Facilities would be installed in accordance with current codes, including electrical, spill containment as needed, and seismic and structural stability. New small-scale equipment would not be the tallest features on sites and not prone to lightning strikes. The presence of combustibles, such as fuel, increases the risk of fire and/or explosion, but the risk of a direct lightning strike on combustibles would be minimal due to shielding. No adverse public safety impacts are anticipated for this component.

### 8.6.4.3 Energy Storage Component

#### 8.6.4.3.1 Hazardous Materials

The specific technology likely to be used for energy storage facilities is unknown. There may be types of systems that do not contain hazardous materials. This discussion assumes that a battery system containing some type of acid would be employed.

As with almost any chemical reaction, the energy stored and released by battery cells has the potential to cause overheating and, if undetected and unmitigated, eventually cause the battery to experience *thermal runaway* (a positive feedback loop where an increase in cell temperature and pressure leads to an uncontrolled heat reaction). Runaway could result in the destruction of the cell through melting or fire, which has the potential to spread to other cells (Strauch, personal communication, 2016). A primary concern with battery fires includes the release of toxic fumes from hazardous materials (varying by battery chemistry and enclosure materials), in addition to challenges and uncertainty with extinguishing battery fires by first responders as described in Chapter 15. In addition, accidental damage of the equipment could possibly lead to leaks or spills, with a potentially significant adverse impact if the materials were to reach area water bodies or locations where the public could come in contact with the acid. However, these types of systems would be constructed with the same type of containment as distributed generation facilities. Minor adverse impacts could occur.

#### 8.6.4.3.2 Public Safety Risks - Activities Near Pipelines

The proximity of energy storage facilities to pipelines would not pose a particular type of threat to pipeline safety.

#### 8.6.4.3.3 Public Safety Risks – Natural Phenomena

As with the distributed generation component, facilities would be installed in accordance with current codes for electrical, spill containment, and seismic and structural stability. There would not likely be any particular fire or explosion risk related to lightning strikes or earthquakes, or concern about proximity to pipelines, with operation of this component. No adverse public safety impacts are expected to occur.

### 8.6.4.4 Peak Generation Plant Component

#### 8.6.4.4.1 Hazardous Materials

The potential for impacts associated with this component would likely be similar to that of the distributed generation component. Although fuel used to power these facilities could leak or spill, and there would be more fuel in one location with this type of larger-scale generation system than with distributed generation, these generation plants operating within existing substations would be required to have containment design. Adverse impacts related to potential releases of hazardous materials would be expected to be negligible to minor.

#### 8.6.4.4.2 Public Safety Risks – Activities Near Pipelines

As with the distributed generation and energy storage components, no impacts would be expected to occur during operation.

#### 8.6.4.4.1 Public Safety Risks – Natural Phenomena

The potential risks and level of likely impacts would be negligible, as described for the distributed generation and energy storage components.

### 8.6.5 Alternative 3: New 115 kV Transmission Lines and Transformers

#### *8.6.5.1 Hazardous Materials*

Operation of Alternative 3 is expected to have negligible to minor adverse hazardous material impacts. The 60 miles of new transmission lines (and possible reconstruction of area distribution power lines) would mean more pole-mounted transformers containing small quantities of oil installed in the area than with No Action or Alternative 1, with more potential for accidental spills. However, regulations are in place for facility design and for reporting and cleaning up spills when they occur, and there are relatively small quantities of hazardous materials involved with the lines. The new transformers at substations would be designed to current codes with spill protection measures in place to avoid accidental releases of materials, the same as Alternative 1.

#### *8.6.5.2 Public Safety Risks - Activities Near Pipelines*

The potential public safety risks would be the same as described for Alternative 1, including potential proximity to the OPLC pipeline. As with Alternative 1, adverse public safety impacts would not be likely.

#### *8.6.5.3 Public Safety Risks – Natural Phenomena*

The potential risks and impacts would be the same as described for Alternative 1.

#### *8.6.5.4 EMF and Corona Ionization*

With no health effects known from power-frequency EMF or corona ionization, no adverse impacts related to either of these issues would be expected.

## 8.7 WHAT MITIGATION MEASURES ARE AVAILABLE FOR POTENTIAL IMPACTS TO ENVIRONMENTAL HEALTH?

### 8.7.1 Hazardous Materials

For all alternatives, it is anticipated that PSE would comply with regulations intended to control potential hazardous materials-related impacts, applying industry best management practices such as the following:

- Conduct due diligence to identify any preexisting contamination on properties PSE may choose to purchase for the project.
- Conduct any site cleanups that may be required by law.

- Provide contamination-related information in construction contracts and to PSE workers, identifying locations and types of known contamination.
- Require training for agency and contractor staff to identify contamination when encountered unexpectedly during construction work; prepare and implement a health and safety plan that addresses construction work with contaminated soil and water.
- During construction, prepare and implement a Temporary Erosion and Sediment Control Plan to prevent wind and stormwater dispersal of any contaminated soil that may be encountered.
- Prepare and implement Spill Prevention, Control, and Countermeasures Plans to prevent releases of hazardous materials that may be used during project construction, and contain them and clean them up if a spill should occur.
- Design facilities with adequate spill containment where needed.
- Use industry best practices and safety protocols during operation. This would include equipment maintenance procedures to contain spills, and safety procedures and cleanup plans in place in the event of accidental spills.

While regulations are likely adequate to minimize impacts, PSE could also do the following:

- Conduct targeted characterization of soils prior to construction at identified high- and moderate- impact site locations.
- Prior to start of work, develop a remediation plan for sites known to be contaminated and that will be impacted by construction, and determine disposal requirements (including whether significant groundwater dewatering may be necessary).
- Prepare and implement a contaminated-media management plan to address unanticipated contaminated soil, groundwater, and surface water that might be found during construction.
- Design the project where feasible to avoid intercepting known soil and/or groundwater contamination.
- For the alternatives with transformers, if technically feasible, install vegetable-based oil in transformers rather than mineral oil or $SF_6$.
- Choose XLPE type cable, rather than SCFF or HPFF, to avoid bringing one type of hazardous material into the area where feasible, especially into Lake Washington.
- Select and use landscape and plants that minimize the need for pesticides (generally containing hazardous materials).
- In shared utility corridors, PSE could coordinate use of hazardous materials for corridor (vegetation) maintenance with the operations and uses of hazardous materials by the other utility if this is not already part of operation and maintenance plans or easement agreements.

### 8.7.2 Public Safety Risks

#### 8.7.2.1 Activities Near Pipelines

For public safety during construction, PSE would follow regulatory requirements to correctly locate and plan for other utility locations such as gas lines or the OPLC pipelines prior to start of construction, including showing pipeline locations on plans and requiring contractors to field locate utilities.

PSE would comply with all applicable local requirements for siting of transmission lines and other electrical facilities.

PSE would site new transmission lines according to industry best practices, which includes proper positioning and design (separation and grounding) relative to other utilities.

PSE would ensure that staff or contractors working near pipelines fully understand the location of those features, have plans in place to avoid and protect those facilities, and have emergency response protocols in place in the event of a disruption of gas or petroleum lines.

Local governments and PSE would further evaluate the PIPA recommendations (discussed in Section 8.2.2.1) to determine if any additional safety practices could be implemented for the Energize Eastside Project.

#### 8.7.2.2 Natural Phenomena

Standard substation facility design according to the NESC incorporates features that abate the risk of fire related to lightning strikes or earthquakes. If needed to meet applicable permit requirements, PSE could investigate the feasibility of alternative design options for transformer foundations, to provide increased seismic stability and further abate risk of fire at substations.

### 8.7.3 EMF and Corona Ionization

No adverse impacts relative to these issues are expected; therefore no mitigation is proposed.

## 8.8 ARE THERE ANY CUMULATIVE IMPACTS TO ENVIRONMENTAL HEALTH AND CAN THEY BE MITIGATED?

No cumulative adverse impacts to environmental health are anticipated. The project would not contribute to a cumulative impact with regard to public safety risks since regulations are expected to ensure that facilities are designed to avoid such risks and that appropriate safety measures are conducted in case of such events. Further, local planning policies and development regulations are expected to ensure that new infrastructure is located appropriately to protect public health and safety. As the combined study area increases in developmental density, increased risks to public safety would be expected to occur, however, implementation of the Energize Eastside project would not significantly contribute to those risks.

## 8.9 ARE THERE ANY SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS TO ENVIRONMENTAL HEALTH?

There would not likely be any significant unavoidable adverse impacts related to environmental health from any of the alternatives if construction and operations adhere to regulations, safety protocols and industry practices. There is a risk of damage and subsequent explosion whenever construction or operations and maintenance occur near buried natural gas lines or the Olympic Pipeline. However, that risk is not considered an unavoidable significant impact because the probability of damage occurring is minimized by conformance with industry standards, regulatory requirements, and construction and operational procedures that address pipeline safety.

# CHAPTER 9. NOISE

## 9.1 WHAT IS NOISE AND HOW IS IT EVALUATED?

Noise is defined as unwanted sound. Sound is created when a source (such as a machine) creates mechanical energy that travels as pressure waves through the air. Several parameters are used to measure noise, including the rate of oscillation of sound waves (frequency), the speed of wave propagation, and the pressure level or energy content (*amplitude*).

**Noise Key Findings**

Alternatives 1 and 3, and the distributed generation, energy storage, and peak generation plant components of Alternative 2, would result in minor construction noise impacts during daytime hours and moderate impacts if nighttime work were to occur. Operation of Alternative 1, Option A, or Alternative 3 could cause minor noise impacts. Operation of the distributed generation component (Alternative 2) or the new peak generation plants (Alternative 2) could result in minor to moderate noise impacts.

The sound pressure level has become the most common descriptor used to characterize the loudness of a sound. Sound pressure level is measured in decibels (dB), which is a logarithmic loudness scale. On this scale, 0 dB corresponds roughly to the threshold of human hearing, and 120 to 140 dB corresponds to the threshold of pain (HUD, 1985).

The typical human ear is not equally sensitive to all frequencies of sound. When assessing potential noise impacts, sound is measured using an electronic filter that deemphasizes the frequencies below 1,000 hertz (Hz) and above 5,000 Hz. This mimics the human ear's decreased sensitivity to low and extremely high frequencies. This method of adjusting the sound scale to reflect human hearing is referred to as A-weighting and is expressed in units of A-weighted decibels (dBA).

Community noise levels must be measured over an extended period of time because they are constantly changing. This time-varying characteristic of environmental noise is described using statistical noise descriptors. The most frequently used noise descriptors are as follows (Caltrans, 2013):

Leq: The Leq or equivalent sound level is used to describe noise over a specified period of time, typically 1 hour, in terms of a single numerical value. The Leq is the constant sound level that would contain the same acoustic energy as the varying sound level, during the same time period. It reflects the average noise exposure level for the given time period.

Lmax: The Lmax is the instantaneous maximum noise level measured during the measurement period of interest.

Ldn: The Ldn or day-night average sound level (also written as DNL) is the energy average of the A-weighted sound levels occurring during a 24-hour period. It accounts for the greater sensitivity of most people to nighttime noise by

weighting (penalizing) nighttime noise levels: 10 dBA is added to noise occurring between 10:00 PM and 7:00 AM.

Steady-state sound remains constant (on average) over time; examples include the sound of an air conditioner, fan, or pump. Steady-state sounds are typically described using the Leq descriptor.

Impulse sound is generated over a relatively short period (e.g., a car horn or backup alarm). Impulsive sound is typically characterized using the Lmax.

The effects of noise on people can be placed into three categories: (1) subjective effects of annoyance, nuisance, and dissatisfaction; (2) interference with activities such as speech, sleep, and learning; and (3) physiological effects such as hearing loss or sudden startling.

Because there is such wide variation in how people respond to noise, an important way of predicting human reaction to noise is the way that noise levels compare to the existing environment to which one has adapted, or the *ambient noise level*. In general, the more a new noise exceeds the previously existing ambient noise level, the less acceptable the new noise will be to the individual. With regard to increases in A-weighted noise levels, the following relationships occur (Caltrans, 2013):

- Except in carefully controlled laboratory experiments, a change of 1 dBA cannot be perceived by the human ear.
- Outside of the laboratory, a 3 dBA change is considered a just-perceivable difference.
- A change of at least 5 dBA is required before any noticeable change in human response is expected.
- People perceive a 10 dBA change as approximately a doubling in loudness and it can cause an adverse response.

## 9.2 WHAT ARE THE RELEVANT PLANS, POLICIES, AND REGULATIONS?

### 9.2.1 Washington State

The Washington Administrative Code (WAC) has established limits on maximum permissible noise levels for residential, commercial, and industrial zones (Chapter 173-60 WAC). The exterior sound level limits for specified land use zones or “districts” vary depending on the district generating the sound and the district affected by the sound (Table 9-1). Noise from electrical substations and construction activity occurring between 7 AM and 10 PM are exempt from these limits. However, these levels would apply to new transmission lines that operate continuously.

**Table 9-1. Exterior Sound Level Limits (Washington Administrative Code 173-60-040)**

| Sound Generating District | Sound Receiving District | | |
|---|---|---|---|
| | Residential (dBA Leq) | Commercial (dBA Leq) | Industrial (dBA Leq) |
| Class A (Residential) | 55 | 57 | 60 |
| Class B (Commercial) | 57 | 60 | 65 |
| Class C (Industrial) | 60 | 65 | 70 |

### 9.2.2 King County

The King County Comprehensive Plan (2013 Update) addresses noise only from airports and mining operations, and it contains no specific policies regarding construction noise or stationary source noise. Section 12.86 of the King County Code establishes maximum exterior sound level limits for specified land use districts, which vary depending on the district generating the sound and the district affected by the sound (Table 9-2). Temporary noise from construction is allowed to exceed these limits depending on the time of day and type of equipment in use (King County, 2015).

**Table 9-2. Exterior Sound Level Limits (King County Code 12.88.020)**

| Sound Generating District | Sound Receiving District | | | |
|---|---|---|---|---|
| | Rural (dBA, Leq) | Residential (dBA Leq) | Commercial (dBA Leq) | Industrial (dBA Leq) |
| Rural | 49 | 52 | 55 | 57 |
| Residential | 52 | 55 | 57 | 60 |
| Commercial | 55 | 57 | 60 | 65 |
| Industrial | 57 | 60 | 65 | 70 |

### 9.2.3 City Codes and Policies

Bellevue, Redmond, Kirkland, and Beaux Arts Village have policies in their comprehensive plans regarding excessive noise. These generally address noise that could impair permitted land use activities in all zones, with special emphasis on nighttime noise in residential zones. All study area communities have noise regulations similar to those described for King County. Table 9-3 summarizes noise-related codes and policies of cities in the combined study area (Alternatives 1, 2, and 3 as depicted on Figure 1-4 in Chapter 1). While some cities have adopted the noise standards contained in the Washington Administrative Code, some cities, as indicated in Table 9-3, have different or more stringent standards and these would apply to construction and stationary noise sources in these communities.

**Table 9-3. Noise Codes and Policies of Cities in the Combined Study Area**

| Comprehensive Plan Policies | Code Requirements |
|---|---|
| **Beaux Arts Village** | |
| The 2014 Draft Comprehensive Plan states that noise should be considered during review of public facilities proposed by King County and other agencies. | No applicable code requirements. |
| **Bellevue** | |
| Ensure that excessive noise does not impair the permitted land use activities in residential, commercial, and industrial land use districts.<br><br>Protect residential neighborhoods from noise levels that interfere with sleep and repose through development standards and code enforcement. | Bellevue City Code Chapter 9.18 provides maximum permissible sound levels for stationary sources generally consistent with Table 9-2 for King County. Bellevue exempts construction noise from these limits between 7:00 AM and 6:00 PM on weekdays, and 9:00 AM and 6:00 PM on Saturdays (not including legal holidays). More stringent noise restrictions apply to Robinsglen Community Park and Lake Hills Greenbelt Access Areas (designated quiet zones). |
| **Clyde Hill** | |
| No applicable comprehensive plan policies. | Municipal Code 8.10.030 prohibits sounds originating from construction sites, except between the hours of 7:00 AM and 6:00 PM on weekdays and 10:00 AM and 4:00 PM on weekends and holidays, |
| **Hunts Point** | |
| No applicable comprehensive plan policies. | Municipal Code 15.50.010 permits site development and building construction activities that transmit noise to surrounding properties (over 55 dB) only during the hours of 7:30 AM to 4:30 PM (Monday through Friday) and from 9:00 AM to 2:00 PM on Saturday (not including legal holidays).<br><br>Municipal Code 8.40.010 and 8.40.020 adopts by reference the noise standards of the King County Code, Chapters 12.86 through 12.100, which govern excessive noise and noise control by reference. Chapter 12.91, Watercraft Sound Levels, is excluded. |
| **Issaquah** | |
| No applicable comprehensive plan policies. | Issaquah Municipal Code 18.07.36 adopts by reference the noise standards of Chapter 173-60 WAC (Table 9-1). Issaquah Municipal Code Chapter 19.22 prohibits noisy activity in general but does not identify quantitative standards. |

| Comprehensive Plan Policies | Code Requirements |
|---|---|
| **Kirkland** | |
| Policy CC.4-11: Minimize Impacts on Residential Neighborhoods states that the City should have development regulations and urban design principles to reduce and, in some cases, prohibit impacts such as noise, lighting, glare and odor. Site design, building orientation, underground parking, landscape buffers, solid screen fencing, acoustical sound walls, directional lighting, and limitation on business hours of operation are some of the techniques that may be used. | Kirkland Municipal Code Chapter 115.95 adopts by reference the noise standards of Chapter 173-60 WAC (Table 9-1). Kirkland Municipal Code 11.84A.070 prohibits noisy activity in general but does not identify quantitative standards. |
| **Medina** | |
| No applicable comprehensive plan policies. | Municipal Code 8.06.010 adopts by reference the noise standards of the King County Code, Chapters 12.86 through 12.100. It adds that a technical variance may be granted by the hearing examiner on the grounds that there is no practical means known or available for the adequate prevention, abatement, or control of the noise involved.<br><br>Municipal Code 12.06.330 requires the permittee to take appropriate measures to reduce noise during excavation work. No noise sufficient to disturb neighboring properties is allowed between the hours of 10:00 PM and 7:00 AM.<br><br>Municipal Code 20.32.040 states that fences surrounding electrical power and utility substations must be located in a manner that minimizes noise impacts to adjoining properties and streets.<br><br>Municipal Code 20.71.030 states that a use must not have materially detrimental effects on neighboring properties due to excessive noise if it is to be approved for an administrative special use permit. |
| **Newcastle** | |
| No applicable comprehensive plan policies. | Newcastle Municipal Code 9.05.510 prohibits noisy activity in general but does not identify quantitative standards. It prohibits sounds originating from construction sites, including but not limited to sounds from construction equipment, power tools and hammering, between the hours of 7:00 PM and 7:00 AM on weekdays and 6:00 PM and 9:00 AM on weekends and holidays, unless authorized by the City Manager. |

| Comprehensive Plan Policies | Code Requirements |
|---|---|
| **Redmond** | |
| Maintain noise regulations to limit noise to levels that protect the public health and that allow residential, commercial and manufacturing areas to be used for their intended purposes. Provide flexibility in the regulations to allow construction at night when necessary to protect worker safety while maintaining the tranquility of the city.<br><br>Require buffering or other noise reduction and mitigation measures to reduce noise impacts from commercial and industrial zones on residential areas. | Redmond Municipal Code Chapter 9.18 establishes maximum permissible sound levels for stationary sources generally consistent with Table 9-2 for King County. The City exempts construction noise from these limits between 7:00 AM and 10:00 PM if not impacting a residential zone. In residential zones, construction noise is exempt from these limits between the hours of 7:00 AM and 7:00 PM on weekdays, and 9:00 AM and 6:00 PM on Saturdays that are not legal holidays. |
| **Renton** | |
| Policy SH-3: All shoreline policies, regulations, and development shall recognize and protect private rights consistent with the public interest and, to the extent feasible, shall be designed and constructed to protect the rights and privacy of adjacent property owners. Shoreline uses and activities should be discouraged if they would cause significant noise or odor or unsafe conditions that would impede the achievement of shoreline use preferences on the site or on adjacent or abutting sites. | Renton Municipal Code Chapter 8.7 adopts by reference the noise standards of Chapter 173-60 WAC (Table 9-1). |
| **Sammamish** | |
| No applicable comprehensive plan policies. | Sammamish Municipal Code 8.15.020 prohibits public nuisances in general but does not identify quantitative standards. |
| **Yarrow Point** | |
| No applicable comprehensive plan policies. | Yarrow Point Municipal Code 12.31.030 restricts noisy construction activity audible within 50 feet to between the hours of 7:00 AM and 6:00 PM, Monday through Friday, and 9:00 AM and 5:00 PM on Saturdays. Section 8.04 prohibits public nuisances in general but does not identify quantitative standards. |

## 9.3 WHAT IS THE EXISTING NOISE ENVIRONMENT IN THE COMBINED STUDY AREA?

The EIS Consultant Team reviewed multiple recent noise studies performed in Bellevue and surrounding areas. This review revealed that transportation is the primary source of noise in most of the study area communities. Locations within 100 feet of Interstate 90 or I-405 can experience noise levels of 70 dBA Ldn or greater, while more secluded areas, such as lower density residential areas in Bellevue, may not have noise levels above 53 dBA Ldn (Sound Transit, 2011).

Hourly noise fluctuates consistent with daily activity levels. Noise levels during the day (7 AM to 10 PM) typically average between 50 and 60 dBA in suburban residential areas of King County, falling to between 40 and 50 dBA during nighttime hours (King County Department of Natural Resources and Parks, 2012).

### 9.3.1 Corona Discharge

The potential for noise from corona discharge was identified as a concern during scoping. Corona is the electrical ionization of the air that occurs near the surface of the energized conductor and suspension hardware because of very high electric field strength. Corona discharge occurs when the voltage of the line exceeds the insulating capability of air and may result in audible noise such as random crackling or hissing being produced by the transmission lines.

The amount of corona produced by an overhead transmission line is a function of the voltage of the line, the diameter of the conductors, the locations of the conductors in relation to each other, the elevation of the line above sea level, the condition of the conductors and hardware, and the local weather conditions.

Corona discharge is greater on misty days because the air has a lower insulating ability when wet. Also, particles such as dust or water droplets that might come in contact with a conductor tend to increase corona discharge. Therefore, the potential for noise from corona discharge is greatest during wet weather. However, the noise generated by falling heavy rain hitting the ground will typically be greater than the noise generated by corona, masking the audible noise from the transmission line. Corona generated noise is of concern primarily for transmission lines operating at voltages of 345 kV and above (U.S. DOE, 2006).

Recent analyses in the Pacific Northwest indicate that maximum corona noise produced from 230 kV lines at ground level during wet weather conditions is 29 dBA (Oregon DOE, 2013). This is a relatively low noise level that would not be noticeable in most suburban environments. As a point of reference, the U.S. Department of Housing and Urban Development identifies a noise level of 45 dBA (Ldn) as an interior noise goal for federal housing (HUD, 1985), which is equivalent to a steady state noise level over a 24-hour period of 39 dBA.

### 9.3.2 Other Equipment Noise

Transformers and their cooling fans generate noise as could any *ancillary* equipment such as air handling equipment or backup generator testing. PSE has established noise standards for autotransformers (upon initial installation) of 70 and 65 dBA at 1 meter with and without cooling, respectively. Monitoring at a relatively small substation in a quiet suburban area in Seattle found that typical daytime noise at the fence line during operation of a bank of three transformers with cooling fans running was 64 dBA Leq[1]. This level of noise could be audible at adjacent sensitive land uses, depending on their distance and the existing ambient noise level.

Electrical substations are exempt from the maximum permissible noise levels established in Chapter 173-60 of the Washington Administrative Code.

## 9.4 HOW WERE POTENTIAL NOISE IMPACTS ASSESSED?

For this programmatic EIS, a programmatic-level analysis was conducted to provide a general evaluation of potential noise impacts from construction and operation of the proposed project alternatives. The EIS Consultant Team reviewed available data on estimated noise levels generated by construction activities, electrical transmission lines, and substation equipment. Anticipated project noise levels were compared to the existing noise environment for the types of land uses in the study areas.

## 9.5 WHAT ARE THE LIKELY CONSTRUCTION IMPACTS RELATED TO NOISE?

### 9.5.1 Construction Impacts Considered

Construction of the proposed project would result in temporary increases in ambient noise levels associated with the operation of heavy-duty construction equipment. Construction noise levels would fluctuate depending on the particular type, number, and duration of use of various pieces of construction equipment. The effect of construction noise would depend upon the type of construction activity on a given day and equipment used, the distance between construction activities and the nearest sensitive land uses, and the existing noise levels around the site. Construction noise would be considered to impact surrounding land uses if noise became noticeable to the extent that conversation or other outdoor activities are disrupted, indoor activities are affected, or sleep is disturbed. An exceedance of noise ordinance requirements, or the need for a variance, would be considered an impact.

Table 9-4 shows the type of equipment that would likely be used for construction of the action alternatives.

[1] Environmental Science Associates monitored noise levels at the Delridge substation in May 2013 as part of a data gathering effort for the preparation of the Environmental Impact Statement for the proposed Denny Substation in Seattle.

Construction noise impacts are assessed according to the following criteria:

**Minor** –Temporary construction-related noise consistent with local ordinances and occurring during daytime hours.

**Moderate** –Temporary construction-related noise consistent with local ordinances but potentially occur during nighttime hours in proximity to sensitive land uses

**Significant** –Temporary construction-related noise that would conflict with local ordinances or occur during nighttime hours in proximity to sensitive land uses for a substantial (greater than 2-week) period.

**Table 9-4. Typical Noise Levels from Construction Equipment**

| Construction Equipment | Noise Level (dBA, Leq at 50 feet) |
|---|---|
| Grader | 85 |
| Auger Drill | 84[1] |
| Scraper | 84 |
| Bulldozer | 82 |
| Pump Truck | 82 |
| Crane, mobile | 81 |
| Excavator | 81 |
| Generator | 81 |
| Roller | 80 |
| Concrete Mixer | 79 |
| Loader | 79 |
| Backhoe | 78 |
| Paver | 77 |
| Man Lift | 75 |
| Vibratory Sheet Pile Driver (Alternative 1, Option C and Option D) | 101 |

Source: Federal Highway Administration (FHWA), 2006.
[1] Noise level from auger drill is reported for engine noise only. Augering can also generate noise from shaking the bit to remove sticky soils.

### 9.5.2 No Action Alternative

The No Action Alternative would not result in construction activities. Corrective Action Plans, the primary component of the No Action Alternative, would implement operational measures to reduce and/or shift electrical demand and would not involve infrastructure improvements. The No Action Alternative would not result in changes to maintenance activities or require construction of new or relocated maintenance yards. While conductor

replacement could occur under the No Action Alternative, installation methods would likely involve the use of a single-man lift and would cause negligible construction noise.

### 9.5.3 Alternative 1: New Substation and 230 kV Transmission Lines

Impacts are described according to the major components associated with Alternative 1. The transmission line options are described, with associated major facilities.

#### *9.5.3.1 Option A: New Overhead Transmission Lines*

Installation of new overhead transmission lines would require specific construction activities that may include boring holes for geotechnical investigations, removing existing wood poles and replacing them with tubular steel poles (TSPs) and foundations, installing conductors, relocating existing distribution and telecommunications facilities, and associated site preparation activities (e.g., road grading and work pad construction). These activities would require use of much of the equipment presented in Table 9-4. Additionally, construction of the new transformer would require similar equipment, depending on whether the transformer would be added to an existing substation or installed in a new substation.

Table 9-5 provides an estimate of *noise contour* distances from each of the activities associated with transmission line installation. Tower locations would be spaced approximately 1,000 feet apart, and *noise receptors* within the distances indicated in Table 9-5 could be exposed to the noise levels indicated over a period of approximately 1 week while the work is conducted. Additionally, stringing of power lines would likely be completed using cranes, which would generate additional noise.

A **Noise Contour** is a line on a map that represents equal levels of noise exposure.
A **Noise Receptor** is a location where noise can interrupt ongoing activities. Sensitive receptors for noise are generally considered to include hospitals, nursing homes, senior citizen centers, schools, churches, libraries, and residences.

If the selected alignment under Alternative 1, Option A has supporting structures or transformers closer than 180 feet to sensitive receptors, those receptors could be exposed to noise levels in excess of 75 dBA. While likely to be above background noise levels, this would likely be within the restrictions for construction noise in Section 12.88 of the King County Code (and most local codes), which exempt construction noise from quantitative noise exposure limits but restrict construction noise to daytime hours. If nighttime construction work were required, a moderate noise impact could occur. Nighttime construction activity would require a variance or exemption from regional or local codes and would potentially be disruptive to adjacent sensitive land uses during typical sleeping hours.

**Table 9-5. Construction Activity Noise Contour Distances**

| Construction Activity | dBA $L_{eq}$ Contour Distance (feet) | | | | |
|---|---|---|---|---|---|
| | 75 | 70 | 65 | 60 | 55 |
| Conductor Removal | 183 | 327 | 572 | 975 | 1,610 |
| Wood Pole Removal | 171 | 307 | 537 | 916 | 1,517 |
| TSP Foundation Installation | 173 | 309 | 539 | 924 | 1,534 |
| TSP Erection | 132 | 239 | 420 | 726 | 1,219 |
| Conductor Installation at Stringing Site | 204 | 364 | 630 | 1,067 | 1,757 |

Source: Based on SCE, 2013 and 2014.

#### 9.5.3.2 Option B: Existing Seattle City Light 230 kV Transmission Corridor

Rebuilding and reconductoring the existing Seattle City Light transmission lines would require replacing most of the existing structures and all conductors. Consequently the construction-related noise impacts for Alternative 1, Option B would be similar to those described for Option A. Noise impacts would depend on the relative distances of the alignment from sensitive receptors.

#### 9.5.3.3 Option C: Underground Transmission Lines

Construction techniques for Alternative 1, Option C would be different and require substantially more earthwork that either Option A or Option B. Rather than construction occurring at discrete tower locations, Option C would require open-cut trenching techniques over a continuous alignment. Construction activity would likely progress along the alignment at about 100 feet per day, typically affecting nearby receptors for a duration of approximately 1 week.

Trenching typically involves the use of excavators or backhoes, dump trucks, bulldozers, concrete mixers, and cranes. At some locations such as busy intersections, or to cross hills or streams, trenchless techniques such as *jack-and-bore* or horizontal directional drilling may be required. Trenchless techniques can require the brief use of relatively noisy impact equipment such as vibratory sheet pile drivers to install sheet piles around the bore pit. Jackhammers or *hoe rams* are other relatively noisy impact equipment that may be used to remove concrete structures.

The construction noise impacts of Option C would be more substantial than either those of Alternative 1, Option A or Option B because of the increased intensity and duration of construction and the potential use of impact equipment or other noisy construction techniques. However, the overall impact would still be consistent with local codes regarding construction noise and considered a minor impact if the work is restricted to daytime hours. If nighttime construction work were required, a moderate noise impact could occur. Nighttime construction activity would require a variance from regional or local codes and could potentially be disruptive to adjacent sensitive land uses during typical sleeping hours.

#### 9.5.3.4 Option D: Underwater Transmission Lines

Construction techniques for Alternative 1, Option D would require a combination of standard construction equipment, such as backhoes and vacuum trucks, as well as equipment for potential trenchless methods such as horizontal directional drilling. Cable would be installed using a ship designed to lay the cable in one continuous piece. Installation of cable landing points may require sheet or soldier pile driving, and *cofferdams* may be required for bore pits that also would require sheet pile driving. Construction would be centralized at the cable landing points and therefore would impact the fewest sensitive receptors with construction noise.

Although sheet pile driving is relatively noisy and likely under this option, the overall impact would still be consistent with local codes regarding construction noise and considered a minor impact if restricted to daytime hours. If nighttime construction work were required, a moderate noise impact could occur depending on the proximity of sensitive receptors. Nighttime work would require a variance from regional or local codes and could potentially be disruptive to adjacent sensitive land uses during typical sleeping hours.

### 9.5.4 Alternative 2: Integrated Resource Approach

#### 9.5.4.1 Energy Efficiency and Demand Response Component

Energy efficiency and demand response components would not involve infrastructure improvements, changes to maintenance activities, or construction of new or relocated maintenance yards. Consequently, these components would have no impact with regard to construction noise.

#### 9.5.4.2 Distributed Generation Component

Construction of distributed generation facilities could result in noise impacts within the vicinity of each facility. Impacts would vary in intensity and duration depending on the type and magnitude of facility.

The most likely forms of distributed generation would be gas turbines, anaerobic digesters, microturbines, and fuel cells. These facilities would be relatively small units (ranging from a small rooftop installation up to 1 acre) distributed throughout the study area rather than one large generation facility. Construction of these facilities would vary in duration and require standard construction equipment presented in Table 9-4.

Depending on the distance to the construction area, receptors in the vicinity of each facility could be exposed to noise levels in excess of 75 dBA. While likely to be above background noise levels, this construction noise would likely be within the restrictions for construction noise in Section 12.88 of the King County Code (and most local codes), which exempt construction noise from quantitative noise exposure limits but restrict construction noise to daytime hours. If nighttime construction work were required, a moderate noise impact could occur depending on the proximity of sensitive receptors. Nighttime work would require a variance from regional or local codes and could potentially be disruptive to adjacent sensitive land uses during typical sleeping hours.

#### 9.5.4.3 Energy Storage Component

Construction of an energy storage facility could result in noise impacts within the vicinity of each facility. Impacts would vary in intensity and duration depending on the proximity to receptors. Construction of these facilities would typically take up to 6 months and require many of the standard types of construction equipment presented in Table 9-4.

Depending on the distance to the construction area, receptors in the vicinity of each facility could be exposed to noise levels in excess of 75 dBA. While likely to be above background noise levels, this construction noise would likely be within the restrictions for construction noise in Section 12.88 of the King County Code (and most local codes), which exempt construction noise from quantitative noise exposure limits but restrict construction noise to daytime hours. If nighttime construction work were required, a moderate noise impact could occur depending on the proximity of sensitive receptors. Nighttime work would require a variance from regional or local codes and could potentially be disruptive to adjacent sensitive land uses during typical sleeping hours.

#### 9.5.4.4 Peak Generation Plant Component

Peak generation plants would have construction noise impacts similar to those described above for distributed generation. Construction of these facilities would typically take up to 12 months and require standard construction equipment presented in Table 9-4.

### 9.5.5 Alternative 3: New 115 kV Lines and Transformers

The construction noise impacts of Alternative 3 would largely be the same as Alternative 1, except that a new transformer would need to be installed at each of three existing substations, thus potentially impacting more receptors. The Sammamish substation is approximately 700 feet from the nearest receptor; the Lake Tradition substation is approximately 3,200 feet from the nearest receptor; and the Talbot Hill substation is approximately 200 feet from the nearest receptor, although this substation is expansive and, depending the location of the transformer, the nearest receptor could be much farther away.

As with Alternative 1, Option A, if the selected alignment would have supporting structures or transformers closer than 180 feet, receptors could be exposed to noise levels in excess of 75 dBA. While likely to be above background noise levels, this would likely be within the restrictions for construction noise in Section 12.88 of the King County Code (and most local codes), which exempt construction noise from quantitative noise exposure limits but restrict construction noise to daytime hours. If nighttime construction work were required, a moderate noise impact could occur depending on the proximity of sensitive receptors. Nighttime work would require a variance from regional or local codes and could potentially be disruptive to adjacent sensitive land uses during typical sleeping hours.

# 9.6 HOW COULD OPERATION OF THE PROJECT AFFECT THE NOISE ENVIRONMENT?

## 9.6.1 Operation Impacts Considered

### 9.6.1.1 Impacts Common to All Alternatives

There are no impacts that would be common to all alternatives because of the diversity of alternatives considered in this Draft EIS. Alternatives involving overhead power lines would have common impacts regarding operational noise from corona discharge. Alternatives involving construction of new facilities (Alternative A), some components of Alternative B (distributed generation), and Alternative C would all have operational noise impacts of varying degrees and durations which are discussed individually below.

Operational noise impacts are assessed according to the following criteria:

**Minor** – Project would generate operational noise consistent with local ordinances and would increase ambient noise levels by less than 3 dBA (see Section 9.2).

**Moderate** – Project would generate operational noise consistent with local ordinances and would increase ambient noise levels by less than 5 dBA (see Section 9.2).

**Significant** – Project would generate operational noise that would conflict with local ordinances or would increase ambient noise levels by 5 dBA or greater at a sensitive land use.

## 9.6.2 No Action Alternative

The No Action Alternative would rely on Corrective Action Plans to reduce and/or shift electrical demand. This alternative would not involve infrastructure improvements, changes to maintenance activities, or operation of new or relocated maintenance yards. Consequently there would be no operational noise impacts associated with the No Action Alternative.

## 9.6.3 Alternative 1: New Substation and 230 kV Transmission Lines

Operational impacts for Alternative 1 are described for the major components, with transmission lines discussed first, followed by equipment noise from substations.

### 9.6.3.1 Option A: New Overhead Transmission Lines

#### 9.6.3.1.1 Corona Discharge

Potential operational impacts from overhead transmission lines associated with any of the transmission line alternatives would occur from corona discharge. The maximum corona noise produced from 230 kV lines at ground level during wet weather conditions a relatively low noise level that would not be noticeable in most suburban environments, see Sections 9.3 and 9.4. Background ambient noise levels in suburban residential areas of King County fall between 40 and 50 dBA during nighttime hours. Even in rural areas, corona noise from 230 kV transmission lines would be unlikely to impact sensitive uses. Consequently, audible corona noise would be a negligible operational noise impact of Alternative 1, Option A.

#### 9.6.3.1.2 Other Equipment Noise

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

Electrical substations are exempt from the maximum permissible noise levels established in Chapter 173-60 of the Washington Administrative Code. Consequently, substation operations would likely be consistent with local municipal codes governing noise sources. However, the substation could result in a noticeable increase in local ambient noise levels and result in a minor noise impact. Mitigation measures are identified to address this potential (Section 9.8).

### 9.6.3.2 Option B: Existing Seattle City Light 230 kV Transmission Corridor

Alternative 1, Option B would replace existing Seattle City Light lines with new lines rated for increased electrical capacity. The existing and proposed lines are 230 kV. Option B would reduce the potential for exposing new receptors to corona noise because the improvements would be confined to existing electrical facilities. Also, as discussed under Option A, corona noise would be a negligible noise impact. As with Option A, additional substations would be required under Option B. Therefore, Option B would have a similar noise impacts to Option A (negligible to minor).

### 9.6.3.3 Option C: Underground Transmission Lines

Alternative 1, Option C would locate transmission lines underground through the entirety of the transmission alignment as well as from the alignment to local substations. There would be no audible noise resulting from operation of Option C for those portions of the line placed underground. If some portions of the transmission line are aboveground, impacts in those segments would be consistent with those described for Option A. Option D: Underwater Transmission Lines. As with Option A, additional substations would be required. Therefore, Option C would have a similar noise impacts to Option A (negligible to minor).

### 9.6.3.4 Option D: Underwater Transmission Lines

While Alternative 1, Option D would locate transmission lines underwater through most of the transmission alignment, some overhead transmission lines would be required connecting the proposed underground lines to the three substation locations. There would be a small potential for exposing sensitive land uses to corona noise, but this would be a negligible adverse impact as described for Option A. As with Option A, additional substations would be required. Therefore, Option D would have a similar noise impacts to Option A (negligible to minor).

## 9.6.4 Alternative 2: Integrated Resource Approach

### 9.6.4.1 Energy Efficiency Component

Energy efficiency improvements would not involve infrastructure improvements, changes to maintenance activities, or new or relocated transformers, substations, or maintenance yards. These components would have no impact with regard to operational noise.

### 9.6.4.2 Demand Response Component

Demand response measures would entail implementing measures to reduce and/or shift electrical demand and would not involve infrastructure improvements, changes to maintenance activities, or new or relocated transformers, substations, or maintenance yards. Consequently, implementation of demand response systems would have no impact with regard to operational noise.

### 9.6.4.3 Distributed Generation Component

Distributed generation facilities could result in operational noise impacts within the vicinity of each facility. The impacts would vary in intensity and duration with the type and magnitude of facility. Gas turbines, reciprocating engines, and similar mechanical generators could generate operational noise on an intermittent basis. This noise could be a concern to neighbors or require mitigation to ensure operations are consistent with noise standards in county or municipal codes. This represents a minor to moderate noise impact.

### 9.6.4.4 Energy Storage Component

Operation of a battery storage facility would be similar to that of a small office building, with worker vehicle trips and vendor trips to perform periodic replacement of degraded cells representing the only meaningful noise source. Energy storage would have a negligible impact with regard to operational noise.

### 9.6.4.1 Peak Generation Plant Component

The peak generation plants are assumed to be 20 MW simple-cycle gas-fired generators or similar equipment. The primary noise sources of this type of generation plant include the gas turbine generators, gas turbine air inlets, selective catalytic reduction units and their exhaust stacks, electrical transformers, fuel gas compressors and metering equipment, and various pumps and fans. Cumulatively this equipment can result in operational noise levels of approximately 65 dB at 300 feet (Siemens AG, 2005), which is high enough that in some residential areas it would not meet noise regulations. Depending on the location of receptors relative to a generation plant, local noise levels could be elevated, especially during nighttime hours, and represent a moderate noise impact. Mitigation measures are identified to address operational noise from combustion turbine facilities (Section 9.8).

### 9.6.5 Alternative 3: New 115 kV Lines and Transformers

#### 9.6.5.1 Corona Discharge

Potential operational impacts of 115 kV overhead power lines resulting from corona discharge would be the same as those identified above for 230 kV power lines. Corona discharge from 115 KV lines would be a negligible operational noise impact.

#### 9.6.5.2 Other Equipment Noise

New transformers would be an operational noise source under Alternative 3. As discussed above with respect to Alternative 1, Option A, operational transformer noise could be audible at adjacent sensitive land uses, depending on their distance and the existing ambient noise level. While electrical substations are exempt from the maximum permissible noise levels established in Chapter 173-60 of the Washington Administrative Code, the transformers could result in a noticeable increase in local ambient noise levels and a minor noise impact. Mitigation measures are identified to address this potential (Section 9.8).

## 9.7 WHAT MITIGATION MEASURES ARE AVAILABLE FOR POTENTIAL NOISE IMPACTS?

### 9.7.1 Nighttime Construction Noise

For project elements that would require prolonged nighttime construction activities, portable acoustical barriers may be used to reduce noise. Moveable sound barrier curtains can provide 15 dBA of sound attenuation (INC, 2014). Static sound barrier curtains can provide sound transmission loss of 16 to 40 dBA, depending on the frequency of the noise source (ENC, 2014).

### 9.7.2 Substation/Transformer Operational Noise

Although electrical substations are exempt from the maximum permissible noise levels established in Chapter 173-60 of the Washington Administrative Code, the transformers could result in a noticeable increase in local ambient noise levels and therefore elicit an adverse community reaction. If new transformers are proposed for installation in a new substation facility, siting of that facility should consider the proximity of sensitive land uses. Site plans should include noise attenuation measures as necessary to maintain noise levels at the nearest receptors within 5 dBA of existing ambient noise levels. Static sound barrier curtains can provide sound transmission loss of 16 to 40 dBA, depending on the frequency of the noise source (ENC, 2014).

### 9.7.3 Distributed Energy Operational Noise

The following distributed generation sources have the potential to result in minor to moderate operational noise impacts: wind turbines, gas turbines, anaerobic digesters, reciprocating engines, and microturbines. Siting of facilities that would operate these types of equipment should consider the proximity of sensitive land uses. Site plans should include noise attenuation measures as necessary to maintain noise levels at the nearest receptors within 5 dBA of existing ambient noise levels. Static sound barrier curtains can provide sound

transmission loss of 16 to 40 dBA, depending on the frequency of the noise source (ENC, 2014). The efficacy of such barriers would depend on the surrounding elevations of the plant and receptors, and air flow requirements of the plant that might prohibit ceiling barriers. Exhaust stack silencers are also widely available for electrical generator engine applications.

## 9.8 ARE THERE ANY CUMULATIVE IMPACTS FROM NOISE AND CAN THEY BE MITIGATED?

Because local conditions play an important role in assessing potential noise impacts, it would be speculative, at the programmatic level, to identify potential cumulative noise impacts. First, the specific locations of facilities are not yet identified and, therefore, existing ambient noise conditions and sources are also unavailable. Secondly, the contribution from other foreseeable projects that may cumulatively contribute to noise impacts would also depend on the proximity to proposed noise sources and existing or proposed receptors. However, it can be acknowledged that the Eastside is continuing to urbanize, with accompanying increased noise levels from roadway traffic, construction, and aircraft overflights. Additional noise from energy facilities will contribute to that overall trend, but specific quantitative increases cannot reliably be estimated.

## 9.9 ARE THERE ANY SIGNIFICANT UNAVOIDABLE ADVERSE NOISE IMPACTS?

With prudent siting of new substations and distributed generation facilities, there would be no significant and unavoidable construction-related or operational adverse noise impacts associated with any of the project alternatives. However, peak generation plants, which would need to be located next to substations that are generally within or adjacent to residential areas, could have significant noise impacts that can only be avoided by ensuring that there are no residential uses in close proximity to the plants.

# CHAPTER 10. LAND USE AND HOUSING

## 10.1 HOW WERE EXISTING LAND USES AND HOUSING IN THE COMBINED STUDY AREAS EVALUATED?

This chapter describes the types of existing land uses, and planning designations within the combined study area shown in Figure 1-4, as well as applicable land use and housing policies. Land use information was obtained from data maintained by the King County Assessor for property valuation and tax purposes. Existing population and housing supply in the study area are also described, based on U.S. Census data and local comprehensive plans. Since there is no data source specific to the study area itself, for this programmatic evaluation, population and housing data at the city level are used as a proxy to provide context for the study area.

Planning designations were obtained from comprehensive plans and zoning maps from study area communities. Shoreline planning designations were identified using shoreline master programs and Washington State Department of Ecology (Ecology) data.

To provide context for discussion of land use impacts, it is also important to understand the regulatory framework by which land uses are established and regulated. Therefore, this chapter describes the applicable state, regional, and local legislation, policies, and regulations for land use and shoreline planning. The land use and shoreline policies of each study area community that would likely apply to the project (including those related to *essential public facilities*) were identified based on local comprehensive plans and shoreline master programs.

**Land Use and Housing Key Findings**

Construction would not be expected to lead to land use impacts.

The No Action Alternative would likely lead to declining reliability of the electrical power supply on the Eastside, which could be inconsistent with local planning policies and constitute a significant adverse impact.

Of the action alternatives, Alternative 1, Option A has the greatest potential to create significant adverse land use and housing impacts. The magnitude of probable impacts ranges from minor to significant, depending on final project location and adjacent uses.

Alternative 3 could result in land use changes similar to Alternative 1, Option A, but would require less property acquisition. The severity of probable impacts ranges from minor to moderate, depending on specific project siting and adjacent uses.

Alternative 2 would have the fewest overall land use impacts, ranging from negligible to minor.

## 10.2 WHAT ARE THE RELEVANT PLANS, POLICIES, AND REGULATIONS?

### 10.2.1 Comprehensive Planning Framework

In 1990, the State of Washington adopted the Growth Management Act (GMA) in response to rapid population growth and concerns with suburban sprawl, environmental protection, and quality of life. The GMA requires the fastest growing counties and the cities within them to identify and protect critical areas and natural resource lands, designate urban growth areas, prepare comprehensive plans, and implement those plans through capital investments and development regulations. The GMA also establishes a goal related to adequate utilities and services for development – Growth Management Act Goal 12.

**Growth Management Act Goal 12: Public facilities and services.** Ensure that those public facilities and services necessary to support development shall be adequate to serve the development at the time the development is available for occupancy and use without decreasing current *service levels* below locally established minimum standards.

Each study area community has adopted a comprehensive plan in compliance with the GMA. The local comprehensive plans lay out the goals and policies by which housing and employment growth over a 20-year period will be managed by each city and county. At a minimum, plans must provide for land uses and densities, capital facilities, and transportation infrastructure sufficient to meet future needs.

In conjunction with the GMA, regional planning strategies are articulated by the Puget Sound Regional Council (PSRC). The PSRC has published a planning document titled VISION 2040, which serves as the long-range growth management, environmental, economic, and transportation strategy for the central Puget Sound region. VISION 2040 also contains a Regional Growth Strategy that provides substantive guidance for planning for the roughly 1.7 million additional people and 1.2 million additional jobs expected in the region between 2000 and 2040 (PSRC, 2015b).

**Puget Sound Regional Council** is an association of cities, towns, counties, ports, and state agencies that serves as a forum for developing policies and making decisions about regional growth management, environmental, economic, and transportation issues in the four-county central Puget Sound region of Washington state (King, Pierce, Snohomish and Kitsap Counties).

In complying with GMA, coordinating with regional planning, and setting local planning parameters, local governments establish comprehensive plan land use designations to guide future growth and development. Comprehensive plan land use designations are unique to each study area community but typically reflect the following broad categories:

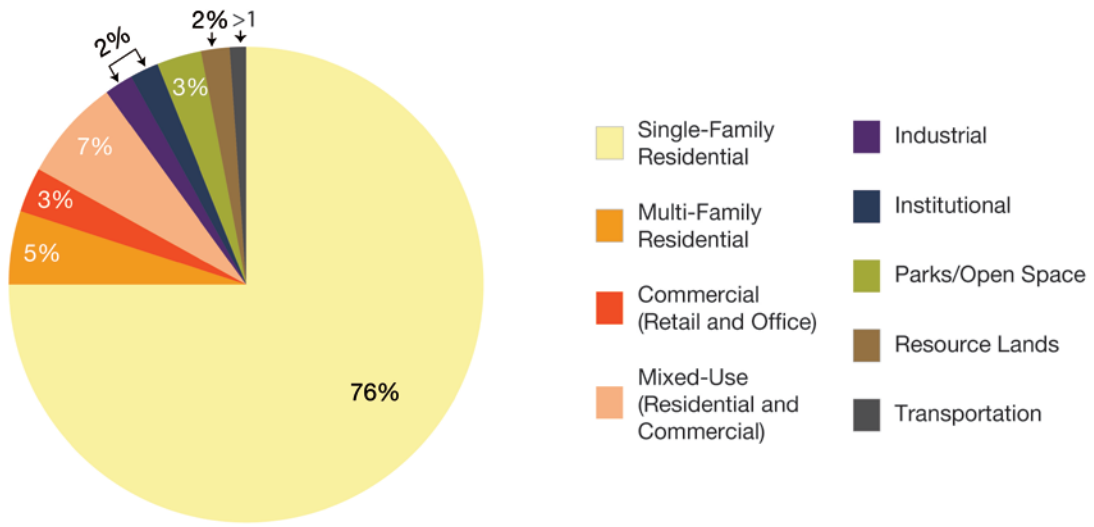
- **Residential** - Depending on the community, designates land for a range of different densities of housing types (characterized as low, moderate, and high). In

some cases allowed or desired housing types may be designated (such as single-family detached, townhouse, etc.).

- **Mixed-Use** – Incorporates both residential and commercial uses in close proximity in the interest of creating high-density communities where housing, services, and employment are within easy walking distance. Some communities designate more specialized areas such as Transit-Oriented Development or Urban Center.
- **Parks/Open Space** - Designates land for parks, recreation facilities, open space, greenbelts, conservation easements, and urban/rural separators.
- **Commercial** - Designates land for commercial uses such as office and retail, and may be divided into specialty classifications such as Business Park or Medical.
- **Industrial** - Designates land for warehouses and manufacturing, and may be divided into categories such as Light Industrial, Heavy Industrial, or Manufacturing.
- **Institutional -** Designates land for public schools, government buildings, civic centers, and other public facilities.
- **Resource Lands -** Designates land for forestry, mining, and agriculture in unincorporated areas of King County.

The comprehensive plans adopted by study area communities that were evaluated for this EIS are listed in Appendix E. For this programmatic Draft EIS, subarea plans were not reviewed, but subarea plans could be applicable at the project level analysis. The comprehensive plan land use designations of these plans vary among the communities and were grouped into generalized categories, reflecting the seven categories above, for the purposes of summarizing planned future land uses consistently across the combined study area. The proportional distribution of designations across categories are shown in Figure 10-1 and mapped in Figure 10-2. Future land uses are mostly single-family residential with a mix of multifamily, mixed-use, and commercial in urban areas.

**Figure 10-1. Future Land Use Designation by Type**[1]




Sources: City of Bellevue, 2015a; City of Issaquah, 2015; City of Kirkland, 2015b; City of Newcastle, 2015; City of Redmond, 2015; City of Renton, 2015; City of Sammamish, 2015

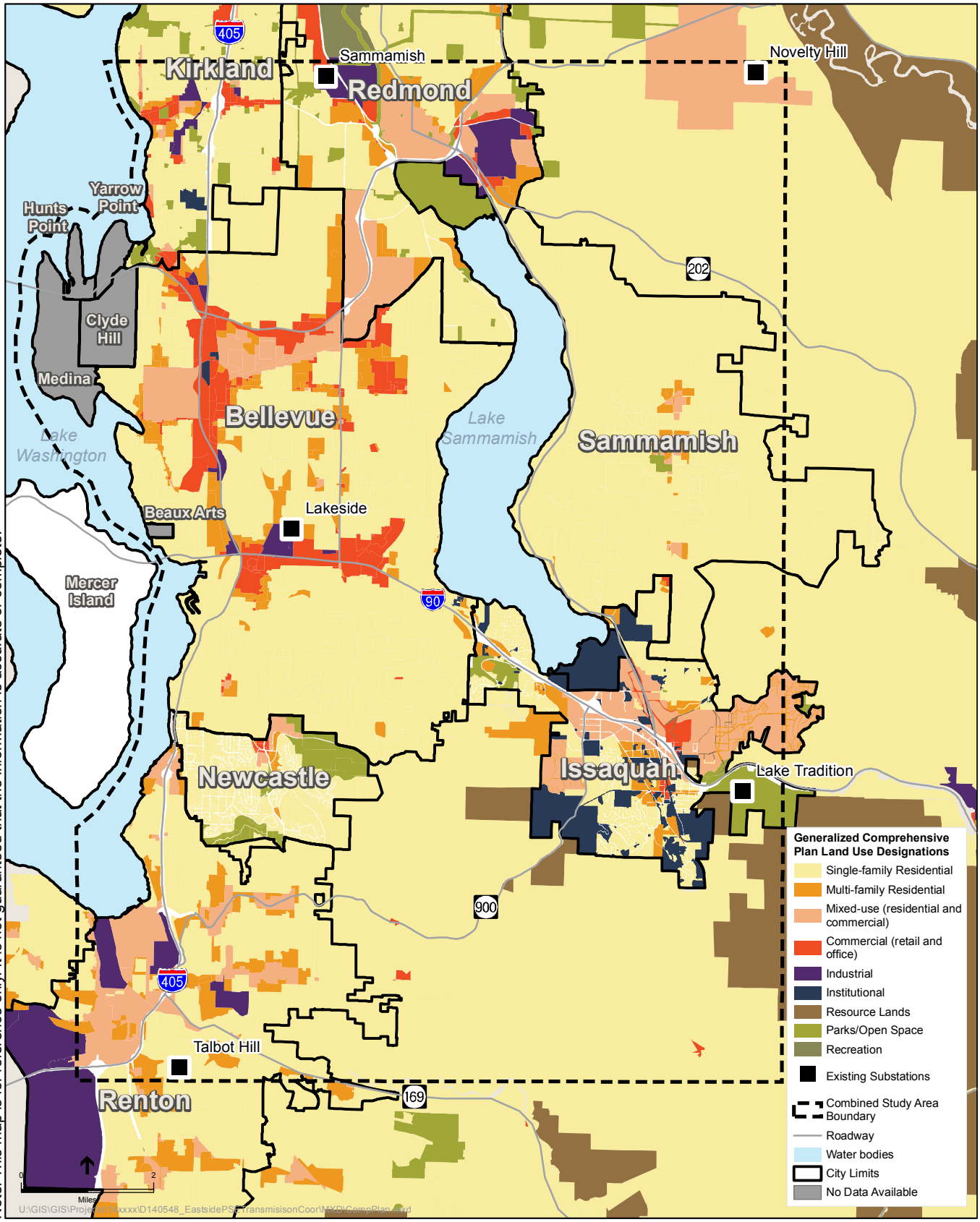
Comprehensive plans also include goals and policies that establish a 20-year vision and roadmap for each study area community's anticipated future. Appendix F lists the comprehensive plan land use goals and policies that could address or guide the Energize Eastside Project's location or type of electrical infrastructure. Goals and policies that relate to electrical infrastructure can be grouped into the following broad topics[2]:

1. **Encouragement of energy efficiency and conservation** - Goals and policies generally promote investment in, and proliferation of, renewable energy resources and reduce the demand for fossil fuels.

2. **Hazardous pipeline safety** - Goals and policies generally require coordination between the pipeline operator, development project proponents, and local jurisdictions to examine the potential for construction and operational conflicts, and to avoid, minimize, or mitigate for such conflicts.

3. **Utility corridor development/management** - Goals and policies generally promote co-location and shared use of utility corridors in order to minimize impacts, except when major adverse safety or land use consequences could result. Timely improvements to infrastructure are encouraged in order to meet anticipated energy demands.

[1] Figures 10-1 and 10-2 do not include the communities of Medina, Clyde Hill, Yarrow Point, Hunts Point, and Beaux Arts Village since GIS data used for this land use analysis were not available from the jurisdictions. The land use within those communities is primarily single-family residential and comprehensive plans indicate no proposed changes from existing land uses (see Figure 10-5).
[2] The "broad topics" provided in this chapter are intended to facilitate comprehension of applicable land use goals and policies and therefore do not exactly match the "topics" in Appendix F, which are applicable to multiple EIS chapters.




Note: This map is for reference only. It is not guaranteed that the information is accurate or complete.

SOURCE: King County 2015; ESA 2015; WAECY 2014; Renton 2015; Newcastle 205; Bellevue 2015; Sammamish 2015; Kirkland 2015; Redmond 2015.
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**Figure 10-2**

Future Land Uses

4. **Protection of community or neighborhood character and safety** - Goals and policies generally support siting and designing utilities to minimize conflicts with community character and maintain safety.

5. **General utility coordination regarding location and service provision** - Goals and policies generally support coordination between the utility purveyors and government to ensure safe, efficient, and reliable service provision consistent with land use regulations.

6. **Ensuring compatibility of land uses** - Goals and policies generally encourage locating, designing, and screening infrastructure to ensure compatibility with the surrounding land use pattern and, where feasible, siting within the area requiring additional service.

7. **Undergrounding of utility lines** - Goals and policies support undergrounding existing and new or expanding lines where safe, practical, and in accordance with rules, regulations, and other utility- and site-specific factors.

8. **Shoreline management** – Goals and policies generally discourage locating non-water-related utilities in the shoreline jurisdiction, particularly in-water. Uses that negatively impact ecological functions are generally prohibited.

9. **Adequate infrastructure for development** – Goals and policies generally acknowledge that electrical service and infrastructure should be available to serve development.

Each comprehensive plan is required to establish a process for identifying and siting essential public facilities (EPFs). State, regional, county, and local agencies are also required to coordinate in determining the location of these facilities. EPFs are facilities that are typically difficult to site, such as airports, state education facilities, and state or regional transportation facilities (RCW 36.70A.200). A determination of whether the Energize Eastside Project qualifies as an EPF would be made by the permitting agency at the time of permit preparation or submittal.

**Essential Public Facilities** (EPF) are defined by state law (RCW 36.70A.200 and WAC 365-196-550) as necessary facilities that are typically difficult to site. The GMA requires planning so that such facilities can be placed appropriately.

### 10.2.2 Shoreline Planning Framework

In 1971, the State of Washington adopted the Shoreline Management Act (SMA) to foster reasonable and appropriate land uses along Shorelines of the State (simply referred to as "shorelines" in this document). A goal of the SMA is to protect shorelines and adjacent shorelands from incompatible development as well as "to prevent the inherent harm in an uncoordinated and piecemeal development of the state's shorelines" (Chapter 90.58 RCW, 1971). Ecology oversees management of the shoreline resources in the State of Washington. The SMA applies to all 39 counties and more than 200 towns and cities that have shorelines (RCW 90.58.030(2)) within their boundaries.

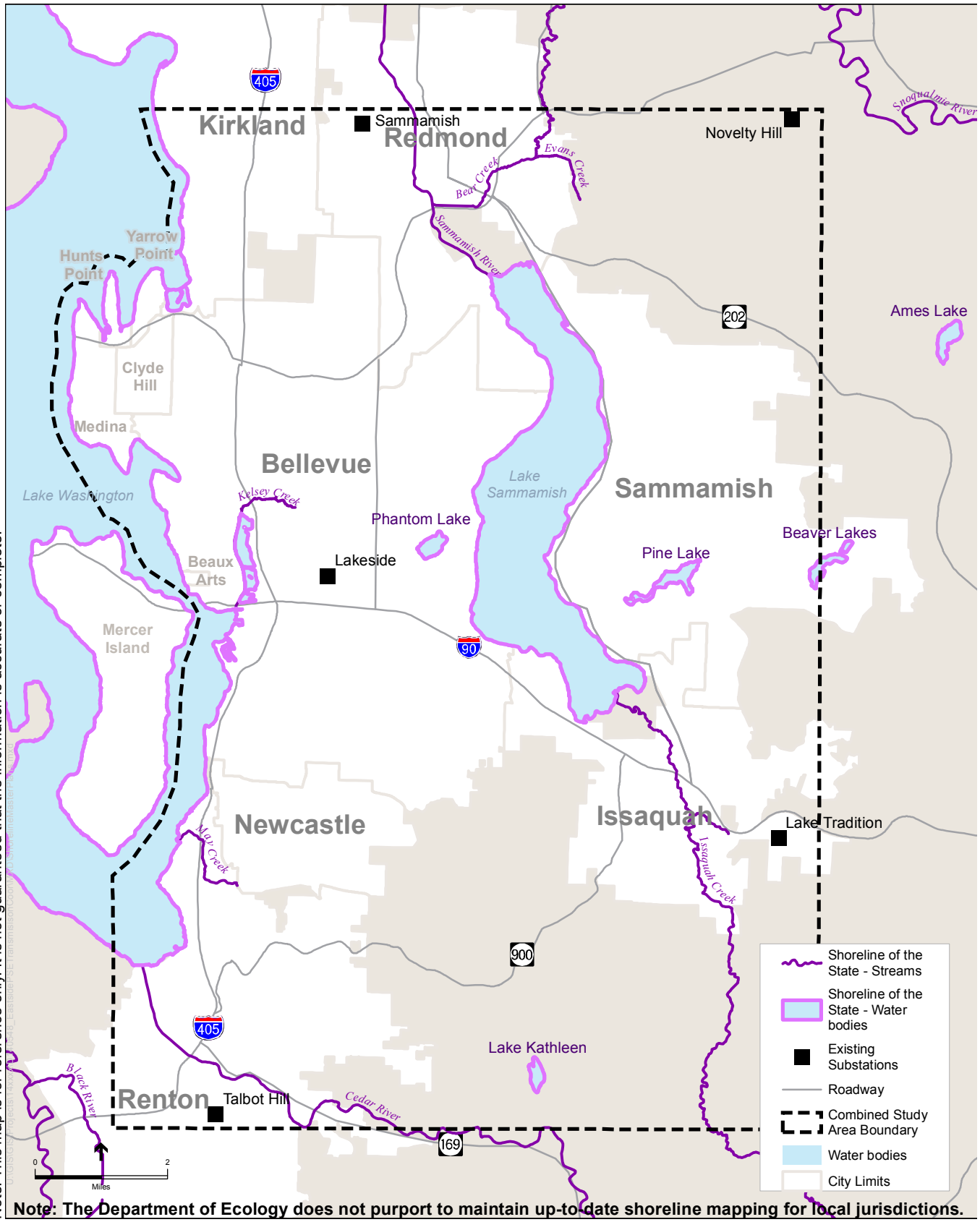
Local jurisdictions with shorelines have adopted shoreline master programs (SMPs) to comply with the SMA. These local SMPs include shoreline management goals and policies, identify shoreline environment designations and allowed uses, and outline regulations and permit requirements for activities within shoreline jurisdiction. An SMP is considered to be both a policy document, identifying the community's 20-year vision of its shorelines, and a regulatory document. SMPs must be consistent with the state implementing regulations for the SMA (WAC 173-26).

**Shorelines of the State include**:

- All marine waters;
- Streams and rivers with greater than 20 cubic feet per second mean annual flow;
- Lakes 20 acres or larger;
- Upland areas called shorelands that extend 200 feet landward from the edge of these waters; and
- The following areas when they are associated with one of the above:
- Biological wetlands and river deltas; and
- Some or all of the 100-year floodplain including all wetlands within the 100-year floodplain.

The communities of Clyde Hill and Newcastle do not have their own specific SMPs. Newcastle has adopted (and implements) King County's program and Clyde Hill does not have any jurisdictional *shoreline areas*. The City of Bellevue is updating its SMP consistent with state law. Not all shoreline areas have been established on adopted maps. Figure 10-3 shows the location of the available mapped shorelines of the state within the combined study area (Ecology, 2015a-c[3]), including Lake Washington, Lake Sammamish, Sammamish River, Bear Creek, and Issaquah Creek. These shorelines would be regulated in addition to other areas where shoreline jurisdiction would be applied based on criteria described above (e.g., location relative to known waters of the state, rate of stream flow).

[3] The Department of Ecology does not purport to maintain up-to-date shoreline mapping for local jurisdictions.




Note: This map is for reference only. It is not guaranteed that the information is accurate or complete.

**Note: The Department of Ecology does not purport to maintain up-to-date shoreline mapping for local jurisdictions.**

SOURCE: King County 2015; WA Ecology 2015; Bellevue 2015; Redmond 2015; Sammamish 2015; Issaquah 2015.

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**Figure 10-3**

Shorelines of the State

Shoreline Master Programs map and classify known shorelines, and establish policies on how to determine where other regulated shorelines may exist. Shoreline areas are classified into specific shoreline environment designations, based on the existing land use pattern, biological and physical characteristics of the shoreline, and the goals of the community as expressed through comprehensive plans and in conformance with state's recommended classification system (WAC 173-26-211 (4) and (5)). The state code recommends the following six basic shoreline environment designations:

The SMA states that "the interests of all the people shall be paramount in the management of shorelines of statewide significance." In western Washington, **Shorelines of Statewide Significance** in the combined study area include:

- Lakes or reservoirs with a surface area of 1,000 acres or more (includes Lake Washington and Lake Sammamish); and
- Wetlands associated with all of the above.

1. **High-Intensity** to provide for high-intensity water-oriented commercial, transportation, and industrial uses while protecting existing ecological functions and restoring ecological functions in areas that have been previously degraded;
2. **Shoreline Residential** to accommodate residential development and appurtenant structures along with appropriate public access and recreational uses;
3. **Urban Conservancy** to protect and restore ecological functions of open space, floodplains, and other sensitive lands where they exist in urban and developed settings, while allowing a variety of compatible uses;
4. **Rural Conservancy** to protect ecological functions and conserve existing natural resources and valuable historic/cultural areas to provide for sustained resource use, achieve natural floodplain processes, and provide recreational opportunities;
5. **Natural** to protect shoreline areas that are relatively free of human influence or that include intact or minimally degraded functions intolerant of human use; and
6. **Aquatic** to protect, restore, and manage the unique characteristics and resources of the areas waterward of the ordinary high water mark.

Local governments map their designated shoreline environments where known. Each community's SMP describes the criteria for determining shoreline environment classifications around area water bodies. Local governments can develop shoreline environment designations that are different from the general categories listed above.

Appendix F provides a sample of SMP goals and policies from study area communities that could guide the Energize Eastside Project's location or type of electrical infrastructure. The goals and policies for activity within the shoreline jurisdiction can be generally grouped into the following broad topics:

1. **Protection of ecological functions and aesthetics**- Goals and policies generally promote the protection and preservation of vegetation, fish and wildlife species and their habitats, and viewsheds for the enjoyment of current and future generations.

2. **Use priorities** - Goals and policies generally reflect a preference for water-oriented uses and place limitations or prohibitions on non-water-oriented uses.
3. **Avoidance, minimization, mitigation** - Goals and policies generally promote avoidance, minimization, and mitigation of interruptions to natural shoreline functions.
4. **Limitation on infrastructure** – Goals and policies generally state that infrastructure should be limited to the minimum necessary to achieve its purpose. Location outside of the shoreline jurisdiction is preferred unless other locations are infeasible or a water-dependent component exists.
5. **Coordinated management and development** - Goals and policies generally promote coordination between local, state, and federal agencies to prevent harm to shorelines.
6. **Maintenance of natural areas and dynamics** - Goals and policies generally promote maintaining shorelines to perform natural dynamic processes that support fish and wildlife and associated habitat.

Many of the adopted SMPs do not contain specific goals and policies for locating EPFs. Where EPFs are not specifically defined in the SMP, the applicable jurisdiction would preliminarily evaluate the proposed activities, classify the project as a use identified within the adopted SMP (for example, as a "utility" use), and then proceed with project review to ensure consistency with adopted policies and regulations.

### 10.2.3 Development and Zoning Framework

The comprehensive plans adopted by study area communities are implemented through each City's zoning map and local land use code, which set the stage for land development intensities and patterns. Based on the comprehensive plan land use designations that define a broad range of allowed land uses, local communities establish zoning districts, and develop detailed maps, specific land use type classifications, and development criteria for each of the identified zones.

Examples of land use designations are: the City of Bellevue's Single-Family Comprehensive Plan land use designation, implemented through the 'R-1' zone (Single Family – Residential Estate, one dwelling unit per acre), or Kirkland's Commercial Comprehensive Plan land use designation implemented through the BN zone (Neighborhood Business). A development review process is implemented by each study area community to assess a project's compliance with zoning and code requirements.

Shoreline environment designations, determined under the SMPs described above, also establish land use type classifications and development criteria over and above what zoning allows. The SMP includes shoreline regulations that help to implement the shoreline goals and policies. Some communities include shoreline environment designations as a type of overlay on their zoning maps. Review of SMP compliance and potential impacts to shorelines are assessed as part of development review.

Development of any of the project alternatives would ultimately be subject to the zoning and other development regulations of each community, including shoreline management. Development permits would be required for land disturbing activities and to install most of the components of the project alternatives (concrete pads for transformers and other equipment, security fencing, power poles, transmission and distribution lines, battery storage facilities, etc.). When a project location is determined, PSE would submit permit applications to the applicable study area communities.

In addition to the overall zoning and other code compliance for each City, Bellevue and Kirkland have community municipal corporations enacted by statute in certain areas as a result of past annexations. These corporations have statutory authority to approve or disapprove ordinances of the city council with respect to certain actions, including conditional use permits, special exceptions, or variances. Disapproval cannot affect the application of any ordinance affecting areas outside the community municipal corporation.

In addition to the powers and duties related to the approval of zoning regulations, the community municipal corporation, acting through its community council, may make recommendations and provide a forum for proposals that affect property or land within the service area (of the corporation) and may advise, consult and cooperate with the city council on local matters that may directly or indirectly affect the service area (RCW 35.14.050). The East Bellevue Community Council (EBCC) was established in 1969 and has jurisdiction within a designated planning boundary in East Bellevue (City of Bellevue, 2015b). The Houghton Community Council was established in 1968 and has jurisdiction within the area formerly designated as the Town of Houghton (City of Kirkland, 2015a).

## 10.3 WHAT ARE THE EXISTING LAND USES, POPULATION, AND HOUSING IN THE COMBINED STUDY AREA?

### 10.3.1 Existing Land Uses

The combined study area comprises approximately 90,000 acres of land area. According to the King County Assessor's 2015 geographic information systems (GIS) data, the most prevalent land use in this combined area is single-family residential properties (40 percent), followed by vacant land (17 percent), transportation and parking (13 percent), and parks and open space combined with other recreational uses (10 percent).

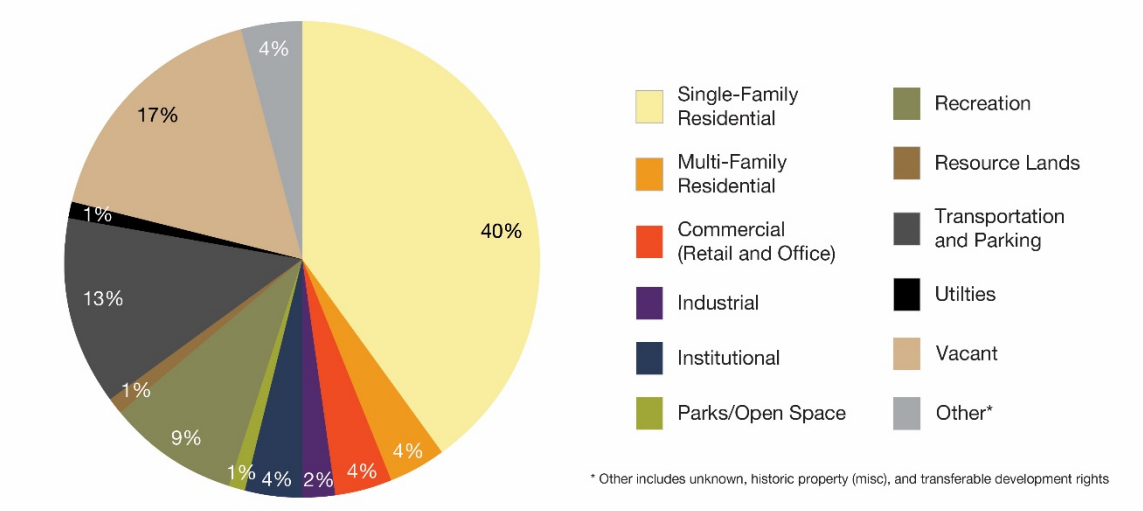
Existing land uses are shown in Figures 10-4 and 10-5[4]. Single-family residential properties are located throughout all of the study area communities, while multifamily properties (4 percent of the project area) are congregated around larger urban areas. Although vacant and recreational land is present throughout the combined study areas, the greatest concentration

[4] Differences may exist between the land uses shown in figures and actual current land uses due to anomalies between Assessor's and Planning Departments' land use categorization, changes in actual land use from the time Assessor's information was obtained, and broad categorization of multiple jurisdictions' discrete land use designations. Because of the large study area coupled with the programmatic nature of this analysis, these discrepancies are relatively minor and therefore not anticipated to have an influence on overall analysis or conclusions; therefore, parcel-by-parcel data reconciliation was not conducted.

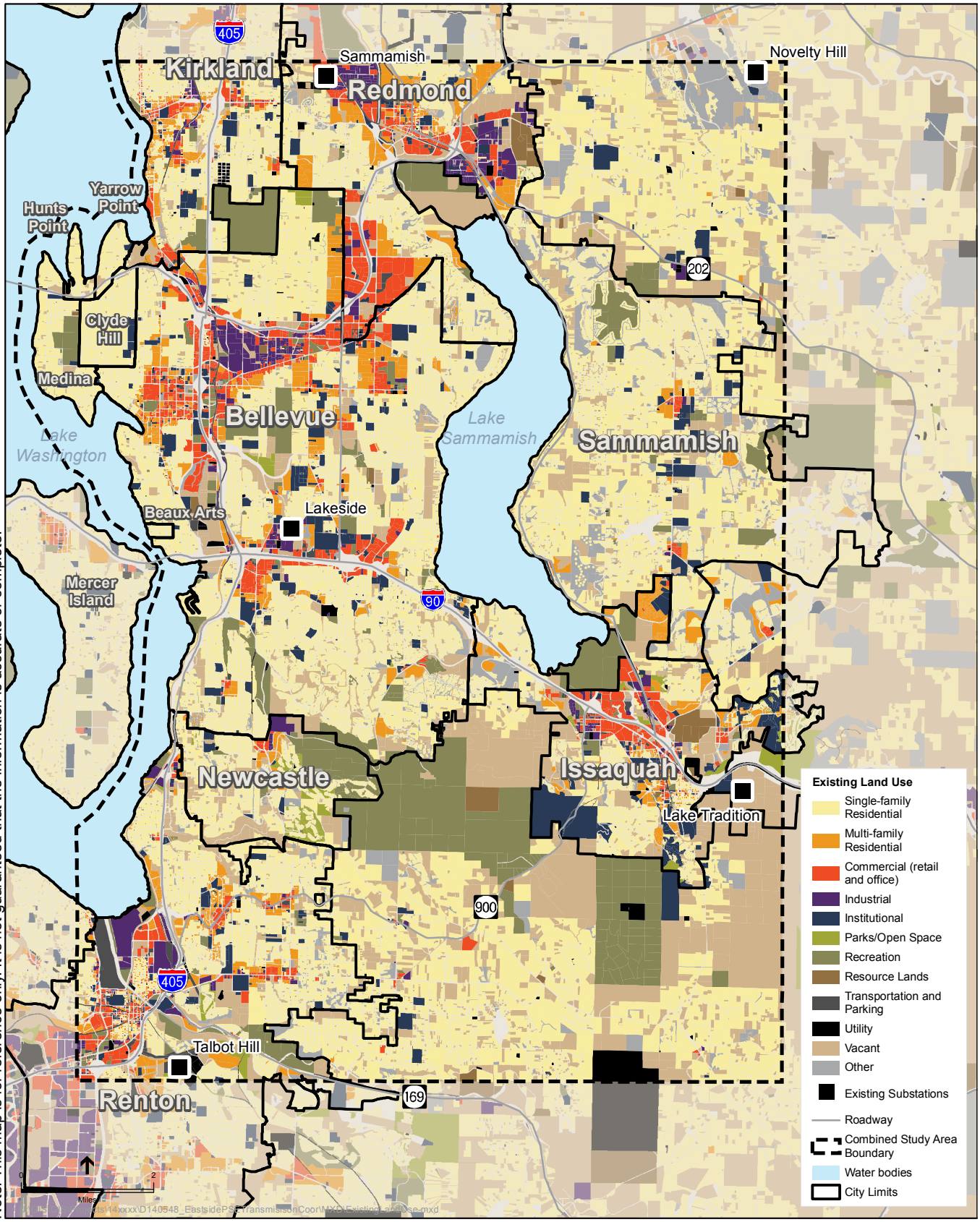
of these land uses is in the southeastern portion of the study area surrounding the southern and eastern boundaries of Newcastle, Bellevue, and Issaquah. This includes the large forested areas comprising the *Issaquah Alps* and undeveloped portions of unincorporated King County. Institutional land uses such as schools, churches, hospitals, and libraries are scattered throughout the combined study area. Commercial land uses are primarily clustered around the city centers and major highways, with the highest concentrations in Bellevue, Redmond, and Issaquah. Industrial uses are relatively scarce in the combined study area, clustered in Bellevue, Redmond, Renton, and Newcastle with small areas in Kirkland, King County, and Sammamish as well.

**The Issaquah Alps** is the unofficial name for the highlands near the city of Issaquah, and includes Cougar Mountain, Squak Mountain, Tiger Mountain, Taylor Mountain, Rattlesnake Ridge, Rattlesnake Mountain, and Grand Ridge.

**Figure 10-4. Existing Land Use by Type**




Source: King County, 2015




Note: This map is for reference only. It is not guaranteed that the information is accurate or complete.

SOURCE: King County 2015; ESA 2015; WA Ecology 2014.
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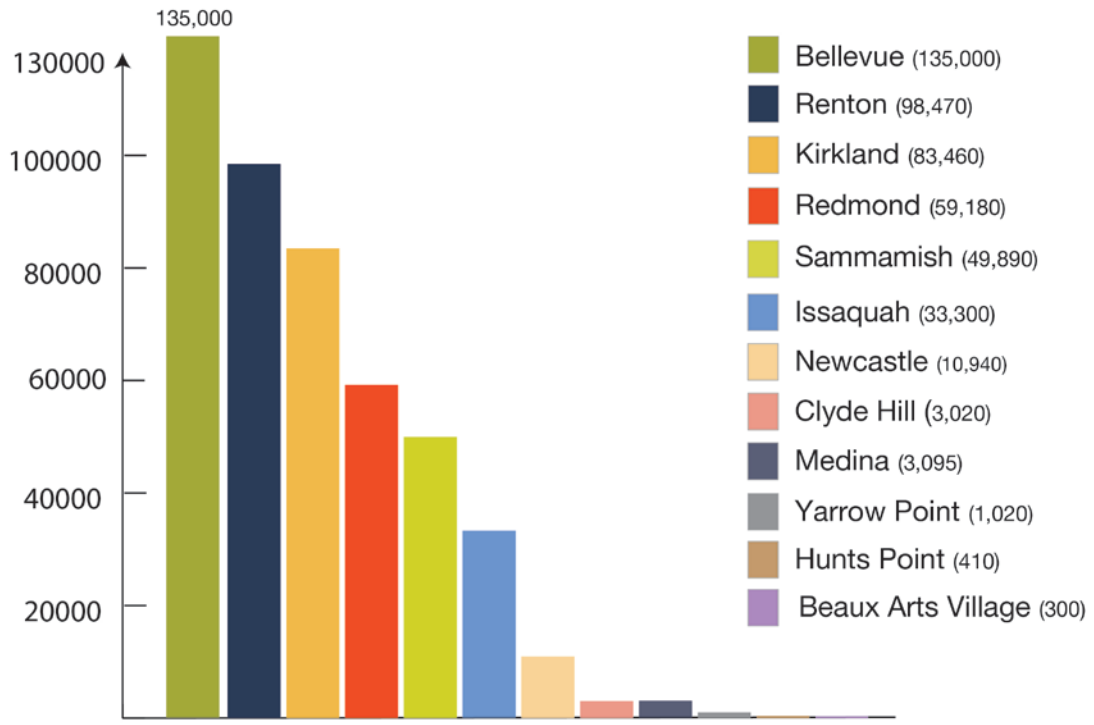
**Figure 10-5**

Existing Land Uses

## 10.3.2 Population

The total population in the study area communities was 477,875 as of April 2015 (Figure 10-6). However, the population of the combined study area is smaller because the study area boundaries do not align with city boundaries (or census tract boundaries, which were the basis of the population information for the cities) and portions of some cities are outside of the combined study area. City population data is presented in Figure 10-6.

**Figure 10-6. Local Area Population (2015)**




Source: Municipal Research and Services Center (MRSC), 2015

The population of the unincorporated King County portion of the combined study area (in 2014) is estimated at 54,800 based on interpolation of Census Block Group data (2010) obtained from the Municipal Research and Services Center (MRSC, 2015). Although these city and county numbers are not exact, they provide a general sense of the population in the combined study area.

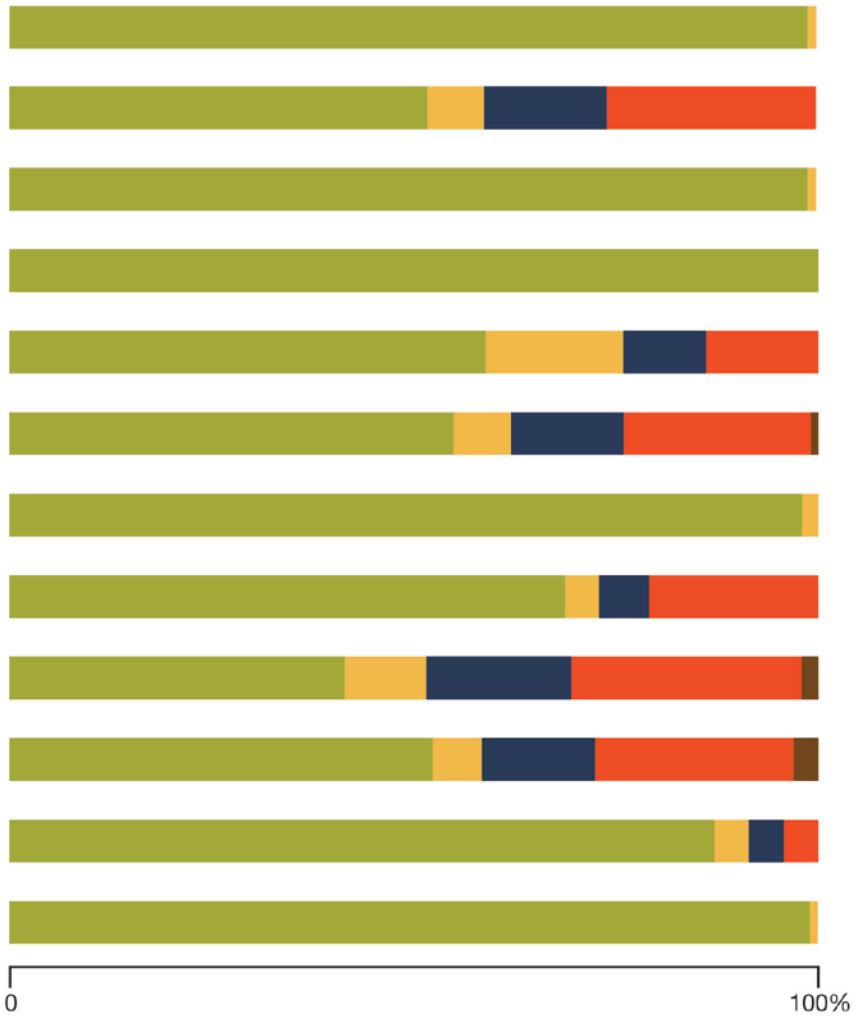
## 10.3.3 Housing Characteristics

The majority of the housing stock in the combined study area is single-family, detached housing (Figure 10-7). Communities such as Hunts Point (with no employment centers and developed primarily as a residential community) are composed almost entirely of single-family homes, while approximately half of the housing stock in more urbanized areas like Redmond is multifamily. The larger cities in the project area (Kirkland, Renton, Bellevue, Issaquah, Redmond, and Newcastle) typically have apartment complexes with over 10 units per building, composing approximately a quarter of their housing stock (U.S. Census, 2013).

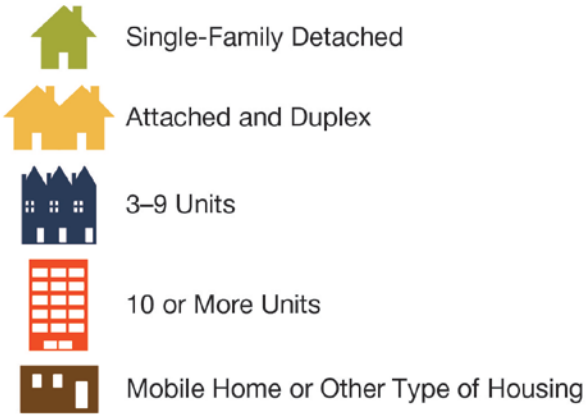
This is indicative of the land use planning strategy seen throughout the Eastside communities, which is to preserve existing single-family residential neighborhoods while fostering population growth in high-density housing in the urban areas.

The communities with the oldest housing stock in the combined study area are Beaux Arts Village, Clyde Hill, and Yarrow Point, where approximately 70 percent of the housing was constructed prior to 1980. The rest of the combined study area communities (Bellevue, Renton, Kirkland, Redmond, Sammamish, Issaquah, Newcastle, Medina, and Hunts Point) experienced residential property development between 1960 and 2010, but generally have a greater proportion of newer housing than the communities previously described. The newest housing is likely to be found in Issaquah or Newcastle where 2.9 percent and 2.2 percent of the housing was constructed after 2009, respectively (U.S. Census, 2013).

**Figure 10-7. Housing Types In the Study Area Communities**




Note: Data for housing in the areas of King County within the study area is not available, but aerial mapping indicates predominantly single family detached.



## 10.4 HOW WILL LAND USE, POPULATION, AND HOUSING CHANGE IN THE FUTURE?

Population in most of the study area communities is projected to increase through 2040. The PSRC expects population in the Puget Sound region to grow by about 24 percent to approximately 4.9 million by 2040. Along with that increase in population, the number of households in the region is expected to increase by about 37 percent to approximately 2.1 million (PSRC, 2015a). Consistent with that trend, from 2010 to 2014 the population of King County grew at an average annual rate of 1.1 percent, slightly above the regional average. Between 2013 and 2014, the King County population grew by 35,350 (1.8 percent) and King County is expected to continue to lead the region in growth.

**PSRC Growth Centers**

Centers are locations characterized by compact, pedestrian-oriented development, with a mix of different office, commercial, civic, entertainment, and residential uses. While relatively small geographically, centers are strategic places identified to receive a significant proportion of future population and employment growth when compared to the rest of the urban area. Centers of different sizes and scales - from the largest centers to the smallest - are envisioned for all of the region's cities.

Concentrating growth in centers allows cities and other urban service providers to maximize the use of existing infrastructure, make more efficient and less costly investments in new infrastructure, and minimize the environmental impact of urban growth.

The Regional Growth Strategy established by VISION 2040 (described in Section 10.2.1) calls for broad shifts in locations where growth should be located within the region. The Strategy establishes six clusters of jurisdictions called "regional geographies" including four types of cities (by size) and two unincorporated types (urban and rural). The study area communities within each cluster are in **bold** font as follows:

1. Metropolitan Cities: Seattle, **Bellevue**
2. Core Suburban Cities: Auburn, Bothell, Burien, Federal Way, Kent, **Kirkland**, **Redmond**, **Renton**, SeaTac, Tukwila
3. Larger Suburban Cities: Des Moines, **Issaquah**, Kenmore, Maple Valley, Mercer Island, **Sammamish**, Shoreline, Woodinville
4. Small Cities: Algona, **Beaux Arts**, Black Diamond, Carnation, **Clyde Hill**, Covington, Duvall, Enumclaw, **Hunts Point**, Lake Forest Park, **Medina**, Milton, **Newcastle,** Normandy Park, North Bend, Pacific, Skykomish, Snoqualmie, **Yarrow Point**
5. **Urban Unincorporated King County**: all unincorporated areas within urban growth areas
6. **Rural Unincorporated King County**: rural- and resource-designated areas outside urban growth areas

The Strategy calls for: (1) increasing the amount of growth targeted to metropolitan cities and core suburban cities; (2) increasing the amount of growth targeted to larger suburban cities; (3) decreasing the amount of growth targeted to urban unincorporated areas, rural designated

unincorporated areas, and small cities; and (4) achieving a greater jobs-housing balance within the region.

As land redevelopment continues within the comprehensive planning framework, land use patterns will change. Figure 10-2 in Section 10.2 shows what land uses are planned to look like in the future. The majority of the combined study area (76 percent) is anticipated to remain suburban in character, with single-family housing, while the current trend of focusing new development within the established city limits and urban growth areas is expected to continue. The majority of new residential and commercial growth is expected to occur as mixed-use and multifamily developments within designated downtown and neighborhood commercial centers. Multifamily residential uses are anticipated to be 5 percent of the total land acreage, commercial uses 3 percent, and mixed-use areas 7 percent. Single-family development will also continue, but likely on smaller lots, resulting in higher densities in some single-family areas.

## 10.5 HOW WERE POTENTIAL IMPACTS TO LAND USE AND HOUSING ASSESSED?

This chapter evaluates the alternatives' consistency within the general regulatory framework, including applicable land use and shoreline goals and policies. Zoning and shoreline designations in the combined study area were reviewed to confirm whether the alternatives would be allowed in all types of zones and shoreline environments.

Because study area communities would determine whether to designate the project as an EPF as part of the project-specific permit application process, this programmatic evaluation does not include a complete analysis for consistency with EPF policies and regulations. This chapter generally discusses the EPF designation and what it would mean for location and development of the project.

The EIS Consultant Team conducted research to identify potential changes in land use related to transmission lines and other utility components. Information was obtained from land use studies and an interview with a local Assessor's Office (FCS, 2016).

The potential for the project to convert existing non-utility land uses to a utility use was also considered. The evaluation includes the potential for the project to physically separate existing neighborhoods.

## 10.6 WHAT ARE THE LIKELY CONSTRUCTION IMPACTS TO LAND USE AND HOUSING?

### 10.6.1 Construction Impacts Considered

The project could be considered to have an adverse land use impact if construction would cause a substantial disruption of normal access, services, or activities.

The magnitude of potential land use impacts during construction is classified as minor, moderate, or significant, which have been defined for this analysis as follows:

**Minor -** Construction could temporarily disrupt normal access at any one location, but adequate alternate access could be provided to approximate or maintain existing uses.

**Moderate** – Construction continues for a substantial amount of time at any one location or at numerous locations in close proximity, compromising access sufficiently to adversely affect service provision and site uses for brief periods.

**Significant** – Long-term construction at any one location or numerous locations in close proximity disrupts normal access to area homes, services, or businesses, where alternate access cannot be provided and uses/services are disrupted.

### 10.6.2 No Action Alternative

Under the No Action Alternative, the project would not be constructed and no impacts would occur. While some existing equipment could be replaced, no major construction would occur.

### 10.6.3 Action Alternatives

The study area communities would ensure that appropriate access to properties (homes, businesses, or services) from public rights-of-way would be maintained for all alternatives, options, or components considered.

All alternatives involving construction of new infrastructure (except the Energy Efficiency and Demand Response Components of Alternative 2) would need permits prior to construction. During the permit process, development review would determine how access would be maintained. Negligible land use and housing impacts would be expected from project construction under any of the action alternatives.

## 10.7 HOW COULD OPERATION OF THE PROJECT AFFECT LAND USES AND HOUSING?

### 10.7.1 Operation Impacts Considered

#### *10.7.1.1 Consistency with Goals, Policies, and Regulations*

The project could have an adverse land use impact if it were inconsistent with planning goals and policies, or if the zoning and shoreline environment designation restrictions of any study area community would prohibit any aspect of the project.

Land use goals and policies of the study area communities (Appendix F) provide some guidance as to where new transmission lines, transformers, or the features of Alternative 2 should be located, and some have goals or policies supporting undergrounding of electrical lines. All of the area comprehensive plans acknowledge a need for adequate infrastructure to support development.

The infrastructure components of all of the alternatives would likely be allowed by most zoning designations of the study area communities. The exceptions are described in the sections below for each alternative. Development regulations related to height/scale and setbacks would be applied depending on specific location and the project component. Specific designs for the project would need to be reviewed by each community to determine compliance with applicable zoning codes and regulations. Most local area SMPs would require new utilities that are not dependent on a shoreline location to be built outside of the shoreline jurisdiction unless there were no feasible alternative. Some study area communities specifically prohibit particular types of utility activities in some shoreline areas, as described for the alternatives below.

Most local area comprehensive plans establish policies for developing EPFs. These generally relate to coordination, applying sustainability principles in siting decisions and intent to ensure impacts are adequately mitigated (see applicable policies in Appendix F). For the project or any component of the project to be considered as an EPF by one or more of the study area communities, the jurisdiction would need to determine that the project is critical infrastructure, important regionally as well as locally and difficult to site. This determination would be made based on a specific project proposal.

#### 10.7.1.2 Conversion of Land or Housing to Utility Use

Properties could be converted to utility uses. If land were converted to utilities it could take away land otherwise available to cities to accommodate the required King County Growth Targets for housing and jobs, including land already developed with housing or commercial uses. Although the planning process that established those targets also identified the need for utilities, none of the study area communities specifically identify how much land is expected to be needed for utility use. Use of land for utilities that would have been used to meet mandated growth targets would not necessarily create an adverse impact. The amount of land converted to utilities would need to be considered in the context of remaining available land to confirm whether an impact would likely occur and whether it would be significant.

Housing impacts would occur in the event that residences needed to be purchased and removed in order to build the project. PSE confirms that due to safety regulations, transmission lines would never be placed directly over homes (Strauch, personal communication, 2015).

#### 10.7.1.3 Classifying Impacts

The magnitude of potential land use impacts from operation of the project is classified as minor, moderate, or significant, which have been defined for this analysis as follows:

**Minor** – Project could be developed consistent with policies and regulations, and would convert some land to utility uses, but not require the removal of existing homes or businesses.

**Moderate** – Project could be developed consistent with policies and regulations and would convert a relatively small percentage of land targeted to meet housing or employment goals to utility use.

**Significant** – Project could not be developed consistent with policies or regulations, and would convert substantial numbers of homes or businesses to utility uses, or otherwise substantially affect the ability of study area communities to meet their housing or employment targets, or other adopted development goals.

#### 10.7.1.4 Property Values

During EIS scoping, a number of public comments were received on the topic of whether the proposed new transmission line would affect property values. Although the effect of transmission lines on property values is an economic rather than an environmental issue as defined by SEPA, the issue is discussed in this land use analysis to the extent that a change in property values could result in a change in land use (for example, a single-family residential use becoming vacant or substantially changed resulting from loss in property value).

To respond to these comments, the EIS Consultant Team reviewed existing studies addressing whether location of transmission lines could affect property values to the extent that devaluation would result in a change of use. A search of online literature databases found over 25 articles and reports related to power line effects on property values. Of that number, one study prepared for The Electric Power research Institute (EPRI) titled *Transmission Lines and Property Values: State of Science* (Mullins et al., 2003) was chosen for use as the source of information for this EIS because it synthesizes and summarizes the findings of over 50 surveys and studies.

**EPRI is** a nonprofit organization that conducts "research, development and demonstration relating to the generation, delivery and use of electricity for the benefit of the public." See: http://www.epri.com/About-Us/Pages/Our-Business.aspx

The EPRI report finds that the results of previous studies are mixed. In some cases the report found that small decreases in property values had been associated with proximity to a transmission line. In other cases no changes in property values were found. In some cases there were increases in property values. The specific conclusions of the report are provided verbatim below, starting with the statement that findings are not conclusive (Mullins et al., 2003):

> *"Quoting from William N. Kinnard Jr. (1990), no quantitative generalizations about findings from the studies can be made with any degree of reliability. Still today, differences in location and time of data collection, as well as research design, make direct comparisons of results from all of the studies reviewed very difficult. That said, the research projects covered in this report do suggest a number of conclusions that are not substantially different from what we already knew, as listed below.*
>
> - *There is evidence that transmission lines have the potential to decrease nearby property values, but this decrease is usually small (6.3% or lower);*
> - *Lots adjacent to the ROW [right-of-way] often benefit; lots next to adjacent lots often have value reduction;*
> - *Higher-end properties are more likely to experience a reduction in selling price than lower end properties;*

- *The degree of opposition to an upgrade project may affect the size and duration of the sales price effects;*
- *Setback distance, ROW landscaping, shielding of visual and aural effects, and integration of the ROW into the neighborhood can significantly reduce or eliminate the impact of transmission structures on sales prices;*
- *Although appreciation of property does not appear to be affected, proximity to a transmission line can sometimes result in increased selling times for adjacent properties;*
- *Sales-price effects are more complex than they have been portrayed in many studies. Even grouping adjacent properties may obscure results;*
- *Effects of a transmission line on sales prices of properties diminish over time and all but disappear in five years;*
- *Opinion surveys of property values and transmission lines may not necessarily overstate negative attitudes but they certainly understate (or ignore) positive attitudes; and*
- *The release of findings from the Swedish study on EMF[5] and health effects had no measurable influence on sales prices."*

Overall, the EPRI study does not support a conclusion that property value shifts would occur that would lead to negative impacts on land uses. The King County Assessor does consider views of powerlines in assessing property values, as discussed in Chapter 11 Views and Visual Resources. Therefore, the land use analysis in this Phase 1 Draft EIS considered effects on property values but found them to be inconclusive with regard to causing changes in land use.

More recent studies have confirmed the results of the 2003 EPRI report. A 2012 study concluded that effects, if they occurred, ranged from 3 to 6% of value, and other factors such as property use, size, and uniqueness affected property values more significantly (Chalmers, 2012). A 2014 literature review found that the presence of transmission lines does not automatically adversely impact property values of adjacent properties, and what effects are seen dissipate with distance, usually disappearing at 200 – 300 feet (Roddewig and Brigden, 2014). No studies were found indicating a different conclusion than those summarized in the EPRI study.

**Examples of Goals and Policies for Reliable Energy Provision**

**Redmond Policy UT-59:** Work with energy service providers to promote an affordable, reliable, and secure energy supply that increases development and use of renewable and less carbon-intensive sources, and that minimizes demand and consumption.

**Kirkland Policy U-7.3:** Work with and encourage PSE to provide clean and renewable energy that meets the needs of existing and future development, and provides sustainable, highly reliable, and energy-efficient service for Kirkland customers.

[5] The EPRI document cited includes reference to the following study: Des F. Rosiers. 2002. Power lines, visual encumbrance and house values: a microspatial approach to impact measurement. Journal of Real Estate Research 23(3):275–301.

### 10.7.2 No Action Alternative

Under this alternative, no properties would be purchased, no neighborhoods would be traversed by a new transmission line, and no new transformers would be installed, with no expansions of existing substations. There would be no conversions of other land uses to utility uses and no resulting land use impacts.

However, the No Action Alternative would likely lead to declining reliability of the electrical power supply on the Eastside, which could be inconsistent with Growth Management Act Goal 12, described in Section 10.2.1. It would also be inconsistent with local planning policies for Redmond, Kirkland, Renton, Bellevue, and others regarding provision of reliable energy.

Planning goals in the region recognize the importance of economic development for community stability, creation and retention of jobs, adequate housing, and efficiencies in service provision such as transportation (sometimes referred to collectively as *smart growth*). Without a confident forecast of reliable power by PSE, developers and businesses may choose not to invest in the Eastside area, which could delay growth or shift growth (including housing) to other areas of the region. Since electrical reliability is only one of many factors that developers and businesses consider, in the short term some businesses could ensure against power outages with their own backup generators. In the long term; however, if a trend of unreliable power supply were to continue, it could have a negative impact on the role the Eastside is expected to play in accommodating growth in the region.

**Smart growth** is an urban planning and transportation concept that concentrates growth in compact walkable urban centers to avoid sprawl. It also advocates compact, transit-oriented, walkable, bicycle-friendly land use, including neighborhood schools, complete streets, and mixed-use development with a range of housing choices.

Therefore, due to policy inconsistencies and potential changes to land use patterns from those planned under the GMA, the No Action Alternative would likely have a moderate to significant land use and housing impact, depending upon the degree to which uncertain power availability affects land development.

### 10.7.3 Alternative 1: New Substation and 230 kV Transmission Lines

Impacts are described according to the major components associated with Alternative 1. The substation impacts are described first, followed by transmission line options.

This alternative includes placing a new 230 kV to 115 kV transformer near the center of the Eastside at one of three locations described in Chapter 2 (Vernell, Westminster, or Lakeside). PSE has proposed this alternative as their solution to best ensure reliability of the electrical supply system, consistent with local and regional planning goals. In addition, new transmission lines would be constructed connecting the new transformer to the Sammamish and Talbot Hill substations.

The Vernell and Westminster sites shown in Table 10-1 below (owned by PSE) would likely be adequate to accommodate the proposed new substation and impacts to land use and

housing would be negligible. If the Lakeside site were chosen, PSE would need to purchase and develop land adjacent to the existing substation. Table 10-1 summarizes the existing land uses around the three potential substation sites for the new transformer, in order of their prevalence.

**Table 10-1. Alternative 1 - Existing Land Uses around Substations Needing Expansion**

| Substation | Land Use |
|---|---|
| Lakeside | Industrial, institutional, vacant land (and single-family residential across the street). |
| Westminster | Parks/open space, recreation, commercial, and single-family residential (across the street). |
| Vernell | Industrial, transportation, and commercial. |

Source: King County Assessor

The conversion of land to utility use at the Lakeside site is considered a minor impact on land use, considering the small amount of land that would be needed along with other appropriate measures that would be employed to address compatibility with adjacent uses, such as screening for visual impacts and addressing potential noise. Impacts from the substation should be considered together with the transmission line impacts of each option, which are described in Sections 10.7.3.1 through 10.7.3.4.

### *10.7.3.1 Option A: New Overhead Transmission Lines*

Overall, the potential impacts to land use and housing with the transmission lines of Alternative 1, Option A could range from minor to significant depending on specific location and whether a new or existing corridor were used for the facility.

#### 10.7.3.1.1. New Corridor

Impacts to specific properties would occur if land were purchased and used for the project. With this option, overhead transmission lines could be placed in entirely new corridors, with conversion of existing uses to utility uses. Conversion could occur with purchase of complete parcels (including homes or businesses), portions of parcels, or easements across land. If the overhead line were placed in a new corridor, it is assumed the corridor would be approximately 150 feet wide under the worst-case scenario described in Chapter 2. Given that a new corridor would need to be at least 18 miles long, this width would mean a change to utility land use for approximately 327 acres out of the approximately 90,000 acres in the combined study area.

PSE would attempt to avoid placing a new transmission corridor directly where single-family or multifamily housing structures now exist and lines would not be allowed directly over residential structures (Strauch, personal communication, 2015). However, a new transmission corridor would likely not be able to completely avoid housing impacts due to the predominance of residential uses in the combined study area. If a route crossing existing

housing were needed, those homes would need to be purchased and removed. In this scenario, direct land use and housing impacts would range from moderate to significant, depending on the specific corridor location and proximity of housing to the corridor.

#### 10.7.3.1.2. Existing Corridor

Placing the line through existing PSE corridors or other dedicated utility easements, or along roadways, would be more consistent with land use and utility policies supporting utility co-location, although it could still result in some conversions of adjacent properties or purchases of housing. These conversions could occur in the event that the corridors needed to be widened to accommodate the new utility and allow an adequate clear zone between the lines themselves and between lines and other structures. Up to 50 feet of additional clear zone could be needed throughout the corridor. This could require removal of some structures, including housing, and would reduce the availability of vacant land for additional housing or other development. The use of an existing shared corridor would have a lower potential for impacts from property conversion than a new corridor. Impacts would range from minor to moderate, depending on location and actual design.

**High Consequence Land Use** is a use which, if located in the vicinity of a hazardous liquid pipeline, would present an unusually high risk in the event of pipeline failure due to its function, including utilities providing regional service.

Alternative 1, Option A would be generally consistent with local planning policies listed in Appendix F except in the event that PSE intended to co-locate the transmission line with the Olympic Pipeline Company (OPLC) high pressure pipeline described in further detail in Chapter 16. While some local planning policies encourage co-location with utilities where safe (see Chapter 8), three study area communities (King County, Redmond, and Kirkland) have policies or regulations that could specifically prohibit combining new or expanded transmission lines (which are considered high consequence land uses) with hazardous material pipelines. Development regulations would need to be consulted for all study area communities. The City of Bellevue, for instance, has one code section (LU 20.20.255) which would disfavor site selection in residential areas.

Some of the study area communities have zoning requirements (including shoreline overlay requirements) that would specifically prohibit placement of this alternative in certain locations. Table 10-2 shows the zoning districts and shoreline environment designations in which Beaux Arts Village, Hunts Point, Issaquah, Newcastle, Redmond, Renton, and Yarrow Point appear to prohibit all or portions of Alternative 1[6]. This table will also apply to the other options of Alternative 1.

[6] The City of Bellevue is updating its SMP. The existing, adopted SMP was used for this analysis.

**Table 10-2. Potential Land Use Restrictions for Alternative 1**

| Study Area Community | Use Restriction |
|---|---|
| Beaux Arts Village | New utilities prohibited in following shoreline environment designations: Urban Conservancy, Residential, and Aquatic |
| Hunts Point | • Primary electrical utilities prohibited in: Stormwater Utility<br>• Primary electrical utilities prohibited in these shoreline environment designations: Natural, Residential, and Aquatic |
| Issaquah | Utilities not allowed in: Mineral zoning district |
| Newcastle | Utility yards not allowed in: Mixed Use, Urban Residential, Neighborhood Business zoning districts |
| Redmond | • Regional utilities not allowed in these neighborhoods: Anderson Park, Carter, East Hill, Old Town, River Bend, River Trail, Sammamish Trail, Trestle, Town Square, Town Center, or Valley View<br>• Substations (and utility storage) not allowed in these shoreline environment designations: Aquatic, Natural, Urban Conservancy<br>• No additional utilities allowed in: utility corridor along the west side of the edge of Lake Sammamish containing the City's sewer line[7] |
| Renton | All utilities prohibited in: Shoreline Natural shoreline environment designation |
| Yarrow Point | Primary utilities prohibited in the following shoreline environment designations: Urban Conservancy, Residential, Natural, Aquatic |

Note: This list of restrictions is not intended to be comprehensive. Study area communities may identify other regulations not included here during review of a project level proposal in Phase 2 of this EIS.

Other study area communities not listed in the table would appear to either allow the alternative outright or as a conditional use in all zones; some would prohibit the project in some or all shoreline areas unless there was no other alternative. In some cases, the zoning code does not specifically articulate whether the project would be allowed or prohibited. In those circumstances, the local government would need to perform a code interpretation to determine if the project were allowed, conditionally allowed, or prohibited. The same would be true in the event that project development were proposed inconsistent with zoning and shoreline regulations.

#### *10.7.3.2 Option B: Existing Seattle City Light 230 kV Transmission Corridor*

The Seattle City Light (SCL) transmission line is an existing corridor with a 230 kV line. Sharing the transmission line with SCL would likely require rebuilding the existing system of transmission lines as described in Chapter 2. Because the other utility's functioning lines could not be taken out of service during construction, new lines would be built adjacent to the existing lines. For this analysis, it was assumed that that width of the existing corridor would

[7] Determination of whether additional/new components added to an existing utility would be considered a new use or expansion of an existing use would be made by the jurisdiction(s) with approval authority at the time of permit submittal.

not need to be expanded. However, if it was expanded, additional adjacent property may need to be purchased in order to maintain adequate, safe clearance between construction activities and the operating line and thus similar conversions of properties or houses could occur as with existing corridors under Alternative 1, Option A. This would likely be a minor impact, because this likelihood is considered to be low.

In addition, some west-east transmission lines would be needed outside of the existing north-south corridor to connect to the existing substations, leading to some land or easement purchases and changes in land use. Additional land would also be needed for a new Lakeside substation as described in Chapter 2.

This option would have some of the same zoning consistency issues as Option A (Table 10-2) including potential for co-location with a high consequence land use, since it also crosses the OPLC pipeline in places and is parallel to it in other locations. Option B would not affect Lake Washington shorelines to the extent that Option D would, but could intersect shorelines associated with other waterbodies such as Kelsey Creek.

#### 10.7.3.3 Option C: Underground Transmission Lines

An underground line placed within a new corridor would be narrower than Alternative 1, Option A's overhead line, because the underground facilities require a more narrow clear zone. A new corridor for underground transmission might require less land, easement area, or homes to be purchased than for Option A. As with Option A, PSE would attempt to avoid the removal of residential structures in establishing a route for the line. Potential impacts for a new corridor would likely be minor in nature due to the relatively narrow corridor and more limited likelihood for land conversion to utility uses than with Option A.

With this option, the underground transmission line could be entirely or partially constructed through existing PSE 115 kV overhead transmission line rights-of-way, other utility rights-of-way (such as roadway or rail corridors), or new rights-of-way. As with Option A, new property could be needed for new corridors or additional property could be needed to widen existing corridors depending on space available. However, existing underground utilities present constraints in siting new underground corridors in the highly developed study area. This option has a lower potential for land use impacts than Option A, because of the reduced corridor width. Overall, impacts would be expected to be minor.

Alternative 1, Option C would have the same general zoning and shoreline constraints as Option A (Table 10-2). An underground transmission line would have the same potential constraints as Option A's overhead line regarding co-location with OPL's pipeline. Co-location may not be allowed if the uses are determined to be incompatible or unsafe. If co-location were not permissible, either the pipeline would need to be relocated (likely given the prior easement rights owned by PSE in the corridor as described in Chapter 16) or the proposed transmission line would need to be sited elsewhere, with consideration given to current easement holders of the utility corridor.

#### 10.7.3.4 Option D: Underwater Transmission Line

This option would be subject to the same types of zoning and shoreline restrictions as Alternative 1, Option A (see Table 10-2). The in-water component would not generate changes to land use; the potential for land use impacts would begin at the shoreline where the line would transition from in-water to on-land and where vaults would be needed. PSE would acquire land for vaults either outright purchase or through easements.

Once away from the shoreline area, the potential changes to land use from the transmission line would be the same as for Option A (minor to significant), with two lines routed generally west to east (either overhead or underground) to connection points, as described in Chapter 2. There are some existing east west corridors that could be used, except in the Kirkland area. In that location, a new corridor would be required to provide the connection to substations.

In Beaux Arts Village and Yarrow Point, a transmission line would be prohibited in the Shoreline Aquatic environment, which includes Lake Washington. Therefore, if proposed in those communities, the underwater component could have a significant impact due to inconsistency with shoreline regulations.

### 10.7.4 Alternative 2: Integrated Resource Approach

A number of the communities in the Alternative 2 study area have energy policies that would appear to specifically support some of the types of actions and features of this alternative. There are no local planning policies that would oppose or discourage the components of Alternative 2, although some development regulations would prohibit some components in certain locations as described below.

#### 10.7.4.1 Energy Efficiency and Demand Response Components

These components would have negligible land use impacts, with no new structures and no purchases of land required. They would not likely lead to changes in use of properties or housing impacts, and would therefore have negligible impacts to land use and housing. No development regulations have been identified that would prohibit these components.

#### 10.7.4.2 Distributed Generation Component

This component would likely have negligible land use impacts because it would involve adding small-scale infrastructure (generation sources such as anaerobic digesters, gas turbines, reciprocating engines, microturbines, or fuel cells). The component would not lead to changes in existing land use or housing impacts. If these types of facilities were installed in conformance with all applicable development regulations, consistency with adjacent land uses would be ensured, and these types of facilities would not create trends for changes in land use.

Local development regulations would address specific site compatibility issues for such structures, ensuring proper setbacks from property lines, appropriate access, and site landscaping; any specific height, bulk, and scale limitations established by local zoning codes would be applied as the site was being designed. Generally, these facilities would not be considered utility uses, but would be regulated along with the primary land use on the site.

Table 10-3 shows four cities in the Alternative 2 study area that have zoning designations (including shorelines) where these types of facilities may not be allowed or where they could be restricted in size.

**Table 10-3. Land Use Restrictions for Alternative 2**

| Study Area Community | Use Restriction |
|---|---|
| Beaux Arts Village | New utilities prohibited in following shoreline environment designation: Urban Conservancy, Residential, and Aquatic |
| Kirkland | Utility production and processing facilities[1] prohibited in these shoreline environment designations: Natural and Aquatic |
| Redmond | No additional utilities allowed in: the utility corridor along the west side of the edge of Lake Sammamish containing the City's sewer line |
| Renton | • Electrical power generation and co-generation **is** permitted as an accessory use when located more than 100 ft. from any property zoned for residential use and production of less than 10 MW of electricity. In the CO zone the use must be accessory to a medical institution.<br>• All utilities prohibited in: Shoreline Natural shoreline environment designation |

[1]"Facilities for the making or treatment of a utility such as power plants and sewage treatment plants or parts of those facilities" (Kirkland Municipal Code 83.80.130).

#### *10.7.4.3 Energy Storage Component*

This component would likely have minor to moderate land use impacts. PSE would locate the site for this component near the load to be served. It would ideally be adjacent to one or more existing substations, and would occupy approximately 6 acres, Similar to the substation component of Alternative 1, Option A, an existing substation footprint could be expanded to accommodate the site, or PSE could place the facility on land not adjacent to one of its substations, which PSE may not currently own. Existing housing could be purchased and converted to this new utility use. There would be a potentially negligible to minor land use/housing impact considering that 6 acres is a relatively small land area compared to the land area of the Eastside. A 6-acre site could require removal of more than one home or business depending on location.

#### *10.7.4.4 Peak Generation Plant Component*

Three peak generation plants could be placed on sites of approximately 1 acre, and each would be adjacent to or within existing PSE substations on the Eastside. Land use impacts would be similar to but smaller than for the substation component of Alternative 1, Option A. As with the energy storage component, peak generation plants would likely encompass entire sites near the load to be served. These sites would need to be purchased and maintained by PSE, converting some land uses, possibly including housing, to a utility land use (or the use classification determined by the governing authority). Impacts would be minor to moderate but similar to energy storage as there would be relatively compact, types of development (compared to transmission corridors).

The local code restrictions described above (see Table 10-3) would likely apply to peak generation plants, and the same type of local site review (setbacks, height, and other parameters) would occur.

## 10.7.5 Alternative 3: New 115 kV Lines and Transformers

### *10.7.5.1 Substations*

As discussed in Chapter 2 and shown in Table 2-3, provision of the new 115 kV transmission lines would necessitate expansion of five existing substations for this alternative, as opposed to the one substation needing alteration with Alternative 1. Table 10-4 below describes the existing land uses around the substation sites that would be expanded with Alternative 3. One of the facilities, the Lakeside substation, would likely expand onto property already owned by PSE. Work at the other substations listed would require purchase of property.

**Table 10-4. Alternative 3 - Existing Land Uses around Substations Needing Expansion**

| Substation | Percent Expansion | Abutting Land Uses |
|---|---|---|
| Hazelwood (Newcastle) | 200% | Single-family residential, vacant, and other uses, with recreation (Hazelwood Park) and institutional (Hazelwood Elementary) uses in the immediate vicinity |
| Clyde Hill (Bellevue) | 50-60% | Single-family residential |
| Sammamish (Redmond) | 10-20% | Utility, commercial, industrial, recreation, and vacant uses |
| Lakeside (Bellevue) | 10-20% | Industrial, institutional, vacant (and single-family residential uses across the street) |
| Talbot Hill (Renton) | 5-10% | Transportation, utility, parks and open space, multifamily residential, vacant and recreation uses |

### *10.7.5.2 Transmission Lines*

The same types of property conversions expected for the transmission line of Alternative 1, Option A, would also occur for Alternative 3, with potential purchase and demolition of homes or other uses; however, Alternative 3 would only install the new lines overhead along existing road or utility rights-of-way, and not in a new corridor. The utility easement for a new 60-mile long, 40-foot wide corridor could involve a conversion of up to 291 acres from other land uses to utilities. The potential impacts of this alternative could range from minor to moderate, depending on location and specific adjacent uses. As with Alternative 1, this alternative would likely be consistent with local planning policies stating a need to plan for adequate power supply.

The same types of development regulations that would apply to Alternative 1would be applied by study area communities to Alternative 3. This alternative would be subject to the same zoning and shoreline restrictions as Alternative 1, Option A (see Table 10-1).

## 10.8 WHAT MITIGATION MEASURES ARE AVAILABLE FOR POTENTIAL IMPACTS TO LAND USE OR HOUSING?

Planning, locating, and designing the project consistent with local policies and regulations would generally ensure compatibility of land uses.

To limit impacts associated with conversion of properties to utility uses, PSE could apply the following measures:

- Use existing utility corridors or properties already in PSE-ownership to the extent feasible.
- Underground all or part of the line, or place the line through Lake Washington.
- Provide relocation assistance for any residents displaced or businesses purchased.

## 10.9 ARE THERE ANY CUMULATIVE IMPACTS TO LAND AND SHORELINE USE OR HOUSING AND CAN THEY BE MITIGATED?

The project would add utility infrastructure to a highly developed area where it is already commonly found, expected to exist, and needed to support existing and future land uses. No cumulative adverse impacts are expected.

## 10.10 ARE THERE ANY SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS TO LAND AND SHORELINE USE OR HOUSING?

No significant unavoidable adverse impacts to land use or housing are expected with any of the action alternatives. Alternative 1, Option A, would likely have significant impacts if a new transmission corridor was developed, but mitigation is available as discussed above.

The No Action Alternative could lead to unavoidable significant adverse impacts in the long term if unreliable power supply were to outweigh the regional factors amenable to growth and development, leading to development inconsistent with regional growth plans and targets.

# CHAPTER 11. VIEWS AND VISUAL RESOURCES

## 11.1 HOW WERE VIEWPOINTS AND VISUAL RESOURCES IN THE COMBINED STUDY AREA EVALUATED?

This chapter describes the *visual resources*, *views*, and *viewpoints* within the combined study area (Figure 1-4 in Chapter 1).

The importance of visual resources is subjective, based on the viewer's perspective, but study area communities have identified and characterized visual resources in their planning documents and regulations. For this EIS, viewpoints and visual resources were characterized by reviewing comprehensive plans, shoreline master plans (SMPs), and regulatory codes of study area communities (see Appendix G). For this programmatic EIS, subarea plans were not reviewed. A list of key viewpoints and visual resources can be found in Section 11.3.

The EIS Consultant Team also considered comments received during the scoping process for the EIS. Comments received during scoping expressed concern that a 230 kV transmission line would negatively impact views from individual houses, including territorial and neighborhood views. For this reason, in addition to public places with views, the analysis focused on potential effects on views from residential areas with single-family homes. Scoping comments also noted that new transmission lines could negatively affect the look of Eastside neighborhoods and cities (City of Bellevue, 2015c). For this programmatic EIS, regional-scale visual resources were evaluated; individual or specific neighborhoods and backyards were not evaluated due to their site-specific nature. Specific potentially affected neighborhoods will be evaluated as part of the Phase 2 EIS.

**Views and Visual Resources Key Findings**

Alternatives 1 and 3 could cause significant impacts to views and visual resources due to vegetation removal and obstruction of scenic views. Overhead transmission lines have the greatest potential to affect residential views. Of all overhead options, 230 kV lines in a new corridor would have the greatest visual impact (Alternative 1, Option A), while using the existing Seattle City Light 230 kV corridor would have a lower impact (Alternative 1, Option B).

Undergrounding the transmission line or placing it underwater (Alternative 1, Options C and D) would reduce impacts. If new overland corridors are required, significant impacts may result due to loss of vegetation.

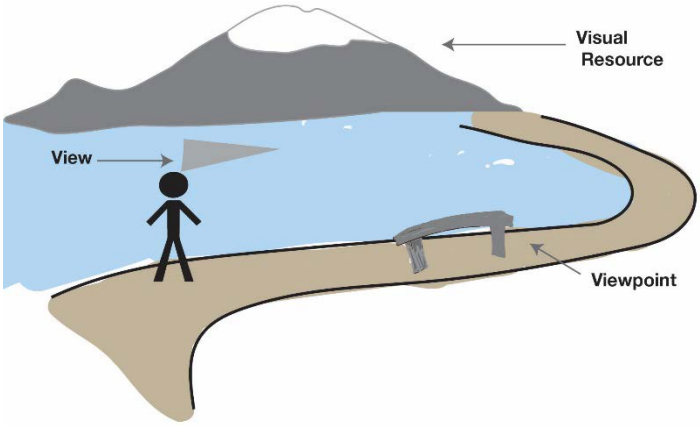
Using existing corridors for the 230 kV lines (Alternative 1) could affect fewer residential properties than using 115 kV lines (Alternative 3). However, the taller poles used in Alternative 1 would have a greater contrast with the existing visual setting.

Energy storage facilities (Alternative 2) could result in significant impacts. Other components, such as peak generation plants or distributed generation facilities, could have moderate impacts depending on size and location.

### 11.1.1 Visual Resources, Views, and Viewpoints Defined

**Visual resources** are generally defined as natural and constructed features of a landscape that are viewed by the public and contribute to the overall visual quality and character of an area. Such features often include distinctive landforms, water bodies, vegetation, or components of the built environment that provide a sense of place, such as city skylines.

**Figure 11-1. Views, Viewpoints, and Visual Resources**




**Views** are defined as the observation of a visual resource from a particular location, such as a private residence or a public park.

**Viewpoints** are places from which views can be seen. They are typically associated with residential properties or publicly accessible recreation areas, such as parks, trails, and open spaces or along scenic roadways or in civic centers (Figure 11-1).

### 11.1.2 Property Values, Views and Visual Resources

During the scoping process, commenters voiced concern over the potential for property values to decrease due to visual impacts associated with the project. The EIS Consultant Team mapped properties that the King County Assessor has identified as having a view that, in the Assessor's judgment, affects the value of those properties to varying degrees. While this dataset does not provide an exhaustive assessment of properties with views, or a precise method of scoring views, it is useful to describe general patterns of view properties in the combined study area. Assessor's information also identifies properties with a view of a power line that, in the judgment of the Assessor, lowers the property valuations. These data were also mapped and reviewed. Differences in actual assessed values were not useful for this evaluation because the data were inconclusive as to whether the reason parcels were valued differently was because of use restrictions within a power line easement, because of visual impacts, or for some other reason.

## 11.2 WHAT ARE THE RELEVANT PLANS, POLICIES, AND REGULATIONS?

Many of the study area communities highlight the importance of visual resources, and their planning documents include policies that emphasize the benefits of visual resources. There is, however, little specific guidance in adopted comprehensive plans regarding the placement of new utilities and reduction of impacts to views and visual resources. Most of the plans emphasize the visual benefits provided by large parks and natural areas, wooded neighborhoods, water bodies, mountain views, and city skylines. In general, local plans

support the preservation of existing public viewpoints and views that are enjoyed by a "significant number" of residential properties. In many of the smaller suburban communities (such as Clyde Hill), diverse views are considered to provide a positive impact on property values (City of Clyde Hill, 2015a).

Most of the study area communities have adopted plans that prioritize protection of views of shorelines, as well as views from the shoreline, and consider the impact of utility location in shoreline areas. These policies are outlined in adopted SMPs. In most of the applicable SMPs, utility development on shoreline areas is discouraged but allowed if no other alternative is available. In such instances, it is usually suggested that the utility lines should be buried underground or placed within existing utility corridors to reduce visual impacts. A detailed summary of the applicable plan goals and policies from study area communities is provided in Appendix G.

The municipal codes of King County, the City of Newcastle, the City of Sammamish, and the Town of Beaux Arts Village do not include regulations that specifically guide development of new utilities in order to reduce impacts to views or visual resources. The Cities of Issaquah, Redmond, and Renton have regulations that place a general emphasis on screening utility infrastructure by using aesthetically pleasing fences, materials, or landscaping. The City of Bellevue provides specific guidance on how new electrical infrastructure should be screened. A more detailed summary of the applicable codes is provided in Appendix G.

A general overview of each community's plans, policies, and regulations that are applicable to the visual environment is provided below. All of the communities have recently updated or are in the process of updating their comprehensive plans. The EIS Consultant Team reviewed both draft comprehensive plan chapters and current, adopted versions for each community. A summary of the primary visual resources and viewpoints identified through that review is provided in Section 11.3.

### 11.2.1 King County

The 2013 King County Comprehensive Plan (King County, 2013), and the incorporated SMP policies, emphasize the value of visual resources, particularly those related to shorelines, open space, and rural areas. These plans do not include specific guidance regarding the placement of new utilities and reduction of impacts to views and visual resources. The King County Code (Title 21A, updated April 15, 2015) does not include regulations that guide development of new utilities to reduce impacts to views or visual resources (King County, 2015c).

### 11.2.2 Beaux Arts Village

Neither the Beaux Arts Comprehensive Plan nor the Beaux Arts Village Municipal Code (last updated April 9, 2013) explicitly discusses visual resources in regard to utility infrastructure (Town of Beaux Arts Village, 2013, 2014a). The Beaux Arts Village SMP does prohibit new utilities in the Urban Conservancy, Shoreline Residential, and Aquatic Shoreline areas. The SMP states that all development on navigable water should consider impacts to public views (Town of Beaux Arts Village, 2014b).

### 11.2.3 Bellevue

In its comprehensive plan, Bellevue characterizes itself as being a "City in a Park" as a result of its "breathtaking vistas, viewpoints, and recreation areas" (City of Bellevue, 2015a). Inherent to its character are "tree-lined streets, public art, vast parks, natural areas, wooded neighborhoods, two large lakes, and mountain views." The Bellevue Comprehensive Plan states that views from public places of water, mountains, skylines, or other unique landmarks should be identified and preserved as valuable civic assets (City of Bellevue, 2015a).

The City of Bellevue seeks to provide utility service in a manner that balances adequate, reliable utility service and the aesthetic impacts of the infrastructure associated with such service (City of Bellevue, 2015a). The Bellevue Comprehensive Plan states that utilities should be developed and maintained to the appropriate levels of service to accommodate future growth. It also states that utility service should be provided in a way that considers the aesthetic compatibility with surrounding uses (City of Bellevue, 2015a).

The Bellevue City Code (current through August 3, 2015) regulates how electrical utility facilities are developed, setting design standards to reduce visual impacts. It also requires that visual and aesthetic impacts associated with an essential public facility (EPF) are "mitigated to the greatest extent technically feasible" (City of Bellevue, 2015b).

An **Essential Public Facility** (EPF) is a concept established by state law (RCW 36.70A.200 and WAC 365-196-550), intended to ensure that necessary facilities that are typically difficult to site can, in fact, be placed appropriately.

The City of Bellevue is updating its SMP; the draft SMP under consideration was not reviewed for this Phase 1 Draft EIS.

### 11.2.4 Clyde Hill

The comprehensive plan for Clyde Hill notes the City's views of Lake Washington, the Seattle skyline, Meydenbauer Bay, Kirkland, and downtown Bellevue (City of Clyde Hill, 2015a). The Clyde Hill Municipal Code (current through June 9, 2015) states that views contribute to the economic vitality of the City, particularly because the community is mostly residential and relies upon property taxes. The primary focus of the City's regulations regarding views is to resolve neighborhood disputes concerning landscaping (trees) and their effects on surrounding properties' exposure to views and sunlight (City of Clyde Hill, 2015b). Clyde Hill does not have an SMP.

### 11.2.5 Hunts Point

The 2014 Draft Comprehensive Plan Update for the Town of Hunts Point does not identify specific views or visual resources of importance. However, it does state that its tree code regulates the removal and replacement of significant trees to "soften the visual impacts of development" and protect the town's wooded character (Town of Hunts Point, 2014).

The Hunts Point Municipal Code (current through April 13, 2015) does not include any policies or regulations that guide development of new electrical utilities to reduce impacts to views or visual resources. However, development in general is restricted to avoid or minimize impacts to view corridors of wetlands (Town of Hunts Point, 2015). The Hunts

Point SMP does not provide explicit guidance with regard to transmission lines and their impacts on views and visual resources (Town of Hunts Point, 2012).

### 11.2.6 Issaquah

The 2014 City of Issaquah Comprehensive Plan states that, as long as the safety of the facility and emergency access are not compromised, utilities should be reasonably screened or designed so that new aboveground facilities are architecturally compatible with the surrounding area. In addition, the plan states that proposals for major utility installations, such as transmission lines and substations, must be reviewed to ensure impacts to aesthetic values and land use conflicts are minimized and mitigated (City of Issaquah, 2015a).

The Issaquah Municipal Code (current through April 20, 2015) guides how utility infrastructure should be implemented, providing height requirements and material suggestions for fences and walls depending on the location of the facility (City of Issaquah, 2015b).

The City's SMP does not provide explicit guidance with regard to transmission lines and their impacts on views and visual resources (City of Issaquah, 2013).

### 11.2.7 Kirkland

The City of Kirkland 2015 Comprehensive Plan Update (Kirkland 2035) includes design principles and development regulations that are used, in part, to protect public views (City of Kirkland, 2015a). The plan states that public views of the city, surrounding hillsides, Lake Washington, Seattle, the Cascades, and the Olympics should be protected. Public streets and spaces and view corridors along the Lake Washington shoreline are identified as viewpoints that should be preserved as development occurs.

Under Kirkland 2035, private views are protected only where such views are specifically mentioned in the neighborhood plan chapters of the comprehensive plan and in the City's development regulations. However, the plan establishes a policy that states the siting analysis for new and expanded electrical transmission and substation facilities should address land use and sensitive areas, as well as provide mitigation to minimize visual and environmental impacts. It also states that new or expanded aerial transmission lines should be sited and designed to minimize impacts to critical areas, preserve trees, and reduce visual impacts, especially where views of Lake Washington, the Olympic Mountains, and view corridors are affected (City of Kirkland, 2015a).

The City of Kirkland Municipal Code (updated June 16, 2015), which includes the City's SMP regulations, states that whenever feasible, utility facilities must be located outside the shoreline jurisdiction. Should there be no alternative location; the code requires utilities to be placed so that they do not obstruct scenic views (City of Kirkland, 2015b).

### 11.2.8 Medina

The Draft 2015 City of Medina Comprehensive Plan describes Medina as a community set in a semi-wooded and heavily landscaped environment. Many residences are located in open settings with territorial views and views of Lake Washington.

The Medina Comprehensive Plan states that utilities should be placed outside of the shoreline. If this is not possible, the plan includes policies supporting the location of utilities in a manner that protects scenic views (City of Medina, 2015a).

According to the Medina Municipal Code (current through July 13, 2015), all electrical utilities should be enclosed in buildings or structures (City of Medina, 2015b). Specifications regarding the types of materials that can be used, heights of walls and fences, and setbacks are discussed in further detail in Appendix G.

Medina Municipal Code states that regional utility facilities involved in production, processing, and transmission must be located outside of the shoreline jurisdiction "unless no other feasible option exists." If no other reasonable location is found, utilities must be placed so that they do not obstruct views of a "significant number" of nearby residential properties. The code supports combining utility corridors and placing utility infrastructure underground whenever feasible.

The City's SMP states that substations, and similar primary utility facilities, are not permitted within the shoreline environment (City of Medina, 2014).

### 11.2.9 Newcastle

The Draft 2015 City of Newcastle Comprehensive Plan states that the city is "a small town situated in a lush green setting" (City of Newcastle, 2015a). The draft plan also states that utilities, including electricity, should be provided to serve the projected population growth within the planning area in a manner that is aesthetically acceptable to the community (City of Newcastle, 2015a). Specifically, the plan states that utility lines should be placed in shared utility corridors, and that utility providers should minimize visual impacts of overhead transmission lines on adjacent land uses (City of Newcastle, 2015a). The City of Newcastle Municipal Code (current through May 5, 2015) does not include any regulations that guide development of new utilities to reduce impacts to views or visual resources (City of Newcastle, 2015b). Newcastle does not have an SMP.

### 11.2.10 Redmond

The City of Redmond has views of Mount Rainier, Mount Baker, the Cascade Mountains, Lake Sammamish, the Sammamish River, Bear and Evans Creeks, and the open and pastoral vistas in the northern Sammamish River valley (City of Redmond, 2015a). City policies recognize the aesthetic benefits derived from views of natural landscapes, wildlife, water bodies, and shorelines, and also note that unique public views can set apart one community from another and define the unique character of a place. As such, the Redmond Comprehensive Plan identifies specific view corridors that should be preserved, some of which are located in the combined study area (see Appendix G). In general, the plan highlights ways to reduce visual impacts to shorelines, open space, and residential views.

The City's SMP is embodied in the City's comprehensive plan (City of Redmond, 2015a). It states that transmission lines and cables should be placed underground in shoreline zones. If private utility owners place utility corridors on public property within the shoreline, they must integrate them with trails and other open space connections to the shoreline, whenever it

is possible. However, utilities cannot encroach on shoreline views unless "no feasible alternative exists." The SMP requires utilities to incorporate screening and landscaping to maintain the aesthetic quality of the shoreline (City of Redmond, 2015b).

The Redmond Zoning Code promotes placement of utilities underground to improve the appearance and aesthetics of public ways, but this does not apply to electrical lines over 50 kV unless it is economically feasible (City of Redmond, 2015b).

### 11.2.11 Renton

The City of Renton's 2015 Comprehensive Plan seeks to preserve the natural setting as an important component of residents' quality of life, including trees and clear mountain views (City of Renton, 2015a). The comprehensive plan states that public scenic views and public view corridors should be protected, including Renton's "physical, visual, and perceptual linkages to Lake Washington and Cedar River." The plan also states that natural forms, vegetation, distinctive stands of trees, natural slopes, and scenic areas that "contribute to the City's identity, preserve property values, and visually define the community neighborhoods" should be preserved (City of Renton, 2015a).

The City of Renton's SMP also promotes preservation of scenic and aesthetic qualities derived from natural features of the shoreline, such as vegetative cover and shore forms. This includes reducing the visual prominence of structures, including associated light and glare. In addition to these requirements, the SMP also prohibits utilities in the Shoreline Natural shoreline environment designation (City of Renton, 2011).

The Renton Municipal Code (current through May 18, 2015) states that local utility services that are permitted within the shoreline are "subject to standards for ecological protection and visual compatibility." It also states that a structure or other facility enclosing an electrical substation, or other aboveground public utility built in the shoreline, should be housed in a building that conforms with the architecture of surrounding buildings (current or planned), as well as the applicable design standards of the zoning district in which it is located (City of Renton, 2015b). Details regarding the height and materials of the surrounding walls/fence and screening methods are provided in Appendix G. The municipal code states that new electrical distribution lines should be placed underground if they are located within the shoreline. However, in the event underground placement is not feasible, visual impacts must be "minimized to the extent feasible" (City of Renton, 2015b).

### 11.2.12 Sammamish

The City of Sammamish has adopted policies to protect views, particularly those of shorelines and water bodies. The Draft 2015 City of Sammamish Comprehensive Plan states that "residents identify streams, lakes, forested areas and other natural features as defining features of the City, and they believe the preservation of these natural features should be an important priority" (City of Sammamish, 2015a). City policies also recognize the positive aesthetic benefits associated with Sammamish parks and recreation facilities, and suggest that they should be maintained to "ensure the longevity of their benefits" (City of Sammamish, 2015a).

The Draft Comprehensive Plan also supports identifying and protecting, where appropriate, scenic areas such as designated view corridors, with an emphasis on providing visual public access to public shorelines, such as Lake Sammamish, Pine Lake, Beaver Lake, and all tributary waters and wetlands in the city. The plan includes policies that utilities should be placed underground if it is "physically and financially feasible" (City of Sammamish, 2015a). If undergrounding utilities is not possible, aboveground utility facilities should be aesthetically compatible with the surrounding area. The plan includes policies that visual impacts associated with towers should be minimized in the community.

The City of Sammamish Municipal Code (current through March 17, 2015) does not include regulations that guide development of new utilities to reduce impacts to views or visual resources. There are, as of yet, no designated view corridors in Sammamish (City of Sammamish, 2015b). However, the Sammamish SMP protects visual access to the shorelines (City of Sammamish, 2011).

### 11.2.13 Yarrow Point

The 2014 Town of Yarrow Point Comprehensive Plan states that the Town's long-term vision for electrical utility infrastructure is to have it placed underground (Town of Yarrow Point, 2015). This is reflected in the Yarrow Point Municipal Code (current through June 10, 2014), which states that existing overhead electrical facilities should be converted to underground facilities prior to any system modification, and any new electrical facilities should be installed underground (Town of Yarrow Point, 2014). This preference for undergrounding utilities is also discussed in the SMP, which states that new utilities should be located outside of the shoreline jurisdiction whenever feasible. Utilities that must be located in the shoreline must be placed in existing rights-of-way (Town of Yarrow Point, 2012).

## 11.3 WHAT ARE THE VISUAL RESOURCES, VIEWPOINTS, AND VIEWS IN THE COMBINED STUDY AREA?

### 11.3.1 Visual Character on the Eastside

The Eastside is a landscape bounded on the east and west by large lakes, centered in the Puget Sound region where the horizons are defined by the Cascade Mountains to the east and Olympic Mountains to the west. Except for the southeast portion of the Eastside, the topography consists of low, rolling hills rising from approximately 20 feet above sea level near Lake Washington, to hilltops 400 to 500 feet above sea level. The highest points in the Eastside are in the southeast portion, where topography rises to approximately 1,200 feet in Newcastle and 1,400 feet in Bellevue. Cougar Mountain, a natural area in unincorporated King County, rises to 1,614 feet.

The higher elevation areas and areas directly adjacent to the lake shorelines generally afford the widest views. Oftentimes, the clearing associated with residential development can result in the creation of new view corridors. However, due to the extensive tree cover and rolling topography common throughout the Eastside, views are often limited despite the presence of

residential development (Figure 11-2). Developed shoreline and hilltop areas are the exception; these areas tend to have less tree cover and more extensive views.

**Figure 11-2. Wooded Neighborhood in Bellevue**

From the more open shorelines and hilltops, portions of Lake Washington, Lake Sammamish, the Cascades, and the Olympics are generally visible. The skylines of downtown Seattle and downtown Bellevue are also visible from many of these same areas. There are also areas throughout the Eastside where closer territorial views are available. Because of the tree cover generally found throughout the Eastside, these territorial views are often views of wooded hillsides with a few houses or other structures visible among the trees. A few areas are dominated by more urban views, including freeways and commercial development.

Several existing overhead electrical transmission corridors cross the Eastside. These are typically areas cleared of trees that abut single-family and multifamily residential development over much of their length, but they also cross commercial and industrial areas.

While several neighborhoods on the Eastside have underground electrical distribution lines, most neighborhoods have overhead distribution lines. Distribution lines are typically on shorter poles than transmission lines, and they do not require as large a clear zone around the lines as transmission lines. There are also numerous other structures that are tall enough to protrude into views, including buildings and cell phone towers.

In residential areas, single-family homes and low-scale multifamily buildings mostly range from 15 to 35 feet in height. In commercial areas, building heights are mostly less than 60 feet, but in some areas mid-rise and high-rise development extends much higher.

### 11.3.2 Visual Resources

Many visual resources are documented in local plans and regulations as being important to Eastside communities (Appendix G). Comprehensive plans note the visual benefits provided by natural features, such as parks and open spaces, as well as built features that provide character and identity to the area, such as the Seattle skyline. For this programmatic EIS, visual resources are defined as areas that are viewed from a particular location (a viewpoint). Therefore, although plans and scoping comments discuss the visual benefits of parks (such as Bridle Trails State Park), for this analysis these are listed as viewpoints rather than visual resources because viewers generally would be located within the park to enjoy the views of the park (see Section 11.3.3).

The following features are considered to be major visual resources because they are regional in nature, and they are identified as visual resources by the study area communities:

- Cascade Mountain Range;
- Mount Rainier;
- Olympic Mountain Range;
- Lake Washington;
- Seattle skyline;
- Issaquah Alps (Cougar Mountain, Tiger Mountain, and Squak Mountain);
- Lake Sammamish;
- Sammamish valley;
- Beaver Lake;
- Pine Lake; and
- Cedar River.

These visual resources are discussed below and mapped on Figure 11-3. Several of these are also identified as important for property value assessment by the King County Assessor (King County, 2012).

The **Cascade Mountain Range** extends from British Columbia to southern Oregon. Most of the peaks are around 6,000 feet tall, although some such as Mount Rainier are much higher. Because the mountains are located 8 to 10 miles east of the easternmost study area boundary, they are visible from various private and public locations throughout the combined study area.

**Mount Rainier,** the tallest peak in the Cascade Mountain Range, provides a visual landmark for the greater Seattle area (Figures 11-4, 11-6). At 14,410 feet tall, Mount Rainier "visually dominates the skyline" from numerous locations throughout the combined study area, and up to 100 miles away (The National Geographic Society, 2015).

The **Olympic Mountain Range** is on the Olympic Peninsula, west of Puget Sound. The highest peak, Mount Olympus, is 7,980 feet tall. The Olympic Mountain Range can generally be seen in the background anywhere there are views of the Seattle skyline (Figure 11-7).

**Lake Washington**, at 34 square miles, is the largest lake in King County. It separates the city of Seattle from the Eastside, with Kirkland, Bellevue, Beaux Arts, Hunts Point, Yarrow Point, and Renton sharing its shoreline in the combined study area (WDFW, 2015). In addition to views from residences abutting the lake shoreline, Lake Washington is visible from many properties on the hillsides above the shoreline, from taller hills within the combined study area, and from several public parks. Most views of Lake Washington from the Eastside also include Seattle and the Olympic Mountain Range in the background (Figure 11-7).

The **Seattle skyline** includes Seattle's tallest buildings, such as the Space Needle, the Columbia Center, and Two Union Square. Located west of Lake Washington, the skyline is visible from most locations in the combined study area that have views of the lake. Residents on the highest hills on the Eastside, such as in Newcastle and on Cougar Mountain, also have a view of the Seattle skyline (Figure 11-7).

**Cougar, Tiger, and Squak Mountains** are part of the Issaquah Alps and are prominent features in the southern portion of the combined study area. These large natural areas include King County's Cougar Mountain Regional Wildland Park, Tiger Mountain State Forest, and Squak Mountain State Park. Ranging from approximately 1,600 to 3,000 feet in elevation, these peaks are visible from many residential locations in the southwest portion of the combined study area.

**Lake Sammamish** is visible from shoreline residences, many other properties on the hillsides above the shoreline, and from several public parks (Figures 11-8, 11-9).

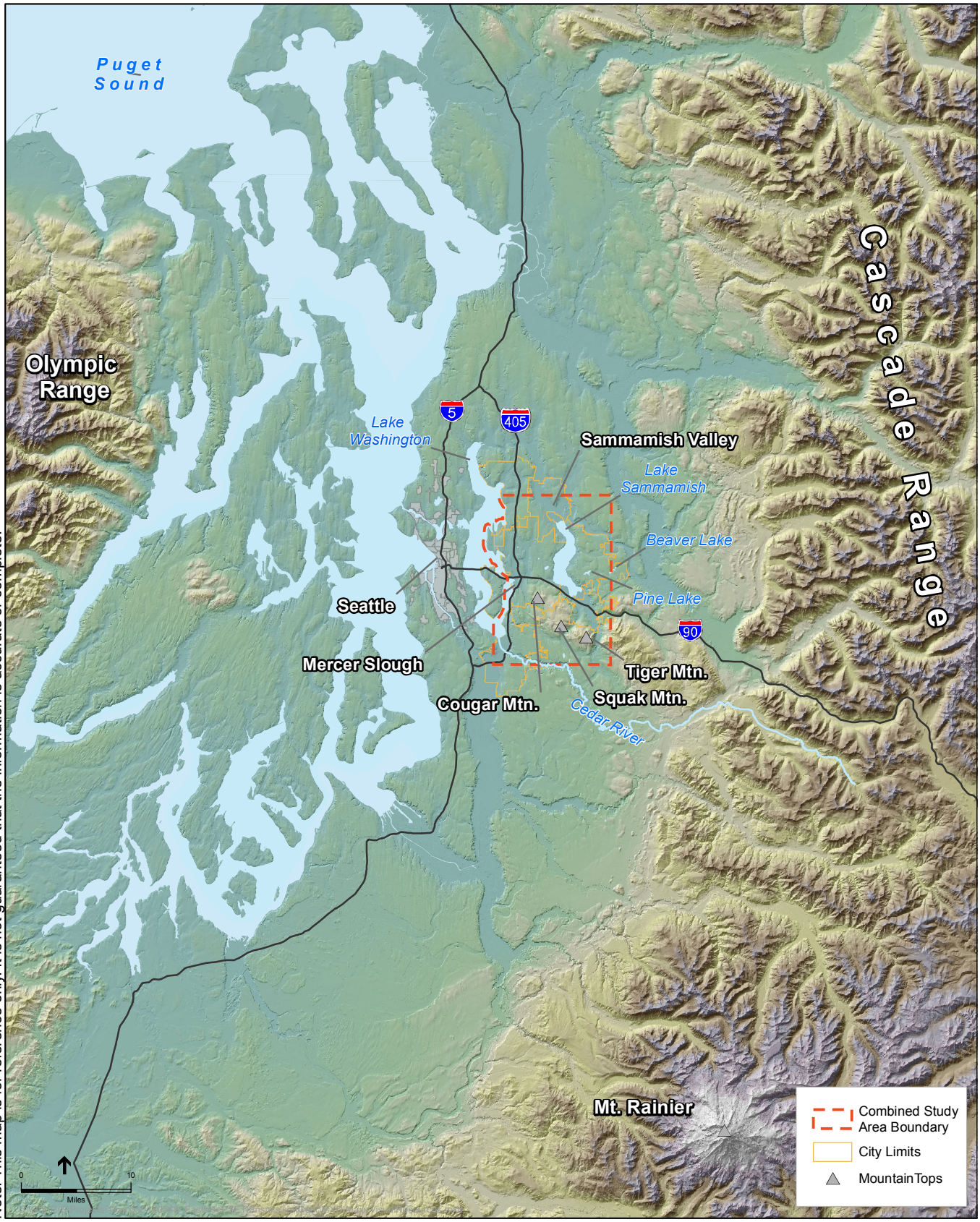
The **Sammamish valley** is in Redmond, north of Lake Sammamish beginning at Marymoor Park. The northern portion of the valley is composed of recreational and agricultural lands.

**Beaver Lake** is a 79-acre lake in Sammamish, east of Lake Sammamish. It is surrounded by residential development and Beaver Lake Park (King County, 2015a).

**Pine Lake** is an 88-acre lake in Sammamish, surrounded by residential development and Pine Lake Park (King County, 2015b).

The **Cedar River** is a 45-mile-long river that originates in the Cascade Mountain Range and flows through Renton, emptying into the southern portion of Lake Washington. Its primary viewpoint is from the Cedar River Trail and Park.

Other, smaller features that are considered to be visual resources include small water bodies, parks, and natural areas. Natural areas and parks are described in Chapters 5 and 12, and listed in Appendix G.




Note: This map is for reference only. It is not guaranteed that the information is accurate or complete.

SOURCE: King County 2015; ESA 2015; WA Ecology 2014.

Energize Eastside EIS 140548

**Figure 11-3**

Major Visual Resources

**Figure 11-4. Mount Rainier View from a Neighborhood in Northwest Bellevue**

**Figure 11-5. View of the Bellevue Skyline**

**Figure 11-6. View of Mount Rainier from Renton**

**Figure 11-7. View of Lake Washington, Seattle Skyline, and the Olympic Mountain Range from a Neighborhood in Renton**

**Figure 11-8. View of Lake Sammamish and the Cascades from Neighborhood in Northeast Bellevue**

**Figure 11-9. Lake Sammamish**

### 11.3.3 Public Viewpoints

According to the comprehensive plans described in Section 11.2, most public viewpoints in the combined study area are provided at parks, trails, and public open spaces. However, they may also be located in less obvious areas, such as along roadway corridors or municipal buildings. Viewpoints and important visual or aesthetic resources that have been identified as such by local communities through their comprehensive plans or other policies are described in greater detail in Appendix G. The EIS Consultant Team used City websites and GIS data to identify parks, trails, and open spaces that provide views, both of visual resources or of the parks themselves. These identified public viewpoints are summarized in Table 11-1. Figure 11-10 shows the larger parks, trails, and public open spaces. Smaller parks are not shown on the figure, but will be considered in the project-level analysis if potentially affected by any of the Alternatives evaluated in Phase 2 of this EIS.

**Table 11-1. Public Viewpoints**

| Jurisdiction | Major Parks, Trails, and Open Spaces |
|---|---|
| Washington State Parks | Bridle Trails State Park, Issaquah to High Point Trail Site, Lake Sammamish State Park, Squak Mountain State Park, West Tiger Mountain Natural Resources Conservation Area |
| King County | Bridle Crest Trail Site, Cavanaugh Pond Natural Area, Cedar Grove Natural Area, Cedar River to Lake Sammamish Trail Site, Cougar Mountain Regional Wildland Park, Cougar/Squak/Tiger Corridor, East Lake Sammamish Trail Site, Eastside Rail Corridor, Evans Creek Preserve, Evans Creek Natural Area, Grand Ridge Park, Issaquah Creek Natural Area, Marymoor Park, May Valley 164th Natural Area, Sammamish River Trail Site, Soaring Eagle Regional Park, Soos Creek Trail |
| Beaux Arts | Western Academy of Beaux Arts (WABA) Lake Washington waterfront beach |
| Bellevue | Bellevue Downtown Park, Burrows Landing, Chesterfield Beach Park, Coal Creek Natural Area, Goddard Mini Park, Kelsey Creek Park, Lake Hills Greenbelt Park, Lake Washington Trail, Lewis Creek Park, McCormick Park, Mercer Slough Nature Park, Phantom Lake/ Larson Lake Wetland Complex, Pikes Peak Greenbelt, Robinsglen Nature Park, Weowna Beach Park, YMCA Trail |
| Clyde Hill | Clyde Hill City Park, Clyde Hill Viewpoint Park |
| Hunts Point | Wetherill Nature Preserve |
| Issaquah | The City's Central Park, Emily Darst Park, Tibbetts Valley Park, Squak Valley Park, Talus Open Space, Timberlake Park, The Tradition Plateau Natural Resource Conservation Area |
| Kirkland | David E. Brink Park, Heritage Park, Houghton Beach Park, Houghton Neighborhood Park, Lake Washington Trail, Marina Park, Marsh Park, Rose Hill Meadows, Street End Park, Watershed Park, Waverly Beach |
| Medina | Lake Washington Trail, Medina Beach Park, Viewpoint Park |

| Jurisdiction | Major Parks, Trails, and Open Spaces |
|---|---|
| Newcastle | Clubhouse Trail, East Cross Town Trail, Golf Course Trail, Hazelwood Park, Highland Trail, Lake Boren Esplanade, Lake Boren Park, Lake Washington Trail, May Creek Park, May Creek Trail, May Creek Open Space, Meadowview Trail, Mid Cross Town Trail, Olympus Trail, Terrace Trail, West Cross Town Trail, Windtree Park |
| Redmond | Bridle Crest Trail Site, Dudley Carter Park, Idylwood Beach Park, Luke McRedmond Landing, Redmond Central Connector, Reservoir Park |
| Renton | Cedar River Trail and Park, Gene Coulon Memorial Beach Park, Honey Creek Open Space, Jones Park, Kennydale Beach Park, Lake Washington Trail, Maplewood Golf Course, Phillip Arnold Park, Riverview Park, Ron Regis Park |
| Sammamish | Beaver Lake Park, Ebright Creek Park, Evans Creek Preserve, Pine Lake Park, Sammamish Landing |
| Yarrow Point | Yarrow Bay Wetlands Trail |


Note: This map is for reference only. It is not guaranteed that the information is accurate or complete.

SOURCE: King County 2015; ESA 2015; WA Ecology 2014; Issaquah 2015; Newcastle 2015; Bellevue 2015; Sammamish 2015; Renton 2015; Kirland 2015; Redmond 2015.

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**Figure 11-10**

Public Views

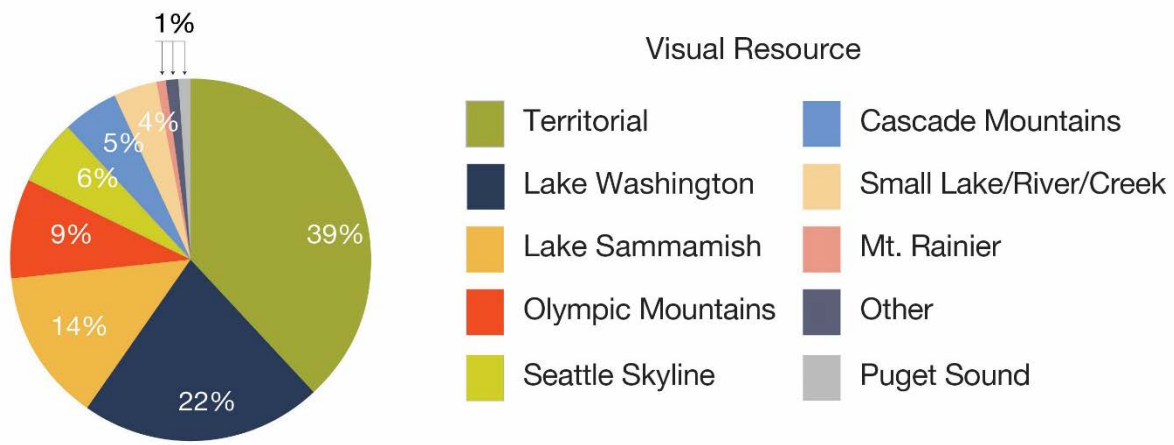
### 11.3.4 Private Viewpoints

King County Assessor data were used to identify views associated with study area properties and examine correlations between views and property values. Many of the visual resources identified earlier in the chapter are used by the King County Assessor to evaluate property values. These include views of Puget Sound, Lake Washington, Lake Sammamish, the Olympic Mountains, the Cascade Mountains, Mount Rainier, territorial views, and views of small lakes, rivers, or creeks.

Highly valued views are available from many properties in the combined study area. King County Assessor tax assessment data were used to estimate how many properties have views that are valued sufficiently to affect property values. The Assessor's office identifies properties with views, and rates those views with a view score. Because the Assessor typically makes these observations without entering the structures on the properties, this analysis likely does not identify all properties with views, but it provides a broad sense of the most likely locations where views are available (King County, 2012).

Of the 114,000 parcels within the combined study area, the King County Assessor identified 16,000 parcels (15 percent) as having a view. Figure 11-11 shows the views most commonly noted in the King County Assessor data. Many properties have more than one view (visual resource) listed, such as a territorial view and a view of mountains or an urban skyline in the background. The most common views noted within the combined study area were territorial views.

**Figure 11-11. Percentage of View Types in the Combined Study Area**



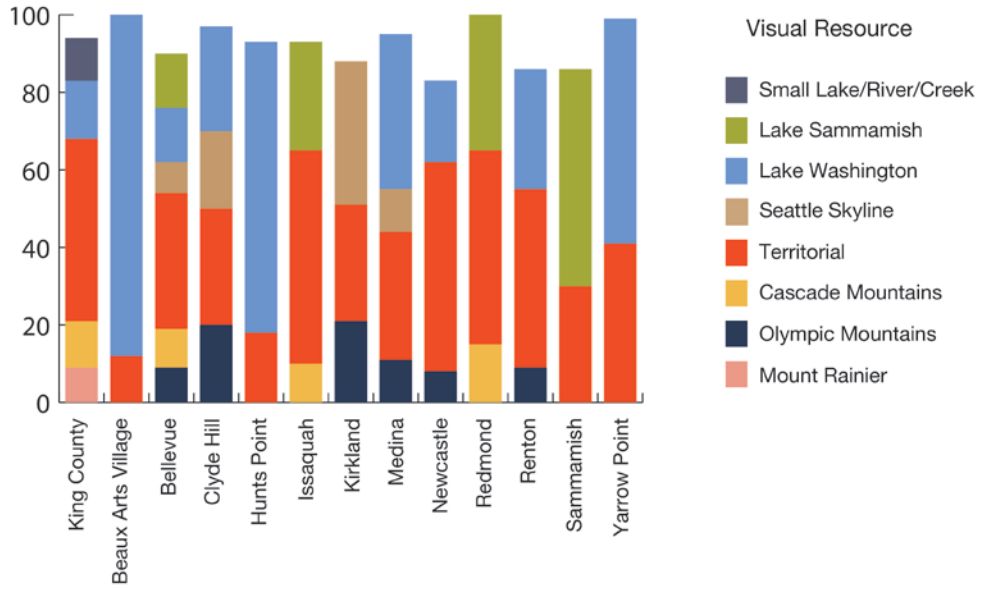

Source: King County, 2012

The King County Assessor's office assigns each property a view score, with higher values being assigned to better quality views as judged by the assigned property Assessor. Each Assessor takes into account the extent of view, obstructions, and other factors based on their external site observations. Recognizing that the data collected by the Assessors were intended for property tax assessment purposes and do not constitute an exhaustive inventory of properties with views, these observations provide a broad overview of where view properties are clustered within the combined study area. Properties with the highest view scores are

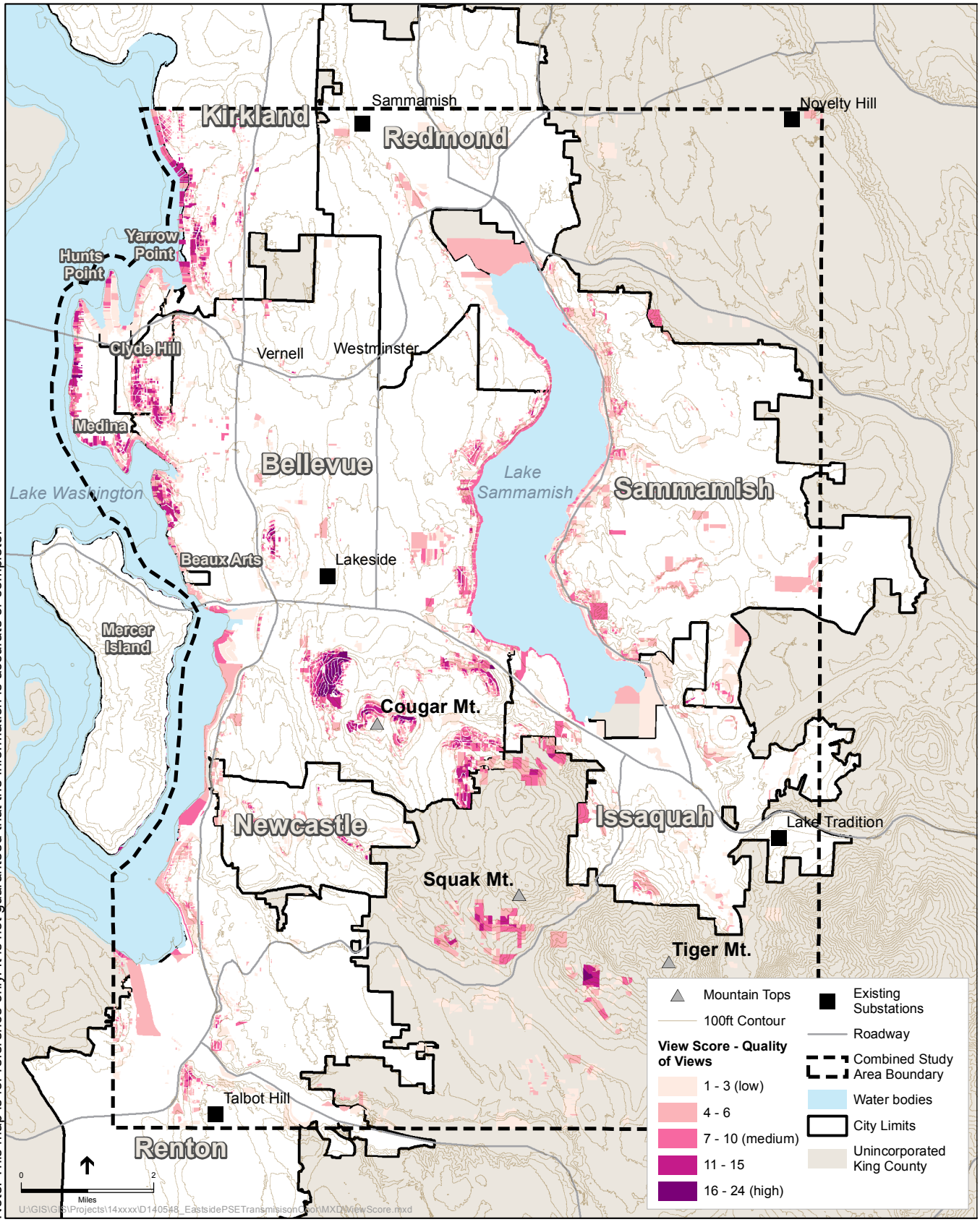
along the Lake Washington shoreline, particularly in Bellevue, Medina, and Hunts Point; in Clyde Hill at 300 to 400 feet above sea level; along the flanks and top of Cougar Mountain, and to a lesser degree on the flanks of Squak Mountain and Tiger Mountain; and along the shoreline of Lake Sammamish in Bellevue, Issaquah, Redmond, and Sammamish (Figure 11-13).

As stated above, territorial views are the most commonly noted views. Many properties have more than one visual resource noted by the Assessor; therefore, the number of views is greater than the total number of parcels. Overall, Bellevue has the highest number of view properties (6,299) in the combined study area, followed by Sammamish which has 2,205 view properties. Smaller cities, such as Beaux Arts Village, have the fewest view properties. This skew toward the larger cities is partially because larger cities have more properties overall. Figure 11-12 summarizes the percentage of common views noted in the Assessor's data in each study area community.

**Figure 11-12. Percent of Private Viewpoints Identified by King County Assessor in Study Area Communities**




Source: King County, 2012




Note: This map is for reference only. It is not guaranteed that the information is accurate or complete.

SOURCE: King County 2015; ESA 2015; WA Ecology 2014.
For more info visit www.energizeeastsideeis.org/map-propertyviews

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**Figure 11-13**

Property View Scores

### 11.3.5 Existing Light and Glare

The combined study area is mostly urbanized with residential, commercial, and industrial land uses. Daytime glare is mostly associated with reflected sunlight from building doors and windows and vehicles. Current sources of nighttime light and glare include pole-mounted streetlights, lighting from vehicle headlights and traffic, illuminated buildings and residences, and exterior lighting associated with buildings and residences (parking lots, building signs, entryways for single-family homes, etc.). Ambient nighttime light and glare levels typically depend on surrounding land uses. Commercial areas and roadways usually have the most light and glare, while agricultural lands and open space often have the lowest levels. Ambient nighttime light levels are expected to be lowest in the rural areas at the foothills of the Issaquah Alps, varied from low to moderate in single-family residential areas, and highest in commercial areas such as downtown Bellevue (Figure 10-5).

### 11.3.6 Existing Electrical Facilities

Within the combined study area, electrical infrastructure is already present including 12.5 kV lines, 115 kV lines, 230 kV lines, and transmission and distribution substations (Figures 11-14, 11-15, and 11-16).

The 12.5 kV lines distribute electricity directly to consumers. These lines are commonly constructed of wood poles up to approximately 60 feet tall; the shorter poles make the lines less visible from a distance (Antunes et al., 2006). As stated in the comprehensive plans noted in Section 11.2 most study area communities are working to underground these smaller distribution lines as new development occurs.

Typically, 115 kV lines are suspended on single wood poles and are generally 70 to 90 feet above ground (Corbin, 2007), but within the Eastside some are as short as 49 feet (Strauch, personal communication, 2015). Depending on the terrain, the poles are typically spaced 300 to 400 feet apart (Corbin, 2007).

**Figure 11-14. 115 kV Transmission Line at the Intersection of NE 8th and 136th Ave NE in Bellevue**

**Figure 11-15. 230 kV Transmission Line Crossing SE May Creek Park Road in Newcastle**

**Figure 11-16. Lakeside Substation**

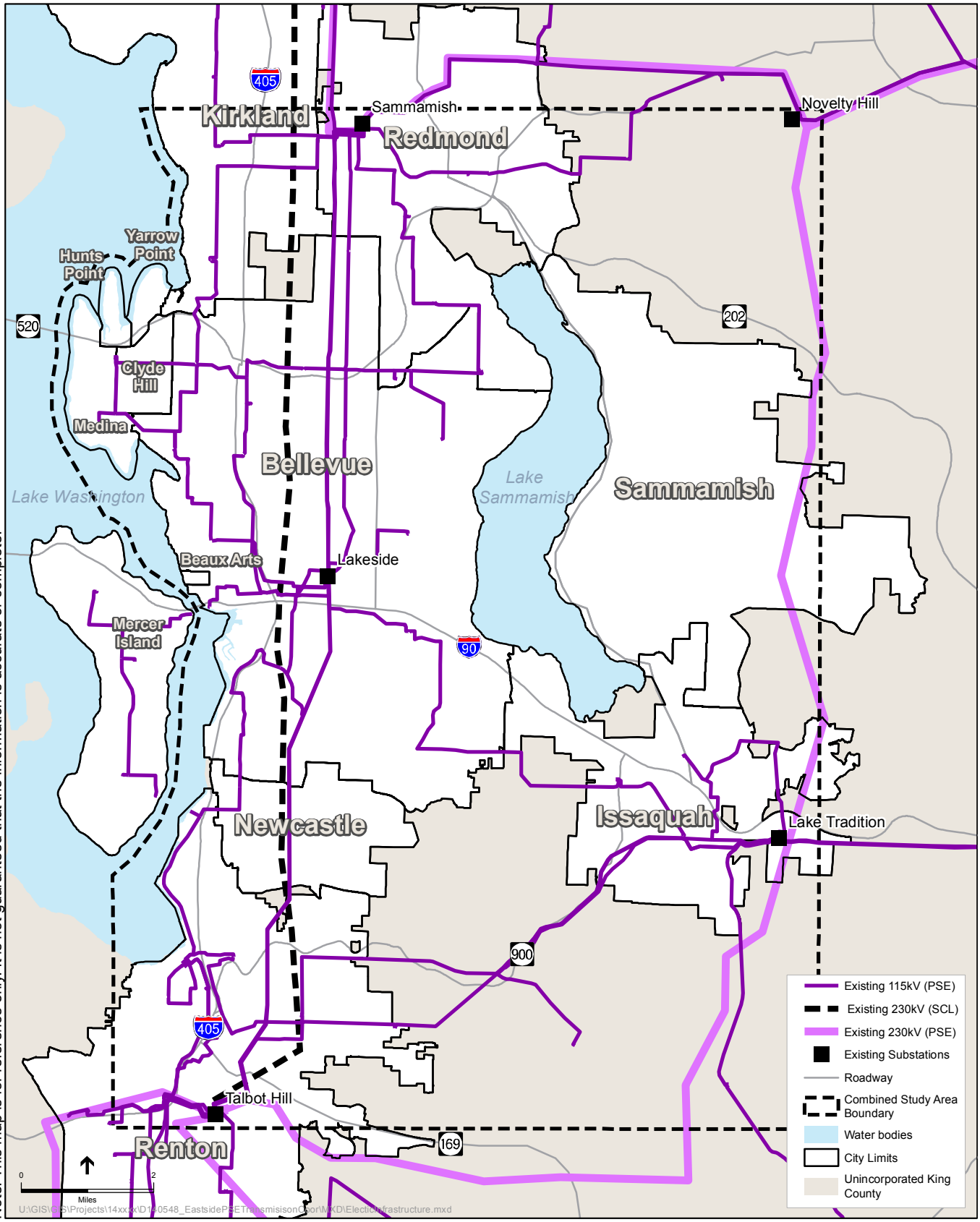
The 230 kV lines are typically suspended on steel poles that are 100 to 135 feet tall and 200 to 1,000 feet apart (Corbin, 2007).

Substations are fenced areas that contain a building and a yard with electrical equipment. On the Eastside, overhead wires typically feed the substation and the surrounding electrical distribution system.

Figures 11-14, 11-15 and 11-16 show an example of existing electrical infrastructure, including substations, 115 kV lines, and 230 kV lines located within the combined study area.

The main 115 kV PSE line enters the combined study area from the north through Redmond and heads south through the Westminster substation and the Lakeside substation, terminating at the Talbot Hill substation in Renton, with minor offshoot lines diverging from the mainline along the way (Figure 11-17).

The existing large substations (e.g., Sammamish, Lakeside, Talbot Hill, and Lake Tradition) are typically located in industrial, commercial, or vacant areas where topography and vegetation can shield the substation. Smaller substations, which are lower in height and easier to conceal, can be found adjacent to most land uses, including residential properties, but vegetation and fences are often used so that they are less noticeable. The 115 kV lines, which are more prominent, are most common along commercial rights-of-way, while 230 kV lines, with their large easements, are located in residential areas but are often buffered by vegetation.




Note: This map is for reference only. It is not guaranteed that the information is accurate or complete.

SOURCE: King County 2015; ESA 2015; WA Ecology 2014; Puget Sound Energy 2015.

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**Figure 11-17**

PSEs Eastside Electrical Transmission Infrastructure

## 11.4 HOW WERE POTENTIAL VISUAL IMPACTS ASSESSED?

Due to the programmatic nature of this EIS, a general overview of potential impacts is provided. In order to conduct a detailed visual impact assessment, the exact location, size, and configuration of the proposed project would need to be known. A more site-specific analysis will be provided in Phase 2 of this EIS process, when a specific project is proposed.

Because the value of visual resources is subjective based on the viewer, it is difficult to quantify or estimate visual impacts, particularly at a programmatic level. Available methods focus on project-level evaluations. For this programmatic evaluation, potential visual impacts were evaluated using an adaptation of the Federal Highway Administration *Guidelines for Visual Impact Assessment* (FHWA, 2015). This method, although developed for project-level review, takes into account visual compatibility (e.g., scale, form, materials); viewer sensitivity (e.g., proximity, extent, awareness, focus, protected views); and degree of impact (adverse, neutral, or beneficial). The general methods and impact assessment criteria are applicable to this evaluation. This EIS analysis used the four impact assessment criteria from the FHWA guidelines shown in Table 11-2.

**Who are the potential viewers?**

A viewer is anyone who observes project-related changes to the visual environment. For instance, viewers of new transmission lines in a transportation corridor would include drivers and pedestrians. Viewers of expanded substations in single-family residential areas would likely be residents. Knowing the type of viewer helps determine the viewer's sensitivity to the impact because it determines the context and how long they experience the view. To learn more about the types of viewers present in the combined study area, see Figure 10-4 which shows existing land uses.

**Table 11-2. Impact Assessment Criteria**

| Criterion | Description |
|---|---|
| Degree of contrast | The extent to which a viewer can distinguish between an object and its background. |
| Duration of impact | How long the visual impact would last. |
| Number of viewers | How many viewers would notice the change in the visual environment. |
| Sensitivity of the viewer | The proximity of viewers and their level of awareness. |

In most cases, viewers who are closer to new electrical infrastructure would be subject to greater visual impacts than those located farther away from the project. However, factors such as topography and vegetation are considered because they could substantially affect project visibility and perceived visual contrast levels.

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

**Minor** - If they would be noticeable but infrequent or limited in extent. The duration of the impact would be temporary, the degree of contrast would be minimal, few viewers would be impacted, or the viewers who would be impacted have a low sensitivity to the change to the visual environment.

**Who are Sensitive Viewers?** Viewers are considered sensitive if they have traveled to a viewpoint to enjoy the view, and/or they are residents who enjoy a view over the long term.

**Moderate** - If they would be long term or permanent, but limited in scope or effect. The degree of contrast could be high with few, less sensitive viewers, or the degree of contrast could be low but with more viewers with higher sensitivity to the change in the visual environment.

**Significant** - If the duration of impact would be permanent, the degree of contrast would be high, and there would be a medium to high number of viewers with medium to high sensitivity to the change in the visual environment.

A summary of how the four assessment criteria are used to assign impact classifications is provided in Table 11-3.

**Table 11-3. Applying Assessment Criteria to Assign Impact Classification**

| Impact | Degree of Contrast | Number of Viewers | Duration of Impact | Sensitivity of the Viewer |
|---|---|---|---|---|
| Minor | Low to Medium | Low to Medium | Short-Term to Long-Term | Low to Medium |
| Moderate | Medium to High | Medium to High | Short-Term to Long-Term | Medium to High |
| Significant | High | Medium to High | Permanent | Medium to High |

## 11.5 WHAT ARE THE LIKELY CONSTRUCTION IMPACTS TO VIEWS AND VISUAL RESOURCES?

### 11.5.1 Construction Impacts Considered

This section describes the types of project-related construction impacts that could affect the visual environment of the study areas. Common construction-related impacts to *views* and *visual resources* include clearing and grading or general construction activities (presence of construction workers, vehicles, or equipment).

Clearing and grading can result in a visual impact because areas that were once vegetated would be cleared, and natural undulations in the topography would be graded. Clearing and grading has the potential to permanently change the character of the area, particularly if a substantial amount of taller vegetation (such as trees) is removed or if grading noticeably alters any existing landforms. Therefore, clearing and grading is less likely to be noticeable in

areas that are already mostly flat and have limited vegetation. However, clearing in heavily forested areas, or areas with varied terrain such as hills or mountain ranges, would potentially impact foreground views, especially where extremely linear forms contrast against curved landscapes. The effects of permanent clear zones for transmission lines are discussed under operational impacts.

Construction activities often require introduction of large equipment into the visual environment. Construction vehicles and equipment often produce visible dust while clearing the right-of-way and traveling on unpaved access roadways. Increases in local traffic during construction could also result in temporary visual impacts, particularly if a given location requires numerous workers and on-site parking.

Construction-related impacts to views and visual resources from the project would be temporary and vary depending upon the component, ranging from approximately 2 to 36 months (see Table 2-3 in Section 2.3.5 for anticipated construction durations for each alternative). Impacts resulting from the project would vary throughout the combined study area, depending on the duration of the construction activities and the visibility and proximity of the construction to viewers. In general, construction impacts to visual resources and views are not considered significant because they would be temporary.

All of the alternatives would likely require some degree of construction, and therefore would produce temporary construction impacts. Impacts would likely result from creation of access roads, clearing for *transmission line* rights-of-way, or increased presence of construction vehicles, equipment, materials, and personnel, as well as the potential for increased light and glare associated with construction site lighting. Alternatives 1 and 3 present the greatest potential for visual impacts during construction, while Alternative 2 presents the least potential for visual impacts, due to the decentralized and small-scale nature of most of the components.

Vegetation clearing during construction can be either temporary or permanent. Temporary vegetation removal that can be restored after construction is discussed in Section 11.5. Adopted plans and policies for visual impacts and view protection focus on the permanent structures that remain following construction. Long-term impacts associated with permanent facilities are discussed in Section 11.6.

### 11.5.2 No Action Alternative

Under the No Action Alternative, PSE would not engage in any construction activities beyond the occasional conductor or pole replacement that is necessary for regular maintenance. Individual property owners may choose to construct solar panels, wind turbines, or rooftop generators as a means of reducing energy consumption, but the level of such activity is not expected to change. Impacts to visual resources or views are expected to be negligible.

### 11.5.3 Alternative 1: New Substation and 230 kV Transmission Lines

Impacts are described according to the major components associated with Alternative 1. The substation impacts are described first, followed by transmission line options.

Construction or expansion of a substation would be required for any of the options under Alternative 1. Substation construction would require equipment and activities that would contrast with the visual character of residential areas since it would be larger scale construction than is common in such areas. The duration of construction would also be longer than in any other location in the transmission corridor. The visual impacts from substation construction activities at the Westminster and Lakeside substation sites would be minor to moderate, depending on design and location. The Westminster substation site is surrounded by residential uses, and therefore has higher viewer sensitivity, while the Lakeside substation is surrounded by commercial, industrial, and institutional land uses and has lower viewer sensitivity. Impacts at the Vernell site (which is just south of SR 520 and surrounded by industrial and commercial uses) would be minor, due to lower contrast with the character of the areas and lower viewer sensitivity.

Under the options proposed for Alternative 1, clearing would be required for construction of the transmission line, access roads, substation expansion, and placement of accessory infrastructure (vaults, etc.) Depending on where the alignment is placed, construction could affect many viewers (such as along a major highway) or few viewers (for example, in a heavily wooded area where there is less development). The sensitivity of viewers could also vary depending on whether the alignment is placed in a highly developed area (such as along a freeway where viewers are accustomed to views of large construction projects) or within a lower density residential neighborhood (where viewers may be accustomed to other residential development but not large-scale construction equipment). The duration of impact for construction would vary depending on the amount of vegetation that needs to be cleared and other construction requirements, but could range up to 8 weeks in any given location.

#### 11.5.3.1 Option A: New Overhead Transmission Lines

Clearing, grading, and construction activities described above would be required for construction of Alternative 1, Option A. Most construction vehicles and equipment would be visible only in the immediate vicinity. Cranes would be visible from a distance. In any given location, construction activity would be visible for a few weeks. Due to the short construction period in any location, construction activities for Option A are generally expected to have minor impacts on visual resources and viewers if the work is conducted within an existing corridor or right-of-way. If a new corridor were selected, the duration would likely be longer due to the need for more extensive clearing. The longer duration and likelihood of stockpiled construction debris in or near residential areas and parks, where more sensitive viewers reside, could have a moderate impact on viewers.

#### 11.5.3.2 Option B: Existing Seattle City Light 230 kV Transmission Corridor

Alternative 1, Option B would have the same clearing, grading, and construction activities as described for Option A because the existing transmission line would need to be replaced, and the new transmission line and substation equipment would be the same or similar to Option A. Option B would require modifications to and expansion of several substations in order to make the interconnections with the existing transmission line. Minor impacts are anticipated.

#### 11.5.3.3 Option C: Underground Transmission Lines

Clearing, grading, and construction activities described above would be required for construction of Alternative 1, Option C. Undergrounding transmission lines generally requires more extensive construction effort to cut trenches and place concrete duct banks, conduits, and vaults that carry the conductors, resulting in a longer construction period. This longer construction period could result in greater short-term impacts than for Option A or B, but they would still be considered minor because of the temporary nature of construction.

#### 11.5.3.4 Option D: Underwater Transmission Lines

Alternative1, Option D would require clearing, grading, and construction activities described above. This option would require underground transmission line installation near the shoreline and underwater construction in Lake Washington. The lake is considered to be a visual resource by most nearby communities. Although submerged lines are not visible after they are constructed, barges and other construction vessels would be present on the lake for a period of time. The presence of unusual vessels would not necessarily be considered an adverse visual impact for a short duration. Due to the short construction period, Option D could have minor impacts on visual resources.

### 11.5.4 Alternative 2: Integrated Resource Approach

In general, Alternative 2 would result in fewer construction-related impacts than Alternative 1 because the components are smaller in scale and distributed over a larger area, resulting in less noticeable contrast. Viewer sensitivity is also expected to be less because construction would be small-scale and similar in nature to other construction projects in the area.

Potential construction-related activities associated with the different components (energy efficiency, demand response, distributed generation, energy storage, and peak generation plant) would result in minor impacts to visual resources. The construction impacts associated with the energy storage component would be of longer duration but would still be considered minor.

### 11.5.5 Alternative 3: New 115 kV Lines and Transformers

Under Alternative 3, clearing and grading would likely be required for widening of easements for 115 kV lines and expansion of the Talbot Hill, Sammamish, Lakeside, Clyde Hill, and Hazelwood substations. Construction equipment and personnel would be necessary at the substation sites and the 115 kV alignments.

The new 115 kV alignments would primarily be along roads, crossing through all types of neighborhoods and potentially near visual resources such as parks. Viewer sensitivity would range from low for viewers in cars (for whom power pole installation activities are relatively common) to high near natural areas and in new corridors that may need to be developed, especially near residential areas.

The visual contrast present during construction is anticipated to be less than Alternative 1, Option A or B (which involve overhead lines) because the scale of poles would be smaller, and smaller construction equipment would be needed. However, compared to Alternative 1,

the longer corridor of Alternative 3 would result in more dispersed construction impacts that are more likely to be seen by a higher number of viewers.

In general, construction activities for Alternative 3 would have a short duration and result in minor to moderate impacts on the visual environment, depending on viewer sensitivity.

## 11.6 WHAT ARE THE LIKELY OPERATIONAL IMPACTS TO VIEWS AND VISUAL RESOURCES?

### 11.6.1 Operation Impacts Considered

All operation impacts are considered to be permanent. Common operation-related impacts include the following:

- Changes to visual character;
- Changes to views, viewpoints, and visual resources; and
- Light, glare, and exhaust.

These impacts were assessed using the impact criteria listed in Section 11.4, to assign impact classifications (minor, moderate, significant). Impacts resulting from views of existing power lines on assessed property values were also examined. While it is common for properties abutting or within a transmission line corridor to have lower assessed property values than similar properties that are not abutting or within the corridor, a direct correlation between views of high-voltage transmission lines and changes to assessed property values could not be made, because much of the effect is likely due to restrictions on property use in the easement, rather than the view of the property line. For this reason, impacts on property values were not classified as minor, moderate or significant.

#### *11.6.1.1 Changes to Visual Character*

The visual character of the Eastside is described in Section 11.3.1. Changes to visual character can occur through introduction of new infrastructure that creates contrast against the natural or built environment due to its height or geometric form. Changes to visual character can also occur as a result of introducing a clearing or opening in an area that was previously forested.

#### *11.6.1.2 Changes to Views, Viewpoints, and Visual Resources*

Changes to views could occur through obstruction of the view. For example, taller infrastructure can obscure or block views. Changes to visual resources would most likely occur if infrastructure were placed on a visual resource or viewpoint.

#### *11.6.1.3 Light, Glare, and Exhaust*

Light, glare, and exhaust could occur if new lighting fixtures were required, previously unlighted areas were lit, new infrastructure was composed of reflective materials, or new infrastructure produces visible exhaust. The degree of the impact would depend on the contrast created by the new lighting source and the proximity to viewers. The amount of

impact produced through glare would depend on the amount of reflective materials used and how much is already present in the surrounding environment. Impacts associated with exhaust, such as from a peak generation plant, would depend on how visible it is from a distance, and whether it changes the character of the visual environment into which it is placed. Visibility from a distance depends on the density of visible emissions and climatic conditions (such as clear cold air or fog) and frequency of operation.

#### 11.6.1.4 Impacts to Property Values

As described in Chapter 10, there have been a wide range of findings regarding the relationship between property values and views of power lines. As previously discussed, for this evaluation, potential impacts to property values are discussed in terms of assessed valuations, in order to use recent published data with a broad base that can be used for comparison.

Property owners have expressed concern about market value. Because market value is based on a variety of factors in addition to visual resources (for example, amenities of the house, proximity to schools, transit, local services, etc.) it is difficult to obtain data for comparison. Therefore, this analysis describes property values in terms of assessed value, not market value.

Several studies have found that areas adjacent to major transmission lines have lower property values than comparable properties where there is no view of a transmission line. The studies indicate a range of 1 to 20 percent reduction in property value, with most of the reductions in value around 6 percent (Cowger et al., 1996; Rosiers, 2002; Chalmers, 2012). However, in a review of studies investigating the relationship between transmission lines and property values, the Electric Power Research Institute (EPRI) determined that neither the proximity of transmission lines nor the voltage and size of transmission lines and easements were determining factors regarding changes in property values (EPRI, 2003).

Despite the varying conclusions on whether or not views of transmission lines translate into reduced property values, the King County Assessor's Office noted that factors such as construction of a view-obstructing transmission line could result in a negative influence on property values (FCS Group, 2016). The Assessor's Office noted that when a property value appears to be affected by the presence of a power line, the Assessor of the property adjusts the assessed value downward (Prins, personal communication, 2015).

Numerous transmission lines are located in the combined study area. It is beyond the scope of this analysis to prepare a complete cost comparison of all properties having views of transmission lines with comparable properties that do not have views. To conduct a programmatic-level evaluation, the EIS Consultant Team examined Assessor's data to identify a potential correlation between a view of a power line and lower property valuations. The EIS Consultant Team found that the data were inconclusive about the reasons for different valuations set by the Assessor. For example, adjustments are sometimes made to reflect views of power lines, but they may also reflect other factors such as restrictions on use of property in a power line easement. The EIS Consultant Team could not determine the degree to which these various factors negatively impacted the property assessment.

In conclusion, because of the number of factors and interrelationships affecting property values, it is not possible to determine from Assessor's data how much of the effect on property values is due specifically to views. It is reasonable to assume that some existing properties would have lower property values following construction of an overhead transmission line. Refer to Chapter 10 for additional discussion of the effect of overhead transmission lines and property values.

#### *11.6.1.5 Consistency with Plans and Policies*

At a programmatic level, it is assumed that PSE would follow policies associated with design of the project relating to visual aspects of projects, such as use of fencing around substations. If design policies are followed, Alternative 2 would likely be consistent with the plans and policies of study area communities.

Alternative 1, Option C would also likely be consistent with plans and policies because it would place the transmission line underground and would avoid the shoreline and major visual resources.

Additional evaluation of Alternative 1, Option D would be required to determine if the use of the shoreline to connect underwater portions of the line with overhead lines would be consistent with comprehensive plan and SMP guidance (see Appendix G).

The study area policies provided in Appendix G and described in Section 11.2 will be considered in greater detail in the Phase 2 EIS.

### 11.6.2 No Action Alternative

Under the No Action Alternative, no substantial new infrastructure would be introduced into the visual environment, and therefore no substantial changes to the visual character of the Eastside would occur. The primary changes to the visual environment under the No Action Alternative would be those associated with PSE's conservation efforts. These include dispersed and minor changes to buildings, such as weatherproofing and addition of solar collectors. Because conservation improvements would be integrated into an urban framework, no visual resources would be impacted. Public places such as parks, trails, or open spaces and associated viewpoints would also not be impacted.

Due to the dispersed nature of the No Action Alternative, there would be numerous viewers, but viewer sensitivity would be low because improvements would not differ substantially from current conservation efforts in the area. Window replacements and similar weatherproofing would have negligible visual impacts. However, the dispersed presence of solar collectors and similar small infrastructure could result in minor impacts for some viewers because they would create slightly more contrast.

The most visible elements that are expected under the No Action Alternative would be wind turbines and solar panels that may be installed by PSE or its customers as a means of reducing energy consumption. Solar panels can introduce a strong, regular geometry into the landscape and can produce glare from their highly reflective surfaces. However, impacts are reduced when the panels are placed in urban settings, as would occur under this alternative. If

wind turbines are used, they would likely be small-scale turbines serving individual houses or small buildings. Such turbines are typically 6 to 24 meters in height and have rotors with a diameter of 2 to 7 meters (Fortis Wind Energy, 2015). A flickering effect could be produced as sunlight passes through the moving blades of a wind turbine; however, visual impacts are typically minimal. Reflections from the blades of house-scale turbines are unlikely due to the new coatings that are used (Fortis Wind Energy, 2015). As noted in Chapter 2, in the past there have been few solar energy systems installed and even fewer wind turbines on the Eastside. As long as these types of infrastructure continue to be scarce and dispersed throughout urbanized areas of the Eastside, impacts from solar and wind installation produced under the No Action Alternative would be minor.

### 11.6.3 Alternative 1: New Substation and 230 kV Transmission Lines

Under all options proposed for Alternative 1, permanent clear zones would be required for transmission lines, access roads, substation expansion, and accessory infrastructure (vaults, etc.). All options would include visual changes at substations. Overhead options would also produce impacts associated with new power poles and wires, and there is the potential for minor light and glare impacts. These types of impacts are discussed generally below and then in greater detail under the heading for each option.

#### *11.6.3.1 Permanent Clear Zones*

To ensure safe and reliable operation of overhead or underground transmission lines, the National Electric Safety Code (NESC) specifies minimum horizontal and vertical clearance requirements for overhead lines, where trees and overhanging branches are removed. These clear zone requirements typically determine transmission right-of-way (or easement) widths. The amount of right-of-way necessary depends on many factors, including whether or not it is adjacent to an existing transmission corridor or along a roadway. Typical right-of-way widths for 115 kV and 230 kV lines are between 70 and 150 feet depending on voltage and location (AEP-Ohio, 2014). Chapter 2 describes clearing requirements for each alternative. Specific easement agreements may require more clearance.

For this Phase 1 Draft EIS, where a range of widths is possible the analysis assumes the worst case for impact assessment. In practice, PSE may be able to reduce the required clear zone, in which case impacts would be less than assumed for this phase of the EIS. Also, in some cases, such as along street rights-of-way, small trees can remain below the wires. Clearing in a right-of-way is not restricted to vegetation. Easements allow PSE to remove anything located within the right-of-way (such as lawn furniture and other landscaping).

In areas where trees would be removed, the transmission lines and poles would be visible to nearby viewers. Clear zones can result in impacts by changing the visual character of the area (removal of trees, landscaping, and structures) and by opening up views of transmission lines and/or other features of the landscape that were previously obscured by vegetation, such as a highway or an industrial site.

The degree of contrast produced by clear zones would vary depending on where the alignment is placed and which option is implemented. For instance, the clear zone for an overhead transmission line in a new corridor in a wooded area would produce a higher degree

of contrast than one placed along a major highway. The clear zone for an overhead transmission line would have a higher degree of contrast with the surrounding environment than an underground line. Cleared areas would be less noticeable in areas that are currently flat and devoid of vegetation. However, foreground views where the transmission line traverses heavily forested areas, or areas with varied terrain such as hills or mountain ranges, would potentially be impacted due to the contrast between the straight linear form of the transmission line rights-of-way and the curved landscape. Therefore, maintaining the clear zone could result in permanent impacts to residents located along the transmission easement in that the visual character of their backyards could be significantly altered.

The extent of the required clear zone would be less if the transmission line is placed along a typical roadway or within an existing right-of-way. However, utilities paralleling existing corridors can cumulatively create wide, long areas of visual disturbance. In general, the study area communities, through their comprehensive plans, have identified roadways themselves as not being aesthetically pleasing and have policies to include landscaping to soften the visual impact. Locating utility lines along roadways concentrates the visual impact and allows the opportunity for landscaping to soften the impact.

The sensitivity of viewers would generally be higher in residential areas than in commercial and industrial areas or along a major arterial or highway, because the contrast created by a new transmission line would be greater in a residential area. However, the number of viewers who would see the alignment would be substantially greater along a major arterial or highway. Because the Eastside is predominantly single-family residential, there is a high likelihood that any overhead transmission corridor would affect sensitive viewers.

#### 11.6.3.2 Visual Changes at Substations

All of the options associated with Alternative 1 require installation of a new transformer at, or adjacent to, either the Lakeside substation or the possible substation sites referred to as Westminster and Vernell.

Substations can have footprints that range from less than an acre (e.g., Eastgate substation) to 8 acres (e.g., Talbot Hill substation). Equipment in substations typically ranges between 20 and 45 feet tall depending on the type of equipment present. Smaller distribution substations can be screened from view using berms, fencing, or landscaping. Conversely, larger substations often have an institutional or industrial appearance that is harder to conceal.

For this project, existing substation footprints may need to be expanded by up to 4 acres. Substations that already have a 115 kV setup, such as the Lakeside substation, would need less acreage, while additions to Westminster and Vernell substations would need up to the full 4 acres to install the necessary equipment.

The Westminster and Lakeside substation sites are adjacent to parks and open space and residential uses, respectively (Figure 10-5); therefore, changes to these locations would be viewed by more sensitive viewers than the Vernell site, which is adjacent only to commercial development and a highway. The impact on the visual character of the area would depend on the design of the expansion and where it is located relative to sensitive viewers. Because the

Lakeside site already has a substation and associated overhead lines, the substation expansion for the new transformer would not substantially contrast with the existing environment.

The Westminster site has no existing substation but has overhead lines. A substation at this location would alter the character of that area, which includes Viewpoint Park. (Viewpoint Park, despite its name, does not provide significant views and is not listed in Table 11-1 as a public viewpoint.) Therefore, visual impacts associated with development of a substation at either the Westminster or Lakeside substation sites would likely be moderate. At the Vernell site, there are no sensitive viewers nearby and the visual character is dominated by commercial development and a major highway, so impacts from a substation would be minor.

#### 11.6.3.3 Increase in Overhead Poles and Lines

Poles and wires for overhead lines have the potential to impact views by introducing structures that may be of a different scale than existing structures in the area. They may also impact the enjoyment of visual resources by partially obstructing views.

#### 11.6.3.4 Light and Glare

The Federal Aviation Administration (FAA) has standards and guidelines that determine when structures need to be marked and lighted for aircraft safety. It is not anticipated that aviation warning lights would be required for this project because the proposed electrical infrastructure, including transmission poles, would be less than 200 feet in height and would not exceed the obstruction standards contained in 14 CFR Part 77 (FAA, 2007).

Substations include security lighting that operates all night to discourage vandalism and trespassing. When work at the substation is required at night (e.g., to fix a power outage), lighting intensity is increased for the duration of the work. In residential areas, substation lighting is generally required to be kept at the lowest possible levels and shielded to reduce light spillage impacts. In some areas, landscape screening is also required.

#### 11.6.3.5 Option A: New Overhead Transmission Lines

Long-term visual impacts associated with Alternative 1, Option A include changes to visual character through introduction of new electrical infrastructure, partially obstructing views of visual resources, and maintenance of clear zones. Some viewers would likely perceive a significant impact.

##### 11.6.3.5.1 Permanent Clear Zones

Permanent clear zones would be required under Alternative 1, Option A. The combined study area is highly varied in visual character, and many areas of the Eastside are already cleared and developed or have limited tree cover; in such areas clear zones would not contrast strongly. However, if located adjacent to forested parks or natural areas such as Cougar Mountain Natural Area, clear zones would produce a pronounced contrast.

It is anticipated that Option A would require a clear zone between 120 and 150 feet wide, requiring clearance of up to 327 acres of vegetation. Existing transmission corridors in the combined study area vary in width. If an overhead transmission line were placed in an

existing transmission right-of-way, the existing right-of-way would need to be extended to meet clear zone requirements. In the combined study area, many existing 115 kV transmission lines have clear zones that are close to the required width for a 230 kV line. Replacing the existing line with a 230 kV line would involve a more limited amount of clearing than a new corridor, but could still require removal of up to 109 acres of vegetation. If a 230 kV transmission line was placed along a typical roadway, a cleared corridor outside of the road right-of-way could be required in order to provide the required horizontal clearance.

Because the clear zone would create views of the transmission line, placing a new transmission line in a residential area where one does not currently exist would have a significant impact on the visual character of the area adjacent to it, and could have moderate to significant effects on territorial views or views of visual resources from surrounding properties within approximately 750 feet (depending on topography and vegetation). Visual impacts from replacing an existing transmission line could range from minor (in commercial or industrial areas) to significant (in residential areas or public viewpoints with unique views).

#### 11.6.3.5.2 Visual Changes at Substations

Visual changes at substations would be as described in Section 11.6.3.2 for all options under Alternative 1.

#### 11.6.3.5.3 Increase in Overhead Poles and Lines

The presence of transmission lines often results in a sharp contrast with the surrounding landscapes. The size of transmission line poles and the material they are made of can influence the amount of impact they create. It is anticipated that 85- to 100-foot-tall steel or wood poles would be used for the 230 kV lines. Depending on topography the pole height may vary, with the tallest height being approximately 135 feet if a highway is crossed (Corbin, 2007).

Placement of poles can also determine the degree of impact. When placed in relatively unobstructed skylines, transmission lines can become the dominant structure on the horizon, create contrast against the sky, and result in a more noticeable visual impact. Conversely, transmission lines placed in areas where they would be surrounded by other tall structures or trees can result in a less noticeable visual impact. Topography can also play a role in the visibility of the poles, with poles that are atop hills, ridges, or slopes being more visible than those that are located below the tree line.

Depending on where the poles are placed, views of visual resources could also be impacted. Although it is not anticipated that the new transmission corridor would be routed through known viewpoints, the presence of the line, depending on where it is being viewed, could obscure views. For instance, if the transmission line were placed along a roadway, it is likely that the impacts to visual character would be less than significant because the line would not be a prominent aspect of the viewshed. However, if the transmission line were placed along a scenic roadway, the lines could obscure views because the roadway itself would be considered a viewpoint (see Section 11.3).

Because of their height and geometric form, transmission lines are often visible above the horizon, contrasting against the sky and skyline (Figure 11-18). An overhead transmission line would cross or abut approximately 100 lots per mile in a typical single-family subdivision with 4 lots per acre. In total, overhead transmission lines would need to extend at least 18 miles to reach from Talbot Hill substation to Sammamish substation, with greater length required depending on how many turns the line makes between these two substations. In industrial, commercial, and lower density residential areas, fewer properties would be affected. In multifamily areas, and in some commercial areas, the number of viewers could be greater than in typical single-family subdivisions, even though the number of parcels might be less.

Views are likely to be impacted where the transmission line is located in the foreground distance zone (up to approximately 0.5 miles away from the project). However, impacts on views could also be substantial at greater distances depending on the angle at which the project is viewed and whether or not it is within the viewer's direct line of sight. In addition to affecting the visual character of the area adjacent to it, overhead transmission lines can impact views of visual resources from surrounding properties. Researchers from the Argonne National Laboratory analyzed the visibility of transmission lines in their 2013 paper, *Electrical Transmission Visibility and Visual Contrast Threshold Distances in Western Landscapes.* This analysis showed that high-voltage H-frame towers were noticeable to casual observers at distances of up to 3.5 miles and were thought to "strongly attract visual attention at distances of up to 1.5 miles" (Sullivan, 2013). However, topography and other conditions of the setting and viewers can limit the level of visual contrast created by transmission facilities. Smaller structures like those proposed for this project are not as noticeable, and other characteristics of the Eastside landscape affect the distance at which these structures would significantly affect views.

On the Eastside, topography and vegetation limit visibility in many locations. Figure 11-18 shows an example of an existing transmission line in Bellevue that is estimated to be less than 65 feet above the ground, seen from an uphill location approximately 500 feet horizontally from the line, where the view of Lake Washington and the Seattle skyline is affected by the overhead line. The proposed overhead lines would be smaller than the H-frame facilities in the Argonne National Laboratory study, but they would be at least 20 feet taller than those shown in Figure 11-19. For Alternative 1, Option A, viewers within approximately 750 feet (depending on topography and vegetation) would likely notice a high degree of contrast created by the transmission line poles and conductors. Given the approximately 18-mile length of the corridor and the predominance of residential land uses, a high number of viewers with high sensitivity would likely be impacted.

**Figure 11-18. 115 kV Existing Overhead Lines in a Residential Area of Bellevue**

**Figure 11-19. 115 kV Existing Overhead Lines in Bellevue Affecting Views of Lake Washington and the Seattle Skyline, from a Distance of 500 feet.**

Several factors would affect the visibility of the transmission line and therefore would be studied in detail in phase 2 of this EIS process. For viewpoints where the viewer's eye elevation is higher than the poles, the poles would appear below the horizon line and would not contrast as much as in places where the poles penetrate the horizon line. For transmission lines viewed from a distance greater than 1,000 feet, the lines and poles would likely be a small part of the view and the contrast they produce would be minimal to moderate. In addition, views from the east looking west toward downtown Bellevue would be less likely to be impacted because the infrastructure would share the horizon with the tall buildings located behind it. Except for locations immediately adjacent to the power line easement, new overhead transmission lines are also less likely to be visible from a distance in heavily vegetated areas, such as some forested areas of Newcastle and Bellevue. In these areas the poles would share the horizon with trees, which would also obstruct views from neighboring properties.

Replacing an existing 115 kV transmission line with a taller set of poles could affect a similar number of parcels as a new corridor, but the change in contrast between the transmission lines and the surrounding environment would be less noticeable than from a new line because the existing lines already affect some views. Typically, properties within approximately 500 feet of and either uphill from or at the same elevation as existing transmission lines have

views that are already affected. Replacement with new taller transmission lines could increase the effect on those properties as well expand the area impact by approximately 250 feet because of the increased height. However, the greater the distance, the greater the likelihood of intervening features such as vegetation, other structures, and changes in topography that would obstruct views of the power lines. For immediately adjacent properties with small structures such as single-family homes, duplexes, and triplexes, taller poles would appear out of scale. For some adjacent properties where poles are not in sight but the wires are, the higher placement of wires could mean that the transmission line is less noticeable than at present, but generally, taller poles would make the lines more visually prominent.

#### 11.6.3.5.4 Light and Glare

Steel poles, when coupled with the reflectivity of their conductors, are more likely to create a stronger visual contrast than wood poles. They are also more likely to result in glare impacts. If steel poles are used, a non-reflective coating would be used.

### *11.6.3.6 Option B: Existing Seattle City Light 230 kV Transmission Corridor*

Long-term visual impacts associated with Alternative 1, Option B include changes to visual character through introduction of new electrical infrastructure and maintenance of clear zones, transecting a viewpoint (Bridle Trails State Park), and having the potential to partially obstruct views of visual resources.

#### 11.6.3.6.1 Permanent Clear Zones and Increase in Overhead Poles and Lines

Alternative 1, Option B would use an existing corridor for most of the north-south distance but would require several miles of new corridor to connect to the existing PSE system. Option B would utilize the portion of the Seattle City Light (SCL) corridor that transects the Bridle Trails State Park. The SCL corridor already contains a 230 kV transmission line, so the clear zone would generally not need to expand, except in limited areas where the new line cannot be constructed in the center of the right-of-way due to the existing line that must remain in service while the new one is constructed. Although new poles and conductors would be required, the scale would be similar to that of existing structures and visual impacts would be minor within the existing corridor. However, the need for a new corridor to interconnect with the SCL line under Option B would likely involve moderate to significant impacts on residential neighborhoods as a result of establishing and maintaining a clear zone and installing new poles and wires to reach the selected substation site.

#### 11.6.3.6.2 Visual Changes at Substations

Visual changes at substations would be described in Section 11.6.3.2 for all options under Alternative 1.

#### 11.6.3.6.3 Light and Glare

Light and glare impacts would be the same as described under Alternative 1, Option A.

### 11.6.3.7 Option C: Underground Transmission Lines

#### 11.6.3.7.1 Permanent Clear Zones

Long-term visual impacts associated with Alternative 1, Option C include changes to visual character through maintenance of clear zones. Underground lines could be placed in roadways or in off-street corridors. Off-street corridors would require clear zones (creating more contrast), while in street settings, the street serves as a portion of the clear zone (creating less contrast). Since many streets have limited underground areas where a transmission line could be installed, it is likely that underground lines would need to be constructed off-street. Off-street corridors would likely result in a greater contrast than Alternative 1, Options A and B associated with removal of street trees and existing landscaping, because no vegetation would be allowed to grow within the clear zone due to maintenance access needs. Up to 66 acres of vegetation could be impacted PSE often allows the presence of shorter, pruned vegetation within the clear zones of overhead lines, which could help to reduce the visual contrast following construction.

#### 11.6.3.7.2 Visual Changes at Substations

Visual changes at substations would be as described in Section 11.6.3.2 for all options under Alternative 1.

#### 11.6.3.7.3 Increase in Aboveground Structures

Although underground lines themselves would not be visible, vaults would still be required at the surface or above ground. Vaults are large underground concrete boxes (8 feet by 26 feet) that are buried at regular intervals, typically every 1,500 to 2,500 feet depending on topography and the type of cable used. Vaults are equipped with hatches at the surface to allow worker access for installing conductors and for maintenance and repair activities. Vaults are generally not conspicuous except that they would be noticeable in a vegetated landscape to a viewer walking close to them. It is anticipated that few viewers would be impacted by Alternative 1, Option C, and impacts would be minor.

#### 11.6.3.7.4 Light and Glare

No light, glare, or exhaust impacts are expected because the lines would be underground and would not require any surface lighting.

### 11.6.3.8 Option D: Underwater Transmission Lines

Long-term visual impacts associated with Alternative 1, Option D include changes to visual character where overhead lines are required, and potential impacts to views of Lake Washington and viewpoints located along the shoreline.

#### 11.6.3.8.1 Permanent Clear Zones and Increase in Overhead Poles and Lines

Impacts associated with the overland portions would be similar to those described for Alternative 1, Options A and C. However, Option D could require overhead lines close to the shoreline, where they could impact views from surrounding areas. Option D would require an overhead 230 kV transmission between the shoreline and the Sammamish substation. This east-west line could cross portions of Kirkland, Clyde Hill, Medina, Yarrow Point, or Hunt's

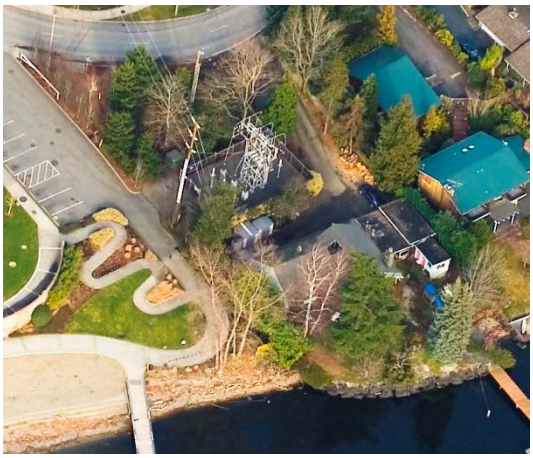
Point. There are no existing east-west power line corridors in any of these locations that could be used, so a new corridor would be necessary, resulting in visual impacts due to the contrast created and the sensitivity of the viewers impacted. This section of the alternative is also expected to impact the most viewers because the overhead line would traverse urbanized areas, resulting in potentially significant visual impacts.

Once installed, the submerged portion of the line would not be visible. It is unknown at this time whether or not buoys or other in-water markers would be needed for operation of the submerged lines.

Installation of submerged transmission cables would require permanent right-of-way clearing at the shoreline for access roads and vaults. For a submerged transmission line that runs from Renton to Kirkland, splice vaults would be needed at a minimum of three shoreline locations and it could be necessary to have one or more additional splice vaults on land. At each vault location, a clear zone would be maintained from the vault to the water. Shoreline regulations may require vegetative or other screening of utilities depending on the jurisdiction. Any such screening would have to occur outside of the clear zone. Visual impacts associated with vaults and access roads would likely be restricted to the immediate vicinity of the vaults, and therefore would only impact a few viewers.

Visual impacts associated with a submerged line, other than those associated with any overhead lines connecting to the submerged line, would be minor because once constructed they would not be visible. Land-based facilities including the transition stations and power lines connecting the submerged lines to substations in the Eastside would be visible. Figure 11-20 shows an existing PSE transition station on Lake Washington at Enatai Beach Park in Bellevue. Depending on siting, and other factors as described for Option A, overhead lines, if used, could have minor impacts if placed in existing utility corridors. Significant impacts could occur if overhead lines are placed near the shoreline of Lake Washington or where utility corridors do not presently exist.

**Figure 11-20. PSE Transition for Underwater Cable Station at Enatai (Ecology, 2014).**



#### 11.6.3.8.2 Visual Changes at Substations

Visual changes at substations would be as described in Section 11.6.3.2 for all options under Alternative 1.

#### 11.6.3.8.3 Light and Glare

No light, glare, or exhaust impacts are expected because most of the lines would be underwater. Overhead portions would have impacts as described in Alternative 1, Option A.

## 11.6.4 Alternative 2: Integrated Resource Approach

In general, Alternative 2 is anticipated to result in few visual impacts because the infrastructure would be small and distributed over a large expanse, resulting in a low degree of contrast. Despite the wide geographic reach of the alternative, few viewers are expected given the small scale of individual projects and the placement of projects in already developed locations.

### *11.6.4.1 Energy Efficiency Component*

Energy efficiency includes measures such as weatherization, efficient lighting and appliances, and similar measures. These improvements are not anticipated to result in permanent impacts to the visual environment. Most changes would be to features inside buildings where they would not be visible to the general public. Changes to windows and exterior lighting would occur, but they would not substantially change the appearance of buildings or sites in a manner that would cause light or glare impacts or would adversely affect viewers through contrast or hindrance of views. If placed in a historic neighborhood, the equipment may not match the character of the area and would result in a more noticeable contrast. These impacts are evaluated in Chapter 13. Overall, negligible impacts are anticipated.

### *11.6.4.2 Demand Response Component*

The demand response system hinges primarily on changes in consumer energy consumption. Demand response meters are the only exterior fixtures required. They are small and not substantially different in appearance from other electric meters, and would not result in light, glare, or exhaust impacts. Therefore, negligible impacts to the visual environment are anticipated from this component of Alternative 2.

### *11.6.4.3 Distributed Generation Component*

The types of generators likely to be installed include small reciprocating engines, gas turbines, microturbines, anaerobic digesters, and fuel cells. Typically, these would be placed atop commercial or larger multifamily buildings and would not be visible to more than a few, less sensitive, viewers. In this context, small generation equipment would be similar in appearance to heating, ventilation, and air conditioning (HVAC) systems and other similar equipment on the top of such buildings. These types of generation equipment would have exhaust systems, and viewers may observe steam plumes and other gas emissions, in addition to emissions that are common from other rooftop equipment

If numerous generators were placed on buildings in close proximity, it could create a more cluttered appearance. None of these changes would contrast with the general appearance of similar sized buildings, and for buildings over a few stories in height, few viewers would notice their presence. The number of generation facilities needed is not known and would depend on the scale of the facilities that are developed. In order to make a contribution toward meeting the transmission capacity deficiency, it would likely require hundreds of small facilities to be installed and interconnected with the grid. Given the total number of buildings in the Eastside area, this would represent a small impact and would not likely change the overall visual character of the Eastside. Distributed generation would have minor

to moderate visual impacts, depending on whether components are concentrated, the scale of individual facilities, and the design and location of the facilities.

#### 11.6.4.4 Energy Storage Component

An energy storage component would be a new permanent feature in the Eastside environment occupying approximately 6 acres. The setting for a battery facility would be similar to the setting for substations discussed in Alternative 1, with most suitable sites being commercial or industrial, impacting less sensitive viewers, but in some cases adjacent to more sensitive residential areas. The battery containers can be stacked, but for technical reasons, it is anticipated that they would not be stacked more than two high, so they would not be prominent visual features. Security lighting would be installed. A 6-acre energy storage facility in a residential area could create a significant visual impact, but a smaller facility in an industrial area would be a minor impact.

#### 11.6.4.5 Peak Generation Plant Component

The peak generation plants would be permanently located within or adjacent to existing substations, and therefore would impact fewer and less sensitive viewers. It is anticipated that inclusion of the additional generator would require less than 1 acre of expansion at each substation.

The design of the generators would likely blend with the current infrastructure located at the existing substations. However, depending on the contrast between the existing substations and their surrounding uses, the new generator would provide additional contrast and could increase the visual impact of the substation beyond existing conditions. Expansion of the substations could also require additional security lighting, but this is not expected to result in impacts due to light shielding practices. In addition, the generators would introduce a new source of emissions (primarily a mix of carbon dioxide and water vapor) that may be visible to viewers periodically (i.e., when the peak generation plants are running).

This component would likely result in minor to moderate impacts on the visual environment depending on the scale and design of the generators and where they are located. The exact location of these generators would be determined at the project level.

### 11.6.5 Alternative 3: New 115 kV Lines and Transformers

Long-term visual impacts associated with Alternative 3 include changes to visual character through introduction of new electrical infrastructure, partially obstructing views of visual resources, reducing the aesthetic quality of a viewpoint, and maintenance of clear zones. At this stage, it is not anticipated that visual resources themselves would be impacted; however, it is likely that this option would create contrast that would impact a large number of viewers who, depending on the placement of the line, may be sensitive to the visual change.

#### 11.6.5.1 Permanent Clear Zones

Under Alternative 3, permanent clear zones would be required that could result in removal of street trees and roadside landscaping (up to 291 acres), and limitations on the height of trees

placed under the transmission lines. It is anticipated that Alternative 3 would require a clear zone that is 30 to 40 feet wide. This could slightly change the visual character of the area.

#### 11.6.5.2 Visual Changes at Substations

Under Alternative 3, three new transformers would be installed, one at each of the following substations: Sammamish, Lake Tradition, and Talbot Hill. In addition, the Clyde Hill and Hazelwood substations would need to be expanded to accommodate connections for each of the new lines. At the Sammamish, Talbot, and Lake Tradition substations, the expansions would be relatively minor and therefore would have minor to moderate visual impacts, similar to those described for a substation under Alternative 1.

Expansion of the Clyde Hill substation could impact views because it is surrounded by residential properties with views of Lake Washington, the Seattle skyline, and the Olympic Mountain Range (Figure 11-9). However, the properties immediately adjacent to the substation are not identified by the Assessor as having views (King County, 2012). Whether or not the expansion of the substation would obscure views would depend on the height of the structures added, but tall structures other than the transmission lines are not anticipated. The expansion would take place in a largely residential setting where viewer sensitivity is likely to be high, and the expansions would be of a scale that moderate visual impacts could be expected. Overall, minor to significant impacts are anticipated.

#### 11.6.5.3 Increase in Overhead Poles and Lines

Installation of the new transmission lines could have impacts ranging from minor in areas with existing lines, to significant visual impacts in residential areas where no transmission line is present. Under Alternative 3, approximately 60 miles of 115 kV single circuit lines would be constructed. These lines would consist of single, wood poles generally 60 to 75 feet in height. New 115 kV lines would follow existing utility or road rights-of-way and would either replace or be co-located with existing transmission and distribution lines, reducing the likelihood of impacting sensitive viewers.

If new 115 kV lines are co-located with existing lines, poles must be taller than existing lines with only one circuit on the transmission line. Where lines have to cross areas with existing or planned multistory buildings, tall poles may be necessary, depending on building setbacks from the transmission lines. This could result in views being obscured. The transmission lines would generally be designed with a narrower profile than the 230 kV overhead lines proposed under Alternative 1.

The number and sensitivity of viewers would vary depending on the location of the new lines. Viewer sensitivity would likely be higher in residential areas than in most commercial locations. Residential areas are predominant throughout the Eastside, and even more so in the areas where Alternative 3 would need to be implemented. In residential areas 60- to 75-foot transmission lines would be taller and therefore contrast more with the surrounding structures. Viewer sensitivity would also be high near parks and natural areas. Parks and homes within 500 feet of the project alignment would be the most likely to have their views affected by the addition of a 115 kV transmission line. More detailed analysis should be conducted for the Phase 2 EIS to confirm the distance where impacts are most likely. In most

areas of the Eastside, power lines of this type and size are common along major roads. However, along the approximately 60 miles of new lines that would be constructed under this alternative, substantial clearing would be required in some areas where there are few tall overhead lines present. In such areas, the contrast imposed by the new lines and the potential for the lines to obstruct views would generate the greatest visual impacts from this alternative.

In highly urbanized portions of the combined study area, the view is dominated by buildings and other structures. In such areas, there would be a greater number of viewers, but the contrast between new transmission lines and surrounding areas would be less than in lower density residential areas. In addition, if the new transmission lines are placed along roadways, street trees would be replaced with smaller trees that remain below the lines. Although this would still change the visual character of the roadway, it would not result in the same level of contrast that a clear zone would create.

#### *11.6.5.4 Light and Glare*

As the substations are expanded, additional security lighting would be required, which might result in minor light impacts.

## 11.7 WHAT MITIGATION MEASURES ARE AVAILABLE FOR POTENTIAL IMPACTS TO VIEWS AND VISUAL RESOURCES?

In areas where new electrical infrastructure is introduced, the following mitigation options should be considered:

- Choosing routes that are already developed with power lines and where minimal vegetation clearing is necessary;
- Consulting with Cities and affected residents when locating structures, rights-of-way, and other disturbed areas to minimize visual impacts;
- Complying with applicable plans and policies within potentially affected jurisdictions;
- Placing and designing structures to minimize impacts on specific visual resources and popular public viewpoints;
- Using aesthetically pleasing materials and landscaping to shield electrical equipment from public view;
- For steel poles, using paint colors that reduce the contrast of the poles with the surrounding environment;
- Placing portions of the transmission line underground (as in Alternative 1, Option C) or underwater (as in Alternative 1, Option D) in areas where significant impacts would occur from overhead lines; and

- For 115 kV lines proposed in corridors with existing distribution lines, placing both transmission and distribution lines on the same poles (referred to as "underbuild") to limit additional visual clutter.

## 11.8 ARE THERE ANY CUMULATIVE IMPACTS TO VIEWS AND VISUAL RESOURCES AND CAN THEY BE MITIGATED?

The Eastside is developing rapidly, with widespread construction-related visual impacts associated with residential, commercial, and industrial projects, as well as regional roadway and other infrastructure projects. Construction of the Energize Eastside Project would add to the overall short-term visual impacts associated with construction equipment and activity, but is not expected to represent a significant cumulative impact because of the overall high level of construction in the area.

Once construction is complete, the finished project could contribute to cumulative visual impacts. The region is urbanizing, with accompanying changes to its visual character. New electrical infrastructure and associated clearing would result in long-term changes to views and visual resources that would contribute to the trend of changing visual character. Development of other transmission or distribution lines could contribute to a trend of increased view obstruction in some neighborhoods. Road development and utility expansion in the Eastside could result in clearing of vegetation that could contribute to the trend of reduced vegetation and a more urbanized visual character.

## 11.9 ARE THERE ANY SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS TO VIEWS AND VISUAL RESOURCES?

Under Alternative 1, potentially significant impacts to visual resources are likely with any overhead line alignment because of the high number of sensitive viewers and the high degree of contrast that would be created. Significant impacts would be unavoidable with development of a new overhead transmission line corridor. If existing corridors are used, significant impacts may occur, but could be reduced through careful siting or installation of underground lines.

It may be possible to implement Alternative 2 without significant visual impacts. However, the energy storage facility could result in significant visual impacts, depending on the scale and location of the facility, which are not known at this time. Other components, such as peak generation plants or distributed generation facilities would be small enough in scale that impacts would be minor to moderate, or they can be screened with vegetation or other means to avoid significant impacts.

Under Alternative 3, significant impacts to visual resources may be unavoidable. In order to provide transmission capacity where it is needed, transmission lines could be required in areas where few overhead lines are present, creating new clear zones and introducing new electrical infrastructure into the visual environment for a high number of sensitive viewers.

Such construction would permanently change the visual environment for surrounding viewers. However, at this time no specific alignment has been established. If this alternative is carried forward into the project-level EIS for Energize Eastside, additional analysis will be provided.

# CHAPTER 12. RECREATION

## 12.1 HOW WERE RECREATIONAL RESOURCES IN THE COMBINED STUDY AREA EVALUATED?

This chapter provides a programmatic analysis of potential impacts to recreation sites including parks, natural areas, trails, and amenities as well as informal recreation in the combined study area (Alternatives 1, 2, and 3 as depicted on Figure 1-4 in Chapter 1). For the purpose of this study, informal recreation includes activities that take place outside of designated recreation sites (e.g., bicycling on a street). Recreation sites include designated recreation areas such as parks, natural areas, open spaces, trails, and playfields. Amenities such as community centers, playground equipment, and boat launches are included in this evaluation as they are located within designated recreation sites.

**Recreation Key Findings**

For any of the action alternatives, there could be significant impacts if use of recreation facility is permanently lost and cannot be replaced. Recreation facilities will be avoided to the extent practicable. Where existing transmission lines are already located within a recreation facility (Alternative 1, Option A) it is more likely that impacts cannot be avoided. Recreation facilities are often established using funds which restrict their conversion to another use. These restrictions would further limit impacts to recreation facilities.

The EIS Consultant Team collected maps and other information available from the cities, King County, and Washington State to describe existing recreational resources. Plans and policies for each study area community were reviewed to evaluate goals and priorities for recreation in the combined study area. Potential impacts to specific recreation sites were not assessed because this evaluation was conducted at a conceptual level. However, where specific location information was known, potential impacts to recreation sites were considered.

## 12.2 WHAT ARE THE RELEVANT PLANS, POLICIES, AND REGULATIONS?

The combined study area encompasses several state parks, which are governed by the policies and regulations set by the Washington State Parks and Recreation Commission. The combined study area also includes some lands managed by the Washington State Department of Natural Resources (DNR) for multiple uses including recreation. All other public recreation sites are governed by King County or one of the cities or towns within the combined study area. King County and all cities in the combined study area are required to consider parks and recreation as part of their comprehensive plans (RCW 36.70A.070). Cities and counties often have a specific plan for parks and recreation (Table 12-1) as well as plans for individual recreation sites. Jurisdictions develop capital improvement plans in order to allocate funding to planned projects, such as new parks and renovations. Some communities have also developed separate pedestrian or bicycle plans.

**Table 12-1. Parks and Recreation Plans for Study Area Communities**

| Jurisdiction | Parks and Recreation Plans |
|---|---|
| Washington State | Strategic Plan 2014-2019: Moving Towards a Healthy and Sustainable Washington State Parks System (Washington State Parks and Recreation Commission, 2013) |
| King County | King County Open Space Plan: Parks, Trails, and Natural Areas (2010) (currently updating) |
| Beaux Arts Village | Draft Town of Beaux Arts Village Comprehensive Plan, Chapter 4 Capital Facilities (2014) |
| Bellevue | Parks and Open Space System Plan (2010)<br>Pedestrian and Bicycle Transportation Plan (2009) |
| Clyde Hill | City of Clyde Hill Comprehensive Plan, Parks and Open Space Chapter (2015) |
| Hunts Point | Draft Town of Hunts Point Comprehensive Plan, Parks and Open Space Chapter (2014) |
| Issaquah | Parks, Recreation, Trails and Open Space Plan (2009);<br>Walk and Roll Issaquah (2014) |
| Kirkland | City of Kirkland Parks Recreation and Open Spaces Plan (final review and adoption scheduled to occur later in 2015) |
| Medina | Medina Parks Long Range Vision and Strategic Planning Document (2015a) City of Medina Draft Comprehensive Plan, Parks and Open Spaces Element (2015b) |
| Newcastle | City of Newcastle Comprehensive Plan, Parks, Trails, and Recreation Element (2013); Non-motorized Transportation Plan (2008) |
| Redmond | Parks, Arts, Recreation, Culture and Conservation Plan (2010) (currently updating) |
| Renton | Parks, Recreation, and Natural Areas Plan (2011);<br>Renton Trails and Bicycle Master Plan (2009) |
| Sammamish | City of Sammamish Parks, Recreation and Open Spaces Plan (2012);<br>Trail, Bikeway and Paths Master Plan (2015) |
| Yarrow Point | Town of Yarrow Point Comprehensive Plan, Parks/Open Space Chapter (2014) |

The City of Bellevue's comprehensive plan has a policy to avoid placing overhead lines in greenbelts or open spaces, which are often recreation sites. The Cities of Bellevue, Issaquah, Newcastle, and Redmond all have similar policies to encourage use of utility corridors for nonmotorized recreation. The other communities' plans do not have specific policies regarding the placement of electric utilities in or near recreation sites, but they generally discourage the use of recreation sites for non-recreational uses. The enjoyment of recreation sites can be linked to visual quality and natural resources. For additional discussion of

policies related to visual quality, see Chapter 11. For discussion of policies related to general protection of plants and wildlife, see Chapter 6.

Many recreation sites in the combined study area were acquired with federal, state, and local grants, bonds, or other funding sources. The funding comes with provisions that protect the land for recreation in perpetuity. The conversion of recreation land purchased with restricted funds for non-recreation purposes would need to meet site-specific agency requirements. The City of Bellevue's comprehensive plan also requires a public review process for the conversion to non-recreational use of park lands and facilities. Other study area communities do not include specific language regarding conversion of recreation land.

## 12.3 WHAT RECREATIONAL RESOURCES ARE IN THE COMBINED STUDY AREA?

The combined study area contains approximately 265 recreation sites under the jurisdiction of 11 different communities as well as King County and Washington State, shown on Figure 12-1. This encompasses approximately 16,400 acres in recreation sites. The recreation sites provide a wide range of facilities and opportunities and range from small neighborhood or "pocket" parks to natural areas spanning thousands of acres.

**Recreational Opportunities in Study Areas:**
Beach with water access
Boat launch with water access
Bicycling
Boating
Gardening
Golf
Hiking/walking/running
Horseback riding
Nature viewing
Off-leash dog areas
Picnicking
Playgrounds
Skateboarding (skate-park)
Sports fields/sports leagues
Swimming
Tennis

Table 12-2 lists some of the recreation sites in each study area community. Some of the larger recreation sites are as follows:

- The **Cougar Mountain Regional Wildlands Park, Squak Mountain State Park, and Tiger Mountain Natural Resource Conservation Area** cover more than 9,000 acres (some of this area is outside of the combined study area). The forested wildlife preserve is owned primarily by King County and Washington State with smaller adjoining parks owned by other communities. Hiking, biking, and horseback riding are the primary recreational opportunities (King County, 2015; Washington State Parks, 2015a; DNR, 2015).
- **Marymoor Regional Park** is a 640-acre King County Park located where Lake Sammamish flows into the Sammamish River. It has trails, multiple sports fields, an off-leash dog area, rock-climbing wall, community gardens, the historic Willowmoor Farms, and unique features such as a radio-controlled airplane field and velodrome (bicycle track). It is the location of festivals and events, including a summer concert series and outdoor movies (King County, 2015).
- **Lake Sammamish State Park** is a 512-acre park at the south end of Lake Sammamish. It is primarily a day-use park with a large waterfront and beach area,

boat access, ball fields, trails, a forested area and a wetland area. There is also a group camping area for up to 200 people (Washington State Parks, 2015b).

- **Bridle Trails State Park** is a 482-acre park in the Kirkland area. It is a forested park, with 28 miles of equestrian/pedestrian trails as well as horse show grounds and arenas (Washington State Parks, 2015c).
- **Mercer Slough Nature Park** in Bellevue is a 320-acre preserve that includes a large wetland, blueberry farm, an environmental education center, walking trails, a canoe launch, and the historic Winters House (City of Bellevue, 2015).
- **Kelsey Creek Park** in Bellevue is a 150-acre park with wetlands and forested areas. It is also the site of a historic farm which has animals and provides farm-themed tours, classes, and camps (City of Bellevue, 2015).

Along the Cedar River a series of Renton and King County parks together form a major open space. A key feature is the Cedar River Trail (King County, 2015; City of Renton, 2015). Along May Creek a series of parks owned by Renton, Newcastle, and King County form another major open space featuring forested areas and the May Creek Trail (King County, 2015; City of Renton, 2015; City of Newcastle, 2015). Regional trails located at least partially within the combined study area include the Sammamish River Trail, SR 520 Trail, Eastside Rail Corridor, Mountains to Sound Trail (I-90), and Lake Washington Trail (Figure 12-1). Designated on-street bicycle lanes and trail corridors cross throughout the combined study area.

There are 18 city-operated community centers within the combined study area providing indoor and outdoor recreational activities and programs. Public and private facilities such as tennis courts, swimming pools, and golf courses add to the activities available. Many public schools have sports fields or playground equipment available to the public during non-school hours.

Recreation is not limited to designated areas. Informal recreational activities occur throughout the combined study area, taking advantage of the natural environment. There are both formal and informal recreation trails within and across several segments of the existing PSE and Seattle City Light (SCL) transmission line corridors within the combined study area.

Lake Washington and Lake Sammamish are also important recreational features for neighboring communities and the region. Bellevue, Hunts Point, Kirkland, Medina, Renton, and Yarrow Point all have public parks along Lake Washington, most offering water or beach access for swimming, boating, and fishing. Lake access is a key feature of Lake Sammamish State Park, whereas at Marymoor Regional Park the shoreline features a nature preserve with limited public access. In addition, there are multiple private docks with opportunities for lake access. Only portions of Lake Sammamish and Lake Washington are within the combined study area.


Note: This map is for reference only. It is not guaranteed that the information is accurate or complete.

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

Energize Eastside EIS 140548

**Figure 12-1**

Recreation Sites

**Table 12-2. Major Recreation Sites in the Combined Study Area**

| Jurisdiction | Park, Natural Area, or Amenity |
|---|---|
| Washington State | Bridle Trails State Park, Squak Mountain State Park, Lake Sammamish State Park |
| King County | Cedar River Natural Area, Cougar/Squak/Tiger Mountains parks and natural areas, May Creek Park and Open Space, Marymoor Regional Park |
| Beaux Arts Village | Beaux Arts Beach and Boat Docks[1] |
| Bellevue | Bellevue Botanical Gardens, Coal Creek Natural Area, Kelsey Creek Park, Lake Hills Greenbelt Park, Lakemont Park and Open Space, Mercer Slough Nature Park, Wilburton Hill Park |
| Clyde Hill | Clyde Hill City Park |
| Hunts Point | Hunts Point Playfield, DK McDonald Park |
| Issaquah | Talus Open Space, Pickering Barn, Tradition Plateau Natural Resources Conservation Area |
| Kirkland | Heritage Park, Watershed Park, Kirkland Waterfront (and associated parks), Yarrow Bay Wetlands |
| Newcastle | Lake Boren and Park, May Creek Park and Open Space |
| Medina | Fairweather Nature Preserve, Medina Park, Overlake Golf and Country Club |
| Redmond | Grass Lawn Community Park, Idylwood Beach Park |
| Renton | Cedar River Natural Area and adjoining parks, Gene Coulon Memorial Beach Park, May Creek Park |
| Sammamish | Evans Creek Preserve, Beaver Lake Park |
| Yarrow Point | Wetherill Nature Preserve |

[1]Privately owned by Western Academy of Beaux Arts

Sources: King County, 2015; Bellevue 2015; Newcastle 2015; Renton 2015; Issaquah, 2009; Kirkland 2015; Redmond, 2010; Washington State Parks, 2015a-c.

## 12.4 HOW WERE POTENTIAL IMPACTS TO RECREATION ASSESSED?

Because this first phase is programmatic in nature and the specific locations of energy facilities have not yet been determined, potential impacts were evaluated conceptually. The EIS Consultant Team evaluated potential impacts within and adjacent to recreation sites, as well as impacts to informal recreation that may occur near proposed facilities. The assessment considers potential indirect effects to recreational facilities from impacts to other elements of the environment, such as vegetation and aesthetics.

## 12.5 WHAT ARE THE LIKELY CONSTRUCTION IMPACTS RELATED TO RECREATION?

### 12.5.1 Construction Impacts Considered

Details of how the alternatives would be constructed have not yet been developed; however, general construction activities with these types of projects are generally understood. Site-specific impacts will be evaluated in the Phase 2 EIS. However, PSE will avoid recreation facilities to the extent practicable. Construction of all alternatives would involve clearing for infrastructure and use of heavy equipment. Alternatives 1 and 3 would also result in construction of temporary access roads. These impacts would be limited to the construction period. Permanent impacts that may begin during construction are discussed below under Operational Impacts. The intensity of potential impacts to formal and informal recreation would vary based on proximity to recreation sites, scale of construction activities, the time of year of construction (e.g., during peak summer use), number of users affected, and number of recreation facilities affected. Significance would also depend on how many recreation facilities are affected from the construction of the transmission lines.

**Minor** – If a recreation facility is not usable for a short duration or if construction activities are noticeable (e.g. noise and decreased visual enjoyment) and cause irritation to users but do not preclude recreation use, then impacts are considered minor. However, if these types of minor impacts were to occur at multiple recreation facilities concurrently impacts would be moderate.

**Moderate** – If a recreation facility was unusable or access completely blocked outside of peak use or in a recreation facility or area of a recreation facility that is not frequently used, then impacts are considered moderate.

**Significant** – If a major recreation facility is unusable or access is completely blocked during peak use (e.g. a park is inaccessible during the summer months and many users are affected), then impacts are considered significant.

If construction impacts at recreation facilities are from noise or to aesthetic impacts, impacts are as defined in Chapter 9 and Chapter 11.

#### *12.5.1.1 Construction Within a Recreation Site*

Impacts to recreation would occur if construction takes place within a recreation site. Construction activities would reduce the enjoyment of the recreation site, during the construction period, which would vary depending on the alternative. Portions of a recreation site could be closed and access limited during construction. Construction trucks around a recreation site may also disrupt traffic or make parking difficult (see Chapter 14). Noise and disturbance from construction equipment and trucks could also reduce the enjoyment for park users (see Chapter 9). Construction activities and noise may disturb or temporarily displace wildlife, which could decrease user enjoyment. Removal of vegetation would result in a temporary loss of habitat and subsequently reduce the aesthetic quality of the recreation site (see Chapter 6 and Chapter 11). Furthermore, construction activities may pose safety risks to the public, due to the proximity of construction vehicles or activities in areas that are for

pedestrians or bicycles only. Safety risks would increase if people cross construction barriers during nonworking hours.

#### 12.5.1.2 Construction Adjacent to a Recreation Site

If construction occurs adjacent to a recreation site, users may be disturbed by noise, truck traffic, restricted access, dust, and other construction activities. Wildlife may also be deterred by construction activities and avoid portions of the recreation site close to construction, which could diminish user enjoyment.

#### 12.5.1.3 Construction in Rights-of-Way

Construction in rights-of-way, sidewalks, bicycle trails, or other corridors used for informal recreation, could decrease the enjoyment of informal recreation users such as pedestrians and cyclists. Access may be restricted due to road or sidewalk closures, traffic diversions, and additional vehicles for construction. This potential impact would be larger where there are sidewalks or bicycle facilities (e.g., on-street bicycle lanes), especially those that are connected with the network of trails or paths throughout the Eastside.

### 12.5.2 No Action Alternative

There would be no impacts to recreation from the No Action Alternative because construction activities would be limited to maintenance of existing facilities. Maintenance of facilities located in recreation areas would be limited and short in duration.

### 12.5.3 Alternative 1: New Substation and 230 kV Transmission Lines

Impacts are described according to the major components associated with Alternative 1. The substation impacts are described first, followed by transmission line options.

All four options for Alternative 1 would require expansion of an existing substation (Lakeside) or construction of a new substation (Vernell or Westminster) to accommodate a new transformer and associated equipment. The Westminster substation would be located within an existing transmission right-of-way that crosses Viewpoint Park. The Lakeside substation is located adjacent to Sunset Park. Construction would take up to 18 months. Construction activities and noise would cause minor and temporary noise and visual disturbance to park users and informal recreation and potentially decrease enjoyment. Noise would be above background levels but would likely be within the restrictions for construction noise (see Chapter 9). Construction activities may decrease the visual enjoyment of the park by park users, but impacts would be minor (see Chapter 11).

#### 12.5.3.1 Option A: New Overhead Transmission Lines

If new overhead transmission lines were built in new utility corridors or along existing corridors, they would likely cross recreation sites, be located near recreation sites, and cross areas used for informal recreation. The corridor would be relatively wide (120 to 150 feet) and thus may require more clearing than for a 115 kV line (70 to 100 feet). If the corridor is located along the existing PSE easement it would be widened by up to 50 feet. Construction activities would be concentrated along a minimum of 18 miles of corridor, and would require temporary construction access roads. Construction of infrastructure may temporarily reduce

enjoyment of recreation sites or visitors may avoid these sites during the construction period. Construction of new overhead transmission lines may take up to 18 months and would be constructed concurrent with the substation. The location of impacts would change as construction progressed along the corridor. Construction in any one location would occur in 3 stages, each 1 to 3 days long, over a period of 2 months. Clearing for if new corridors are used would take longer. In segments where existing transmission line corridors with formal and informal trails would be used, the trails may be closed for extended periods due to safety and security concerns. As construction in any one location would not be a long duration, potential impacts from construction of overhead transmission lines would be considered minor to moderate depending on the time of year of construction, if a major recreation facility is affected, and how many recreation facilities are affected concurrently. Types of impacts could include those described in Section 12.5.1.1.

#### 12.5.3.2 Option B: Existing Seattle City Light 230 kV Transmission Corridor

The use of existing SCL overhead transmission lines would involve reconstruction of the existing infrastructure and likely construction of access roads. Some of the existing overhead transmission lines are located within and adjacent to recreation sites, and thus would impact visitors to those sites during construction. The existing SCL 230 kV transmission line crosses North Rose Hill Park, Bridle Trails State Park, Wilburton Hill Park, Coal Creek Natural Area, May Creek Park, and Cedar River Natural Zone, and is adjacent to others. Construction activities would be less intense than new overhead lines in new corridors and would involve substantially less land clearing. Activities would be concentrated along a similar length of corridor as for the new transmission lines for Alternative 1, Option A. Recreation users may avoid a recreation site or construction activities may decrease the user experience during active construction. Recreation areas as well as formal and informal trails along the existing transmission line would also likely be closed, or partially closed, during construction for safety and security reasons. These impacts would likely be longer in duration for Option B (up to 24 months) than Option A because existing SCL lines would need to be completely rebuilt. The location of impacts would change as construction progresses along the corridor. Similar to construction of new overhead transmission lines, Option B would cause minor to moderate construction-related impacts on recreational resources depending on the time of year of construction, if a major recreation facility is affected, and if construction occurs in recreation facilities concurrently. Types of impacts could include those described in Section 12.5.1.1. Construction in recreation facilities will be avoided where practicable.

#### 12.5.3.3 Option C: Underground Transmission Lines

Underground transmission lines could be placed in existing PSE 115 kV overhead line rights-of-way, in public road rights-of-way, or in new rights-of-way. Placing transmission lines underground usually involves open-cut installation depending on geography and the features the line may need to cross. Construction could include large equipment, construction materials, land disturbance, road closures, and noise. If construction were to occur in or adjacent to recreation sites or areas used for informal recreation, it would negatively affect recreation user experience, and visitors may avoid recreation sites. The duration of construction of underground transmission lines would likely be the longest of the three alternatives, taking up to 28 months. The duration of impacts to individual recreational sites

would be less (approximately 2 months), because the affected area would change as construction progressed. Alternative 1, Option C could cause moderate construction-related impacts to recreation depending on the time of year of construction, if a major recreation facility is affected, and how many recreation facilities are affected. The types of impacts could include those described in Section 12.5.1.1. Construction in recreation facilities will be avoided where practicable.

#### 12.5.3.4 Option D: Underwater Transmission Lines

Construction of the underwater portion of the transmission line could take approximately 8 months. During this time, construction activities would be disruptive to water-based recreation if access to portions of Lake Washington is restricted during construction. Access restrictions may include closure of docks or lake access points, or areas of the lake near construction boats or barges. Public shoreline access along Lake Washington is already limited and used by a large number of people. A temporary loss of access to docks or other lake access points could affect water-based recreation experiences and would be considered minor (if it occurred during the winter months and/or in an area that is seldom used) to significant (if occurring in a high use area during a peak use period). Impacts are anticipated to be minor as PSE would likely be able to avoid affecting public recreation access. Construction activities on the water may also decrease enjoyment for individuals by negatively affecting scenic water views. See Chapter 11 for more details regarding visual impacts. The types of impacts could include those described in Section 12.5.1.1.

### 12.5.4 Alternative 2: Integrated Resource Approach

Construction activities for Alternative 2 would be less than would occur for Alternative 1 because infrastructure would be smaller in scale. However, small-scale construction would be distributed over a larger portion of the combined study area.

#### 12.5.4.1 Energy Efficiency Component

Energy efficiency includes methods that reduce demand for energy such as weatherization and efficient lighting, most of which would not affect recreation. Within recreation sites, impacts would be limited to minor potential improvements to recreation buildings and exterior lighting. These activities would be limited to small crews and construction vehicles for a short duration and recreation impacts would be negligible.

#### 12.5.4.2 Demand Response Component

Construction related to demand response would involve installation of meters and/or in-home monitoring systems and control equipment. Construction disturbance would be minimal and not result in impacts to recreation.

#### 12.5.4.3 Distributed Generation Component

Distributed generation facilities would be located throughout the combined study area and their construction would require more activity than for energy efficiency and demand response components but less than for construction of Alternative 1. Distributed generation facilities would likely be located on rooftops or inside buildings. It is possible that buildings within recreation sites could be used to house distributed generation facilities. Impacts from

construction are anticipated to be short in duration and would not affect extensive areas of any recreation site. Distributed generation would therefore have minor impacts on recreation sites.

#### 12.5.4.4 Energy Storage Component

An energy storage system site would be approximately 6 acres and would need to be close to the center of the Eastside, ideally adjacent to an existing substation (Strategen, 2015). An energy storage system would not be located within a recreational site but may be located adjacent to a recreation site or in areas used for informal recreation. If located near a recreation site or areas used informal recreation, construction activity could reduce the enjoyment for recreationists. Construction of a battery storage facility would take approximately 6 months. Impacts would be minor to moderate, depending on how close it is to a recreation site, time of year of construction, and if access is restricted. Types of impacts could include those described in Section 12.5.1.2.

#### 12.5.4.5 Peak Generation Plant Component

Three peak generation plants would be located within or adjacent to existing PSE substations. If located near a recreation site or in areas used for informal recreation, construction activities may reduce the enjoyment of recreationists. Impacts from construction would be minor to moderate, depending on the size of the facility and distance from a recreation site. The substations that would be used have not been determined. However, if either Lakeside or Lake Tradition is used, recreation sites may be impacted. The Lakeside substation is located near Sunset Park and the Lake Tradition substation is in the Lake Tradition Natural Resource Conservation Area (NRCA). Impacts to Sunset Park from construction would be minor as the park is far enough away from the substation. The Lake Tradition substation is located within the Lake Tradition NRCA, impacts would be minor to moderate depending on time of year of construction and how access to the construction site affects access within NRCA. PSE will avoid restricting access to recreation opportunities to the extent practicable, and thus impacts to recreation would likely be minor.

### 12.5.5 Alternative 3: New 115 kV Lines and Transformers

For Alternative 3, new 115 kV transmission lines would need to be constructed in existing or new rights-of-way. The types of impacts would be similar to those described for Alternative 1, Option A of Alternative 1, except that construction activities would be less intense because of the use of existing corridors such as roads and narrower cleared areas required (30 to 40 feet). However, the corridor would be much longer (60 miles) and thus distributed over a larger area. Construction of new 115 kV transmission lines would take 24 to 28 months, assuming three to four crews installing an average of 3 poles per day. New 115 kV lines could be located within or adjacent to recreation sites or in areas used for informal recreation. Because the length of the corridor would be longer with 115 kV transmission lines compared to 230 kV lines proposed in Alternative 1, there is a high likelihood that more recreation sites would be affected. Impacts would be minor to moderate depending on how many recreation facilities are affected from the overall project.

Five substations would require complete rebuilds or expansion under this option (Sammamish, Lakeside, Talbot Hill, Clyde Hill, and Hazelwood) and three transformers would be installed at existing substations (Sammamish, Talbot Hill, Lake Tradition). Some of these substations are near recreation sites and construction activity may disrupt access for visitors. The types of impacts could include those described in Section 12.5.1.1. Impacts to Sunset Park from construction would be minor as the park is far enough away from the substation. The Lake Tradition substation is located within the Lake Tradition NRCA, impacts would be minor to moderate depending on time of year of construction and how access to the construction site affects access within NRCA. PSE will avoid restricting access to recreation opportunities to the extent practicable, and thus impacts are expected to be minor.

## 12.6 HOW COULD OPERATION OF THE PROJECT AFFECT RECREATION?

### 12.6.1 Operation Impacts Considered

If new infrastructure is located within recreation sites or in rights-of-way used for informal recreation, operation of the facilities could reduce user enjoyment of a recreation site through noise or visual impacts or changes to the resource, such as habitat loss or changes in light and shade; access to a recreation site (such as for safety or security reasons); or disruption of informal recreation activities. Infrastructure operating adjacent to a recreation site may affect enjoyment of the recreation site through noise or visual impacts, or changes to the resource, such as habitat loss or changes in light and shade. Siting of electrical facilities would consider potential impacts to recreation sites and avoid these areas if possible. Land purchased with grant funds for the purpose of recreation often has restrictions that preclude its conversion into another use. During Phase 2 of the EIS, site-specific restrictions on recreation facilities will be evaluated. PSE will avoid recreation facilities to the extent practicable.

**Minor** – If there is a change to a recreation facility but recreation opportunities are still available, then impacts would be considered minor.

**Moderate** – If there are permanent changes in a recreation facility that decrease the enjoyment of recreationist such as noise or visual impacts but the current use of the facility is not lost, then impacts would be considered moderate. These types of impacts are defined in Chapters 9 and 11 respectively. Operational impacts to recreation would also be moderate if the current use of recreation site is permanently lost but could be replaced.

**Significant** – If the current use of recreation site is permanently lost and could not be replaced, or if there is conversion of vegetation type (e.g., from forested to low-growing vegetation) that would substantively change or negatively impact the scenic nature of a recreation facility, then impacts would be considered significant.

### 12.6.2 No Action Alternative

There would be no changes to recreation sites from the No Action Alternative because no new infrastructure would be constructed.

## 12.6.3 Alternative 1: New Substation and 230 kV Transmission Lines

Impacts are described according to the major components associated with Alternative 1. The substation impacts are described first, followed by transmission line options.

All four options for Alternative 1 would require expansion of an existing substation (Lakeside) or a new substation (Vernell or Westminster) to accommodate a new transformer and associated equipment. There are no parks near the proposed Vernell substation. Westminster substation would be located adjacent to an existing transmission line right-of-way that crosses Viewpoint Park. If the new transformer with substation is sited at Westminster, there could be some loss of vegetation and changes to the scenic nature of the area that may negatively impact users of this recreation site. The Lakeside substation is located adjacent to Sunset Park and 115 kV lines already cross the site, so expansion here would not substantially change the scenic nature of the area. However, at Westminster, although 115 kV lines already cross the site, the scenic nature would change and noise from a new transformer would be an increase over existing conditions; thus impacts from the new substations would be considered moderate (see Chapters 9 and 11).

### *12.6.3.1 Option A: New Overhead Transmission Lines*

#### 12.6.3.1.1 Permanent Infrastructure within a Recreation Site

If transmission lines are located in recreation sites they could impact recreation users. There would be permanent loss of vegetation, including trees, because a 230 kV transmission line would require a cleared corridor of 120 to 150 feet wide (or up to 50 feet of clearing where the existing PSE easement is used). The corridor would be maintained with low-growing vegetation and all trees would be removed. Trees outside of the corridor that pose a threat to the transmission lines would also be removed. Impacts from vegetation loss would be considered significant if there is a permanent conversion of vegetation type (e.g., from forested to low-growing vegetation) that would substantively change or negatively impact the scenic nature of a recreation site. In recreation sites where there is a permanent conversion of vegetation type, a loss of habitat for animals that may use these areas would result, which could reduce user enjoyment. In addition, benches, playground equipment, gazebos, or other structures may be removed underneath the transmission lines. Visitors may avoid a recreation site if it no longer offers the amenities they previously used at that site. Refer to Chapter 6 and Chapter 11 for further description of potential impacts to plants, animals, and visual quality.

Infrastructure would also reduce the available space for recreation activities, potentially reducing visitor enjoyment; however, this impact would only be considered significant if recreation opportunities could not be replaced. Noise from transmission lines may be audible in recreation sites, depending on weather conditions, but would be low relative to background noise, even in a rural setting. Transmission line noise could have a minor impact on recreation. Refer to Chapter 9 for a discussion of noise impacts.

#### 12.6.3.1.2 Permanent Infrastructure Adjacent to a Recreation Site

Because of the wide corridor needed for 230 kV transmission lines, lines adjacent to a recreation site could result in loss of vegetation. Poles and wires may be visible from within

or approaching the recreation site. Changes in vegetation and the visual appearance of transmission structures could negatively affect the enjoyment of a recreation site by visitors and result in a moderate impact (see Chapter 11). Noise from transmission lines may be audible near the recreation site, but would be a minor impact (see Chapter 9).

#### 12.6.3.1.3 Permanent Infrastructure in Right-of-Way

If the transmission lines are located along rights-of-way, sidewalks, bicycle trails, or other corridors used for informal recreation, these activities may be impacted. Sidewalks or paths might be narrowed to accommodate towers, making it more difficult to navigate safely; however, all facilities would comply with applicable permit requirements. Pedestrians or bicycles may be required to share the road with vehicles where they currently have a protected path. These changes may decrease the enjoyment of informal recreational activities or change where these activities take place, and could result in minor to moderate impacts. Loss or relocation of informal trails on existing transmission line rights-of-way would generally be a minor impact, because these recreation activities are ancillary to the primary use of the property.

### 12.6.3.2 Option B: Existing Seattle City Light 230 kV Transmission Corridor

For Alternative 1, Option B, impacts to recreation from using the existing SCL transmission lines would be minor because most of the corridor is already cleared and infrastructure in place. Towers would be larger than existing, but changes in views and enjoyment of the area are unlikely to change. There would be minimal changes in recreation sites or to informal recreation opportunities. For the new transmission line connections that would be needed to tie the SCL line to PSEs substations, the impacts would be similar to those described for Option A. A significant impact would occur if new lines were to be located within a recreation site and the use of the recreation site was lost and recreation opportunities could not be replaced.

### 12.6.3.3 Option C: Underground Transmission Lines

Underground transmission lines would not be visible after installation; however, there would be permanent access roads for maintenance, and hatch access to underground vaults. Furthermore, trees are not permitted to grow over underground transmission lines and in some areas there could be a conversion from trees to small shrubs or grass where underground lines are not placed along roads or in already cleared areas. If constructed in recreation sites, the roads, vaults, and vegetation removed would result in a change to the appearance of the recreation site, potentially reducing visitor enjoyment. A significant impact could occur if these changes were to occur within a recreation site, use of the recreation site was permanently lost, and recreation opportunities could not be replaced. Impacts would be negligible if recreation sites and access are avoided. Similar types of impacts would occur if underground lines are located in areas used for informal recreation.

### 12.6.3.4 Option D: Underwater Transmission Lines

Underwater transmission lines would not result in permanent visual impacts that would affect recreation. Underwater transmission lines would require aboveground or underground lines

on land to connect to a substation. Vaults and permanent access roads would be located on the shoreline every 1,500 to 2,500 feet to provide access for maintenance and repair of the underwater cables. There would be a potential impact to recreation if transmission lines, vaults, or access roads are located in or near recreation sites, or areas that are used for informal recreation. If these changes were to result in the permanent loss of use of a recreation facility that cannot be mitigated, there would be a significant impact. However, recreation sites and recreation access points would be avoided to the extent practicable and thus impacts would be minor to moderate.

### 12.6.4 Alternative 2: Integrated Resource Approach

Permanent impacts from operation of Alternative 2 are not expected because infrastructure would be minimal and likely located on rooftops or inside buildings. It is possible that buildings in recreation sites could be used for distributed generation facilities, but these would be located on roofs or inside buildings and no impact on visitor enjoyment of recreation sites is likely. The exceptions are some fuel cells, an energy storage facility, and peak generator plants. These large facilities would not be located in a recreation site but may be near a recreation site or near areas used for informal recreation, so they may have visual impacts and negatively impact user enjoyment. The substations that would be used for peak generator plants have not been determined. Permanent impacts from these large facilities would be minor to moderate and would depend on their proximity to recreation sites. There would be no permanent loss of recreation facilities from Alternative 2 with the exception of Lake Tradition NRCA if this substation is chosen for a peak generator plants. A permanent loss of use of this recreation site that cannot be replaced or mitigated would be significant.

### 12.6.5 Alternative 3: New 115 kV Lines and Transformers

The types of impacts to recreation from Alternative 3 would be similar to impacts from Alterative 1. The corridor for a 115 kV transmission line would use existing corridors such as roads and be narrower than for a 230 kV line, but the new corridor would be longer (60 miles of new lines). Thus, the potential to cross or be located near recreation sites is greater. If new 115 kV transmission lines are sited in a recreation site and there is a permanent change or reduction in the use of that site that cannot be replaced or mitigated, the impacts may be significant.

Five substations would require complete rebuilds or expansion under this option (Sammamish, Lakeside, Talbot Hill, Clyde Hill, and Hazelwood) and three transformers would be installed at existing substations (Sammamish, Talbot Hill, Lake Tradition). Once established, these substations are unlikely to impact recreation. Visitors to recreation sites may observe a permanent loss of vegetation where the substation is located near a recreation site, but this impact is not considered to be significant. The Lakeside substation is adjacent to Sunset Park but expansion of the substation is not anticipated to affect the park. The Lake Tradition substation is located within Lake Tradition NRCA, but would not be expanded beyond its existing footprint. Operational impacts to these recreation facilities would be negligible.

## 12.7 WHAT MITIGATION MEASURES ARE AVAILABLE FOR POTENTIAL IMPACTS TO RECREATION?

### 12.7.1 Construction Measures

Best management practices would be used to minimize noise, dust, and other disturbances to visitors to recreation sites during construction, as well as in areas used for informal recreation. Recreation facilities and access to recreation activities (e.g. water access points) would be avoided to the extent practicable. Alternative access points to recreation sites and trail detours would be provided and months in which recreation sites are busier would be avoided as much as reasonably possible. Recreation sites would be restored after construction.

### 12.7.2 Operation Measures

To minimize potential operational impacts to recreation sites, placement of infrastructure within or adjacent to recreation sites would be avoided to the extent possible. All impacts to recreational sites would comply with applicable requirements, such as restrictions that protect recreation land from conversion to other uses (for example, state or federal grant funded sites). If it is not possible to avoid a recreation site, vegetation screening could be used outside of any required clear zone. If recreation sites are affected and cannot be restored, they would be relocated and replaced as required; for example property could be purchased and a new recreation facility created.

## 12.8 ARE THERE ANY CUMULATIVE IMPACTS TO RECREATION AND CAN THEY BE MITIGATED?

As the population of the Eastside grows, there is increased demand for recreation facilities, while available lands for new facilities within the urbanized areas are being considered for other uses. This trend will likely continue, resulting in more pressure on recreational facilities. The Energize Eastside project, when combined with other major construction projects in the region, could contribute to this trend.

The most likely future action that could alter or affect recreation sites within the Energize Eastside project area is Sound Transit's East Link project, which could be constructed during the same general time frame. The East Link project will impact some parks in Bellevue, Redmond, and King County (Sound Transit, 2011). In combination with the East Link project and other projects planned in the project area, the Energize Eastside project could potentially cause cumulative impacts on recreation if the same recreation sites are affected or if construction periods overlap. Energize Eastside may avoid direct impacts on recreation sites by siting facilities outside of designated park or recreation areas. Construction of the East Link project is anticipated to occur between 2015 and 2021. Construction for the Energize Eastside Project may occur during this same period; however, construction could be planned to avoid working in the same areas concurrently. Construction activity throughout the region could result in potential impacts to parks and other recreation sites. Coordination with potentially affected cities will help to reduce potential impacts through facility siting, and would comply with all applicable permitting requirements to mitigate impacts. With

appropriate mitigation, the cumulative construction and operation effects of the project and other planned projects are not expected to change long term trends related to the use of recreation facilities in the project area under any of the alternatives.

## 12.9 ARE THERE ANY SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS TO RECREATION?

Significant impacts could occur under Alternatives 1 and 3 if transmission lines are placed within a highly used or unique recreation site that substantially alters, limits, or precludes the use of that site. Depending on the specific corridor selected, some significant impacts may be unavoidable if design or siting factors limit the ability to locate a transmission lines away from recreation sites. There could also potentially be significant adverse impacts to recreation under Alternative 2 if the Lake Tradition substation site is selected for a peak generation plant and design or siting factors limit the ability to locate the facility away from the Lake Tradition NRCA.

# CHAPTER 13. HISTORIC AND CULTURAL RESOURCES

## 13.1 HOW WERE HISTORIC AND CULTURAL RESOURCES IN THE COMBINED STUDY AREA EVALUATED?

This chapter addresses two main types of historic and cultural resources: (1) aboveground historic properties; and (2) recorded and potential archaeological resources. The EIS Consultant Team conducted research to identify recorded historic and cultural resources located within the combined study areas (Alternatives 1, 2, and 3 as depicted on Figure 1-4 in Chapter 1).

**Historic and Cultural Resources Key Findings**

There are no known significant impacts to historic and cultural resources that cannot be avoided through appropriate mitigation measures.

For the purposes of this programmatic EIS, specific geographic locations of proposed construction have not been identified. Research within the study areas focused on collecting and summarizing data on previously recorded resources, and it did not include fieldwork or evaluation of recorded resources. For the Phase 2 Draft EIS, additional detail will be developed on the presence of and potential impacts to historic resources.

### 13.1.1 Historic Properties

The analysis of aboveground historic properties focused on buildings or structures currently listed on a historic register. In some cases, an aboveground historic property also includes a belowground archaeological component, as with a historic cemetery; these have been categorized with aboveground resources within this chapter. To be considered historic, a property (building, structure, or site) generally must meet minimum age requirements. However, historic properties are not defined solely by their age but also by criteria related to their historic or cultural importance; this is known as “significance”. Significant historic properties represent important themes, cultures, or patterns in our past. The significance of a property may be on the national, state, or local level.

Recorded historic properties that are listed on federal, state, or local historic registers were identified through a review of records at the Washington State Department of Archaeology and Historic Preservation (DAHP) and the King County Historic Preservation Program. The Cities of Issaquah, Kirkland, Newcastle, and Redmond participate in DAHP’s Certified Local Government program; their historic registers are maintained through an interlocal agreement with the King County Historic Preservation Program. No municipal historic registers exist for the Cities of Bellevue, Clyde Hill, Hunts Point, Medina, Mercer Island, Renton, Sammamish, or Yarrow Point.

Other information reviewed included local histories, historic property inventories, King County and City Landmarks List, the National Register of Historic Places (NRHP), Washington Heritage Register (WHR) properties, and historic maps. Examined documents were acquired from DAHP, online, and within Environmental Science Associates' research library.

### 13.1.2 Archaeological Resources

Locations of recorded archaeological sites were obtained from DAHP during a records search conducted in July 2015. The team also reviewed DAHP's statewide archaeological predictive model to analyze the potential for additional, unrecorded buried resources to be located within the combined study area (DAHP, 2010).

Other information reviewed included archaeological survey reports and site forms and ethnographic studies. Documents were examined at DAHP, the University of Washington Libraries, online, and Environmental Science Associates' research library.

## 13.2 WHAT ARE THE RELEVANT PLANS, POLICIES, AND REGULATIONS?

There are several Washington State laws protecting archaeological resources that apply to this project: Archaeological Sites and Resources (Chapter 27.53 RCW), Indian Graves and Records (Chapter 24.44 RCW), Abandoned and Historic Cemeteries and Historic Graves (Chapter 68.60 RCW), and Human Remains (Chapter 68.50 RCW).

Because this review is being conducted under SEPA, consideration of impacts to cultural resources by the project is required. Cultural resources are defined in SEPA as buildings, structures, or sites that are on or near the project area, over 45 years old, and listed or eligible for listing in national, state, or local historic preservation registers (WAC 197-11-960).

Applicable national, state, and local historic preservation registers reviewed for this project include the following (for more information, see Appendix J):

- National Register of Historic Places (NRHP), as established through the National Historic Preservation Act (NHPA);
- Washington Heritage Register (WHR) and Washington Heritage Barn Register (WHBR); and
- King County Landmarks (including Cities of Issaquah, Kirkland, Newcastle, and Redmond).

The historical significance required for listing on each register varies based on criteria including association with significant events, significant people, distinctive architectural or artistic value, or ability to inform our past. Properties can possess significance on multiple levels and thus be listed on more than one register. For example, there are 16 barns throughout the state that are listed on the NRHP, WHR, and WHBR.

The age at which a property can be considered "historic" varies by register (Table 13-1). For the NRHP, WHR, and WHBR, the standard threshold is 50 years, while for King County Landmarks the standard threshold is 40 years. A property that has achieved exceptional significance within a shorter timespan can also be considered eligible for the NRHP and King County Landmarks, although this is rare. Changes to designated King County Landmarks are managed through the Certificate of Appropriateness (COA) process (King County, 2015b). The COA process typically involves multiple meetings and includes an appeals process.

**Table 13-1. Historic Registers Applicable to this Project**

| State / Local Preservation Register | Standard Age Threshold | Managing Agency |
|---|---|---|
| WHR | 50 years | DAHP |
| WHBR | 50 years | DAHP |
| King County Landmarks | 40 years | King County |

WHR = Washington Heritage Register; WHBR = Washington Heritage Barn Register; DAHP= Department of Archaeology and Historic Preservation

This project is not subject to compliance with federal cultural resources regulations because there is no federal funding, federal permits, or federal lands involved. However, the state and local preservation regulations under SEPA refer to NRHP eligibility; therefore, familiarity with the eligibility criteria is helpful. In brief, a resource can be eligible for listing on the NRHP if it has integrity of location, design, setting, materials, workmanship, and feeling and is associated with significant events, significant people, embodies distinctive architectural characteristics, or has the potential to yield important information about history or prehistory.

## 13.3 WHAT HISTORIC AND CULTURAL RESOURCES ARE PRESENT IN THE COMBINED STUDY AREA?

### 13.3.1 Precontact Period

The *Precontact* cultural chronology of the Pacific Northwest and Puget Sound extending from the Late Pleistocene era to the *Postcontact Period* has been studied and interpreted in several publications (e.g., Ames and Maschner, 1999; Blukis Onat et al., 2001; Kidd, 1964; Matson and Coupland, 1995; Nelson, 1990). The various chronologies generally agree on broad patterns in culture but may differ regarding the timing and significance of changes in specific aspects of culture, such as subsistence, technology, and social organization. The following overview of Precontact sequences draws broadly on the various chronologies, but follows Ames and Maschner (1999) by recognizing five time periods: Paleoindian

**What does "Precontact" Mean?**

Precontact archaeological sites date prior to the point of contact between European-American peoples (including explorers, fur traders, and military personnel) with Native American peoples. In King County, the Precontact period is considered to have ended with the arrival of the Denny Party in 1851.

(before 12,500 years ago); Archaic (12,500 to 6,400 years ago); Early Pacific (6,400 to 3,800 years ago); Middle Pacific (3,800 to 1,800/1,500 years ago); and Late Pacific (1,800/1,500 years ago to AD 1851). Information about the time periods is summarized in Table 13-2.

**Table 13-2. Precontact Time Periods**

| Time Period | Approximate Date Range | Characteristics | Associated Recorded Archaeological Resources in Study Areas |
|---|---|---|---|
| Paleoindian | Before 12,500 years ago | Often referred to as Clovis culture and located in the uplands; represented by *projectile points* (Ames and Maschner, 1999:65) | Yes (45-KI-839*) |
| Archaic | 12,500 to 6,400 years ago | Often referred to as Olcott culture and located in riverine and lake settings; represented by cobble tools and *lanceolate* projectile points | Yes (45-KI-1227) |
| Early Pacific | 6,400 to 3,800 years ago | Located in marine and estuary settings; represented by large shell *middens* and decorative artifacts such as *labrets* and bracelets | None known |
| Middle Pacific | 3,800 to 1,800/1,500 years ago | Represented by large plank houses, increase in decorative items, woodworking tools (*adzes*, *mauls*, *wedges*) | None known, but likely present |
| Late Pacific | 1,800/1,500 years ago to AD 1851 | Represented by seasonal camps associated with resource procurement and increased variability in burial methods | None known, but likely present |

*Smithsonian Archaeological Site number format

### 13.3.2 Postcontact or Historic Period

Early nonnative explorations in Puget Sound took place in 1792 and 1841, though the first nonnative settlers did not arrive in Elliott Bay until 1851. After passage of the 1850 Donation Land Act of Oregon, settlers began to claim homestead lands throughout the Puget Sound region, including lands within the combined study area. Early settlements were located in easily accessible areas, such as boat landings on lakeshores, along trails, wagon roads, and railroads, or at river mouths (U.S. Coast and Geodetic Survey, 1902a, 1902b, 1902c; USGS, 1895, 1897a, 1897b, 1898, 1900; U.S. Surveyor General, 1864a, 1864b, 1864c, 1870, 1872, 1874).

**What does "Postcontact" or "Historic" Mean?**

Postcontact or historic archaeological sites date to after the point of contact between European-American peoples (including explorers, fur traders, and military personnel) with Native American peoples. In King County, the Postcontact or historic period is generally considered to have started with the arrival of the Denny Party in 1851.

The combined study area is located within the traditional territory of the Duwamish and Snoqualmie people (Suttles and Lane, 1990). During the Postcontact period, these groups had villages along the shores of Lake Washington and Lake Sammamish and on the banks of the former Black, Cedar, and Sammamish Rivers (Haeberlin and Gunther, 1930; Smith, 1940; Spier, 1936; Swanton, 1979). During the winter, groups lived in permanent villages of cedar plank houses and practiced local hunting and fishing while sharing supplies of preserved food such as smoked fish and shellfish and dried berries. During the rest of the year, groups moved seasonally to known gathering locations for berries, roots, bulbs, sprouts, nuts, marine and freshwater fish, shellfish, land game, and waterfowl. These resources were used for winter supplies and trade, as well as immediate consumption. Salmon was a dietary staple. Other important resources included plants for medicinal or other uses; western red cedar for rope, baskets, and numerous household items; and reeds such as tules and cattails for mat making. The range in landforms would have provided a variety of gathering opportunities for these types of items and subsistence needs. Traditional burial practices at the time of European-American contact included tree burials, whereby the deceased was placed in a canoe and then raised into a tree or on a frame.

There are over 40 known (recorded) Native American names for places within the combined study area (Hilbert et al., 2001; Miller, 2014; Waterman, 1922). The majority of these are concentrated along the shores of Lake Sammamish, Lake Washington, Sammamish River, Issaquah Creek, Bear Creek, Evans Creek, Cedar River, and the former Black River. Of these 40 places, 25 were recorded on the eastern shoreline of Lake Washington between today's Kirkland and Renton, including one on the southern tip of Mercer Island. Other concentrations are located along the shores of Lake Sammamish, the lower reach of the Sammamish River, and within the Issaquah valley. Further, numerous place names were recorded in the vicinity of today's Renton, which was once the confluence of the Black and Cedar Rivers. The place names range between villages, resource procurement sites, geographical features, and locations with oral tradition and spiritual associations.

The U.S. Government entered into treaties with many of the local Native American groups during the 1850s. Although a signatory of the Treaty of Point Elliott in 1855, the Duwamish were not given their own reservation lands. The Duwamish continue to reside in and around Seattle and are petitioning the U.S. Government for federal recognition. The Snoqualmie were awarded federal recognition by the U.S. Government in 1999.

#### 13.3.2.1 Industrial Development

Industries within the combined study area during the 19th century were primarily logging and coal mining. By 1897 most of the study area between Lake Washington and Lake Sammamish was logged (USGS, 1897a, 1897b). Major industries during the 20th century included agriculture and dairying with smaller operations such as the American Pacific Whaling's headquarters on Lake Washington during the 1920s and 1930s and the Lake Washington Shipyards during the 1940s. A population boom after World War II contributed to the rise in single-family residences throughout the combined study area (Bryant, 2000; Eastside Heritage Center, 2006; Fish, 1981; Gellatly, 1977; Hardy, 2006; McDonald, 2000; Way, 1989).

Several major construction events during the 20th century disturbed the ground and modified shorelines, likely reducing the potential for intact archaeological resources within some portions of the combined study area. First, the construction of the Hiram M. Chittenden Locks and Lake Washington Ship Canal between 1911 and 1916 resulted in an approximate 9-foot drop in Lake Washington shorelines, exposing former lakebed and eliminating the flow of the Black River (Bryant, 2000). The resulting drop means that any archaeological sites along the original shorelines have likely been subject to development. Secondly, construction of a network of highways required major ground disturbance. Interstate 90, which includes the Lacey V. Murrow Memorial Bridge, first opened in 1940, and Interstate 405 opened in 1957. *State Route 520*, including the Evergreen Point Floating Bridge, opened in 1963.

### 13.3.3 Previous Archaeological Work

More than 200 archaeological reports have been previously prepared within the combined study area, but these surveys cover less than 25 percent of the area (DAHP, 2015). The reports were prepared by a range of project proponents for a variety of project types, including construction of highways and roads, mass transit, conversion of former railroads to pedestrian trails, and installation of various utilities. The reports vary from simple literature reviews to summaries of differing levels of fieldwork, including surveys to identify historic properties and archaeological resources up to archaeological site investigations at identified sites. Reports have been conducted at a variety of jurisdictional levels.

As of July 2015, previous archaeological reports have identified a combined total of 94 archaeological sites in the combined study area. The locations of these sites are protected from public disclosure under state law (RCW 42.56.300) and therefore are not mapped for this study (see Appendix H for a list). Of the recorded sites, 43 are located within all three study areas. The 94 recorded archaeological sites include 42 from the Precontact period and 52 from the historic period. The 42 recorded Precontact sites include permanent and temporary camps, cemeteries, culturally modified trees, and fishing, hunting, and resource gathering sites. There are 14 isolated artifacts (10 Precontact and 4 historic); isolated artifacts are typically not eligible for inclusion on historic registers. There are 15 recorded cemeteries; 14 are historic and thus treated here as aboveground historic properties, while 1 cemetery (45-KI-51) dates to the Precontact era and thus is treated here as an archaeological site. There are 6 submerged historic period resources, all of which are located within the Alternative 1 study area; these include sunken vessels, aircraft, railroad cars, and docks. For a summary comparison of recorded resources within each study area, see Table 13-3.

**Table 13-3. Comparison of Recorded Archaeological Resources by Alternative**

| Alternative Study Area | Total Number of Recorded Sites | Precontact | Historic |
|---|---|---|---|
| Alternative 1 | 52 | 21 | 31 |
| Alternative 2 | 43 | 21 | 22 |
| Alternative 3 | 88 | 42 | 46 |

Source: DAHP, 2015

#### 13.3.3.1 Precontact Archaeological Sites

Archaeological evidence indicates that Native Americans have lived within the region and along the shorelines of Lake Sammamish for more than 12,000 years (45-KI-839, the Bear Creek Site). DAHP's statewide predictive model classifies the combined study area as ranging from low to very high risk for containing Precontact archaeological sites (Figure 13-1). The statewide predictive model is a tool used by archaeologists and planners to evaluate potential archaeological risks on a broad scale. The model was developed to statistically evaluate multiple environmental factors (i.e., elevation, slope percent, aspect, distance to water, soils, and landforms) in order to predict where archaeological resources might be found (Kauhi, 2013). It is not a substitute for conducting site-specific subsurface investigations, which may be required for project-level review.

#### 13.3.3.2 Historic Period Archaeological Sites

As of July 2015, there were 41 recorded historic archaeological sites located within all three of the study areas (DAHP, 2015). Generally, these sites date to the late 1800s and mid-1900s. Historic sites typically include infrastructure such as railroads, roads, bridges, docks, and piers; ruins of commercial factories, water conveyance and reservoirs, lumber mills, and mines; submerged vessels, aircraft, and railroad cars; and residential farmsteads, houses, and scatters of historic debris. Of these historic archaeological sites, none are listed on the NRHP; 30 sites are classified as potentially eligible and 11 sites have been determined not eligible for listing on the NRHP. One is listed on the Washington Heritage Register: the Renton Coal Mine (45-KI-211).

### 13.3.4 Aboveground Historic Register Listed Properties

As of July 2015, there were a total of 69 structures or buildings listed on historic registers within the combined study area: 55 are aboveground historic structures of buildings and 14 are recorded historic period cemeteries (Appendix I) (DAHP, 2015; King County Historic Preservation Program, 2015b). Aboveground historic properties are shown on Figure 13-1. For a comparison of historic properties by alternative, see Table 13-4. The listed properties date from 1880 to c. 1938 and are either listed on the NRHP, WHR, WHBR, or are designated King County Landmarks. Some properties are listed on multiple registers. All properties listed on the NRHP are automatically also listed on the WHR.

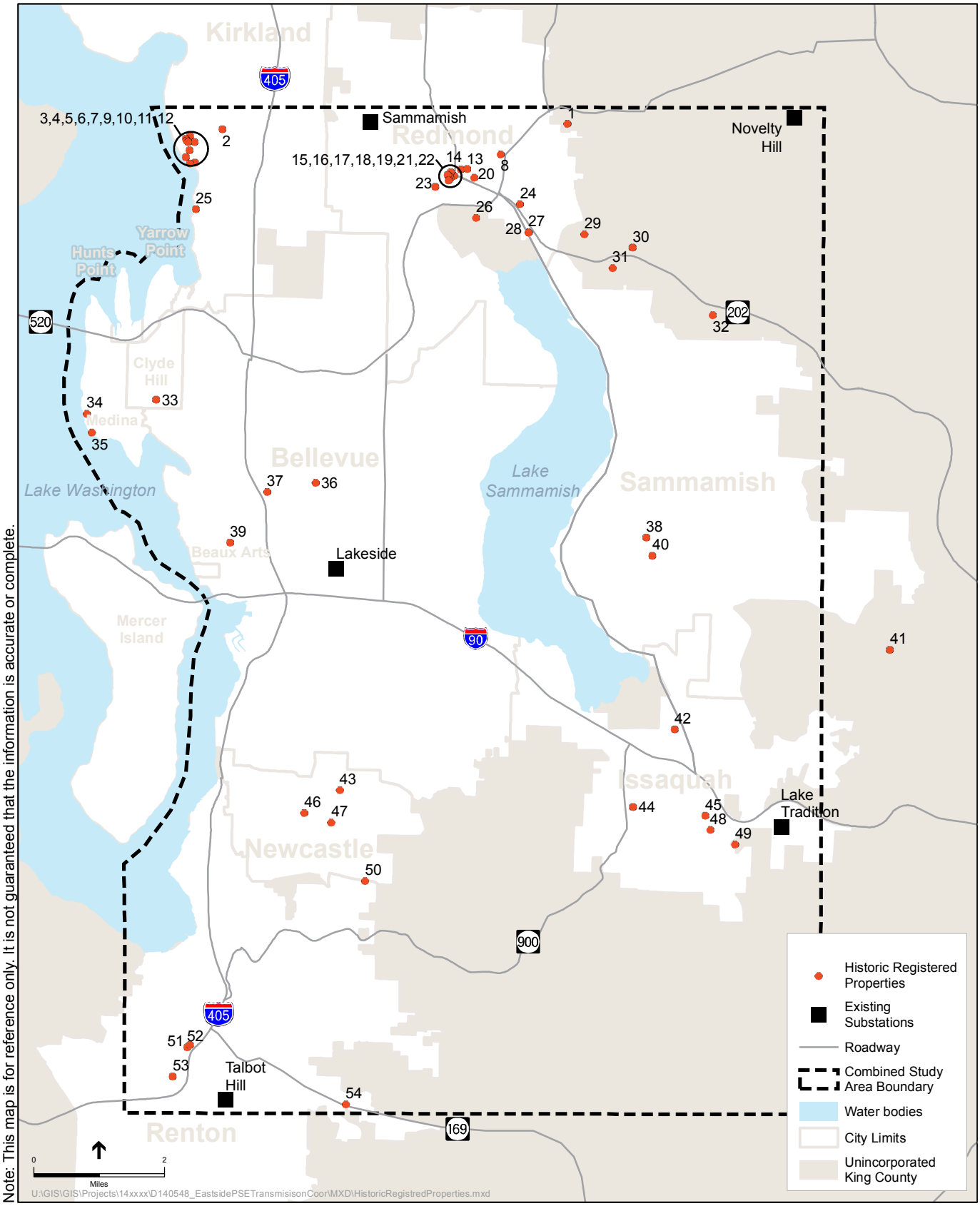
**Table 13-4. Comparison of Historic Register Listed Properties by Alternative**

| Location | Historic Register Listed Properties | Recorded Historic Period Cemeteries | Total |
|---|---|---|---|
| Alternative 1 | 37 | 8 | 45 |
| Alternative 2 | 39 | 8 | 47 |
| Alternative 3 | 55 | 14 | 69 |

Source: DAHP, 2015; King County Historic Preservation Program, 2015b

Two designated King County Landmarks have also been determined eligible for listing on the NRHP: the Justice William White House (45-KI-190) and the Jacob and Emma Reard House (45-KI-659). There are 19 properties listed on both the NRHP and WHR; 7 properties are only listed on the WHR, while 1 property is listed on the WHR and is also a designated King County Landmark (Newcastle Cemetery, 45-KI-141). There are 30 designated King County Landmarks, 9 of which are also listed on the NRHP and WHR. Finally, there are 6 WHBR properties.

Historic period cemeteries are recorded in all three alternative study areas. Cemeteries are protected under state law (Abandoned and Historic Cemeteries and Historic Graves, Chapter 68.60 RCW).




Note: This map is for reference only. It is not guaranteed that the information is accurate or complete.

SOURCE: King County 2015; ESA 2015; WA Ecology 2014.

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**Figure 13-1**

Historic Registered Properties
(Refer to Appendix G)

## 13.4 HOW WERE POTENTIAL IMPACTS TO HISTORIC AND CULTURAL RESOURCES ASSESSED?

It is not possible to identify likely construction impacts to specific historic properties and archaeological resources because the locations of proposed construction areas in relation to documented and probable historic properties and archaeological resources are not yet known.

Any ground disturbance has the potential to impact belowground archaeological resources, if present, including recorded and unrecorded archaeological resources. Any construction impacts to intact belowground archaeological resources would be irreversible and permanent, and considered a significant adverse impact. No impacts to belowground archaeological resources would be minor or moderate, as any disturbance to the depositional integrity (i.e., context) of buried archaeological resources is irreversible.

For aboveground historic resources, potential impacts may range from minor to significant, and have been assessed here depending on their potential permanence.

**Minor** – Temporary impacts and potential minor impacts from increased vibration, increased dust, and alterations to a historic resource that do not impact its ability to convey its historical significance.

**Moderate** – Those impacts which are reversible or can be mitigated through design choices. Potential moderate impacts include alterations to a resource's architectural elements (i.e., window replacement, insulation or cladding modifications, and rooftop additions). Moderate impacts have the potential to diminish the ability of the property to convey its historical significance, if not done in a style that is architecturally sympathetic to the property's significant historical characteristics.

**Significant** – Permanent impacts to the resource. Construction vibration may cause moderate to significant impacts, depending on the proximity to and structural stability of potential nearby historic resources. Vibration from pile driving, for example, has the potential for cumulative significant impacts to the structural integrity of historic buildings, particularly those constructed of brick. Impacts to a building's structural integrity may limit its ability to convey its historical significance, and would be considered a significant impact.

## 13.5 WHAT ARE THE LIKELY CONSTRUCTION IMPACTS RELATED TO HISTORIC AND CULTURAL RESOURCES?

### 13.5.1 Construction Impacts Considered

All of the action alternatives propose some measure of ground disturbance. Any ground disturbance has the potential to impact archaeological resources. Impacts could occur from trenching, dredging, clearing and grading, excavation, pile driving, and compression from driving construction equipment over a resource, or staging construction material or equipment over a belowground resource. While over 200 archaeological reports have been

written for projects in the combined study area, these studies cover limited areas around their associated projects. Much of the combined study area for the Energize Eastside Project has not undergone systematic testing for archaeological resources. Based on the high number of recorded archaeological resources throughout the combined study area, as well as review of the DAHP Statewide Predictive Model, Precontact use, and Postcontact history, all study areas contain high-probability locations for encountering archaeological resources.

To continue to meet PSE's conservation goals under any alternative, customers would voluntarily continue to implement energy efficient improvements. Expected types of conservation include energy efficiency (weatherization, efficient lighting, etc.), fuel conversion (from electric to gas), distributed generation (customer generated heat and power, solar, wind, etc.), distribution efficiency, and demand response. All of these have the potential to change the appearance of historic resources, such as through window replacements, adding rooftop equipment, and other building modifications.

### 13.5.2 No Action Alternative

Under the No Action Alternative, no new construction would occur. This alternative would consist primarily of maintenance of existing facilities and infrastructure.

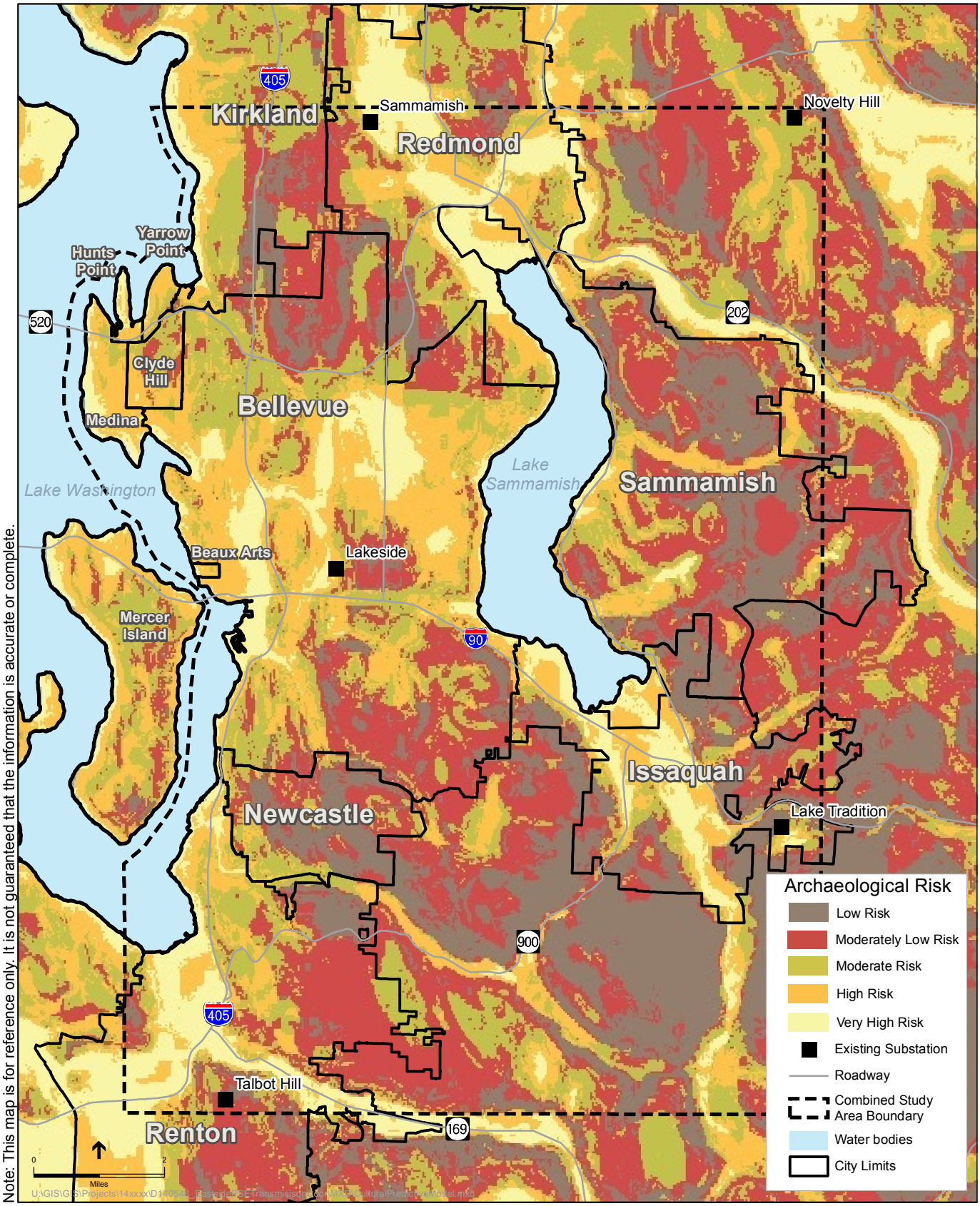
The No Action Alternative includes implementation of energy efficiency conservation measures (weatherization, efficient lighting) and distributed generation (solar panels, wind turbines, or rooftop generators) that may result in minor to moderate impacts to aboveground historic properties and archaeological resources. No ground disturbance is expected under the No Action Alternative, and therefore no impacts to archaeological resources are anticipated.

### 13.5.3 Alternative 1: New Substation and 230 kV Transmission Lines

Impacts are described according to the major components associated with Alternative 1. The proposed new substation and installation of a new transformer is discussed first, followed by descriptions of the transmission line options.

Alternative 1 proposes construction of a new substation and installation of a new transformer at either the existing Lakeside substation, or at either of the possible new substations sites at Vernell and Westminster. This would require ground disturbance for foundations for the transformer and associated switchgear, drainage, and other underground components. Construction of a new substation at Vernell or Westminster would require ground disturbance for foundations.

The land surrounding the proposed Westminster substation site is classified in the statewide predictive model as having a low to moderately low risk for Precontact archaeological resources, while the land surrounding the proposed Vernell substation site is classified as having moderately low to moderate risk (see Figure 13-2). The existing Lakeside substation is classified as high and very high risk for Precontact archaeological resources (see Figure 13-2).




SOURCE: King County 2015; ESA 2015; WA Ecology 2014; DAHP 2015.

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**Figure 13-2**

Statewide Predictive Model for Archaeological Risk

A review of Assessor data indicates that the Vernell location is surrounded by several structures built in the 1950s and 1960s, while the Westminster location is bordered by structures built in the 1970s and 1980s. Adjacent to the Lakeside location are buildings constructed in the 1960s and later. Buildings or structures 40 years or older at the time of potential impacts would qualify for consideration as a potential King County Landmark based solely on the age criterion. In addition, any building or structure 50 years or older at the time of potential impacts would qualify for consideration regarding its potential eligibility for the National Register of Historic Places, the Washington Heritage Register, and the Washington Heritage Barn Register. Therefore, the structures adjacent to the Vernell location would qualify for consideration as potential historic properties, based solely on their age. For the structures adjacent to the Westminster and Lakeside locations, the date of potential impacts will determine if these structures meet the minimum age requirement for consideration to a historic register (for example, if construction were to start in 2020, then those built in and before 1980 would need to be evaluated, as they would be 40 years or older in age at the time of potential impact).

Alternative 1 also includes new 230 kV transmission lines between the new substation and existing Sammamish substation and Talbot Hill substation, which could be overhead, underground, or submerged in Lake Washington. Overhead lines would have the least area of ground disturbance per mile of transmission line, requiring excavations only for pole footings. Underground lines would require excavation for the entire length of the alignment or portion of the alignment that is placed underground. The area of disturbance would be proportional to the length of transmission line installed underground.

The Alternative 1 study area contains the fewest recorded historic properties (37) and 52 recorded archaeological resources, which is the second highest of the three study areas. Existing surveys provide coverage of about 15 percent of the study area for Alternative 1, which is the middle amount of all the alternatives.

#### 13.5.3.1 Option A: New Overhead Transmission Lines

A minimum of 18 miles of new overhead transmission lines may be constructed wholly or partially within existing utility easements and partially within new locations currently not dedicated to utility operations. Depending on the location of the new transmission lines, there may be significant impacts to archaeological resources, if present, during installation of the transmission line poles. This is because any disturbance to the depositional integrity of archaeological resources is irreversible.

The transmission lines may pass near historic properties that meet the minimum age qualifications for consideration to be listed on federal, state, and local historic registers. Construction of new lines may involve impacts from noise and vibration; however, these impacts are considered minor. Therefore, no adverse effects from noise or vibration are expected on historic structures, where present.

#### 13.5.3.2 Option B: Existing Seattle City Light 230 kV Transmission Corridor

Use of existing Seattle City Light lines would necessitate replacing most of the existing structures and conductors. This may involve building a replacement line adjacent to the existing line and placing the new line in service prior to removing the existing structures. This would result in ground disturbance and the potential for minor to significant impacts to archaeological resources, if present. Noise and vibration resulting from construction may impact historic structures, if present, but these impacts are considered minor.

#### 13.5.3.3 Option C: Underground Transmission Lines

The installation of underground transmission lines wholly or partially within existing utility easements and partially within new locations currently not dedicated to utility operations would cause ground disturbance and the potential for minor to significant impacts to archaeological resources, if present. Noise and vibration resulting from construction may impact historic structures, if present, and these impacts range from minor to moderate, depending on the historic structure.

#### 13.5.3.4 Option D: Underwater Transmission Lines

Alternative 1 is the only alternative to propose in-water work along the eastern shoreline of Lake Washington. There are six known submerged archaeological resources within these portions of Lake Washington: two sunken vessels, one aircraft, a grouping of derailed coal cars, and two former dock complexes.

Underwater transmission line could be installed within 1,000 feet of the eastern shoreline of Lake Washington from Kirkland to Renton, including within the entire channel along Mercer Island. Underwater transmission line would be either buried 3 to 5 feet below the lake bottom or laid directly on the lake bottom. Installation methods would involve dredging, open-cut trenching, and sheet piling. At least three shoreline landing points would be needed, and up to six vaults would be constructed at each landing point. Constructing the vaults and burying underwater transmission line would require ground disturbing excavation. Shorelines are generally higher probability areas for encountering buried archaeological resources. Construction methods proposed by Alternative 1, Option D would result in ground disturbance and therefore have the potential for significant impacts to archaeological resources, if present. Noise and vibration resulting from construction may impact historic structures, if present, but these impacts are considered minor.

For the underwater portion of the line, the lack of information for Lake Washington increases the likelihood that a cultural resources survey would need to be completed. Although several underwater archaeological resources have been identified in Lake Washington, little of Lake Washington has undergone underwater survey. Based on the results of the survey, additional study to determine impacts to archaeological resources may be required. If a submerged archaeological resource is identified during construction, redesign may be possible to avoid or minimize disturbance to the resource. If there is no redesign option, the submerged archaeological resource may need to be recorded and removed. Removal would cause a significant impact.

There are 8 recorded historic period cemeteries within the Alternative 1 study area. It is assumed that no construction would occur within cemetery boundaries, but there may be noise and dust impacts to those cemeteries. These impacts are considered minor and temporary.

### 13.5.4 Alternative 2: Integrated Resource Approach

The components being considered under Alternative 2 have the potential for minor to significant impacts to archaeological resources, if present, depending on the proposed locations. If the historic properties are King County Landmarks, a Certificate of Appropriateness (COA) may be necessary depending on the terms of the designating ordinance.

The Alternative 2 study area contains 39 historic register properties (the second highest amount of the three study areas) and 43 recorded archaeological resources (the least of the three study areas). Existing surveys provide coverage of about 25 percent of the study area, which is the highest amount of all the alternatives. The Alternative 2 study area includes the eastern shoreline of Lake Sammamish. There are many recorded archaeological resources along these shorelines. Alternative 2 contains the same 8 recorded historic period cemeteries as Alternative 1 and impacts would be the same.

#### *13.5.4.1 Energy Efficiency Component*

The types of potential impacts from energy efficiency efforts may include modifications to existing buildings (weatherization, efficient lighting). Weatherization could include replacement of original windows which has the potential to diminish a building or structure's integrity of design, materials, workmanship, and feeling, if the replacement windows are not in-kind with their original architectural character, thus impacting the property's potential for conveying its historical significance (Myers, 1981). Any modifications that are permanent have the potential to impact a property's ability to convey its historical significance, which would be significant impact, as described in Section 13.4. No impacts are anticipated to potential archaeological resources under this component. Continued implementation of existing energy efficient improvements may result in minor to significant impacts to historic properties and archaeological resources.

#### *13.5.4.2 Demand Response Component*

Few impacts to historic properties and archaeological resources are anticipated from this component. No impacts are expected to occur to archaeological resources, if present. Meter installation may contribute minor visual impacts to historic properties, if present.

#### *13.5.4.3 Distributed Generation Component*

Ground disturbance could result from the installation of gas turbines, anaerobic digesters, reciprocating engines, microturbines, and fuel cells. Construction of these facilities would range from rooftop installations to larger facilities requiring up to 1 acre; larger facilities would require ground disturbing clearing and grading. Depending on the location of these larger facilities, there may be significant impacts to archaeological resources, if present.

Noise and vibration resulting from the construction of larger facilities may impact historic structures, if present, but these impacts are considered minor.

#### 13.5.4.4 Energy Storage Component

Ground disturbance is anticipated to occur with installation of energy storage systems. This may cause significant impacts to archaeological resources, if present. Noise and vibration resulting from construction may impact historic resources, if present, but these impacts are considered minor.

#### 13.5.4.5 Peak Generation Plant Component

Under this component, ground-disturbing trenching to access upgraded natural gas, water, and wastewater utility lines would be required to install three peak generation plants at or adjacent to existing PSE substations within the Eastside. This may cause significant impacts to archaeological resources, if present. Noise and vibration resulting from construction may impact historic resources, if present, but these impacts are considered minor. Noise from the operation of peak generation plants is considered significant and may cause minor to significant impacts to historic properties at these locations, if present.

This component may also necessitate an upgrade to major natural gas or water supply lines in order to supply the generators. Installation of these underground utilities could also encounter archaeological resources.

### 13.5.5 Alternative 3: New 115 kV Lines and Transformers

Alternative 3 proposes construction of three new transformers at existing substations: Sammamish, Talbot Hill, and Lake Tradition. This alternative also includes rebuilding or expanding five existing substations: Sammamish, Lakeside, Talbot Hill, Clyde Hill, and Hazelwood. Approximately 60 miles of new 115 kV transmission lines would be constructed within existing or new rights-of-way.

Construction of transmission lines would involve ground disturbance and thus have the potential for significant impacts on archaeological resources, if present, depending on the proposed corridors. Installation of new transformers at the Sammamish, Talbot Hill, and Lake Tradition substations would require ground disturbance and has the potential for significant impacts to archaeological resources, if present.

No cultural resources surveys of the three substation properties have been performed. The conservation efforts component of Alternative 3 is anticipated to have the same potential impacts as the No Action Alternative (minor to moderate impacts to historic properties, if present, and no impacts to archaeological resources due to no proposed ground disturbance).

The Alternative 3 study area is geographically the largest of the three and contains the greatest amount of historic properties (55) and recorded archaeological resources (88). Existing surveys provide coverage of less than 10 percent of the study area, which is the lowest amount of all the alternatives. Alternative 3 is the only alternative to propose work at the Lake Tradition substation. There are two recorded Precontact period archaeological resources on the east side of Lake Tradition within 1,200 feet of the substation (45-KI-481

and 45-KI-430). Ground disturbance may cause significant impacts to archaeological resources, if present.

The Alternative 3 study area contains all 15 recorded historic period cemeteries. It is assumed that no construction would occur within cemetery boundaries, but there may be minor impacts to those cemeteries from noise and dust. Noise and vibration resulting from construction may impact historic structures, if present, but these impacts are considered minor.

## 13.6 HOW COULD OPERATION OF THE PROJECT AFFECT HISTORIC AND CULTURAL RESOURCES?

### 13.6.1 Operation Impacts Considered

For belowground resources, any potential impacts to historic properties and archaeological resources would occur during construction.

For aboveground resources, potential operational impacts may result from visual changes to register properties resulting from construction of new electrical facilities. There may also be noise impacts affecting the setting of nearby cemeteries. Depending on the nature of the energy efficiency measures proposed by Alternatives 1, 2, and 3, these may incentivize a loss to the architectural integrity of historic properties through the replacement of original windows with modern energy-efficient types, if not in-kind with the original architectural character. However, for historic properties that are designated King County Landmarks, replacement of windows would likely require a COA.

### 13.6.2 No Action Alternative

Under the No Action Alternative, no construction would occur. No impacts to archaeological resources are anticipated. Conservation efforts could impact aboveground historic properties as described in Section 13.5.2.

### 13.6.3 Alternative 1: New Substation and 230 kV Transmission Lines

No impacts are expected from operation of the substation. Potential operational impacts from the transmission line options are discussed below.

#### *13.6.3.1 Option A: New Overhead Transmission Lines*

Noise, vibration, and visual impacts resulting from maintenance of overhead transmission lines, such as pole replacement, may impact aboveground historic properties, if present. Depending on the resource and proximity of the overhead line to the resource, these impacts would range from minor to significant. Noise and visual impacts from maintenance work would be considered temporary and thus minor, however pole replacement has the potential for causing significant impacts to the structural integrity of historic properties built of brick, if present and depending on proximity to areas being maintained.

#### 13.6.3.2 Option B: Existing Seattle City Light 230 kV Transmission Corridor

Noise and visual impacts resulting from operation of overhead transmission lines may impact historic structures, if present. However, since these lines would replace existing lines, the impacts are considered minor, depending on proximity.

#### 13.6.3.3 Option C: Underground Transmission Lines

No operational impacts are anticipated to occur to aboveground historic properties, if present.

#### 13.6.3.4 Option D: Underwater Transmission Lines

No operational impacts are anticipated to occur to aboveground historic properties, if present.

### 13.6.4 Alternative 2: Integrated Resource Approach

#### 13.6.4.1 Energy Efficiency Component

An increase in energy efficiency implementation (for example, replacement of windows with styles that are not in-kind with the original architectural style) may reduce the integrity of the design, materials, and workmanship of historic resources, if present. This may result in minor to moderate impacts to historic and cultural resources, as described in Section 13.5.1.

#### 13.6.4.2 Demand Response Component

Visual impacts resulting from the presence of new meters may impact historic and cultural resources, if present. These may reduce the integrity of setting for historic resources, if present, but are not anticipated to permanently impact a property's ability to convey its historical significance. These impacts would be minor.

#### 13.6.4.3 Distributed Generation, Energy Storage, and Peak Generation Plant Components

Increased noise and visual impacts resulting from distribution generation, energy storage, or peak generators measures may reduce the integrity of setting for historic resources, if present, but they are not anticipated to permanently impact a property's ability to convey its historical significance. These impacts would be minor.

### 13.6.5 Alternative 3: New 115 kV Lines and Transformers

Increased noise and visual impacts resulting from operation of overhead transmission lines and transformers may reduce the integrity of setting for historic resources, if present, but are not anticipated to permanently impact a property's ability to convey its historical significance. These impacts would be minor to moderate, depending on the proximity to potential resources.

## 13.7 WHAT MITIGATION MEASURES ARE AVAILABLE FOR POTENTIAL IMPACTS TO HISTORIC AND CULTURAL RESOURCES?

Impacts to specific cultural resources cannot be determined at this time because locations of project elements have not yet been identified. The following mitigation measures are typically used.

### 13.7.1 Construction Measures

If the selected alternative presents potential impacts to eligible or listed historic properties, mitigation measures would depend upon the nature of the property and the characteristics contributing to its significance. If impacts to a designated King County Landmark are proposed, the project will be subject to the Certificate of Appropriateness (COA) process with the King County Landmarks Commission.

An archaeological survey of proposed areas of ground disturbance is typically conducted prior to construction. Should impacts to belowground archaeological resources be anticipated, avoidance and mitigation measures would be specific to the nature of the identified resources.

Under state law (RCW 27.53), prehistoric archaeological sites are protected in all cases. Historic archaeological sites must be determined eligible for listing in the Washington Heritage Register (WHR) (RCW 27.34.220) or National Register of Historic Places (NRHP) before they are considered protected. DAHP will make a final determination whether the resource is eligible or not eligible for register listing. If a resource that is considered protected cannot be avoided, the project proponent must apply for an archaeological excavation permit from DAHP (WAC 25-48-060) to conduct any activity that disturbs the site. DAHP will then provide the archaeological excavation permit application for review to the appropriate stakeholders and Tribes.

At a minimum, an Inadvertent Discovery Plan would be prepared for use during construction. The Inadvertent Discovery Plan would outline the procedures to be followed in the event that archaeological resources are identified during construction activities. Under state law (RCW 27.44), archaeological resources identified during construction would need to be evaluated. If the resources are considered significant, any impacts on archaeological resources would require mitigation, which would likely entail archaeological investigation such as scientific excavation and analysis. For archaeological resources found during construction, an emergency archaeological excavation permit may be issued by DAHP and is typically received within three business days. It is possible that archaeological monitoring would be recommended for portions of the project; this work would be conducted under an Archaeological Resources Monitoring Plan.

Best management practices would be implemented during construction to minimize impacts from dust, noise, and vibration. Vibration monitoring may be conducted at historic buildings to document that vibration does not exceed acceptable levels.

### 13.7.2 Operation Measures

If the selected alternative presents potential operational impacts to eligible or listed historic properties, mitigation measures would depend upon the nature of the property and the characteristics contributing to its significance. If impacts to a designated King County Landmark are proposed, the project will be subject to the COA process with the King County Landmarks.

Operational impacts to aboveground resources may include noise, vibration, and views. The impacts to each identified historic resource will need to be assessed individually to determine mitigation measures, which may include redesign options or measures to minimize noise and vibration impacts. No operational impacts are anticipated for belowground archaeological resources.

## 13.8 ARE THERE ANY CUMULATIVE IMPACTS TO HISTORIC AND CULTURAL RESOURCES AND CAN THEY BE MITIGATED?

It is assumed that any impact to a belowground archaeological resource would occur during construction and would be mitigated during the construction phase. Thus cumulative impacts related to belowground archaeological resources are considered unlikely.

For aboveground eligible or listed historic properties, impacts may occur under all alternatives through the promotion of energy efficiency, which is assumed to include replacement of original windows, as described in Section 13.5.1. Any loss of historical integrity, together with ongoing projects in the region, would continue the past and current trends of historic buildings being modified and destroyed. However, no impacts are anticipated from the Energize Eastside project that cannot be mitigated. For King County Landmarks, any loss of historical integrity would be mitigated through the COA process. Therefore, no cumulative impacts on aboveground historic properties are anticipated.

## 13.9 ARE THERE ANY SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS TO HISTORIC AND CULTURAL RESOURCES?

Based on the programmatic evaluation, no known significant impacts to historic and cultural resources have been identified that cannot be avoided through appropriate mitigation measures. However, the exact location of the project is not known. For the Phase 2 Draft EIS, site-specific analysis will be conducted to more definitively determine potential impacts.

# CHAPTER 14. TRANSPORTATION

## 14.1 HOW WERE TRANSPORTATION FACILITIES IN THE COMBINED STUDY AREA EVALUATED?

The transportation study includes vehicular and non-motorized transportation facilities that could potentially be disturbed by construction of the proposed Energize Eastside Project. The study areas for the three alternatives are shown on Figure1-4 in Chapter 1. Transportation elements include the roadway system, transit, non-motorized travel (walking, bicycling), and parking. The transportation system was identified based on geographic information systems (GIS) data, and each transportation element was evaluated at a high level for this programmatic EIS.

**Transportation Key Findings**

Construction of Alternatives 1 and 3 could result in minor to moderate impacts relating to restrictions on roadway use, sidewalk use, property access, transit, and parking, as well as construction-generated truck and commute trips, and potential pavement degradation. Construction of Alternative 2 could result in negligible to moderate impacts, depending on the component and facility. Negligible operational transportation impacts are anticipated for all of the alternatives except for the energy storage and peak generation plant components of Alternative 2, which would result in minor impacts.

## 14.2 WHAT ARE THE RELEVANT PLANS, POLICIES, AND REGULATIONS?

Existing transportation plans, policies, and regulations primarily govern construction activities and road operations. Table 14-1 describes transportation standards and regulations related to construction within public road rights-of-way.

**Table 14-1. Regulations, Guidelines, and Permits for Construction of Projects that Affect the Transportation System**

| Statute or Guideline | Lead Agency | Regulated Activities |
|---|---|---|
| **Federal** | | |
| Manual on Uniform Traffic Control Devices (MUTCD) | Federal Highway Administration (FHWA) | Defines standards used by road managers nationwide to install and maintain traffic control devices on all public streets, highways, bikeways, and private roads open to public traffic. The MUTCD is a compilation of national standards for all traffic control devices, including road markings, highway signs, and traffic signals. It is updated periodically to accommodate the nation's changing transportation needs and address new safety technologies, traffic control tools, and traffic management techniques. The MUTCD includes standards for signs, flagging, and barricades in temporary construction work zones. (FHWA, 2009). |

| Statute or Guideline | Lead Agency | Regulated Activities |
|---|---|---|
| **State** | | |
| Work Zone Traffic Control Guidelines | Washington State Department of Transportation (WSDOT) | WSDOT has jurisdiction over state highways and ramp intersections. Work conducted within the right-of-way of state highways must be coordinated with WSDOT. The *Work Zone Traffic Control Guidelines for Maintenance Operations* (WSDOT, 2014) are based on the standards set forth in the MUTCD. |
| **Local** | | |
| Street Use Permits and Franchises | Cities and King County | Construction activities that affect the transportation system within a city or county are subject to the street use permit requirements of that jurisdiction, as reflected in its locally adopted county or city municipal code. Street use permits would be required from multiple study area communities, depending on the location of project. Cities and counties typically adopt construction guidelines based on the MUTCD. Construction activities may also be guided by the terms of franchise agreements with local jurisdictions. |

Source: FHWA, 2009; WSDOT 2014

In addition to the standards and regulations described in Table 14-1, there are rules established by railroad owners that apply to work near rail facilities. However, the only existing rail line that passes through the combined study area, the Eastside Rail Corridor, is no longer operational. Ownership of this line is divided among the Port of Seattle, King County, Sound Transit, and the Cities of Kirkland and Redmond (King County, 2015a).

## 14.3 WHAT ARE THE EXISTING TRANSPORTATION FACILITIES IN THE COMBINED STUDY AREA?

The existing transportation system includes roadways, parking facilities, transit, and non-motorized facilities, as described in the following sections.

### 14.3.1 Roadways

All roadways in the combined study area have designated functional classifications, which depend on the types of vehicular trips the roadways serve and the relative levels of traffic volumes they carry. There may be different classifications at the municipal and national levels. Since the combined study area includes several municipalities, each with minor differences in classification definitions, the following analysis uses the national designations defined by the Federal Highway Administration (FHWA). Each roadway in the combined study area has been designated with one of the following FHWA classifications (FHWA, 2013):

- **Interstate Freeways** provide the highest capacity and least impeded traffic flow for longer vehicle trips, with limited access.

- **Freeways and Expressways** are very similar physically to interstates with limited access, but they are not officially designated as interstates.
- **Principal Arterials** serve as primary routes for moving traffic through each city, connecting urban centers to one another or to the regional transportation network.
- **Minor Arterials** distribute traffic from principal *arterials* to *collectors* and local roads.
- **Major and Minor Collectors** collect and distribute traffic from principal and minor arterials to local access streets or provide direct access to destinations. Major and minor collectors are differentiated by length, connecting driveway density, speed limits, and street widths.
- **Local Access Streets** provide access to residential neighborhoods, commercial facilities, or other streets. They are not intended for long-distance travel.

These functional classifications represent varying levels of emphasis on mobility and access. For example, freeways and expressways serve mobility needs for high volumes of traffic, with access fully controlled. Arterials provide a high degree of mobility and have more limited access to adjacent land uses, accommodating larger traffic volumes at higher speeds. Collectors generally provide a more balanced emphasis on traffic mobility and access to adjacent land uses. All streets not designated as freeways, arterials, or collectors are considered local access streets, which include most streets in the roadway system. Local access streets provide a high degree of access to adjacent land and are not intended to serve through traffic, carrying smaller traffic volumes at lower speeds.

Regional access to the Eastside is provided via the following freeways.

**Interstate 90 (I-90)** is an east-west freeway that traverses the entire continental United States, connecting to Seattle in the west and Boston, Massachusetts, to the east. In the combined study area, I-90 is 8 to 16 lanes wide, including one High Occupancy Vehicle (HOV) lane in each direction along much of its length, and center express lanes that change direction according to the peak direction of traffic flow. It typically carries about 110,000 to 150,000 vehicles per day (WSDOT, 2015a).

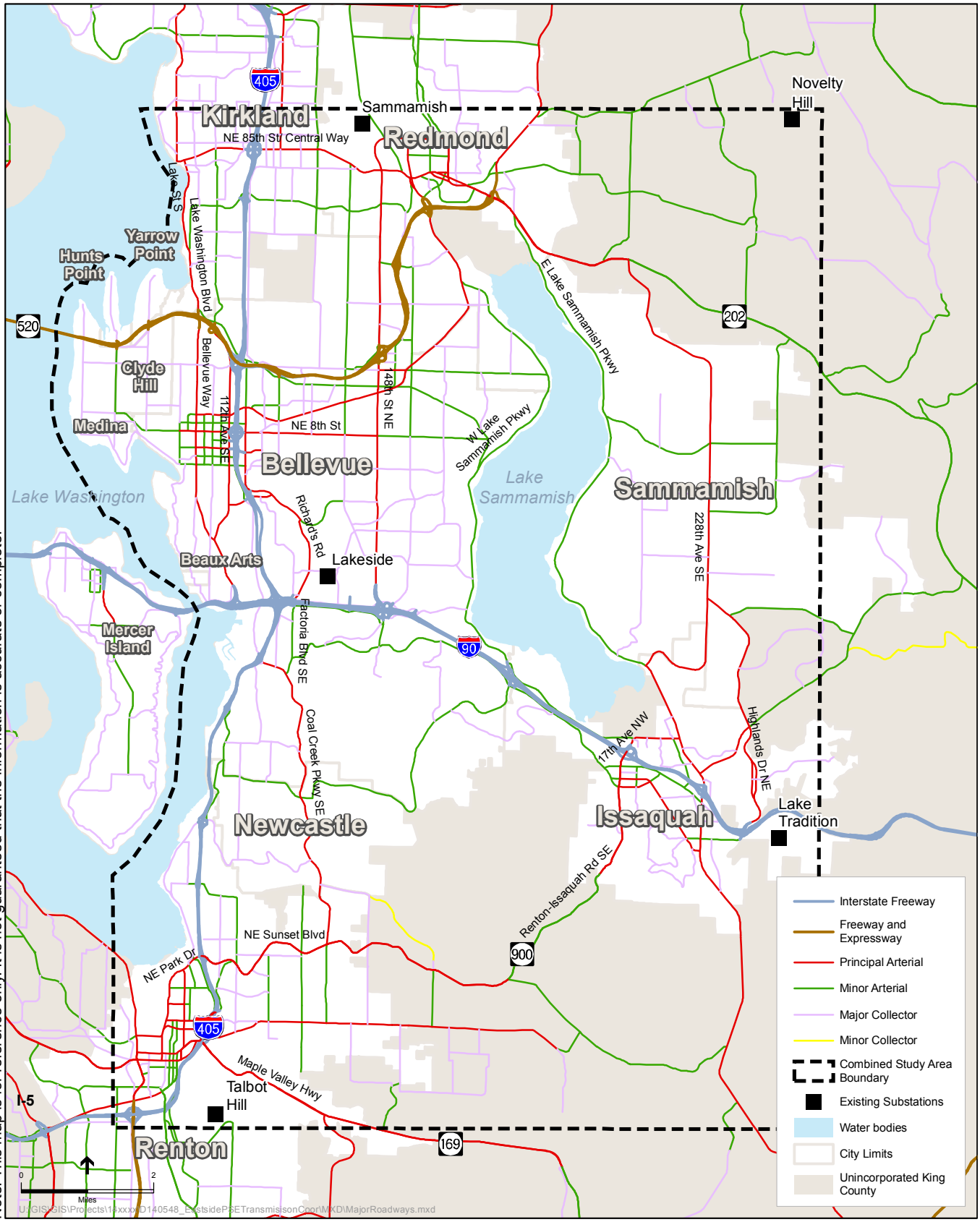
**I-405** is a freeway that serves as the primary north-south facility on the east side of Lake Washington, connecting to I-5 in Lynnwood to the north and Tukwila to the south. In the combined study area, I-405 is 6 to 10 lanes wide, including an HOV lane in each direction along much of its length. It typically carries between 100,000 and 200,000 vehicles per day (WSDOT, 2015a).

**State Route (SR) 520** is an east-west freeway that connects to I-5 to the west in Seattle, and SR 203 to the east in unincorporated King County. It is generally six lanes wide, including HOV lanes along portions of its length. It typically carries 40,000 to 80,000 vehicles per day (WSDOT, 2015a). The *SR 520 Bridge Replacement and HOV Program* is currently underway. Major construction is complete for the Eastside Transit and HOV Project phase, which provided transit, HOV, and non-motorized improvements between Evergreen Point in

Medina and 108th Avenue NE in Bellevue. Replacement of the floating bridge across Lake Washington is currently scheduled for completion by the end of 2016 (WSDOT, 2015b).

In general, WSDOT has jurisdiction over these freeways, although ramp intersections are also under the jurisdiction of the city or county in which they are located. In addition to these regional freeways, the combined study area includes a mix of arterial, collector, and local roadways, shown on Figure 14-1. Traffic volumes on different roadways vary widely; they can be greater than 25,000 vehicles per day on a principal arterial, or less than 2,000 vehicles on a minor collector. Local access streets carry low traffic volumes, typically less than 700 vehicles per day, and often lower than 100 vehicles per day (WSDOT, 2013).

Many municipalities also designate streets as truck routes. Designated truck route streets are typically required to meet design standards to accommodate larger and heavier vehicles, and they are intended to channel truck traffic away from local access streets. Appropriate truck *haul routes* for construction projects are typically identified as part of the construction permitting process. In general, construction trucks are directed toward designated truck route streets, other arterials, and freeways to the greatest possible extent.




Note: This map is for reference only. It is not guaranteed that the information is accurate or complete.

SOURCE: King County 2015; ESA 2015; WA Ecology 2014; WSDOT 2015.

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**Figure 14-1**

Major Roadways

### 14.3.2 Parking Facilities

Most neighborhoods in the combined study area have unrestricted on-street parking in lower density residential and commercial neighborhoods. Many homes and businesses in the combined study area also have parking on-site in garages or surface parking strips or lots.

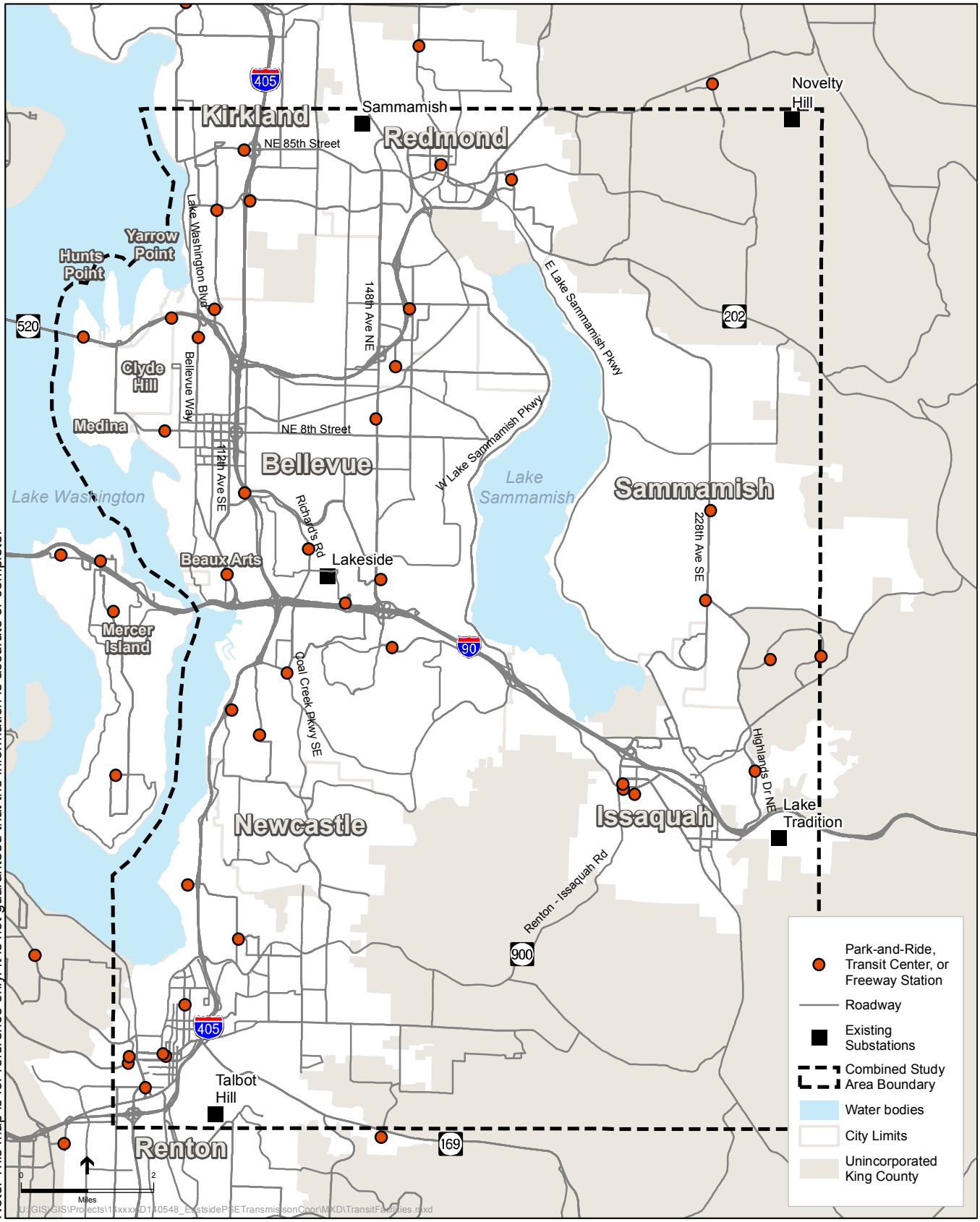
In the denser downtown areas of Bellevue, Kirkland, Redmond, Newcastle, and Renton, on-street parking is time-restricted. There are both public and private fee-based parking lots and garages in these areas. Some streets near schools, athletic facilities, and public parks may also have time restrictions.

### 14.3.3 Transit

Public transit in the combined study area consists of bus service provided by King County Metro (Metro) and Sound Transit; a limited amount of additional service is provided by Snohomish County's Community Transit. Bus service consists of: (1) commuter routes, which operate only during weekday peak periods, with service to employment centers in the morning and away from them in the evening, and (2) local routes, which generally provide two-way, all-day service.

The combined study area is served by 59 Metro routes, 11 Sound Transit routes, and 1 Community Transit route. The Alternative 3 study area is served by an additional five Metro routes. Transit routes and facilities within the study areas are shown on Figure 14-2. Bus volumes and frequencies are typically more concentrated in the vicinity of transit centers, park-and-ride lots, and freeway stations. Bus service becomes more dispersed away from these centers, primarily operating on arterials and freeways (King County Metro, 2015; Sound Transit, 2015a; Community Transit, 2015). Transit routes are regularly adjusted by transit agencies in response to shifts in demand as well as available funding, so the numbers and locations of transit routes and facilities could change slightly over the duration of environmental analysis, design, and construction of the Energize Eastside Project.

Sound Transit is planning to open the East Link Extension light-rail line, which will extend light-rail service from downtown Seattle, across the I-90 bridge, to Mercer Island, Bellevue, and Redmond. The light rail is planned to operate at grade or on elevated platforms along most of its length, with a tunnel section planned in downtown Bellevue. Eight stations are planned in the combined study area, including three with adjacent park-and-ride lots and five without. This project is currently in the design stage, with construction planned for completion in 2023 (Sound Transit, 2015b).




Note: This map is for reference only. It is not guaranteed that the information is accurate or complete.

SOURCE: King County 2015; ESA 2015; WA Ecology 2014; WSDOT 2015.

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**Figure 14-2**

Transit Facilities

### 14.3.4 Non-motorized Facilities

The combined study area includes a mix of facilities to support walking and bicycling. Most downtown areas have complete sidewalk networks. Many residential neighborhoods have sidewalks on one or both sides of the street. However, sidewalks are absent in some neighborhoods. Areas farther away from city centers, particularly those in unincorporated King County, are less likely to have sidewalk systems.

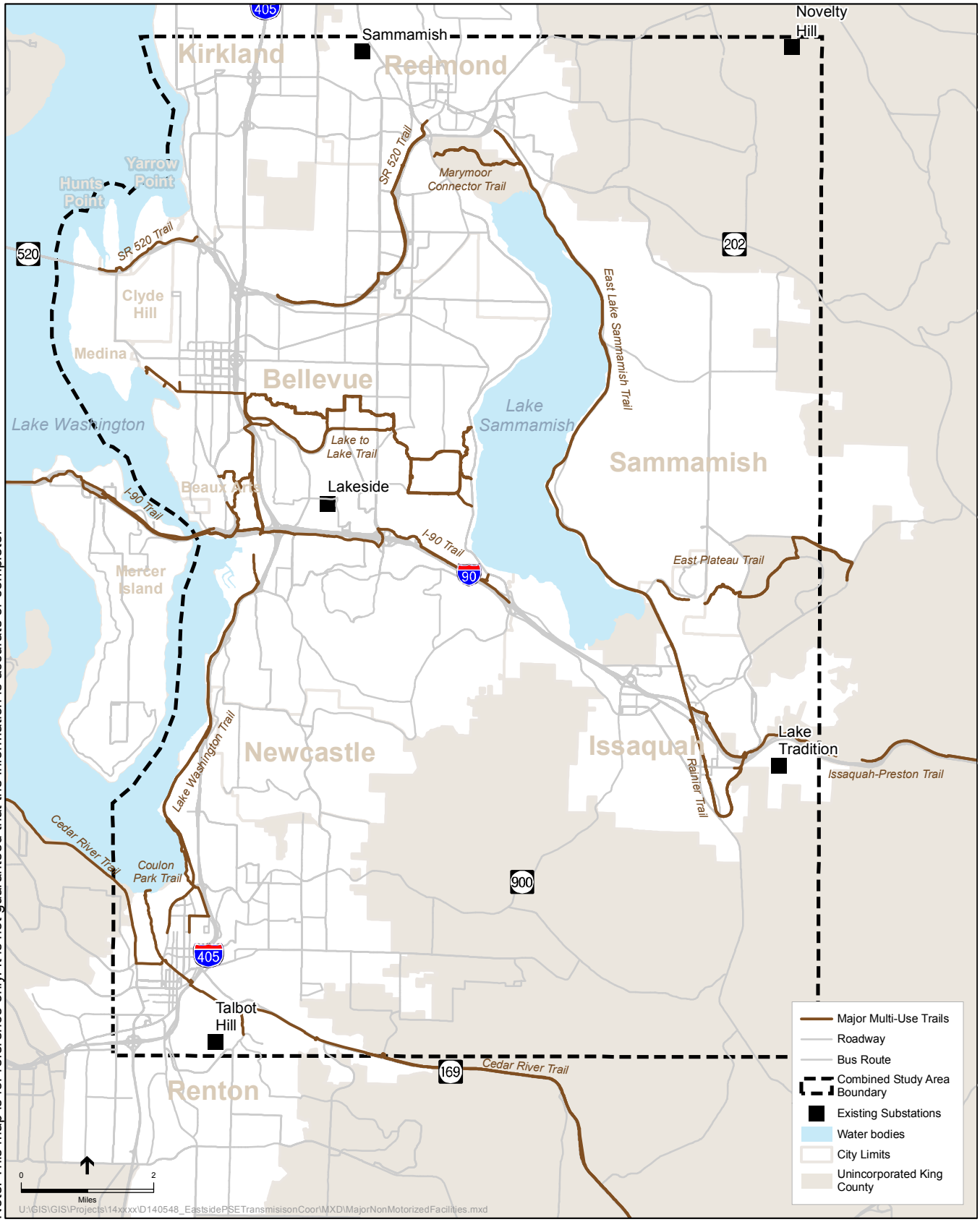
Some roadways have shoulders that can accommodate pedestrians. For roadways without sidewalks or shoulders, pedestrians typically walk along the edge of the roadway pavement. Signalized intersections typically include marked crosswalks with pedestrian signals. Marked crosswalks are provided at some stop-controlled intersections and mid-block locations. All intersections that do not have marked crosswalks are still considered to be legal pedestrian crossings.

Bicycle facilities in the combined study area include painted on-street bicycle lanes, and roadway lanes that are marked with *sharrows* indicating that motorists should share the lane with bicyclists. On streets without bike lanes or sharrows, bicyclists may travel in the general-purpose lanes or on adjacent sidewalks.

Denser downtown neighborhoods that include a mixture of commercial and residential development typically generate higher levels of pedestrian and bicycle travel. Neighborhoods that include parks, libraries, recreational facilities, colleges, schools, and commercial development are also more likely to generate pedestrian and bicycle traffic. Neighborhoods that consist primarily of low-density residential or commercial development typically have lower levels of non-motorized activity.

The combined study area includes a number of multi-use trails separated from roadways that are shared by pedestrians and bicyclists. Some trails utilize portions of the Eastside Rail Corridor, a 42-mile former rail line located between Renton and Snohomish, previously owned by BNSF Railway. In the mid-2000s, BNSF stopped using the rail line and in subsequent years, the Port of Seattle, King County, Sound Transit, and the Cities of Kirkland and Redmond each purchased portions of the corridor. Kirkland and Redmond are currently replacing the rails with multi-use trails. (King County, 2015a)

Major trails located in the combined study area are shown on Figure 14-3.




Note: This map is for reference only. It is not guaranteed that the information is accurate or complete.

SOURCE: King County 2015; ESA 2015; WA Ecology 2014; Renton 2015; Newcastle 2015; Issaquah 2015; Sammamish 2015; Bellevue 2015; Kirland 2015; Redmond 2015; WSDOT 2015.

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**Figure 14-3**

Major Trail Facilities

## 14.4 HOW WERE POTENTIAL IMPACTS TO TRANSPORTATION ASSESSED?

Because this Phase 1 Draft EIS is programmatic, the types of transportation impacts that could be expected from implementation of the alternatives are generally discussed, but potential impacts at specific sites are not evaluated. Impacts were assessed at a general level, based on the amount of disruption to transportation facilities that could potentially result during and after construction, and the types of transportation facilities potentially affected. Site-specific transportation analysis will be conducted during Phase 2 project-level review.

## 14.5 WHAT ARE THE LIKELY CONSTRUCTION IMPACTS RELATED TO TRANSPORTATION?

### 14.5.1 Construction Impacts Considered

Transportation impacts resulting from project construction could include restrictions on roadway use, sidewalk use, access to intersecting alleys and driveways, transit, and parking. Impacts could also include truck trips and employee commute trips generated by construction work, and pavement degradation from heavy trucks.

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

**Minor** – Access to residences and businesses could be maintained, and vehicular and non-motorized travel could still occur with minimal additional traveler delay.

**Moderate** – Access to residences and businesses could be maintained and vehicular and non-motorized travel could still occur, but with expected increases in traveler delay.

**Significant** – If the construction activities would prohibit access to residences or businesses, or prohibit travel through a major corridor.

### 14.5.2 No Action Alternative

The No Action Alternative would not include construction of new facilities; therefore, no construction impacts to transportation would occur.

### 14.5.3 Alternative 1: New Substation and 230 kV Transmission Lines

Impacts are described according to the major components associated with Alternative 1. The substation impacts are described first, followed by transmission line options.

#### *14.5.3.1 Substation Construction under Options A through D*

The following transportation impacts related to construction of a new substation could occur under Alternative 1, Options A through D. Without mitigation, these impacts to transportation could be significant. However, with implementation of measures described in Section 14.7, impacts would be expected to be minor to moderate, depending on factors such

as the adjacent transportation facility types, vehicular and non-motorized traffic volumes, day of week, time of day, and size of transportation right-of-way disturbed.

#### 14.5.3.1.1 Roadway Capacity Restrictions

Substation construction would likely result in temporarily narrowing or closing lanes on the roadways adjacent to the substation construction site, both to construct the substation and to connect transmission lines to the substation. Access to properties located adjacent to the construction site would need to be maintained. The level of impact would depend on the type of roadway, ranging from minor to moderate. Arterials and collectors tend to be wider but more vehicles would be potentially affected by capacity restrictions; local access streets tend to be narrower, but fewer vehicles would be potentially affected.

#### 14.5.3.1.2 Sidewalk Impacts

Construction at the substation could result in temporary closures of sidewalks or walkways adjacent to the substation site while construction is underway. The level of impact would vary from minor to moderate associated with the level of pedestrian activity, depending on proximity to high-use pedestrian areas, the time of day, and day of the week.

#### 14.5.3.1.3 Transit Impacts

Substation construction could require temporarily moving or closing adjacent bus stops. Bus stop closure impacts are expected to be minor to moderate, depending on the walking distance to the nearest alternative bus stop, which would typically be one to three blocks.

#### 14.5.3.1.4 Parking Impacts

Construction at the substation could result in temporary closures of parking lanes on roadways adjacent to construction. However, the impacts are likely to be minor because there is little to no on-street parking near the potential construction sites. Private parking lots are located near Lakeside, Vernell, and Westminster substations, and access to these lots would need to be maintained. Additional parking demand could also be generated by construction employees who work at the site.

#### 14.5.3.1.5 Mobilization of Large Equipment to Substation Sites

Construction at the substation site could require delivery of very large equipment, such as transformers, requiring overweight and/or oversized loads to be carried on surface streets from regional freeways. Carriers of all such loads would be required to obtain a permit from the cities in which they need to travel, and those traveling on state highways would also be required to obtain a permit from WSDOT. Oversized loads can only be routed over roadways that have sufficient clearance. WSDOT and the Cities may also dictate the time of day when such loads can travel. Because of restrictions that accompany the permits necessary to transport oversized loads, transporting these loads is not expected to have a significant impact on traffic along the haul route, and could range from minor to moderate.

#### 14.5.3.1.6 Construction-generated Vehicle Trips

Trips would be generated by trucks traveling to and from the substation site to support construction activities, and also by construction workers commuting to and from the site. Impacts would be minor.

#### 14.5.3.1.7 Pavement Impacts

In areas where construction-generated trucks are concentrated, high truck volumes can potentially result in degradation to the street pavement. As part of construction permitting processes, communities typically require that pavement must be restored upon completion of construction, so this impact is expected to be minor.

### *14.5.3.2 Option A: New Overhead Transmission Lines*

Construction of the overhead lines would require installation of utility poles along a project length of at least 18 miles, some of which would likely be adjacent to roadways. Transmission lines installed overhead would not require construction within the roadway, but could require narrowing or closing vehicle lanes or sidewalks near the pole construction sites, to separate vehicular and non-motorized traffic from construction activities. After utility poles are installed, transmission wire would be strung between the poles. During the period in which wire is pulled, no vehicular traffic could be allowed on roadways or sidewalks located beneath the areas of pulling activity.

Overhead transmission line poles would need to be evaluated for compliance with height restrictions around local airports or seaplane bases. No impact is expected to airplane operations assuming compliance with airport area height regulations.

The following transportation impacts related to overhead transmission line construction would be expected to occur. Without mitigation, some construction impacts to transportation could be significant. However, with implementation of measures described in Section 14.7, impacts would be expected to be minor to moderate, depending on factors such as the transportation facility location and type, vehicular and non-motorized traffic volumes, day of week, time of day, and size of the transportation right-of-way disturbed.

#### 14.5.3.2.1 Roadway Capacity Restrictions

Installation of utility poles could require closure of the roadway lanes in the vicinity of the poles for the duration of construction. Full or partial roadway closures could require traffic to be detoured. The level of impact would depend on the type of roadway but would be expected to range from minor to moderate. Arterials and collectors tend to be wider but more vehicles would be potentially affected by capacity restrictions; local access streets tend to be narrower, but fewer vehicles would be potentially affected.

#### 14.5.3.2.2 Disruption at Alleys and Driveways

Construction across a driveway or alley would disrupt property access at that location. Driveways located along the transmission line route must be passable during construction unless there is an alternative driveway serving a property that can accommodate vehicles if one driveway is closed. Impacts would range from minor to moderate.

#### 14.5.3.2.3 Sidewalk Impacts

Construction of overhead transmission lines would likely result in temporary closures of sidewalks or walkways adjacent to construction activities. The level of impact could be minor to moderate, varying with the level of pedestrian activity and depending on proximity to high-use pedestrian areas and the time of day.

#### 14.5.3.2.4 Bicycle Impacts

Where roadway lanes with marked bicycle facilities (bicycle lanes or sharrows) would be narrowed or closed during construction, bicyclists would be detoured to a roadway lane or sidewalk where they could travel safely. Where marked bicycle facilities do not exist, maintenance of traffic plans to accommodate closed or narrowed roadway lanes would also need to be designed to safely accommodate bicyclists. Impacts would likely be minor to moderate, depending upon the distance and duration of the detour.

#### 14.5.3.2.5 Transit Impacts

Construction along roadway segments with bus routes could require temporarily moving or closing bus stops adjacent to pole construction or beneath wire pulling areas. Bus stop closure impacts are expected to be minor to moderate, depending on the walking distance to the nearest alternative bus stop, which would typically be one to three blocks.

#### 14.5.3.2.6 Parking Impacts

Construction along roadway segments with on-street parking could result in temporary closures of parking lanes adjacent to pole construction or beneath wire pulling activities. Additional parking demand could also be generated by construction employees who work at the site. Impacts would be expected to be minor.

#### 14.5.3.2.7 Construction-generated Vehicle Trips

Trips would be generated by trucks traveling to and from the site to support construction activities, and also by construction workers commuting to and from the site. However, the majority of construction-generated trips typically occur outside of peak commute periods and are dispersed throughout the day, so their impact on roadway operations would be expected to be minor.

#### 14.5.3.2.8 Pavement Impacts

In areas where construction-generated trucks are concentrated, high truck volumes can potentially result in degradation to the street pavement. As part of construction permitting processes, jurisdictions typically require that pavement must be restored upon completion of construction, so this impact is expected to be minor.

#### 14.5.3.2.9 Olympic Pipeline

The possibility that the Olympic Pipeline would be damaged during construction is considered low, because of regulatory requirements and safety practices that govern construction near the pipeline. However, if significant damage to the pipeline were to occur, or if there is a planned temporary disruption during project construction, petroleum products normally transported in the pipeline would be transported by other means, primarily by trucks using interstate highways. This would be expected to generate up to a few hundred truck trips per day, resulting in a minor impact when distributed throughout the day and across the interstate highway system. No disruption in petroleum product supply to airports or other customers of the Olympic Pipeline would be anticipated for any planned temporary shutdown or relocation. If there were an accidental shutdown, short-term disruption could occur until trucking could be arranged.

#### 14.5.3.3 Option B: Existing Seattle City Light 230 kV Transmission Corridor

Since this option would include rebuilding or replacing existing poles and other structures, and pulling new transmission wire, the types of construction impacts to transportation would be similar to those described for installing new transmission lines in Alternative 1, Option A. However, fewer roadways would be affected because activities would be concentrated in existing utility corridors. The upgraded transmission line would also need to be connected to existing PSE substations, resulting in additional construction transportation impacts between the existing corridors and the substation locations.

#### 14.5.3.4 Option C: Underground Transmission Lines

Installation of transmission lines under existing roadways could require excavation, construction, backfill, and pavement restoration within roadway rights-of-way. Impacts to roadway capacity, sidewalks, bicycle facilities, transit and parking, as well as construction-generated vehicle trips and potential pavement degradation, would be similar to those described for overhead construction. However, impacts would be less localized, extending along the entire lengths of roadway segments rather than only at pole locations, and longer in duration. Because installation of underground transmission line segments would likely occur in continuous lengths of one block or longer, the following sections identify additional transportation impacts that would be expected during construction. Without mitigation, these impacts to transportation described below could be significant. However, with implementation of measures described in Section 14.7, impacts would be expected to be minor to moderate, depending on factors such as the affected transportation facility location and type, vehicular and non-motorized traffic volumes, day of week, time of day, and size of area disturbed.

##### 14.5.3.4.1 Disruption at Roadway Intersections

Construction through an intersection would disrupt intersection operations and require manual traffic control (flaggers). In addition, some signalized intersections have in-pavement induction loops that control traffic light operations. Excavation of the pavement at these locations would destroy the existing induction loops and require replacement. Impacts would be temporary and would be expected to be minor.

##### 14.5.3.4.2 Disruption at Alleys and Driveways

Construction across a driveway or alley would disrupt property access at that location. Driveways located along the transmission line route must be passable during construction unless there is an alternative driveway serving a property that can accommodate vehicles if one driveway is closed.

For areas where trenchless techniques would be required, similar types of transportation impacts would be expected in the areas where construction activities are concentrated.

#### 14.5.3.5 Option D: Underwater Transmission Lines

Use of special vessels to dredge trenches in the lake bottom and lay cables in the trenches could restrict boat access in the work areas, but would not be expected to have surface

transportation impacts. Surface transportation impacts would primarily occur at the locations where the cables connect to the shore. At the land connections, construction vehicle trips, roadway capacity restrictions, transit restrictions, and sidewalk impacts similar to those described for Alternative 1, Option A could occur, depending on the location, but would be expected to affect smaller localized areas. Land connections to a submerged line would be underground, resulting in potential construction impacts similar to those described for Alternative 1, Option C.

Marine vessels needed to support project construction would be required to follow the rules of navigation established by the U.S. Coast Guard and U.S. Army Corps of Engineers, and therefore are not expected to result in marine transportation impacts.

Minor impacts to boat traffic in the vicinity of construction could occur, resulting in boats being relocated to avoid the construction area. Depending on the location of the line, recreational boat traffic could be rerouted. Additional site-specific evaluations would be conducted during project design to minimize potential impacts to boat traffic.

### 14.5.4 Alternative 2: Integrated Resource Approach

#### *14.5.4.1 Energy Efficiency Component*

Strategies to promote energy efficiency would consist primarily of communications to customers and are not expected to require construction. Therefore, this component would not result in construction impacts to transportation.

#### *14.5.4.2 Demand Response Component*

Installation of specialized devices to manage customer usage would require minor construction activities, primarily on single residential and commercial sites. Construction activities would generate a small number of trips that would be widely dispersed geographically and over time, and would not involve disruptions to roadways or non-motorized facilities. Therefore, construction impacts to transportation would be negligible.

#### *14.5.4.3 Distributed Generation Component*

Installation of devices to generate on-site power would require minor construction activities primarily on commercial sites. Therefore, construction impacts to transportation would be similar to those described for demand response.

#### *14.5.4.4 Energy Storage Component*

Construction of the large battery storage facilities required to store energy would require construction similar to a substation, with potential minor transportation impacts similar to those described for Alternative 1 substation construction.

#### *14.5.4.5 Peak Generation Plant Component*

Construction peak generation plants would require construction at existing substations. Potential transportation impacts would be similar in type (minor) to those described for

Alternative 1 substation construction, but likely less intense because activities would consist of modifying existing sites rather than constructing new facilities.

### 14.5.5 Alternative 3: New 115 kV Lines and Transformers

#### *14.5.5.1 Improvements to Existing Substations*

Potential transportation impacts associated with adding transformers at existing substations would be similar in type to the impacts associated with building a new substation, as described for Alternative 1, and would be expected to be minor to moderate, depending on factors such as the affected transportation facility location and type, vehicular and non-motorized traffic volumes, day of week, time of day, and size of area disturbed. Construction could require closing or narrowing roadways and sidewalks adjacent to construction activities, with associated impacts to vehicular travel, non-motorized travel, transit, and parking. Trips would be generated by trucks traveling to and from the sites to support construction activities, and also by construction workers commuting to and from the sites. Because construction would consist of improvements to existing facilities, the magnitude and duration of construction impacts to transportation would be lower at any one site than those expected for construction of a new substation in Alternative 1, but impacts would occur at 10 substation locations instead of one substation and therefore would be more geographically widespread.

#### *14.5.5.2 New Transmission Lines*

Potential transportation impacts associated with construction and installation of approximately 60 miles of new transmission lines would be similar in type to the impacts described for new transmission lines in Alternative 1. These could include narrowing or closing roadways and sidewalks adjacent to construction activities, and the associated impacts to vehicular travel, non-motorized travel, transit, and parking. Trips would be generated by trucks traveling to and from the sites to support construction activities, and also by construction workers commuting to and from the sites. However, compared to Alternative 1, more transmission lines would be installed over a larger area under Alternative 3; therefore, the construction impacts to transportation are expected to be more widespread, and would be expected to be minor to moderate, depending on factors such as the affected transportation facility location and type, vehicular and non-motorized traffic volumes, day of week, time of day, and size of area disturbed.

## 14.6 HOW COULD OPERATION OF THE PROJECT AFFECT TRANSPORTATION?

### 14.6.1 Operation Impacts Considered

When constructed, the project elements would be located mostly overhead or underground, on commercial properties, or adjacent to substation sites, and they would be physically separated from transportation infrastructure and services. Transportation infrastructure disrupted during construction would be restored, and streets, sidewalks, and trails disturbed during construction would be repaved. Transportation impacts resulting from project operation could include commute trips of employees at new facilities, truck trips generated

by facility maintenance, and permanent removal of or changes to transportation facilities and public parking. Impacts described below are expected to be minor. Overall, impacts could be negligible to moderate.

## 14.6.2 No Action Alternative

The No Action Alternative would continue conservation and maintenance activities at the current frequency. Maintenance of existing facilities would continue largely as it does under current conditions, and no traffic impacts are expected. Power outages that could occur with the No Action Alternative would affect traffic lights and street lights in the areas where outages occur. This could adversely impact traffic operations by increasing delay at signalized intersections. During nighttime conditions, loss of street lighting during a power outage would reduce visibility along streets and sidewalks.

## 14.6.3 Alternative 1: New Substation and 230 kV Transmission Lines

Impacts are described according to the major components associated with Alternative 1. The substation impacts are described first, followed by transmission line options.

### *14.6.3.1 New Substation under Options A - D*

#### 14.6.3.1.1 Operational Trips

Maintenance and operation of the new substation would generate a small number of employee trips. The substation could have ancillary uses such as storage for a small number of trucks or staff facilities. Operational transportation impacts would be minor.

#### 14.6.3.1.2 Equipment Delivery

A new substation would require infrequent (less than once a year) replacement of very large equipment such as transformers, resulting in oversized loads being carried on surface streets from regional freeways to the substation site. The same route and time of day restrictions could be imposed by a City and/or WSDOT for such loads, as described previously in construction impacts. Operational transportation impacts would be minor.

### *14.6.3.2 Option A: New Overhead Transmission Lines*

When constructed, the transmission lines would be located overhead and physically separated from transportation infrastructure and services. Transportation infrastructure disrupted during construction would be restored prior to project operation, and would not typically generate vehicle trips. However, the new transmission lines would need to be inspected occasionally, generating a small number of trips. Should a transmission line require repairs, truck trips to support those activities would be generated for a short period of time in a localized area. Operational impacts to transportation are expected to be negligible.

### *14.6.3.3 Option B: Existing Seattle City Light 230 kV Transmission Corridor*

When constructed, the upgraded transmission lines would be located overhead and physically separated from transportation infrastructure and services. The operational transportation impacts would be similar to those described for Alternative 1, Option A.

#### 14.6.3.4 Option C: Underground Transmission Lines

When constructed, the transmission lines would be located underground and physically separated from transportation infrastructure and services. The operational transportation impacts would be similar to those described in Alternative 1, Option A.

#### 14.6.3.5 Option D: Underwater Transmission Lines

When constructed, the transmission lines would be located underwater and physically separated from transportation infrastructure and services. The lines would be located at a depth that would avoid potential impacts to boat traffic, anchors, etc., so no impacts are anticipated. The operational surface transportation impacts would be similar to those described in Alternative 1, Option A.

### 14.6.4 Alternative 2: Integrated Resource Approach

#### 14.6.4.1 Energy Efficiency Component

No operational trips, and therefore no operational impacts to transportation, are anticipated as a result of energy efficiency strategies.

#### 14.6.4.2 Demand Response Component

Once installed, specialized devices to control customer usage do not typically generate operational trips. Infrequent trips to support maintenance and repair of these devices would be expected, but they would be widely dispersed over a large geographic area and over time, and consistent with other site-specific routine maintenance activities. Operational impacts to transportation are expected to be negligible.

#### 14.6.4.3 Distributed Generation Component

Once installed, specialized devices to generate on-site electricity do not typically generate operational trips. Operational impacts to transportation would be negligible, similar to those described for demand response.

#### 14.6.4.4 Energy Storage and Peak Generation Plant Components

Battery storage and peak generation plant facilities would have minor operational transportation impacts similar to those described for the Alternative 1 substation.

### 14.6.5 Alternative 3: New 115 kV Lines and Transformers

#### 14.6.5.1 Operational Trips Generated by Substations

Additional equipment installed at existing substation sites could slightly increase the employees needed to operate those sites, and would also increase the substations' maintenance needs. However, few additional operational trips are expected.

#### 14.6.5.2 Operational Trips Generated by Transmission Lines

A small number of trips would occasionally be generated to support maintenance and repair needs for additional transmission lines, similar to those described for Alternative 1, Option A.

## 14.7 WHAT MITIGATION MEASURES ARE AVAILABLE FOR POTENTIAL IMPACTS TO TRANSPORTATION?

Since no significant operational impacts are identified for the project alternatives, no mitigation measures would be needed. This section presents general mitigation measures identified to avoid or reduce the potential transportation impacts expected to occur during construction of Alternatives 1 or 3, and battery storage and peak generation plant facilities for Alternative 2. No construction mitigation would be needed for the No Action Alternative.

**Maintenance of Traffic Plans:** The contractor would be required to prepare "maintenance of traffic" plans for any work within the public right-of-way that affects vehicular, transit, bicycle, or pedestrian traffic. These plans must show the location of traffic cones, traffic control personnel, and signs; note if bus stops are to be closed or relocated; and indicate special treatments for pedestrian and bicycle access.

**Haul Routes:** The contractor would need to coordinate with municipalities to determine appropriate times of travel and haul routes for construction-generated truck traffic. Haul routes generally would be on arterial streets through commercial areas and use the most direct path to and from the state highway system.

**Construction through an Intersection:** Manual traffic control would be needed when construction occurs through an intersection. Work in a signalized intersection may require police officer control; work in an unsignalized intersection can typically be performed with certified flaggers.

**Construction across Driveways:** Access to residential and commercial properties would need to be maintained at all times. When trenching across a driveway, the work can usually be done in two parts: trench across one-half of the driveway and then plate it for driving before trenching the other half of the driveway. At major driveways, flagger control may be needed to facilitate alternating enter and exit traffic. Special treatment would be needed for developments that have split driveways (with one driveway serving entering traffic and one serving exiting traffic) if traffic cannot easily be shifted to the other driveway for two-way operation. The contractor would be required to coordinate with property owners when driveways or alleys are affected by construction.

**Signal Detection Disruption:** Some intersections have in-pavement induction loops that control traffic signal operations. Prior to trenching through these intersections, alternative detection equipment (e.g., camera detectors) might need to be installed to maintain proper signal function. Loops or permanent cameras would need to be installed as part of restoration.

**Bus Stop Closure or Relocation:** For bus stops that would need to be closed or relocated during construction, the contractor would be required to coordinate with King County Metro Transit, Sound Transit, or Community Transit.

**Coordination with Other Projects:** PSE must coordinate all construction needs and impacts of this project with the other infrastructure and development projects in the combined study

area. This would typically be done as part of the permitting process with each community affected by potential construction.

**Pavement Restoration:** Any pavement degradation that results from increased construction truck traffic or excavation would need to be fully restored upon completion of construction activities. This includes restoration of streets, curbs, gutters, sidewalks, parking lots, driveways, and traffic signal induction loops where appropriate.

**Education and Outreach:** A public involvement program should be implemented prior to project construction. It would provide information about the purpose and importance of the project, and detailed information about the types and locations of expected construction impacts and the measures that would be implemented to minimize those impacts. A Construction Outreach Team may be desired, which would work closely with affected residents and business owners to minimize construction-related impacts throughout the duration of project construction. A contact person should be identified whom community members can contact to address specific concerns both prior to and during project construction.

## 14.8 ARE THERE ANY CUMULATIVE IMPACTS TO TRANSPORTATION AND CAN THEY BE MITIGATED?

Cumulative transportation impacts could result from concurrent construction of other major projects in the combined study area, including the SR 520 Bridge Improvement and Sound Transit East Link Extension projects. PSE would be required to coordinate with all jurisdictions in which construction activities would occur. As part of the construction permitting process, agencies may require construction phasing or other coordination strategies to minimize the potential cumulative transportation impacts of concurrent construction projects.

## 14.9 ARE THERE ANY SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS TO TRANSPORTATION?

With the appropriate mitigation measures in place, no unavoidable significant adverse impacts to transportation are anticipated from either construction or operation of the Energize Eastside Project alternatives.

# CHAPTER 15. PUBLIC SERVICES

## 15.1 HOW WERE PUBLIC SERVICES IN THE COMBINED STUDY AREA EVALUATED?

This chapter describes existing public services including police, fire, and emergency response services located within the combined study area (Alternatives 1, 2, and 3 as depicted on Figure 1-4 in Chapter 1). The combined study area spans large geographic regions that were reviewed programmatically because specific project locations have yet to be identified. The EIS Consultant Team identified existing emergency response and police services by reviewing local comprehensive plans for the study area communities. Information on emergency response and polices services was obtained from emergency service provider's website information, publicly available plans and reports, and through interviews with representatives of service providers.

The topic of environmental and public health, including public safety and hazardous materials, is discussed in Chapter 8.

**Public Services Key Findings**

Existing local and regional emergency services are expected to be adequate to address increased demand for fire and emergency response services; minor to moderate impacts could occur. Impacts on response times from construction would also be minor to moderate depending on the alternative.

Although a significant impact on public services could occur if a pipeline leak or an explosion resulted from the project, the risk is minimized by conformance with industry standards, regulatory requirements, and construction and operational procedures that address pipeline safety.

## 15.2 WHAT ARE THE RELEVANT PLANS, POLICIES, AND REGULATIONS?

Public services within the study area communities are primarily managed and regulated by state and local government agencies. The Washington State Growth Management Act requires cities and counties to develop and adopt comprehensive plans that include long-range planning for future public service needs. Among the required elements is a capital facility plan element. The capital facility plan element must include an inventory of existing facilities showing locations and capacities, forecasts of future needs, proposed locations and capacities of new or expanded facilities, and a financing strategy (Revised Code of Washington [RCW] 36.70A.070(3)).

Comprehensive plans for study area communities range from those containing basic information primarily focused on meeting requirements under the Growth Management Act (e.g., The Town of Beaux Arts Village, 2004) to inclusive documents containing a variety of goals and policies related to the provision of police, fire, and emergency services with references to master plans for associated equipment and facilities (e.g., City of Bellevue, 2015). All plans describe general provisions for fire and police protection services and facilities, and some describe existing and ongoing regional coordination efforts to ensure

high levels of service through cost-effective means. Common goals expressed throughout the study area plans are to ensure citizens' feelings of safety and provide effective, efficient, and equitable police, fire, and emergency services and facilities.

## 15.3 WHAT PUBLIC SERVICES ARE AVAILABLE IN THE COMBINED STUDY AREA?

Emergency services include fire, emergency medical response, and police services, which are provided by cities, counties, and emergency medical providers throughout the combined study area. Individual communities may have their own police and fire departments or may contract with other jurisdictions, such as adjacent cities or the county, to provide the services.

### 15.3.1 Fire and Emergency Response Services

#### *15.3.1.1 Providers, Levels of Service, and Response Times*

Table 15-1 summarizes fire and emergency services providers in the combined study area. The Cities of Bellevue, Kirkland, Redmond, and Renton have their own fire departments that provide fire and emergency medical services. The Bellevue Fire Department also provides fire and emergency medical services for Newcastle, Hunts Point, Yarrow Point, Clyde Hill, Medina, and Beaux Arts Village. Eastside Fire and Rescue provides fire and emergency services to Issaquah and Sammamish and unincorporated areas of King County within the combined study area. Multiple fire stations are located throughout the service areas to ensure timely response to emergency calls. For large incidents, fire departments from outside of the combined study area could be dispatched as backup (Anderson, personal communication, 2015).

**Table 15-1. Fire and Emergency Medical Services (EMS) Provider for Each Community**

| Fire and EMS Service Provider | Community Served |
|---|---|
| Bellevue Fire Department | Bellevue, Newcastle, Hunts Point, Yarrow Point, Clyde Hill, Medina, Beaux Arts Village, and much of east King County (for Medic One ALS) |
| Eastside Fire and Rescue | Issaquah, Sammamish, King County |
| Kirkland Fire Department | Kirkland |
| Redmond Fire Department | Redmond, and northeast King County (for Medic One ALS) |
| Renton Fire and Emergency Services Department | Renton |
| King County Public Health – Seattle & King County | Renton and south King County (for Medic One ALS) |

Sources: Bellevue Fire Department 2015; Eastside Fire and Rescue 2015; Redmond Fire Department 2015; Renton Fire and Emergency Services Department 2015; King County Medic One 2015.

Hospitals and emergency medical facilities are located throughout the combined study area. One such facility is Overlake Hospital Medical Center in Bellevue, a level III trauma center. The Bellevue Fire Department, Redmond Fire Department, and King County Public Health – Seattle & King County provide advanced life support (ALS) and transport services for the Medic One/Emergency Medical Services (EMS) program, which runs out of Overlake Hospital. Bellevue Fire Department operates four paramedic ALS units that serve Bellevue and much of east King County; Redmond Fire Department operates three ALS units that serve northeast King County and King County operates eight ALS units that serve Renton and south King County.

In addition to fire suppression and emergency medical response, fire departments in the combined study area also have training and equipment to provide hazardous materials spill response and rescue services. Regional emergency response capacity includes rope, confined space, near surface and swift water, hazardous material, trench, advanced vehicle, and structural collapse rescue. Responders can be trained at the operations level and the technician level. First responders at the operations level protect nearby persons, property, or the environment from the effects of the emergency. Technician responders receive additional training and assume a more central role in that they perform physical rescues or attempt to abate or arrest the cause for emergency. Responders within the departments pursue technician- and operations-level training on a regular basis. In the event of a major incident, rescuers and specialized response units from throughout the region arrive to ensure full capacity (Moulton, personal communication, 2015a; Turner, personal communication, 2015).

Throughout the combined study area, individual fire departments set levels of service and target response times. Levels of service standards generally refer to a number of units per member of the public (units can be measured in numbers of firefighters, fire engines, fully equipped response components, or another measure). Levels of service standards can also be used to determine the number of fire facilities needed per geographic service area. The response time is the time interval from receipt of the alarm at the primary public safety answering point (PSAP) to when the first emergency response unit is initiating action or intervening to control the incident. Targets vary depending on the nature of the incident (fire, life support, or other) and level of risk to public safety (low versus high). Within the combined study area, response targets vary but are generally 10 minutes or under, according to information available in comprehensive plans, master plans, and reports (Eastside Fire and Rescue, 2013; City of Renton, 2015; City of Redmond, 2011; City of Bellevue, 2014).

The EIS Consultant Team interviewed representatives of fire departments within the combined study area to determine the departments' ability to quickly and effectively respond to fires and medical emergencies that could potentially be associated with the type of facilities considered for the project proposal (Bunting, personal communication, 2015). Interview questions included whether the department is currently meeting response targets; whether the department has the ability to respond to incidents involving electrical facilities, including downed 115 kV and 230 kV transmission lines, and substation fires and explosions; whether there are different levels of complexity in responding to each scenario; and how the department coordinates with PSE (see Appendix K for interview questions). Departments were also interviewed to determine their ability to respond to a fire or explosion along the Olympic Pipeline, including training and response protocols. Responses were used to

determine whether departments have adequate capacity to effectively respond to the range of emergencies that could occur under the alternatives.

Fire departments throughout the combined study area reported meeting level of service and response time targets for various types of emergencies, including emergency medical and other incidents (Moulton, personal communication, 2015a; Walgren, personal communication, 2015; Bunting, personal communication, 2015; and Turner, personal communication, 2015), with the exception of Eastside Fire and Rescue who fell just short of a structural fire response target by "literally seconds" in 2014 (Tryon, personal communication, 2015). When an emergency is reported and fire and emergency services are needed, the request for services is routed through one of three dispatch systems in King County. If available resources are limited due to a high volume of incident reporting (such as during heavy storms), response times may take "a little longer" (Bunting, personal communication, 2015). The Bellevue Fire Department is unique in that it is accredited by the Commission on Fire Accreditation International (CFAI); an element considered in the accreditation process is meeting response time targets (Moulton, personal communication, 2015a).

#### 15.3.1.2 Electrical Incidents

Fire departments reported using standard operating procedures to respond to live electrical fires, including downed 115 kV and 230 kV overhead transmission lines on houses and across rights-of-way (Moulton, personal communication, 2015a). Emergency response is coordinated with the utility purveyor through a dispatch system. The fire department and utility purveyor are dispatched simultaneously: Fire department first responders secure the scene and prevent access to the hazard area; and the utility purveyor disconnects or otherwise addresses utility service to the affected equipment. To resolve the emergency, the fire department proceeds to manage fire and emergency medical response, and the utility purveyor manages technical aspects of the emergency, including returning service to customers (Moulton, personal communication, 2015a; Walgren, personal communication, 2015; Bunting, personal communication, 2015; Turner, personal communication, 2015; and Tryon, personal communication, 2015).

Fire departments generally responded that no significant difference exists in their approach to a 230 kV versus a 115 kV incident. A perimeter is secured and the utility purveyor is dispatched to address the utility-specific issue (Moulton, personal communication, 2015a; Walgren, personal communication, 2015; Bunting, personal communication, 2015; Turner, personal communication, 2015; and Tryon, personal communication, 2015). One fire department responded that a greater capacity for harm and damage exists when more power is overhead, and the response would involve securing a larger perimeter than would be secured for lower-power incidents (Moulton, personal communication, 2015a). Generally, the capacity for harm and damage can be minimized if operating under large overhead wires can be avoided (Moulton, personal communication, 2015a). Response actions also include ensuring that adequate resources are deployed to address the incident, such as dispatching additional fire units to the scene and ensuring that law enforcement is present to help isolate the area and direct traffic (Anderson, personal communication, 2015). The fire departments interviewed reported adequate training and capability to respond to live electrical fires, with

the provision that PSE also responds with specialized knowledge that enables them to safely address the incident (Moulton, personal communication, 2015a; Walgren, personal communication, 2015; Bunting, personal communication, 2015; Turner, personal communication, 2015; and Tryon, personal communication, 2015).

If there is a fire at a substation, either electrical or oil, PSE sends the appropriately qualified personnel to meet fire department crews on site. If the responding fire department requires additional resources, such as a foam truck from the Port of Seattle, they contact those resources for assistance in responding to the fire (Strauch, personal communication, 2016).

#### 15.3.1.3 Pipeline Fire or Explosion

The Olympic Pipe Line Company (OPLC) *Facility Response Plan* (FRP) provides guidelines to respond to a spill from the Olympic Pipeline, and supplements responders' training and experience during an actual response. Study area communities located along the pipeline corridor have adopted emergency response plans outlining procedures for responding to pipeline incidents (Anderson, personal communication, 2015). In the event of a pipeline rupture or explosion that requires services such as rescue, evacuation, traffic control, hazardous materials cleanup, etc., the first responders will immediately attempt to establish a safe perimeter and will conduct emergency response activities described above. However, response steps that occur following securing the perimeter could be more extensive than for other emergencies, depending on the magnitude of the incident.

For a large incident involving the Olympic Pipeline, the fire department and OPLC technical staff would be contacted simultaneously (Anderson, personal communication, 2015). Fire departments within other jurisdictions could be dispatched as backup, as could OPLC, Port of Seattle Fire Department, and Boeing for backup equipment and fire suppression supplies (Anderson, personal communication, 2015; Strauch, personal communication, 2016). The Incident Commander of the Fire Department and OPLC would collaborate, along with other affected jurisdictions, to form a multijurisdictional unified command (Anderson, personal communication, 2015). Adopted tactics, unified management of the incident, along with management of the perimeter and public safety, would be employed (Anderson, personal communication, 2015).

Both the Bellevue Fire Department and Redmond Fire Department reported having petroleum-absorbent boom systems that could be employed should petroleum products be spilled in a waterway (Anderson, 2015, personal communication; Moulton, personal communication, 2015b). The booms could be used to stop the flow and expansion of the spill, as well as siphon up the product. They also have the means to monitor and contain flow of petroleum products in the sewer system. The response to a fuel leak in the water system is the same as in other situations: locate the leak, contain the incident, and work collaboratively to address the incident. Bellevue Fire Department engines, ladder companies, and hazardous materials response vehicle all have the necessary monitoring instrumentation to permit ongoing evaluation of flammable materials (Moulton, personal communication, 2015b).

Interview respondents indicated that within the last 16 years following the Olympic Pipeline explosion in Whatcom County, many precautionary measures have been taken to increase safety and avoid a pipeline fire or explosion (Anderson, personal communication, 2015;

Moulton, personal communication, 2015b). Stronger laws are in place that require monitoring for digging that occurs near the pipeline (Anderson, personal communication, 2015). Also, pressure changes and flow levels within the pipeline are continuously measured to identify possible leaks, allowing OPLC to address the issue before an incident occurs (Anderson, personal communication, 2015). To monitor for leaks and ensure unauthorized digging is not occurring, OPLC flies the pipeline corridor once per week to check for discoloration of the grass or other anomalies and to ensure unauthorized digging is not occurring within the easement (Anderson, personal communication, 2015). Additionally, product shut-off valves, located at a distance of up to 5 miles, previously were turned by hand only, but are now automated so product flow can be shut off remotely and immediately (Anderson, 2015; Moulton, personal communication, 2015b).

In the event of other utility-related incidents, such as a natural gas line rupture or explosion, the fire department would contact PSE and follow a protocol similar to other incidents: secure the perimeter, isolate the incident, and deny entry to the hazardous area. When the incident is capable of causing a widespread safety concern, additional units from surrounding jurisdictions are employed to contain and manage the incident. The affected utility and fire department are informed of the incident simultaneously. The utility company disconnects service to the area and is dispatched to the scene to coordinate with the Incident Commander, Chief Commander, or another designated fire department official. The affected utility and fire department establish an action plan and engage in emergency management activities (Tryon, personal communication, 2015; Moulton, personal communication, 2015a).

### 15.3.2 Police Services

Table 15-2 summarizes police service providers in the combined study area. Study area communities primarily rely on municipal police departments for police services. County sheriff departments serve the unincorporated King County area, while local municipal police departments typically serve incorporated cities and towns; some cities contract with the County or another city to provide police service. The Medina Police Department provides law enforcement services for both Medina and Hunts Point. Newcastle, Beaux Arts Village, and Sammamish contract with the King County Sheriff's Office, which also provides police services for unincorporated King County within the study areas.

Many local fire and police agencies now have mutual response agreements, which allow public safety responsibilities to be shared across jurisdictional boundaries. This is especially helpful in emergency situations when sheriff departments are unable to respond in a timely manner, particularly in unincorporated "islands" where city departments may have staff close by who are available to respond.

**Table 15-2. Law Enforcement Provider for Each Community**

| Law Enforcement Provider | Community Served |
|---|---|
| Bellevue Police Department | Bellevue |
| Clyde Hill Police Department | Clyde Hill, Yarrow Point |
| Issaquah Police Department | Issaquah |
| Kirkland Police Department | Kirkland |
| King County Sheriff's Department | Newcastle, King County, Beaux Arts Village, Sammamish |
| Medina Police Department | Medina, Hunts Point |
| Redmond Police Department | Redmond |
| Renton Police Department | Renton |

Sources: Bellevue Police Department 2015; Clyde Hill Police Department 2015; Issaquah Police Department 2015; Kirkland Police Department 2015; King County Sheriff's Department 2015; Medina Police Department 2015; Redmond Police Department 2015; Renton Police Department 2015

Electric transmission corridors and substations are located throughout the combined study area. The EIS Consultant Team interviewed representatives from major police departments within the combined study area to determine whether they have observed an increased rate of reported crime within the transmission corridors and substations in their service areas (Appendix L). Except for a few incidents of theft of ground wires in a utility corridor no other incidents of unique crime-related problems associated with existing electricity substations or transmission corridors (Farman, personal communication, 2015; Irvine, personal communication, 2015; Parks, personal communication, 2015; and Trader, personal communication, 2015). According to the interview respondents, no problems with graffiti, illegal drug sales and use, or other disorderly or illegal behavior were reported in these areas by police patrols. None of the interview respondents expected that the level of crime would change depending on whether a transmission line corridor was located in an urban or rural location.

Similarly, none of the respondents suggested that there are existing problems with electric substations as places that attract crime, such as graffiti or other property crimes. Respondents stated that no notable difference in crime is likely whether a substation is located within a densely populated area versus a low-density area. Online crime data and mapping reflect that littering, graffiti, theft, and other crime are not disproportionately reported in utility corridors or substations (PublicStuff, 2015).

The response from study area police departments is consistent with available research, which indicates that crime associated with electrical facilities is generally directed at power theft rather than property crime or violent crime (Depuru et al., 2011). However, petty metal theft at electrical utility sites also occurs (Kooi, 2010). Overall, published research focusing on crime occurring in transmission line corridors and at substations is not as well documented.

## 15.4 HOW WERE POTENTIAL IMPACTS TO PUBLIC SERVICES ASSESSED?

Potential effects on public services were determined by reviewing comprehensive plans and policies of each jurisdiction, conducting phone interviews with the major police and fire departments, and reviewing published literature on the topic of corona interference. Factors considered for the analysis of construction effects included increased demands on emergency services, and the project's potential to alter or hinder the timely provision of emergency services or other public services during construction. Factors considered for the analysis of operational effects include an increased demand for emergency services, and the ability of emergency services to respond to potential fires and accidents at proposed electric facilities. This analysis address both fire and accident risks confined to electrical facilities, and risks that electrical facilities could have for other nearby or co-located utilities. The potential for facilities included under the alternatives to attract crime and result in increased demand for police services was also addressed.

Based on the potential change to property values described in Chapter 11, this chapter also identifies the potential range of impacts to tax revenue and how that could affect the cities' ability to continue to provide the same level of public services (FCS Group, 2016).

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

**Minor** – Conformance with industry standards and regulatory requirements, and implementation of project design, would address potential adverse impacts such that there would be little likelihood of adverse effects. While there could be some temporary or short-term increase in demands on public services requiring local response from public service providers, or localized temporary or short-term changes in response times, there would be no long term changes**.**

**Moderate** – Conformance with industry standards and regulatory requirements, and implementation of project design, would address most potential adverse effects, but some reasonable potential for adverse effects would remain. Temporary or short-term increase in demands on public services could require regional response providers to assist local response. Temporary or short term changes in response times would be noticeable and may require providers to make service adjustments, but there would be no long term changes**.**

**Significant** –Even with conformance with industry standards and regulatory requirements, and implementation of project design, adverse impacts are likely. Impacts are also considered significant if there would be permanent increase in demand, or changes in response times, that could tax the ability to provide adequate fire protection services, emergency response services, and law enforcement services**.**

# 15.5 WHAT ARE THE LIKELY CONSTRUCTION IMPACTS RELATED TO PUBLIC SERVICES?

## 15.5.1 Construction Impacts Considered

### *15.5.1.1 Increased Demand for Emergency Services*

Construction of the new transmission lines, expanded substations, distributed generation, generators, and energy storage facilities could temporarily increase demand for emergency services. The discussion of construction impacts considers the demand created for fire, police, or medical response services if any of the following emergency incidents occurred:

- Injury or fire due to a construction accident;
- Spill of hazardous materials;
- Damage to an existing natural gas pipeline or the Olympic Pipeline; or
- Theft of materials or equipment.

See also Chapter 8 for discussion of potential pipeline rupture risks.

### *15.5.1.2 Changes in Response Times*

To varying degrees, construction could result in increased congestion along adjacent roadways as a result of temporary reductions in available lane width for travel, changes from signalized to manual intersection control, roadway closures, detours, and general construction activities associated with the project. This could temporarily affect access and response times for public service providers.

## 15.5.2 No Action Alternative

Under the No Action Alternative, maintenance activities would occur and could intensify, but they would not involve a significant increase in demand for emergency services. Occasional conductor replacement, implementation of new technologies not requiring discretionary permits, and installation of distributed generation facilities under PSE's conservation program would require minor construction activities. Construction impacts on public services would be negligible.

## 15.5.3 Alternative 1: New Substation and 230 kV Transmission Lines

Impacts are generally described according to the major components associated with Alternative 1 (substation impacts first, followed by transmission line impacts).

### *15.5.3.1 Option A: New Overhead Transmission Lines*

#### 15.5.3.1.1 Increased Demand for Emergency Services

Fire department service calls could increase related to inspection of specific construction projects and to respond to potential construction-related accidents, injuries, and spills. Site preparation and construction of new electric infrastructure could also increase the risk of an accidental fire requiring a response by the fire department. If construction-related accidents,

injuries, spills, or fires were to occur, PSE personnel and the local fire departments are trained to respond.

Fire department response would also be required if construction equipment or activity damaged nearby natural gas or petroleum pipelines. The Olympic Pipeline crosses near the Lakeside substation and follows the same corridor as PSE's 115 kV easement, within the service areas for Bellevue Fire Department and Redmond Fire Department. In addition, several high-pressure gas mains cross PSE's easement, and gas mains are also located in other portions of the study area. If those lines were not properly identified and located prior to construction (through review of utility maps, coordination with utilities, or fieldwork to precisely locate them), they could be damaged during construction and leak, potentially leading to an explosion if leaked material encountered an ignition source, as described in Chapter 8.

A potential significant adverse impact on public services could occur if a rupture and explosion of a pipeline occurred requiring response from both local and regional emergency service providers. Depending on the magnitude of the incident, the response could be large and involve multiple regional agencies and responders. However, as described in Chapters 8 and 16, conformance with industry standards and regulatory requirements would ensure that potential hazards are identified and design plans developed to minimize adverse effects from these hazards to minor levels. Because existing local service providers are expected to be adequate to address increased demand for fire and emergency response services for construction–related incidents that could occur under Alternative 1, Option A, impacts on emergency services would be minor.

Service calls to police departments could increase during construction due to construction site theft and vandalism. The increase is expected to be minor, and existing police department staff and equipment are anticipated to be sufficient.

#### 15.5.3.1.2 Changes in Response Times

If the 230 kV transmission lines were constructed in road rights-of-way, emergency response would potentially be able to access the construction sites more quickly than in an off-road corridor.

Construction of a new 230 kV substation yard to accommodate a new transformer could include temporary street closures and detours. Construction of the overhead lines would require installation of utility poles along a project length of at least 18 miles, some of which would likely be adjacent to roadways. For these areas, transmission lines installed overhead could require vehicle closures near the pole construction sites. During the period in which wire is pulled, no vehicular traffic would be allowed on roadways located beneath the areas of pulling activity. These delays and closures could delay response by requiring emergency service and other public service providers to use a less direct route, or by increasing traffic congestion such that vehicles are forced to reduce their speeds. Implementation of measures described in Chapter 14, Section 14.7, would be effective in ensuring that impacts on response times would be minor.

### 15.5.3.2 Option B: Existing Seattle City Light 230 kV Transmission Corridor

#### 15.5.3.2.1 Increased Demand for Emergency Services

As with Alternative 1, Option A, construction could occur in the vicinity of regional natural gas pipelines or smaller pipelines that supply natural gas to homes and businesses. Although the transmission lines would, in large part, be located in or near the existing SCL corridor, that corridor does cross a PSE high-pressure gas main and the Olympic Pipeline several times as described in Chapter 16, and other gas utilities may also be present in the area. As described for Option A, a rupture and explosion, if it were to occur, could constitute a significant adverse impact due to the increased demand for emergency services. However, conformance with industry standards and regulatory requirements would ensure that potential hazards are identified and design plans developed to minimize adverse effects from these hazards to minor levels. Because existing local service providers are expected to be adequate to address increased demand for emergency response services for construction–related incidents that could occur, impacts on emergency services would be the same as Option A (minor).

#### 15.5.3.2.2 Changes in Response Times

Since Alternative 1, Option B would include rebuilding or replacing existing poles and other structures, and pulling new transmission wire, the types of construction impacts on response times would be similar to those described for installing new overhead transmission lines in Option A. If constructed along road rights-of-way, the new transmission segment connecting the transmission lines to the Lakeside substation could result in localized impacts on responders. With implementation of measures described in Chapter 14, Section 14.7, impacts on response times would be the same as Option A (minor).

### 15.5.3.3 Option C: Underground Transmission Lines

#### 15.5.3.3.1 Increased Demand for Emergency Services

The types of emergency services potentially needed for construction of an underground line would be the same as for construction of an overhead line. If the underground line was constructed in the existing PSE 115 kV easement under Alternative 1, Option A or SCL easement under Option B, this option would potentially require the same emergency service response as described for Options A and B, should an accidental rupture and explosion of a high-pressure gas main or the Olympic Pipeline occur during construction. Given the greater amount of ground disturbance associated with constructing an underground line, the potential risk would be higher relative to an overhead line. Nonetheless, conformance with industry standards and regulatory requirements would ensure that potential hazards are identified and design plans developed to minimize adverse effects from these hazards. Due to the increased area of ground disturbance, the probability of impacts would be somewhat higher than described for Alternative 1, Options A and B, but still considered low, and anticipated impacts are expected to be minor to moderate.

#### 15.5.3.3.2 Changes in Response Times

As with Alternative 1, Option A, if an underground line is constructed in road rights-of-way, emergency response would potentially be able to access the construction sites more quickly

than in an off-road corridor. Impacts on response times from construction activity affecting roadways would be similar to those described for overhead construction. However, with Option C the impacts would be less localized, likely extending along continuous lengths of one block or longer rather than only at pole locations, potentially causing more traffic disruption. With implementation of measures described in Chapter 14, impacts on response times would be expected to be minor to moderate.

#### *15.5.3.4 Option D: Underwater Transmission Lines*

##### 15.5.3.4.1 Increased Demand for Emergency Services

In addition to the types of emergency services described for an overhead or underground line, construction of an underwater line could potentially require special emergency services to respond to an in-water accident, such as a spill. Although unlikely to occur, local fire departments have capabilities to respond to in-water spills and other accidents. With implementation of measures described in Chapter 8 and Chapter 16, impacts on emergency services are expected to be minor.

##### 15.5.3.4.2 Changes in Response Times

At the land connections, response time impacts would be the same as those described for Alternative 1, Option A, if overhead and Option C, if underground, (minor), but would be expected to affect smaller localized areas.

### 15.5.4 Alternative 2: Integrated Resource Approach

Potential construction impacts under Alternative 2 would be much more limited than Alternative 1 because less construction of new infrastructure would be necessary.

#### *15.5.4.1 Energy Efficiency and Demand Response Components*

Strategies to promote energy efficiency and installation of demand response devices would not increase the demand for construction-related emergency services.

#### *15.5.4.1 Demand Response Component*

Demand response is an end-user strategy that pertains more to customer usage patterns and requires little construction of new infrastructure and would not increase the demand for construction-related emergency services.

#### *15.5.4.2 Distributed Generation Component*

Installation of devices to generate on-site power would require minor construction activities primarily on single residential and commercial sites. Construction impacts on public services would be negligible.

#### *15.5.4.3 Energy Storage Component*

Construction of large battery storage facilities would require activities similar to a substation, with potential impacts on public services the same as those described for Alternative 1 substation construction (minor).

#### 15.5.4.4 Peak Generation Plant Component

Construction of peak generation plants would require construction similar to a substation, but would likely also require replacing or extending major gas mains for natural gas supply. Nonetheless, existing local service providers are expected to be adequate to address increased demand for fire and emergency response services for construction–related incidents that could occur. As a result, impacts would be the same as those described for Alternative 1 substation construction (minor).

### 15.5.5 Alternative 3: New 115 kV Lines and Transformers

#### 15.5.5.1 Increased Demand for Emergency Services

Increased demand for emergency response associated with adding transformers at three existing substations and rebuilding or expanding five existing substations would be similar in type to the impacts associated with building a new substation, as described for Alternative 1. However, Alternative 3 would involve more sites than Alternative 1 and would potentially involve greater distances from some substations to fire departments and hospitals.

Alternative 3 would require a longer transmission line alignment (60 miles as opposed to 18 miles) and could slightly increase the demand for emergency services over a longer duration compared to overhead lines under Alternative 1, Option A and Option B. Also, construction for Alternative 3 would potentially occur in less urbanized areas than Alternative 1. The need for emergency response during construction in less urban areas would potentially have greater impacts on existing overall emergency response services because of potentially less well equipped local fire departments and the longer distances to public service facilities and mutual aid fire departments that may need to be dispatched to construction areas. Nonetheless, any increased demand for emergency services would be temporary and short-term, and local and regional emergency response providers in the study area would be capable of responding to construction-related incidents. Therefore, impacts on emergency services would be minor to moderate.

As with Alternative 1, construction could occur in the vicinity of the Olympic Pipeline, and regional natural gas pipelines or those that supply natural gas to homes and businesses, and would potentially require the same emergency service response as described for Alternative 1, Options A, B, and C in the unlikely event an accidental rupture and explosion of a pipeline occur during construction. Conformance with industry standards and regulatory requirements would ensure that potential hazards are identified and design plans developed to minimize adverse effects from these hazards to minor levels.

#### 15.5.5.2 Changes in Response Times

Potential response impacts associated with adding transformers at three existing substations and rebuilding or expanding five existing substations would be similar in type to the impacts associated with building a new substation, as described for Alternative 1. However, Alternative 3 would involve more sites than Alternative 1 and would potentially have greater response impacts due to temporary road closures.

Potential response time impacts associated with construction and installation of new 115 kV transmission lines would be similar in type to the impacts described for new 230 kV transmission lines in Alternative 1, Option A. Lane closures, other traffic revisions, and construction staging areas could affect travel times for public service providers. Compared to Alternative 1, more transmission lines would be installed over a larger area under Alternative 3; therefore, the response time impacts are expected to be more widespread. With implementation of measures described in Chapter 14, Section 14.7, impacts on response times would be expected to be minor to moderate.

## 15.6 HOW COULD OPERATION OF THE PROJECT AFFECT PUBLIC SERVICES?

### 15.6.1 Operation Impacts Considered

Operation of new transmission lines, expanded substations, distributed generation, generators, and energy storage facilities associated with the alternatives could increase demand for emergency services in the study areas. The discussion of operation impacts considers the demand created for fire, police, or medical response services if any of the following emergency incidents occurred:

- Fire due to equipment malfunction;
- Spill of hazardous materials;
- Damage to an existing pipeline (from natural phenomena, or maintenance and operations activities); and
- Vandalism of equipment, structures, or property.

The potential for corona-ions from transmission lines to interfere with police and emergency communication or devices was often cited as a concern during the scoping process and is also addressed in this section.

See also Chapter 8 for discussion of potential health effects related to the proposed improvements.

### 15.6.2 What is corona-ion interference and is it a concern?

Corona can occur at the surface of an overhead high-voltage transmission line conductor, when the electric field intensity at the surface of the conductor exceeds a threshold (the breakdown strength of air). When this situation occurs, a very small electrical discharge is generated that can create audible noise and radio frequency noise, such as those used by fire and emergency responders. Corona effects on high-voltage transmission lines have been studied for over 60 years and engineers take steps in the design of overhead transmission lines to limit corona activity to acceptable levels (EPRI, 1982). Interference from corona-generated noise is generally associated with lines operating at voltages of 345 kV or higher (Enertech, 2015).

Corona is affected by the local electric field at the surface of the conductor (called the surface gradient). The conductor surface gradient is affected by many factors, including the conductor size, voltage of the line, smoothness or irregularities (such as nicks on the transmission line conductor, water droplets, insects, or debris) on the surface of the conductor, phase configuration, location of other energized conductors, distance to ground, etc. For new projects, such as the Energize Eastside Project, electrical engineers will usually design overhead transmission lines to comply with recommended maximum conductor surface gradient values set forth in the Institute of Electrical and Electronics Engineers (IEEE) *Radio Noise Design Guide for High-Voltage Transmission Lines* (IEEE, 1971). The design guide is applicable to overhead AC transmission lines in the voltage range of 115 kV to 800 kV. This design guide is a valuable tool in the design of overhead high-voltage transmission lines because it gives guidelines for acceptable electrical parameters (conductor surface gradients) that engineers can use to evaluate design options. The IEEE guide is based on many years of research and practical experience. Engineers can control the conductor gradients by selection of conductor size (larger conductors have lower gradients), phase spacing and arrangement, and sometimes by bundling (use of multiple conductors per phase lowers the surface gradient).

Gap discharges (where electricity crosses tiny gaps between mechanically connected parts) can also generate noise. Generally, higher voltage transmission lines (such as the 115 kV and 230 kV transmission lines associated with the Energize Eastside Project) do not produce noise due to gap discharges, since these lines would be constructed with modern hardware that eliminates such problems and therefore minimizes gap noise. Gap discharges are typically more common on lower-voltage distribution lines, caused by loose hardware and wires (Enertech, 2015).

Communication interference is dependent upon the frequency of the system in use, the relative locations of the transmitters and receivers with respect to one another, and other parameters (Enertech, 2015). Overhead transmission lines do not, as a general rule, interfere with radio or TV reception. Corona-generated radio frequency noise decreases with distance from a transmission line and also decreases with higher frequencies. Whenever corona is a problem, it is usually for amplitude modulation (AM) radio and not the higher frequencies associated with frequency modulation (FM) radio or TV/satellite signals. Generally most modern fire and emergency responder communication systems (such as mobile-radio communications) utilize either FM or digital signals that are not affected by transmission line corona. In addition, interference is unlikely with other communications devices such as cell phones and GPS units that operate with digital signals at much higher microwave frequencies.

In the U.S., electromagnetic interference from transmission systems is governed by the Federal Communications Commission (FCC), which requires the operator of any device that causes “harmful interference” to take prompt steps to eliminate it (FCC, 1988). Transmission line owners are also required to resolve interference complaints from licensed operators in accordance with FCC Rules and Regulations (47 CFR Part 15). Electric power companies have been able to work well under the present FCC rule because harmful interference can generally be eliminated. It has been estimated that more than 95 percent of power line sources that cause interference are due to gap-type discharges. These can be found and

completely eliminated when required to prevent interference (USDOE, 1980). Complaints related to corona-generated interference occur infrequently.

### 15.6.3 No Action Alternative

If a fire, explosion, or spill were to occur along the existing transmission line or at a substation as a result of an earthquake, storm, or accident (as described in Chapter 8), there would be a need for emergency response. The need for emergency services would the same as described for construction under Alternative 1. The potential risk of transformer overheating associated with system overload during peak periods would be expected to increase under the No Action alternative, if system capacity is not increased. More frequent system overloading could increase the potential for transformers to catch fire or explode, with accompanying potential safety hazards. These hazards would be managed by load shedding and increased outages under the No Action Alternative.

The proximity of natural gas mains and the two Olympic Pipeline regional lines to the existing 115 kV transmission line through PSE's easement presents a potential operational hazard during PSE maintenance activities, such as conductor replacement near these utility lines. If an accidental rupture and explosion of a pipeline occurred during conductor replacement or other maintenance activities near these utility lines, an explosion would constitute a significant adverse impact due to the increased demand for local and regional emergency services. However, as described in Chapters 8 and 16, conformance with industry standards and regulatory requirements ensure that potential hazards are identified and operations and maintenance procedures in place to minimize adverse effects from these hazards to minor levels. Because existing local service providers are expected to be adequate to address the demand for fire and emergency response services for most operations and maintenance-related incidents that could occur under the No Action Alternative, impacts on emergency services would be minor.

Public service providers and facilities require continuous and reliable supplies of electricity. Under the No Action Alternative, maintenance of existing electrical facilities would likely increase, possibly causing brief interruptions or outages of electrical service. However, these would be planned events with advance notification, and if necessary, public service providers could employ backup generators during outages.

As described in Chapter 2, the risk of interruptions or outages of electrical service would grow under the No Action Alternative. In a sudden, unplanned loss of electricity, emergency response facilities are the highest priority for maintaining power during an outage, and they are equipped with backup power supplies. During load shedding, PSE's approach is to have rolling blackouts, where one area is subject to outages for a few hours, then another area is affected. As a result, only minor impacts on emergency response capabilities are anticipated. Full restoration from a large-scale power outage would likely take several hours. During this time, there could be an increased demand for emergency services to respond to accidents, fires, or other incidents that could occur if traffic controls or alarm systems that do not have backup generators stop functioning.

## 15.6.4 Alternative 1: New Substation and 230 kV Transmission Lines

Impacts are generally described according to the major components associated with Alternative 1 (substation impacts first, followed by transmission line impacts).

### *15.6.4.1 Option A: New Overhead Transmission Lines*

#### 15.6.4.1.1 Increased Demand for Fire Services

The demand for fire department services associated with equipment at the new substation that presents a fire risk could increase relative to the No Action Alternative. The following paragraphs describe potential scenarios that could result in a fire at a new or expanded substation. While an increase in fire demand response is possible, it is not expected to be significant relative to the ability of the fire departments to respond to such emergencies. With implementation of measures described in Chapters 8 and 16, impacts on fire services are expected to be minor. Operational environmental health and hazardous materials impacts of the substation alternatives are discussed in Chapter 8.

Oil-insulated equipment, such as capacitors, transformers, and inductors, has been known to cause fires at substations. Oil is used to insulate electrical equipment because it is more effective than air as an insulator, and it allows equipment to be more compact and placed closer together or underground. Oil insulation comes with the risk that when an element (for example, a capacitor) becomes overheated, the oil can convert to a gaseous state and, if it leaks and is exposed to sparks or high heat, can ignite and cause a fire or even an explosion.

Other activities or events that pose risks of igniting a fire include the following:

- Electrical fault;
- Cable overheating;
- *Arcing*, such as at switches;
- Lightning strike;
- Hot work, such as welding; and
- Equipment failure.

When these events occur at substations, they typically do not cause fires because of the safety systems that have been installed. A fire is not considered a probable outcome of operating the substation. However, if a fire were to occur, it would most likely be similar to the types of fires described in the following paragraphs, and the fail-safe systems described below would be in place to contain the damage (Orth, personal communication, 2014).

Electrical faults can occur in any type of electrical equipment. A typical substation will experience three to five electrical faults per year. Substation equipment has relays and circuit breakers to cut power to a piece of equipment when a fault occurs. Faults typically occur during an unexpected event, such as a lightning strike, a break in a cable, or equipment malfunction. When relays and circuit breakers function properly, they are designed to disconnect power within a fraction of a second to protect equipment and prevent fires that could damage substation equipment and transmission and distribution lines. However, there

is a very small risk that a fault would go undetected and the equipment could overheat, cause sparks, catch fire, or even explode before being detected.

Oil used in insulating electrical equipment is monitored for the presence of *acetylene* and other dissolved gasses that are byproducts of arcing. If these dissolved gases are detected, the equipment may be subject to a combination of the following: being monitored more frequently, inspected, repaired, and/or replaced.

Although lightning occurs relatively infrequently in the combined study area, it still poses a risk of damaging substation equipment if the equipment is struck or if there is a lightning strike nearby. The risk is primarily to aboveground equipment; underground equipment is not expected to be at risk of lightning strikes. Substations would be equipped with mechanical means (such as a system of lightning rods) to convey lightning to the ground to avoid equipment damage and harm to workers on the site. These systems are expected to largely eliminate risks from lightning, but a small risk would remain. The other fail-safe systems described in this section are designed to operate if a lightning strike caused a fault or cable overload or other system malfunction.

Hot work such as welding can pose risks but is sometimes necessary to repair or modify equipment in a substation. While precautions, such as removing the piece of equipment that needs to be welded and welding it inside and away from electrical equipment, would reduce the potential for starting a fire, a small risk would remain. Crews conducting hot work are also trained to shut down equipment being worked on, shield equipment from exposure to intensive heat and sparks, let equipment cool adequately before re-energizing, and monitor any repairs to limit risk of fire.

In addition to the relays and circuit breakers described above, a number of other features are included as fail-safe systems to provide protection in case another system does fail. PSE personnel remotely monitor for conditions of overloading in the system, malfunctions, and other factors that could lead to a fire.

If a fire were to start in a substation, PSE personnel and the local fire departments are trained to deal with substation fires, including how to protect surrounding properties, minimize risk to substation personnel and firefighters, and avoid exacerbating the fire. The protocol is to contain the fire and prevent it from spreading beyond the substation site rather than entering the facility and risking injury to firefighters. Because existing local service providers are expected to be adequate to address increased demand for fire and emergency response services, impacts on public services would be minor.

The same types of hazards and potential need for emergency services related to operation of new 230 kV transmission lines in proximity to the Olympic Pipeline are already present with the existing 115 kV lines and would remain similar with a 230 kV line, even if it were to be located in a new right-of-way corridor. See the No Action Alternative for discussion of impacts. As described in Chapters 8 and 16, conformance with industry standards and regulatory requirements ensure that potential hazards are identified and operations and maintenance procedures in place that minimize adverse effects from these hazards to minor levels.

#### 15.6.4.1.2 Increased Demand for Police Services

The demand for police services could increase if the project increases the opportunity for illegal activity to occur at the new substation site or on or near the transmission corridor. As described in Section 15.3.2, none of the interviewed police departments cited any incidents of theft and vandalism at PSE's existing substations. Security design features would minimize potential impacts on police response services during operations. Substations have security fences or walls and employ a variety of measures, including motion detectors and closed-circuit television surveillance, as needed to monitor each site. These measures would reduce the need for police services. Therefore, additional law enforcement demands are expected to be minimal, resulting in a minor impact on such services.

The potential for incidences of illegal activity and vandalism along the transmission corridor is anticipated to be low based on interview responses received from law enforcement agencies when asked about crime along existing transmission corridors. Unique crime-related problems associated with transmission corridors were generally not cited as an existing problem or future concern. To limit public accessibility into these areas, private property owners can install gates on service roads required for maintenance in locations where PSE has an easement but does not own the property. Therefore, only a minor impact on law enforcements services is expected.

#### 15.6.4.1.3 Corona Interference

In general, corona interference is not considered a problem for transmission lines rated at 230 kV and below. Corona levels for the 230 kV transmission line (Alternative 1, Option A) would be low, and no corona-generated interference with police and emergency personnel communication/emergency devices would be anticipated. Furthermore, if interference should occur, and to comply with FCC regulations, PSE would work with owners and operators of communications facilities along the transmission line to identify and implement mitigation measures. As a result, impacts related to corona interference with emergency communication devices would be negligible. See Section 15.6.2 for additional information.

### *15.6.4.2 Option B: Existing Seattle City Light 230 kV Transmission Corridor*

The demands for public services would be the same as those described for the No Action Alternative (minor), except that fewer portions of the transmission line would be located in proximity to the Olympic Pipeline. As described for Alternative 1, Option A, conformance with industry standards and regulatory requirements ensure that potential hazards are identified and operations and maintenance procedures developed that minimize adverse effects from these hazards. Same as Alternative 1, Option A, impacts related to corona interference with emergency communication devices would be negligible.

### *15.6.4.3 Option C: Underground Transmission Lines*

Because the transmission line would be underground, there would be no risk of fire from lightning strike on the transmission line. Alternative 1, Option C would be located near the Olympic Pipeline in places and could be in operation near, or share corridors with, other utility infrastructure such as gas lines. Same as Alternative 1, Options A and B, with

conformance to industry standards and regulatory requirements, impacts related to the OPLC pipelines or other gas lines in the area from operation of the project are expected to be minor.

Corona and radio noise are not factors for underground lines since they are not in corona (i.e., they are insulated by a solid dielectric material instead of air and therefore do not generate corona). As a result, there would be no impacts from corona interference with emergency communication devices.

#### 15.6.4.4 Option D: Underwater Transmission Lines

Accidents along the submerged cable that might require emergency response would be unlikely considering the depth of water where they would be placed and the dimensions and strength of the cable itself, which would make it difficult to break. With implementation of measures described in Chapters 8 and 16, impacts on emergency service providers would be the same as Alternative 1, Options A, B, and C (minor).

An underwater transmission line will produce no electric fields in the surrounding environment due to the shielding of the conductors. As a result, there would be no impacts from corona interference with emergency communication devices.

#### 15.6.4.5 Property Tax Revenues

During the public scoping process for the proposed project, the public expressed interest and concern regarding the potential impacts of 230 kV transmission lines on property values, with resulting loss in property tax revenues and the ability to adequately fund public services in the study area communities. The EIS Consultant Team conducted a literature review on proximity impacts for property values. Claims of diminished property value through decreased marketability are based on the reported concern about hazards to human health and safety and increased visual impacts associated with living in proximity to high-voltage transmission lines. This issue is discussed in Chapter 11.

As described in Chapter 11, it is reasonable to assume that properties with views of existing transmission lines may have somewhat lower property values than those nearby that do not have views of the power lines. However, because of the number of factors and interrelationships affecting property values, it is not possible to determine from Assessor's data how much of the effect on property values is due specifically to views.

For the purpose of identifying potential impacts of the Energize Eastside Project, the EIS Consultant Team developed a rough estimate of the effect of reduced property values on property tax revenues. A fiscal analysis prepared for the Project (FCS Group, 2016) utilized an estimate of a theoretical $10 million decrease in assessed value to demonstrate the relative effect of such a decrease on property tax revenues in one of the study area communities (City of Bellevue). The results indicated that for each $10 million decrease in assessed value, property tax revenues collected by the City of Bellevue would decrease by $9,800 per year. Although the specific change in property values is not known, out of approximately $35 million that Bellevue collects each year, this change (-0.03%) is small and would not affect the Cities' ability to adequately fund public services.

## 15.6.5 Alternative 2: Integrated Resource Approach

### 15.6.5.1 Energy Efficiency, Demand Response, and Distributed Generation Components

During operation of site-level and small-scale strategies implemented to address energy efficiency, demand response, and distributed generation components, an increased need for emergency services and law enforcement is unlikely. The existing emergency services are expected to be adequate to meet the demands.

### 15.6.5.2 Energy Storage Component

Accidental damage or equipment replacement with this component of Alternative 2 could possibly lead to leaks or spills of hazardous materials, requiring emergency response services. Although the specific technology likely to be used for these devices is unknown, for purposes of this discussion it was assumed that a battery system would likely contain hazardous materials.

As described in Chapter 8, the energy stored and released by battery cells has the potential to cause overheating and, if undetected and unmitigated, eventually cause the battery to experience *thermal runaway* (i.e., a positive feedback loop where an increase in cell temperature and pressure leads to an uncontrolled heat reaction). Primary concerns with battery fires include the release of toxic fumes from hazardous materials, challenges and uncertainty with extinguishing battery fires by first responders (as recommended response techniques vary by chemistry type), and re-ignition and overhaul procedure after extinguishment. Given the potential complexity of a response to a battery storage incident, moderate impacts on emergency service providers could occur.

The incidence of vandalism at battery storage facilities is expected to be negligible, the same as a substation as described for Alternative 1.

### 15.6.5.1 Peak Generation Plant Component

Generators would be located within substation yards and would have the same security measures as the rest of the substation. Therefore, the incidence of vandalism at these facilities is expected to be negligible.

As with Alternatives 1 and 3, accidental damage or equipment replacement under Alternative 2 could lead to leaks or spills of hazardous materials, which would potentially require emergency response from fire departments. The energy storage batteries, generators, and turbines of this alternative have the greatest potential for this type of situation, since they incorporate equipment containing materials such as acid, natural gas, insulating oil, or diesel fuel. Given the potential complexity of the response, moderate impacts on emergency service providers could occur.

## 15.6.6 Alternative 3: New 115 kV Lines and Transformers

The demand for emergency services and law enforcement with Alternative 3 would be the same as described for Alternative 1. As a result, minor impacts on emergency response services could occur.

In general, corona interference is not a problem for transmission lines rated at 230 kV and below. Because of the lower voltage, the 115 kV transmission line associated with Alternative 3 would generally have less corona than the 230 kV line associated with Alternative 1. Corona levels for these proposed lines would be low, and no corona-generated interference with police and emergency personnel communication/emergency devices is anticipated. Furthermore, if interference should occur, and to comply with FCC regulations, PSE would work with owners and operators of communications facilities along the transmission line to identify and implement mitigation measures.

## 15.7 WHAT MITIGATION MEASURES ARE AVAILABLE FOR POTENTIAL IMPACTS TO PUBLIC SERVICES?

A variety of project design features and best management practices to reduce the effects on public services would be implemented as part of the Energize Eastside Project.

### 15.7.1 Emergency Response Services

Measures PSE could take to minimize potential demand for emergency response services during construction and operation are described in Chapter 8.

To further reduce emergencies related to the proposed project, PSE is required by law to contact the appropriate Underground Service Alert organization to identify the location of underground utilities and pipelines prior to any excavation work. An OPLC representative would be present to observe excavation activities around buried pipelines during construction. Further discussion of measures to reduce risks associated with construction or operation in proximity to the Olympic Pipeline is provided in Chapter 8 and Chapter 16.

### 15.7.2 Response Times

The contractor would be required to prepare “maintenance of traffic” plans for any work with the public right-of-way as described in Chapter 14. These plans would minimize effects on emergency response and other public services.

Other potential mitigation measures include the following:

- Notify service providers and neighborhood residents of construction schedules, street closures, and utility interruptions as far in advance as possible.
- Notify and coordinate with fire departments for water line relocations that could affect water supply for fire suppression, and establish alternative supply lines prior to any service interruptions.
- Where feasible, schedule construction outside of hours of peak traffic congestion and times when service providers such as school buses and waste collectors are in the area.
- Coordinate with law enforcement agencies to implement crime prevention plans for construction sites and staging areas.

### 15.7.3 Substation Fire Risk

In order to reduce the risk of substation fire, PSE would routinely do the following:

- Use sulfur hexafluoride ($SF_6$) gas for closely spaced equipment. $SF_6$ is a nonflammable gas and an excellent insulator.
- Install relays and circuit breakers to shut down equipment experiencing a fault or malfunction.
- Install systems to conduct lightning to the ground rather than through lines or equipment.
- Monitor oil insulation for evidence of *arcing* and gassing. Monitor substations for evidence of overloading, overheating, or malfunctions.

## 15.8 ARE THERE ANY CUMULATIVE IMPACTS TO PUBLIC SERVICES AND CAN THEY BE MITIGATED?

As the regional population has increased, so has the demand for public services. Demands for these services will continue to increase as the area continues to grow. The Energize Eastside Project will incrementally contribute to those increased demands. Design and operation in accordance with applicable standards and requirements will reduce the incremental increase associated with the Energize Eastside Project.

## 15.9 ARE THERE ANY SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS TO PUBLIC SERVICES?

With the appropriate mitigation measures in place, no unavoidable significant adverse impacts to public services are anticipated from either construction or operation of the Energize Eastside Project alternatives.

There is a risk of damage and subsequent explosion requiring local, and potentially regional, emergency service response whenever construction or operations and maintenance occur near buried natural gas lines or the Olympic Pipeline. However, that risk is not considered an unavoidable significant impact because the probability of damage occurring is minimized by conformance with industry standards, regulatory requirements, and construction and operational procedures that address pipeline safety.

# CHAPTER 16. UTILITIES

## 16.1 HOW WERE UTILITIES IN THE COMBINED STUDY AREA EVALUATED?

This chapter discusses electrical, natural gas, petroleum, telecommunications, water, wastewater, and drainage utilities in the combined study area (Alternatives 1, 2, and 3 as depicted on Figure 1-4 in Chapter 1) at a programmatic level.

The EIS Consultant Team used geographic information system (GIS) data to identify the types of utilities in the combined study area and the general location of major known utility infrastructure (including water, wastewater, stormwater, and electrical facilities). Service providers for each utility were identified, along with the area served by each of the utilities, and any plans that service providers have for major utility maintenance or expansion in the area. Baseline information about utilities systems was obtained through a review of relevant plans. Additional information on utilities systems was obtained from local government, utility district, and private provider website information, publicly available plans and reports, and through interviews with representatives of service providers.

Because this project proposes to construct new electric facilities, this assessment also includes a brief discussion of the current service provided by PSE and how the proposed project could affect fees charged to customers. For further discussion of the project's purpose and need, refer to Chapter 1.

**Utilities Key Findings**

Impacts related to constructing and operating a transmission line near natural gas and petroleum pipelines would range from minor (No Action Alternative, Alternative 1, Options A and B and Alternative 3) to moderate (Alternative 1, Option C). Although a significant adverse impact on utilities could occur if an explosion of any of these types of lines resulted from the project, the risk is minimized by conformance with industry standards, regulatory requirements, and construction and operational procedures that address pipeline safety.

Under the No Action Alternative, high electrical loads could result in forced outages that are considered moderate to significant adverse impacts to electrical service reliability. Alternatives 1 and 3 would eliminate this risk, while under Alternative 2, some risk to reliability would remain.

Other construction-related impacts would be minor to moderate (Alternative 1, Options A, C, D; Alternatives 2 and 3) and moderate to significant (Alternative 1, Option B).

## 16.2 WHAT ARE THE RELEVANT PLANS, POLICIES, AND REGULATIONS?

This section describes plans, policies, and regulations applicable to general utility provision and management in the combined study area. Applicable federal, state and local regulations that pertain to specific utilities are discussed in Section 16.3.

The comprehensive plans for the study area communities contain a variety of goals and policies related to utilities (City of Bellevue, 2015; City of Clyde Hill, 2014; City of Issaquah, 2015; City of Kirkland, 2013; City of Medina, 2015; City of Newcastle, 2015; City of Redmond, 2015; City of Renton, 2015; City of Sammamish, 2015; King County, 2013; Town of Beaux Arts Village, 2014; Town of Hunts Point, 2014; and Town of Yarrow Point, 2014).

The comprehensive plans establish goals and policies addressing the provision and management of utilities, and the visual and safety aspects of the location of utilities, in particular siting of utility lines. This chapter focuses on policies relating to the provision and management of utilities. Policies relating to safety, land use (siting), and visual aspects of utilities are described in Chapter 8, Chapter 10, and Chapter 11, respectively.

Appendix F lists the comprehensive plan utilities goals and policies that could address or guide the Energize Eastside Project, including those goals and policies related to the provision and management of electrical infrastructure. These goals and policies are generally focused on the following:

- Ensuring that adequate public utilities and facilities are planned for, located, extended, and sized consistent with planned growth;
- Ensuring utility systems are constructed in a manner that minimizes negative impacts to existing development and utilities;
- Encouraging utility coordination regarding location and service provision; and
- Minimizing and preventing unnecessary risk due to hazardous liquid pipelines.

In addition, some study area communities include policies encouraging the use of new or innovative technologies to increase the quality and efficiency of utility service. See Chapter 7 for more information.

Utilities in the combined study area are provided by a combination of City-managed providers (typically water, wastewater, drainage) and providers managed by other entities (typically electricity, natural gas, petroleum, telecommunications). Depending on their services, utilities not managed by Cities are state regulated, federally licensed, and/or municipally franchised providers.

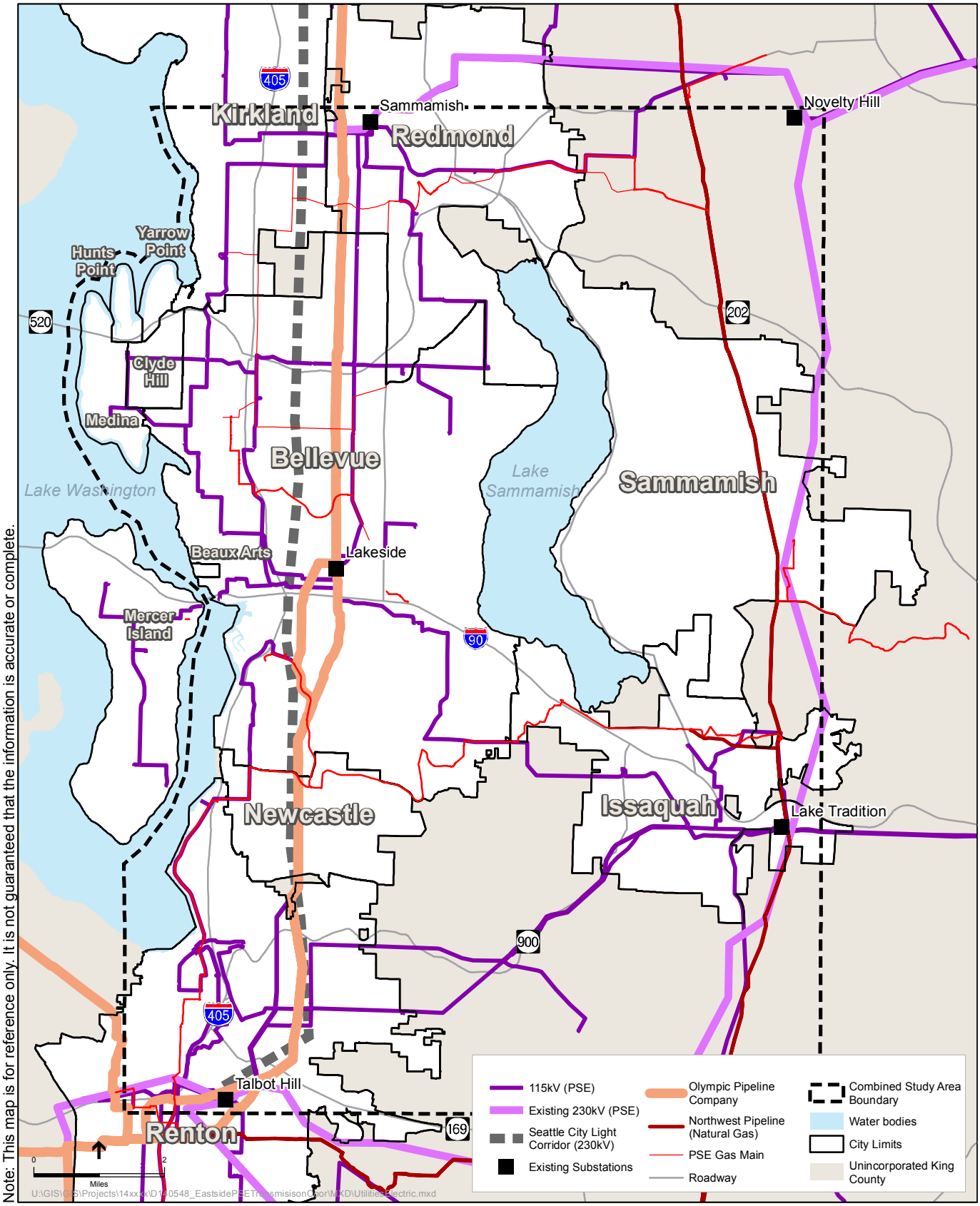
Utilities operating within the combined study area that are not managed by the Cities conduct their own planning processes and maintain their own systems with limited involvement from the study area communities. However, all development and expansion proposals by utility providers are subject to the relevant policies and regulations of the communities where the proposals are located. Utility providers in the combined study area and their utility planning processes and plans are described below in Sections 16.3, 16.4, and 16.5.

## 16.3 WHAT UTILITIES ARE PRESENT IN THE COMBINED STUDY AREA?

This section provides information on natural gas and petroleum pipeline utilities in the study area, related to the proximity of these pipelines to transmission lines under the alternatives and potential risks associated with co-locating these types of utilities. This information includes brief discussion on how natural gas and petroleum pipeline utilities are regulated, inspection and monitoring requirements, and special issues related to co-location (corrosion).

The combined study area includes both regional and local utilities. Regional utilities in the combined study area include power transmission systems (overhead 115 kV, 230 kV, and 500 kV), electric substations, gas transmission pipelines, petroleum pipelines, and large water and wastewater pipelines and associated pump stations. Local utilities include distribution and collection systems (power distribution, water mains, wastewater mains, stormwater systems) that are generally connected to regional utilities. Given the large study area and programmatic nature of this evaluation, local utilities (and telecommunication utilities) were not inventoried. For the Phase 2 Draft EIS, additional detail will be developed on the location of utilities.

Figures 16-1 and 16-2 present GIS data for regional electric transmission and natural gas and petroleum pipelines in the combined study area. Existing regional water and wastewater lines are presented in Figure 16-3. While not inventoried or shown on Figures 16-1, 16-2, and 16-3, the combined study area also contains main feeder telephone and fiber optic lines.



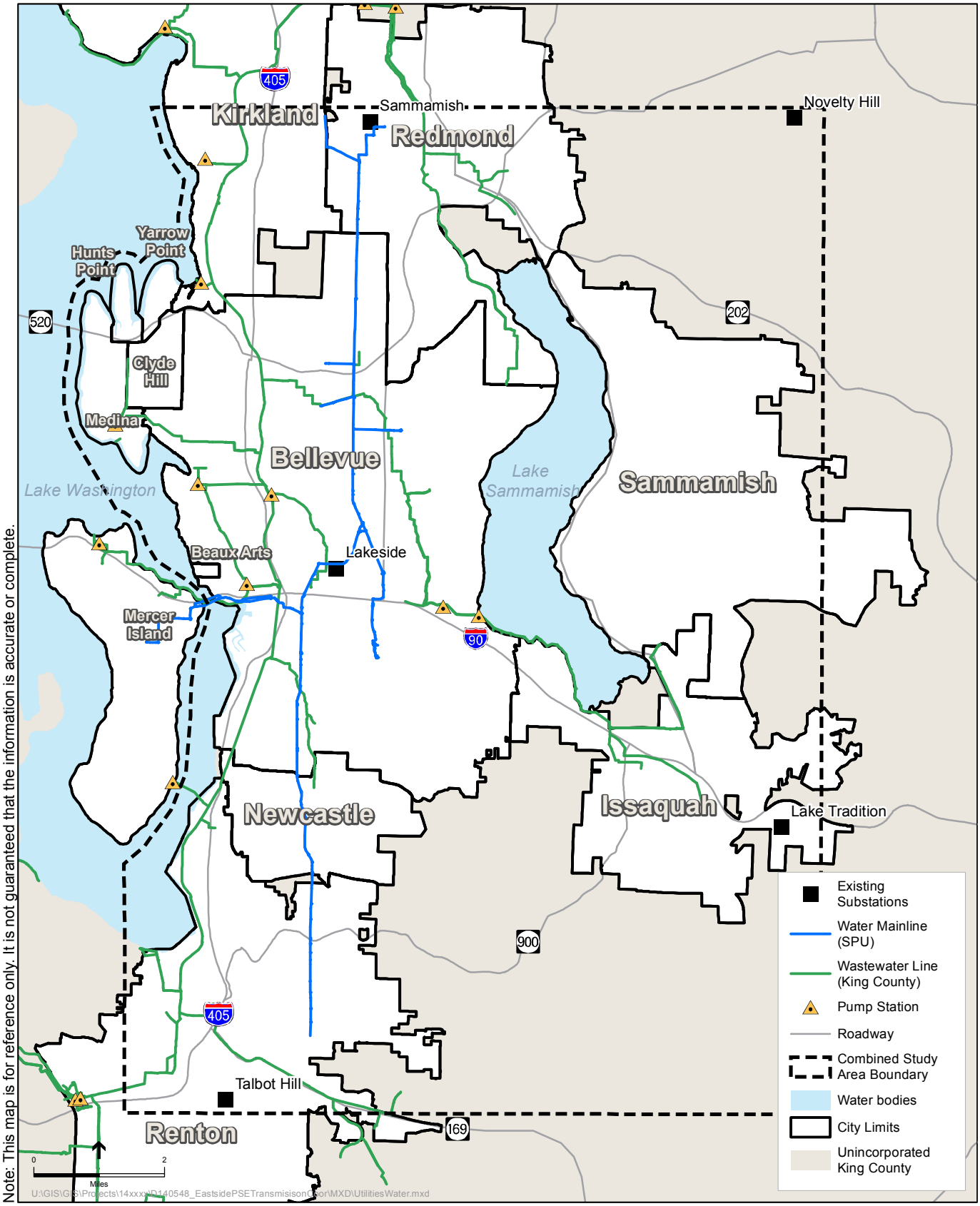

Note: This map is for reference only. It is not guaranteed that the information is accurate or complete.

SOURCE: King County 2015; ESA 2015; WA Ecology 2014;
Puget Sound Energy 2015; Seattle City Light 2015.
For more info visit www.energizeeastsideeis.org/map-electric-gas

Energize Eastside EIS 140548

**Figure 16-1**

Existing Electric Transmission and Natural Gas/Petroleum Pipelines




Note: This map is for reference only. It is not guaranteed that the information is accurate or complete.

SOURCE: King County 2015; ESA 2015; WA Ecology 2014;
Puget Sound Energy 2015; Seattle Public Utilities 2016.
For more info visit www.energizeeastsideeis.org/map-water-utilities

Energize Eastside EIS 140548

**Figure 16-2**

Existing Regional Wastewater and Water Lines

Table 16-1 lists both regional and municipal utility providers (except telecommunications) that provide service or have facilities located in the combined study area. Utility providers are described in greater detail following the table.

**Table 16-1. Utility Providers Serving or Located in the Combined Study Area**

| Primary Provider | Utility | Community Served or Physically Located |
|---|---|---|
| **Regional Provider** | | |
| PSE | Electric and Natural Gas | Kirkland, Redmond, Hunts Point, Yarrow Point, Clyde Hill, Medina, Bellevue, Beaux Arts Village, Sammamish, Issaquah, Newcastle, Renton, King County |
| Northwest Pipeline | Natural Gas | King County, Sammamish, Issaquah |
| Seattle City Light | Electric | Seattle |
| Bonneville Power Administration | Electric | King County |
| Snohomish Public Utility District | Electric | King County |
| Tanner Electric Cooperative | Electric | King County |
| King County | Wastewater | Kirkland, Redmond, Hunts Point, Yarrow Point, Clyde Hill, Medina, Bellevue, Beaux Arts Village, Sammamish, Issaquah, Newcastle, Renton, King County |
| Seattle Public Utilities | Water | Cascade Water Alliance[1] (Bellevue, Kirkland, Redmond, Issaquah, Sammamish), Hunts Point, Yarrow Point, Clyde Hill, Medina, Beaux Arts Village, Newcastle, King County |

| Primary Provider | Utility | Community Served or Physically Located |
|---|---|---|
| **Municipal Providers** | | |
| Beaux Arts Village | Water, Stormwater | Beaux Arts Village |
| Bellevue | Wastewater | Bellevue, Clyde Hill, Beaux Arts Village, Medina, Hunts Point, Yarrow Point |
| Bellevue | Stormwater | Bellevue |
| Bellevue | Water | Bellevue, Clyde Hill, Medina, Hunts Point, Yarrow Point |
| Clyde Hill | Stormwater | Clyde Hill |
| Hunts Point | Stormwater | Hunts Point |
| Kirkland | Water, Wastewater, Stormwater | Kirkland |
| Medina | Stormwater | Medina |
| Newcastle | Stormwater | Newcastle |
| Coal Creek Utility District | Water, Wastewater | Newcastle |
| Redmond | Water, Wastewater, Stormwater | Redmond |
| Renton | Water, Wastewater, Stormwater | Renton |
| Sammamish | Stormwater | Sammamish |
| Northeast Sammamish Water and Sewer District | Water, Wastewater | Sammamish |
| Sammamish Plateau Water and Sewer District | Water, Wastewater | Sammamish |
| Yarrow Point | Stormwater | Yarrow Point |

[1] Cascade Water Alliance is a wholesale water provider to its members and has a purchase contract with Seattle Public Utilities (CWA, 2015)

Sources: PSE, 2015b; SCL, 2015; King County, 2013; SPU, 2015; CWA, 2015; Town of Beaux Arts Village, 2014; City of Bellevue, 2015; City of Clyde Hill, 2015; Town of Hunts Point, 2014; City of Kirkland, 2013; City of Medina, 2015; City of Newcastle, 2015; City of Redmond, 2015; City of Renton, 2015; City of Sammamish, 2015; Town of Yarrow Point, 2014.

## 16.3.1 Electrical

### 16.3.1.1 Puget Sound Energy

PSE serves approximately 1.1 million customers with electricity in a 4,500-square-mile service area (PSE, 2013a). This service area includes the combined study area for Alternatives 1, 2, and 3 (as depicted on Figure 1-4 in Chapter 1) and portions of King County north and south of the study areas. The Eastside represents approximately 14 percent of PSE's total electrical load. PSE is part of a western regional system, through which electricity is produced elsewhere and transported to the Eastside along high-voltage transmission lines. As electricity nears the end users, the voltage is reduced (using transformers) and redistributed through transmission substations and distribution substations.

Power is carried on high-voltage transmission lines (230 kV and greater) from generating facilities to the Eastside via the Sammamish substation in Redmond and Talbot Hill substation in Renton. From these substations, voltage is reduced to 115 kV and distributed to numerous Eastside distribution substations (PSE, 2013b). PSE has existing transmission easements or rights-of-way for 115 kV lines located within the combined study area. Figure 16-1 shows PSE's existing electrical system in the Eastside and vicinity.

Customers in the Eastside service area consume electricity at a rate of approximately 3,000 gigawatt hours (gWh) per year (gWh/yr). Residential uses represent the largest portion (about 90 percent) of PSE's customers; however, business and industry consume about 62 percent of the electricity provided (Strauch, personal communication, 2016).

PSE's electric delivery system is regulated and coordinated by several state and federal agencies described in Chapter 1. These include the Federal Energy Regulatory Commission (FERC), North American Electric Reliability Corporation (NERC), Western Electricity Coordinating Council (WECC), and Washington Utilities and Transportation Commission (UTC). PSE cooperates and supports ColumbiaGrid in its regional planning processes.

For additional description of PSE's service in the Eastside area and the general roles of each agency involved in regulatory oversight, see Chapter 1.

### 16.3.1.2 Seattle City Light

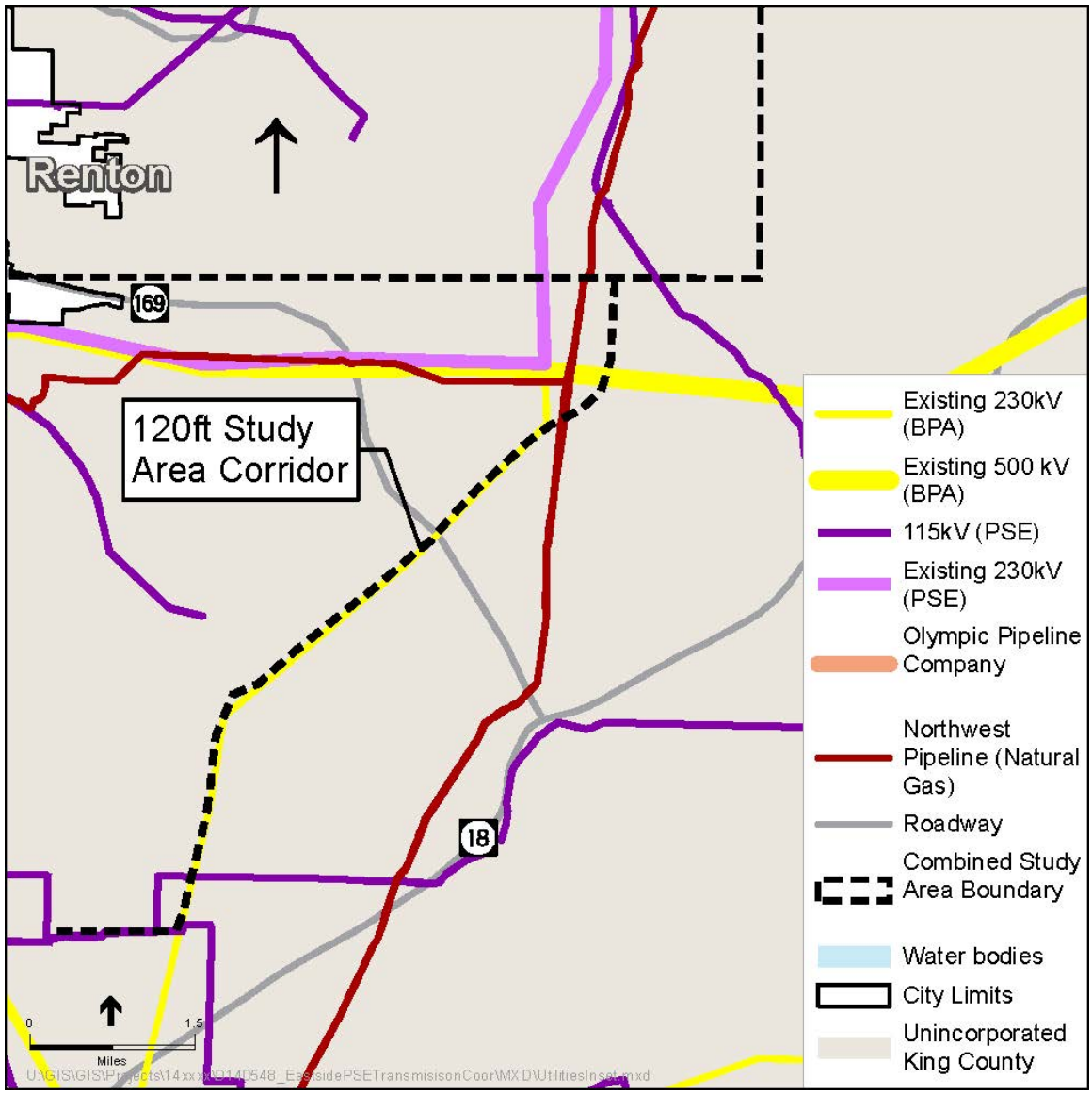
Seattle City Light (SCL), an electric utility owned by the City of Seattle, owns and maintains approximately 650 miles of transmission lines. These lines carry power from the electrical generating facilities to 14 major substations (City of Seattle, 2014). None of these substations are located directly within the combined study area. Two SCL 230 kV transmission lines (on steel towers) run through Kirkland, Bellevue, Newcastle, and Renton, but they do not serve the study area communities (see Figure 16-1). Both of these lines are leased to, and operated by, the Bonneville Power Administration as part of the regional transmission grid (SCL, 2008).

SCL's electric delivery system is regulated and coordinated by the same state and federal agencies as described above for PSE.

### 16.3.1.3 Bonneville Power Administration

The Bonneville Power Administration (BPA) is a federal nonprofit agency based in the Pacific Northwest. BPA markets wholesale electrical power from 31 federal hydro projects in the Columbia River Basin, one nonfederal nuclear plant and several other small nonfederal power plants. About one-third of the electric power used in the Northwest comes from BPA. BPA also operates and maintains high-voltage transmission in its service territory. While BPA transmission lines (230 kV and 500 kV) cross the southern portion of the combined study area (Figure 16-3), BPA does not provide service within the combined study area.

**Figure 16-3. Existing Electric Transmission and Natural Gas Pipelines (Combined Study Area – South)**



## 16.3.2 Natural Gas

### 16.3.2.1 Puget Sound Energy

PSE serves over 760,000 customers with natural gas in a 2,800-square-mile service area (PSE, 2013a). PSE receives natural gas from various regions of the U.S. and Canada. Natural gas lines are located throughout the streets, public properties, and private properties located within the combined study area. PSE's system includes a network of *high-pressure natural gas mains*, district regulators that reduce natural gas pressures, mains, service lines, valves, and meters, all of which are located underground, except for the meters. Several high-pressure gas mains cross through PSE and SCL transmission corridors located within the combined study area.

A number of federal and state agencies are responsible for and involved in the regulation and oversight of pipelines in the United States. The Washington Utilities and Transportation Commission (UTC) is the primary agency responsible for the regulatory oversight of the natural gas pipelines in Washington State. The UTC Pipeline Safety Program provides standards for natural gas pipeline operations and inspects natural gas pipelines operating in Washington in accordance with federal standards. PSE is subject to full compliance with the applicable provisions of Title 49, Code of Federal Regulations (CFR) Part 192, which address federal safety standards related to transportation of natural gas, including requirements for *pipeline corrosion* control. Additional information on pipeline corrosion is presented in Section 16.3.7.

High-pressure gas mains through PSE's and SCL's existing corridors are made of steel. PSE provides corrosion protection for its steel gas pipelines as required by Title 49 CFR. This includes dielectric coatings, cathodic protection, and maintenance. The cathodic protection meets the criteria specified in federal law and recommended by the National Association of Corrosion Engineers (NACE). PSE surveys steel pipelines for leaks every 6 months, and electronic gas-detection equipment is used to inspect every neighborhood's system (PSE, 2015a). As described in Chapter 8, the UTC identifies five major reasons why pipelines leak or fail: (1) third-party excavation damage; (2) corrosion; (3) construction defects; (4) material defects; and (5) outside forces resulting from earth movement, including earthquakes. Information currently available from UTC indicates that the leading cause of gas distribution pipeline failures in 1998 was excavation damage, causing 58 percent of leaks that occurred in Washington State. Construction equipment can create pipe gouges, dents, scrapes, and cracks in pipelines. This type of damage can grow and lead to a catastrophic failure (UTC, 2015).

### 16.3.2.2 Northwest Pipeline

The Northwest Pipeline is an interstate natural gas pipeline system for the mainline transmission of natural gas. It is owned and operated by the Williams Companies. High-pressure gas mains traverse portions of the combined study area in King County, Sammamish, and Issaquah (see Figure 16-1).

Northwest Pipeline is regulated and coordinated by the same state and federal agencies as described above for PSE. In addition, the pipeline is also subject to FERC, which regulates interstate natural gas pipelines.

### 16.3.3 Petroleum Pipelines

The Olympic Pipe Line Company (OPLC) operates a petroleum pipeline system that runs along a 299-mile corridor from Blaine, Washington, to Portland, Oregon. The pipes carry gasoline, diesel, and aviation fuel. This fuel originates at four Puget Sound refineries, two in Whatcom County and two in Skagit County, and is delivered to Seattle's Harbor Island, Seattle-Tacoma International Airport, Renton, Tacoma, Vancouver (Washington), and Portland, Oregon (B.P. Pipelines North America, 2014).

**Where is the Olympic Pipeline Addressed?**

A number of chapters in this EIS address potential impacts associated with the Olympic Pipe Line Company's petroleum pipelines through the combined study area. See Chapter 3 (Earth - seismic conditions), Chapter 8 (Environmental Health – public safety risks), and Chapter 10 (Land Use – compatibility and policy consistency).

Two parallel steel lines (16-inch and 20-inch) run north-south through western Redmond, Bellevue, Newcastle, and Renton, generally along the PSE easement (EFSEC, 1998) (see Figure 16-1). The pipelines through the combined study area are buried 3 feet to 10 feet below the surface; however, the depth of cover over the pipelines may change over time due to erosion or other reasons (West, 2015). The two lines weave back and forth within PSE's easement, and in some instances leave the corridor onto other easements or public rights-of-way and then reenter PSE's easement corridor farther along the route (West, 2015).

OPLC operates its lines pursuant to its own easements and, where they overlap, subject to agreement with PSE and PSE's prior rights. In entering this agreement with PSE, OPLC agreed to: (1) install its pipeline at a depth and in a manner that would not interfere with PSE's facilities; (2) install and maintain permanent markers to give notice of the location of the pipeline; and (3) adjust and/or relocate the pipeline in the event of a conflict with PSE facilities.

The pipelines are considered hazardous liquid pipelines, as designated by RCW 81.88.040 and WAC 480-93-005. Hazardous liquid pipelines, if ruptured or damaged, can cause large explosions and/or fires due to high operating pressure and the highly flammable and explosive properties of the transported products.

Hazardous liquid pipelines are regulated by federal and state rules (see Appendix M, Pipeline Safety Requirements and Plans Relating to Petroleum Pipelines). The standards and enforcement actions are the responsibility of the federal Office of Pipeline Safety (OPS), as described in Chapter 8. Through passage of the Washington Pipeline Safety Act of 2000 (E2SHB 2420), the UTC was directed and obtained the authority from the OPS to inspect interstate hazardous liquid pipelines in Washington State in accordance with federal standards (UTC, 2015). OPLC is subject to full compliance with the applicable provisions of Title 49, CFR Part 195 for hazardous liquid pipelines, and as reinforced by the company's franchise agreements with the study area cities. These regulations address safety in design, construction, testing, operation, maintenance, and emergency response for pipeline facilities. In accordance with 49 CFR Part 195, regular inspections and monitoring of the pipelines are performed using a combination of tools to determine the suitability of the pipeline based on

any anomalies detected, including wall loss, corrosion, or dents. The pipelines through the combined study area are currently on a 5-year general inspection schedule. If anomalies were to be detected, this timeframe would be shortened in accordance with federal requirements (West, 2015).

In accordance with 49 CFR Part 195, OPLC has cathodic protection on all of its pipelines to protect against corrosion and inspects these systems annually. Criteria to determine the adequacy of cathodic protection are included in 49 CFR Part 195.571, which incorporates by reference industry standards and practices developed by the National Association of Corrosion Engineers (NACE) (NACE, 2007).

OPLC has franchise agreements with the Cities of Bellevue (2005), Kirkland (2011), Newcastle (2008), Renton (2006), and Redmond (2006) that establish the conditions related to the company's use of the pipeline corridor and the ways the parties will work cooperatively in the public's best interest. The Cities use reasonable efforts to require all excavators working within the pipeline corridor in proximity to the pipeline to notify OPLC at least 48 hours prior to start of any work and to ensure compliance with the requirements of the State of Washington's "one-call" locator service law (Chapter 19.122 RCW). As further stipulated by the franchise agreements, if OPLC becomes aware that a third party conducts any excavation or other significant work that may affect the pipeline, the company is required to conduct such inspections and testing as is necessary to determine that no direct or indirect damage was done to the pipeline and that the work did not abnormally load the pipeline or impair the effectiveness of the *cathodic protection system* (City of Bellevue, 2005; City of Kirkland, 2011; City of Newcastle, 2008; City of Renton, 2006).

### 16.3.4 Water, Wastewater, and Stormwater

Seattle Public Utilities (SPU) operates a regional water supply system that provides potable water to most of King County, including most of the Eastside. Water is provided through wholesale contracts to municipalities and special-purpose districts within the combined study area. Water is also sold to Cascade Water Alliance, an association of Eastside water districts and cities that serves as a wholesale water provider (CWA, 2015). Other cities in the combined study area obtain their water supply from a combination of groundwater wells, local watersheds, and contracts with other utility providers.

SPU's system includes large-diameter transmission pipelines, storage facilities, pump stations, and other facilities that are used in conveying water from SPU supply sources to its wholesale customers and the SPU retail service area (SPU, 2013).

Regional water transmission pipelines in the combined study area generally range in diameter from 16 inches to 96 inches (SPU, 2013). The large regional pipelines that are owned and operated by SPU within the combined study area include the Tolt Eastside Supply Line, Cedar Eastside Supply Line, and Mercer Island Pipeline.

City water departments, special-purpose districts, and wholesale water suppliers also maintain water mains throughout the combined study areas, many 16 inches or larger. This includes Cascade Water Alliance's Bellevue-Issaquah Pipeline (BIP), which transports water

purchased from SPU's Tolt Eastside Supply Line and Eastside Reservoir to Issaquah and the Sammamish Plateau (CWA, 2012).

The bulk of SPU's transmission pipelines are made of steel and concrete, with a small portion consisting of ductile or cast iron. SPU has used cathodic protection on numerous sections of steel pipelines where significant leaks have been experienced in the past or may be expected in the future due to corrosive soils. SPU is developing a comprehensive strategy to identify where it would be cost-effective to install cathodic protection on other pipes in its system (SPU, 2013).

King County Wastewater Treatment Division owns and operates regional wastewater pipelines, pump stations, and related facilities within the combined study area. Study area cities and special-purpose districts maintain smaller wastewater collection lines and facilities, with most maintaining agreements with King County for wastewater conveyance, treatment, and disposal. Wastewater flows through pipes owned and maintained by Cities or special districts into King County's regional trunk lines where it is then conveyed to the Renton or Brightwater Wastewater Treatment Plant for treatment. In addition, the City of Bellevue owns submerged wastewater pipelines in Lake Sammamish and Lake Washington (see Section 16.4.6). Major King County trunk lines in the combined study area generally range in diameter from 24 inches to 96 inches.

Each of the Cities on the Eastside maintains its own stormwater drainage system. The stormwater systems in the study area communities include a combination of ditches, pipes, catch basins, detention basins, infiltration facilities, and flood control sites. Stormwater and drainage regulations within these communities are discussed in more detail in Chapter 5.

### 16.3.5 Telecommunications

Telecommunications companies operating in the combined study area include Comcast and CenturyLink. A number of other companies (e.g., AT&T, Verizon, Frontier Communications, Broadstripe) maintain fiber optic cables throughout the area.

Cable television, landline telephone service, broadband internet, and wireless communications in the combined study area are provided by various private utility companies. Major telecommunications companies operating in the combined study area include Comcast and CenturyLink. A number of other companies (e.g., AT&T, Verizon, Frontier Communications, Broadstripe) also provide service. *Telecommunication lines* in the combined study area include both coaxial and fiber optic cables. In most cases, telecommunication services use existing utility corridors, public rights-of-way, and other City-owned properties. Some companies have franchise agreements with the study area communities for placement of their cable transmission lines within the public rights-of-way.

### 16.3.6 Submerged Utilities and "Lake Lines"

Several existing pipes and cables are located along the bottom of Lake Washington and Lake Sammamish. Many of them provide electricity, gas, communications, wastewater, and water service to Mercer Island from the Eastside (Power Engineers, 2015). King County's Mercer Island/ Enatai Wastewater Interceptor crosses the bottom of Lake Washington from Mercer

Island to Bellevue, and along the lakefront (underwater). King County also has a submerged wastewater interceptor from Issaquah to Bellevue in Lake Sammamish. The City of Bellevue owns 15 miles of submerged wastewater pipelines in Lake Washington and 4 miles of submerged wastewater pipelines in Lake Sammamish. These "lake lines" were constructed in the late 1950s and 1960s and may be nearing the end of their useful life. The City is evaluating their condition to determine when rehabilitation or replacement will be necessary (City of Bellevue, 2015).

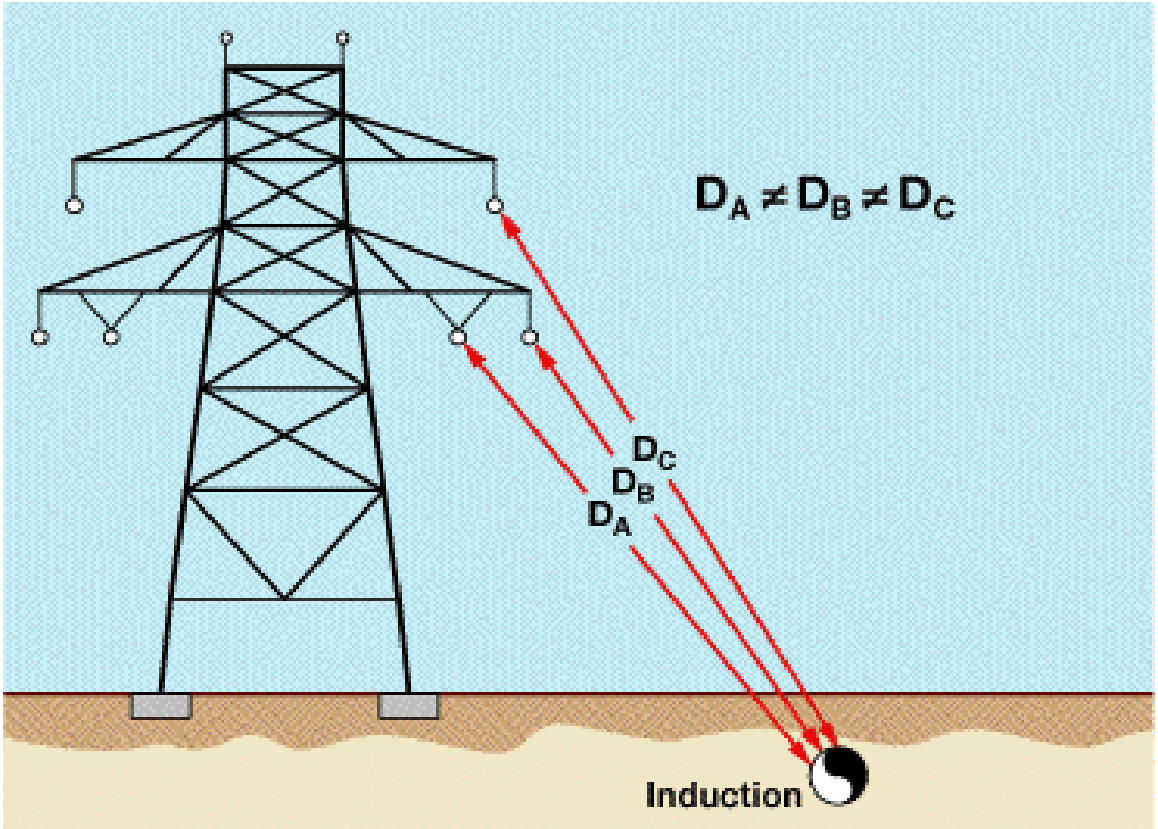
### 16.3.7 What is pipeline corrosion and why is it a concern?

As described in Chapter 8, high-voltage transmission lines produce electric and magnetic fields. Electric fields are produced by the voltage in use and magnetic fields are produced by current. The strength of the electromagnetic field (both electric and magnetic fields, also known as EMF) decreases rapidly with distance from the source.

A consequence of high-voltage power lines and buried petroleum pipelines sharing a corridor is that *electromagnetic interference* can be introduced on the pipelines, which can cause corrosion on the pipeline over time. Corrosion accounts for about 23 percent of the significant failures in both hazardous liquid and gas pipelines (Baker, 2008).

Electromagnetic interference, or induction, on pipelines occurs when there is extended and close parallel routing with three-phase overhead transmission lines (Figure 16-4). The voltage is due to any phase imbalance in the lines. Electromagnetic fields from high-voltage power lines are especially a concern where the pipeline route is in parallel with, or crosses, high-voltage power lines. The corrosion concern depends on the currents flowing in the pipeline, which result in a voltage difference between the pipeline and the surrounding soil. The corrosion potential is influenced by various parameters such as soil properties, pipeline to transmission line distance and configuration, and the overhead line's operating current (Baker, 2008).

**Figure 16-4. Illustration of Induction**




Different distances between the pipeline and each phase transmission line, along with phase imbalance, lead to induced interference on the pipeline.

Source: Smart et al., 1999

To protect buried pipelines against corrosion, a noncorrosive coating is used along with cathodic protection. Cathodic protection is a method used to minimize the rate of electrochemical corrosion of metallic materials, such as pipes, by shifting the corrosion process away from the metal to be protected and onto other more easily corroded "sacrificial" pieces of metal. Cathodic protection systems are commonly referred to as either a *sacrificial anode* or *impressed current anode*. The utility provider is responsible for its own pipeline, but electric utilities may compensate or provide other mitigation if they install new or higher voltage lines where pipelines are already present.

As described by Baker (2008), from a scientific point of view, corrosion is well understood, both in terms of cause and method of control. However, despite the level of industry knowledge, pipelines continue to experience failures due to corrosions. Factors cited include the following:

- The chemical properties of the environment surrounding a buried pipeline are not adequately understood.
- Variations in the oxygen content, moisture content, and chemical composition of the soil along the pipe length and from top to bottom of the pipe can act as concentration cells that promote corrosion.

- Moisture content and oxygen content of the soil vary with time.
- Coating quality varies along the length of a pipeline.
- Coatings sometimes become disbonded from the pipe surface, allowing groundwater to contact the steel but shielding the steel from cathodic-protection currents.
- Disbonded coating will prevent aboveground survey detection of underlying corrosive conditions.
- Physical variations in soil characteristics and placement (gaps, etc.) affect the distribution of cathodic-protection current.
- Visual inspection of the outside of the pipe and the coating require excavation.
- Stray currents from nearby buried structures can interfere with a pipeline's cathodic-protection system (Baker, 2008).

## 16.4 WHAT ARE THE UTILITIES' PLANS FOR FUTURE EXPANSION IN THE COMBINED STUDY AREA?

Several study area utilities are anticipating that demand will require investment to build new utility facilities. Major utility upgrades or expansions planned in the combined study area are described below.

### 16.4.1 Electrical

The UTC requires providers of electricity to provide service on demand in support of growth in their service areas. As described in Chapter 1, PSE conducts an ongoing capacity planning process to ensure its power supply and infrastructure are adequate to meet anticipated future needs (PSE, 2013a). PSE develops both short-range and long-range infrastructure plans based upon economic, population, and load-growth projections, as well as information from large customers and government stakeholders. The plan is reviewed by PSE annually and is periodically updated.

Systemwide, in the next decade, PSE anticipates building over 200 miles of new transmission lines (100 kV and above) and upgrading over 200 miles of existing transmission lines to carry greater loads. Energize Eastside is the only project in the combined study area that proposes new 230 kV transmission lines. In addition, PSE anticipates needing to add up to six 230 to 115 kV bulk power transformers across its service area, including a new transformer for Energize Eastside (Strauch, personal communication, 2016).

PSE is monitoring preliminary "point load" needs where two new substations may be needed in the combined study area to help serve new load, where adjacent existing substations are inadequate, or to serve specific facilities. The timing of the construction of these substations would be aligned with customer plans to add point loads and available capacity from existing substations to serve this load (PSE, 2013b). Additionally, PSE replaces many major substation components, including those in the combined study area, on a continuous basis as a result of ongoing inspection and diagnostics (PSE, 2013b).

Seattle City Light plans transmission capacity and reliability projects to deliver power to the regional power grid. Projects potentially located in the Eastside area and included in the 2015 Capital Improvement Program include installation and reconductoring of transmission lines to address increased load growth in the Puget Sound area. The capacity of the Bothell-SnoKing double circuit 230 kV line would be increased to meet area reliability requirements (City of Seattle, 2015).

### 16.4.2 Natural Gas

As with the electric system, PSE addresses aging gas infrastructure within the system in accordance with regulatory requirements and operating practices. Systemwide, in the next decade, PSE plans to replace or install the following (PSE, 2013b):

- New high-pressure pipe (27.5 miles);
- New intermediate-pressure pipe (28 miles); and
- Gas main replacement (200 to 300 miles).

### 16.4.3 Water and Wastewater

In portions of the combined study area, water and wastewater lines are aging or reaching capacity, and may require rehabilitation or replacement over the next 20 years. SPU has identified the following major implementation and action plan items for its water transmission system (SPU, 2013; City of Seattle, 2015):

- Cathodic Protection Program;
- Transmission Pipeline Rehabilitation;
- Purveyor Meter Replacements;
- Replace Air Valve Chambers; and
- Water System Dewatering.

The Cascade Water Alliance has identified the future need for additional conveyance capacity between Bellevue and Redmond (CWA, 2012).

King County plans to complete a number of wastewater conveyance projects in the combined study area over the next 15 years, including the following (King County WTD, 2014):

- Factoria Pump Station and Trunk Diversion;
- Eastgate Parallel Pipe Storage;
- Coal Creek Siphon and Trunk;
- Bryn Mawr Storage;
- Issaquah Storage;
- Issaquah Interceptor Section 2 Parallel;
- Issaquah Creek Highlands Storage; and
- Sammamish Plateau Diversion.

## 16.5 HOW WERE POTENTIAL IMPACTS TO UTILITIES ASSESSED?

This section discusses potential impacts to utilities, including electrical, natural gas, petroleum, water, wastewater, stormwater, and telecommunications lines resulting from the construction and operation of the proposed project. The analysis is based on a consistency review of local comprehensive plans, utility plans, and applicable laws, regulations, and guidelines, as well as the following technical reports prepared for the proposed project:

- *Eastside 230 kV Project – Lake Washington Submarine Cable Alternative Feasibility Study* (Power Engineers, 2015);
- *Eastside 230 kV Project – Underground Feasibility Study* (Power Engineers, 2014); and
- *Eastside Transmission Solutions Report – King County Area* (Quanta Technology, 2014).

Due to the programmatic nature of this EIS, a general overview of potential impacts to utilities is provided. In order to conduct a detailed assessment of impacts to utilities, the precise location, size, and configuration of the proposed project in relation to existing utilities would need to be known. For example, construction impacts on utilities are primarily related to the utilities' depth below grade and material composition, construction excavation limits, and the location of the electric facilities and any associated foundations relative to the location of other utilities. These details will be determined and verified with utility providers during project-level evaluations and design.

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

**Minor** – Impacts to existing utilities could occur but could be addressed through temporary connections or other means, and would result in only minimal effect on services**.**

**Moderate** – Impacts to existing utilities could occur, resulting in localized interruptions of service, or constraints on operation.

**Significant** – Impacts to existing utilities would occur resulting in widespread or substantial interruptions of service or other constraints, and restoration would be difficult**.**

## 16.6 WHAT ARE THE LIKELY CONSTRUCTION IMPACTS RELATED TO UTILITIES?

### 16.6.1 Construction Impacts Considered

Construction impacts to utilities were assessed by considering the potential for facilities to be constructed in proximity to other utilities, and how that might result in different potential impacts among the alternatives and options. The discussion includes the potential for utility conflicts and service disruption, the potential for accidental disruption due to inadvertent

damage, and the extent of coordination that would be needed with utility service providers in order to construct each alternative.

#### 16.6.1.1 Utility Conflicts and Service Disruption

Construction disturbance from earthmoving (excavation), foundation work, and other activities could affect existing utilities if present. PSE would coordinate with all utility providers that operate facilities within or adjacent to the proposed project to ensure that design does not conflict with other utilities. Exact location and depth of utilities would be verified with utility providers during project design and prior to construction to ensure new excavations are far enough away from existing facilities to avoid damage. This may include potholing (minor excavations to precisely locate utility lines) to identify and minimize potential conflicts.

In order to avoid conflicts with construction and to prevent access disruptions during future maintenance of utilities, some existing utilities would likely need to be temporarily rerouted or relocated. Relocation approaches would be evaluated by PSE on a case-by-case basis and in accordance with applicable franchise agreements.

Temporary service outages could occur during utility relocations. These outages would likely be short-term and intermittent. Disruptions to utility service during utility relocations would likely be minimal because, in most cases, temporary connections to customers would typically be established before relocating utility conveyances. In these situations, impacts would be negligible. If relocating utility conveyances would require service disruptions, impacts would be considered minor, moderate, or significant depending on the extent and duration of the interruption. All service disruptions would be coordinated between PSE's public outreach efforts (Section 16.8), the service provider, and customers. The potential for utility relocations and service disruption is higher when constructing within the road right-of-way or within existing utility corridors or easements.

#### 16.6.1.2 Accidental Disruption

Inadvertent damage to underground utilities could occur during construction if utility locations are uncertain or misidentified. Although such incidents do not occur frequently, if numerous relocations are required during project construction, the potential for accidents is more likely. Such accidents could affect service to customers, and would be considered a minor, moderate, or significant impact depending on the extent and duration of the interruption. Although a pipeline-related explosion as a result of project construction appears unlikely given the regulatory framework now in place (see Chapter 8), such an event would equate to a moderate to significant impact depending on the size of such an event, the number of customers affected, and the time needed to restore service.

Efforts to minimize impacts would include potholing and preconstruction surveys to identify utility locations, and outreach to customers about potential service disruptions. PSE would also coordinate with utility providers to establish replacement procedures and standards of facilities as applicable.

### 16.6.2 No Action Alternative

Under the No Action Alternative, construction activities would likely be limited to occasional conductor replacement, implementation of new technologies not requiring discretionary permits, and installation of distributed generation facilities under PSE's conservation program (e.g., solar panels, wind turbines, or rooftop generators). None of these activities would likely involve heavy equipment and construction activity near major utility lines. No construction impacts on utilities are likely, and therefore impacts would be considered negligible.

### 16.6.3 Alternative 1: New Substation and 230 kV Transmission Lines

Under the options proposed for Alternative 1, construction activity would be required for substation expansion, construction of the transmission lines, and placement of accessory infrastructure (vaults, etc.). Construction would involve the use of heavy equipment and excavation activity. If this work occurs within existing utility corridors, it would have the potential to cause utility conflicts and service disruption.

Impacts are described below according to the major components associated with Alternative 1. The substation impacts are described first, followed by transmission line impacts.

#### *16.6.3.1 Option A: New Overhead Transmission Lines*

##### 16.6.3.1.1 Utility Conflicts and Service Disruption

The expansion of the Lakeside substation or the Westminster or Vernell substation sites would require construction of underground foundations to support the new transformer. Depending on the site, and the depth and placement of the transformer foundation, substantial utility relocations could be required. Given their proximity to the Olympic Pipeline (see Figure 16-1), the potential for utility conflicts and need for coordination would be greater for the Lakeside and Vernell substation sites, depending on the area used for expansion. All relocations would be coordinated with the utility service provider during final design. Construction would also require coordination with utility providers to extend utilities to the new transformer.

During installation of new 230 kV to 115 kV transformers, there would be potential for service interruptions or utility damage in the event of an accident during construction. However, the substations are owned and operated by PSE and thus crews are familiar with the facility. In the event that any accidental damage was to occur, impacts would be minor because PSE employees are trained to respond and to minimize or avoid potential service interruptions by transferring load.

Under Alternative 1, Option A, most construction of transmission lines would occur within existing transmission or other utility easements. However, construction could also occur in new locations currently not dedicated to transmission, such as areas along road rights-of-way, rail corridors, or over or through private or other public property. If new overhead transmission lines were built in existing utility easements or along road rights-of-way or rail corridors, coordination with other utility providers would be required to avoid disrupting existing buried utility lines or overhead lines that may be co-located along the corridor.

If located along the existing PSE 115 kV easement, construction of a 230 kV line has the potential to disrupt existing natural gas lines or the Olympic Pipeline. Extensive coordination with OPLC would be required during project design to avoid disruption to the two lines, or to establish relocation procedures. For large projects, such as Energize Eastside, OPLC would establish a team to review design, identify any vulnerabilities, and identify measures to avoid potential impacts, in coordination with the project proponent (West, 2015). Construction risks associated with the Olympic Pipeline include potential for compression damage from heavy vehicles or machinery driving or placed above the buried lines, potential for pipe disturbance during excavations for new poles, and potential for pipe disturbance from removal of current poles. Certain machinery, such as auger equipment, can be a particular concern because of how heavy the equipment is. If there is a concern, measures can be used to avoid crossing the pipeline by taking a different route, or reducing or eliminating the concern by placing matting or other material to distribute the load to acceptable levels or relocating the pipeline.

As much as possible, poles for new overhead transmission lines would be located to avoid conflicts with underground utilities. Foundations for new 230 kV poles are typically 4- to 8-feet in diameter and extend approximately 25 to 50 feet deep depending on the structure type. Any existing utilities located within or immediately adjacent to the auger hole would need to be relocated. Because there is typically flexibility in designing and locating pole foundations, it is likely that utility relocations could be avoided.

Foundation locations for poles would be coordinated with OPLC during project design to ensure a safe distance from the pipeline for construction and operation considerations. The risk of pipeline disturbance during construction would be further minimized by stabilizing foundation walls, such as using metal sleeves or slurry walls, to avoid movement of adjacent soils that could potentially disturb the pipeline.

A potential significant adverse impact on utilities could occur if a rupture and explosion of a pipeline occurred during construction resulting in widespread service disruption and difficulties in reestablishing service. Service disruption for OPLC customers would likely be minimal because delivery of the product would switch to surface transport by tanker truck, if the outage exceeds customers' on-hand reserve supply. If a pipeline rupture and explosion also damaged the 230 kV transmission lines, there could be substantial and long-term power outages to PSE customers. Extensive coordination with OPLC, gas utility providers, and study area communities would be required during project design to avoid disruption to nearby pipelines. In addition, as described in Sections 16.3.3 and 16.8 (and in Chapter 8), conformance with industry standards and regulatory requirements would ensure that potential hazards are identified and design plans developed to minimize adverse effects from these hazards to minor levels.

Given the level of coordination and number of utility relocations potentially required under Alternative 1, Option A, minor to moderate impacts to utilities could occur from constructing new transmission lines in existing easements or road rights-of-way. If the new lines were built within new corridors, there would be less potential for construction to encounter existing utilities, and impacts would likely be negligible.

#### 16.6.3.1.2 Accidental Disruption

Construction of the new transformer has the potential to damage natural gas mains or the Olympic Pipeline (if the Lakeside or Vernell substations are expanded) if *utility locates* are incorrect, or if excavation work were to go off course. Construction along the existing 115 kV easement also has the potential to damage natural gas mains or the Olympic Pipeline if utility locates are incorrect, or if auger or pole installation were to go off course.

These types of potential risks for the pipeline are managed under the regulatory framework described in Section 16.3.3. The state has an excavation damage prevention law that requires pipeline companies, underground facility owners, and excavators to participate in protecting the public health and safety when excavating, with civil penalties for violation. The law also provides that any excavator who willfully or maliciously damages a field-marked underground facility may be liable for triple the cost incurred in repairing or relocating the facility. The UTC has investigated a few gas pipeline incidents that were caused by the failure of underground facility owners to mark utilities, or excavators' failure to call or precisely locate gas pipeline facilities (UTC, 2015). As a standard practice, OPLC provides Damage Prevention Teams, established by district or area, to monitor excavations located near the pipeline (West, 2015).

If a natural gas main or the Olympic Pipeline were to rupture due to an accident during construction, there could be significant impacts related to service disruption to PSE or OPLC customers while damage is addressed, repairs are conducted, or alternative delivery methods are implemented. However, as described in Sections 16.3.3 and 16.8 (and in Chapter 8), conformance with industry standards and regulatory requirements would ensure that potential hazards are identified and safeguards established during construction to minimize adverse effects from these hazards to minor levels.

**Utility location** is the process of identifying and labeling underground utility lines. Excavating without knowing the location of underground utilities can result in damage, which can lead to service disruptions.

### 16.6.3.2 Option B: Existing Seattle City Light 230 kV Transmission Corridor

#### 16.6.3.2.1 Utility Conflicts and Service Disruption

Similar types of utility relocations, as described for Alternative 1, Option A, may be required to construct a new substation under Option B. Electric service interruptions during construction of the new substation would not be anticipated.

The use of SCL's existing 230 kV overhead transmission lines would likely require rebuilding both of the SnoKing-Maple Valley 230 kV transmission lines as described in Chapter 2. To avoid service disruption to SCL customers, work would involve constructing the replacement line adjacent to the functioning lines and placing them into service prior to removing the existing structures and conductor. Extensive coordination with SCL would be required. If constructed along road rights-of-way, the new transmission segment connecting the SCL line to the Lakeside substation could involve a potential for more utility conflicts than Alternative 1, Option A (if only existing easements are used for Option A).

Although the transmission lines would in large part be located in or near the existing SCL corridor, that corridor does cross PSE gas mains and the Olympic Pipeline several times, and other gas utilities may also be present in the area. As described for Option A, extensive coordination with OPLC, gas utility providers, and study area communities would be required during project design to avoid disruption to the Olympic Pipeline. Same as Option A, conformance with industry standards and regulatory requirements would ensure that potential hazards are identified and design plans developed to minimize adverse effects from these hazards to minor levels.

Given the level of coordination required with SCL and other utility providers and the number of utility relocations potentially required, moderate to significant impacts to utilities could occur under Alternative 1, Option B.

#### 16.6.3.2.2 Accidental Disruption

The potential for accidental disruption to existing buried utilities, if present within the construction area, would be similar to that described for Alternative 1, Option A. As with Option A, construction could occur in the vicinity of the Olympic Pipeline and regional natural gas pipelines or smaller pipelines that supply natural gas to homes and businesses. Although the transmission lines would in large part be located outside the Olympic Pipeline corridor, the Olympic Pipeline crosses the SCL easement at several locations as shown on Figure 16-1.

As described for Option A, PSE would coordinate closely with OPLC, other utility providers, and study area communities during project design and construction to avoid accidental rupture and thus avoid impacts to OPLC and PSE operations. Same as Option A, conformance with industry standards and regulatory requirements would ensure that potential hazards are identified and safeguards established during construction to minimize adverse effects from these hazards to minor levels.

### *16.6.3.3 Option C: Underground Transmission Lines*

#### 16.6.3.3.1 Utility Conflicts and Service Disruption

Similar types of utility relocations as described for Option A may be required to construct the new substation under Option C. All relocations would be coordinated with the utility service provider during project design.

Underground transmission lines could be placed in any of the transmission line alignments considered under Alternative 1, Option A, including the existing 115 kV overhead line easement or along public road rights-of-way or new rights-of-way. Construction of an underground line would require trenching for the line and excavation for vault construction. Construction would result in greater potential for conflicts with existing utilities if accomplished within road rights-of-way that already contain a substantial amount of utility infrastructure. In this situation it would be necessary to protect, relocate, or reconstruct existing utilities. Subsequent project-level evaluations of an underground line would identify the exact location of existing utilities and potential conflicts with the proposed new transmission lines.

Construction of underground transmission lines would cause a substantially greater amount of ground disturbance compared to overhead lines, and has the potential for substantial conflicts with buried utilities that cross or run parallel to the alignment. Relocation of existing utilities, including the Olympic Pipeline, may be required. Given the greater amount of ground disturbance associated with constructing an underground line, the potential risk would be higher relative to an overhead line. Nonetheless, conformance with industry standards and regulatory requirements would ensure that potential hazards are identified and design plans developed to minimize adverse effects from these hazards. Due to the increased area of ground disturbance, the probability of impacts would be somewhat higher than described for Alternative 1, Options A and B, but still considered low, and anticipated impacts are expected to be minor to moderate. As described for Option A, PSE would coordinate closely with OPLC, other utility providers, and study area communities during project design and construction.

Where an underground transmission line would cross or run parallel to other underground utilities (natural gas lines, telecommunications lines, water mains, storm drains, wastewater lines), a minimal radial clearance would be required to minimize the potential for impacts to existing utilities. To provide the required radial distance around the underground 230 kV line, underground utilities located within public road rights-of-way, parallel to and near or under the proposed line, would be moved to a different location within the right-of-way. Trenchless methods to complete underground lines may reduce the potential for utility conflicts along the trenchless portion of the alignment, but would involve substantial disturbance and potential for conflicts at entry and exit points.

Removal of pavement from roadways can cause vibration impacts on older water mains, wastewater, and drainage lines if present in the immediate vicinity. Special provisions would be needed to prevent damage to existing utility lines in these areas during transmission line installation, or proactive pipeline replacement would be needed. With appropriate measures, which would be determined in the field on a case-by-case basis, impacts would be minor and any necessary repairs would be made.

Compared to Options A and B, the potential for service disruptions would be higher for an underground line because of greater number of potential utility relocations needed and potential for conflicts, if located within existing road rights-of-way or utility corridors. Any impacts to existing utilities due to utility relocations would be anticipated to be limited to localized interruptions of service only. As a result, impacts are considered moderate.

#### 16.6.3.3.2 Accidental Disruption

If constructed within PSE's existing 115 kV line easement, the potential impacts associated with construction activity in proximity to natural gas mains and the Olympic Pipeline would be the same as described for Alternative 1, Options A and B. Given the greater amount of ground disturbance associated with constructing an underground line, the potential risk would be higher relative to an overhead line. Nonetheless, conformance with industry standards and regulatory requirements would ensure that potential hazards are identified and safeguards established during construction to minimize adverse effects from these hazards. Due to the increased area of ground disturbance, the probability of impacts would be somewhat higher than described for Options A and B, but still considered low, and anticipated impacts are

expected to be minor to moderate. As described for Options A and B, PSE would coordinate closely with OPLC, other utility providers, and study area communities during project design and construction to avoid accidental rupture and thus avoid impacts to OPLC and PSE operations.

#### *16.6.3.4 Option D: Underwater Transmission Lines*

##### 16.6.3.4.1 Utility Conflicts and Service Disruption

Similar types of utility relocations as described for Option A may be required to expand a substation for construction of a new transformer under Option D. As described for Option A, interruptions of electric service during construction would not be anticipated.

Alternative 1, Option D would include the construction of overhead or underground transmission lines on land that would connect to the underwater portion of the line. This would result in ground disturbance and the potential for utility conflicts, if utilities cross or run parallel to the alignment. The underwater portion of the line would need to cross existing submarine lines and cables in Lake Washington, requiring adequate spacing. The overland lines would potentially cross natural gas lines and the Olympic Pipeline. Impacts would be similar to those described for Alternative 1, Options A, B and C; however, less construction would likely occur in the vicinity of the Olympic Pipeline. With appropriate design measures to protect both existing and new lines, the potential for utility conflicts is considered low and impacts would be considered minor.

##### 16.6.3.4.2 Accidental Disruption

Construction of the underwater segment of the transmission lines would have a low potential for accidental disruption of existing utilities for the same reasons as described above. For the overland segment constructed underground or overhead, the potential for accidental disruption would be the same as described for Alternative 1, Options A and B (if overhead), and Option C (if underground) for alignments located in road rights-of-way or new corridors. Anticipated impacts are expected to be minor.

### 16.6.4 Alternative 2: Integrated Resource Approach

#### *16.6.4.1 Energy Efficiency Component*

Energy efficiency includes methods that reduce demand for energy such as weatherization and efficiency lighting. Construction activity would be limited and primarily focused on existing building upgrades. These activities are unlikely to cause utility conflicts or service disruption. As a result, no construction-related impacts to utilities are anticipated.

#### *16.6.4.2 Demand Response Component*

Demand response is an end-user strategy that pertains more to customer usage patterns and requires little construction of new infrastructure. Construction disturbance would be minimal and would not result in utility conflicts, service disruption, or accidental disruption. As a result, no construction-related impacts to utilities are anticipated.

#### 16.6.4.3 Distributed Generation Component

Heavy equipment operation and excavation activity would be required for installation of gas turbines, anaerobic digesters, reciprocating engines, microturbines, and fuel cells. Depending on the location of these systems, there may be minor impacts to existing buried or overhead utilities, if present. These utility conflicts would primarily involve small distribution lines located on private or public properties (not including road rights-of-way). No impacts to major transmission lines are anticipated.

#### 16.6.4.4 Energy Storage Component

Energy storage would consist of relatively large battery facilities constructed on a site of approximately 6 acres near a substation. Heavy equipment operation and excavation would be required for installation of energy storage systems. With larger sites, there is a greater potential for utility conflicts, service disruption, and accidental disruption if there are existing utility easements located on the parcels. This may cause minor impacts to utilities, similar to the distributed generation component.

#### 16.6.4.5 Peak Generation Plant Component

Installation of new peak generation plants would occur adjacent to existing substations. Heavy equipment operation and excavation would be required for installation of generators and related equipment. The potential for utility conflicts and disruption would generally be the same as for the distributed generation and energy storage components. Utilities would need to be extended at the site, and upgrades or extensions of natural gas or water distribution lines may be required to supply a generator at a particular location, resulting in minor to moderate impacts to utilities including temporary interruptions of service to customers.

### 16.6.5 Alternative 3: New 115 kV Lines and Transformers

#### 16.6.5.1 Utility Conflicts and Service Disruption

Construction associated with complete rebuilds or expansion of the Sammamish, Lakeside, Talbot Hill, Clyde Hill, and Hazelwood substations, and installation of transformers at the Sammamish, Talbot Hill, and Lake Tradition substations, would involve substantial construction disturbance and thus have the potential for utility conflicts. Similar to Alternative 1, construction adjacent to the Lakeside substation would likely require a greater amount of utility coordination due to its proximity to the Olympic Pipeline. Construction would also require coordination with utility providers to extend utilities to the new transformers. Electric service interruptions during construction of substation modifications would not be anticipated. In the event that any accidental damage to the existing substation equipment was to occur, PSE employees are trained to respond and to minimize or avoid potential service interruptions by transferring load.

Under Alternative 3, new 115 kV transmission lines would likely be constructed along existing utility or road rights-of-way. Impacts would be similar to those described for Alternative 1, Option A, except that the shorter towers (smaller foundations) and narrower rights-of-way could involve less construction disturbance. However, Alternative 3 would involve construction of more miles of new transmission line than Alternative 1 and would

potentially include more line installation along public road rights-of-way. As a result, Alternative 3 would have a higher likelihood of utility conflicts.

New overhead lines under Alternative 3 could be constructed near natural gas mains and the Olympic Pipeline, depending on utility or road rights-of-way used, resulting in the same potential impacts as described for Alternative 1. Same as Alternative 1, conformance with industry standards and regulatory requirements would ensure that potential hazards are identified and design plans developed to minimize adverse effects from these hazards to minor levels.

While Alternative 3 would potentially have a higher likelihood of utility conflicts than Alternative 1, Option A, any impacts to existing utilities due to utility relocations would likely be limited to localized interruptions of service only. As a result, impacts are considered moderate.

#### *16.6.5.2 Accidental Disruption*

The potential for accidental disruption to existing buried utilities, if present within the construction area, would be the same as described for Alternative 1. As with Alternative 1, Option A, Option B, and Option C, construction could occur in the vicinity of regional natural gas pipelines or smaller pipelines that supply natural gas to homes and businesses. Although the new 115 kV transmission line would be located outside the Olympic Pipeline corridor, expansion of the Lakeside substation could occur in proximity to the Olympic Pipeline, depending on the area used for expansion. As described for Alternative 1, PSE would coordinate closely with OPLC, other utility providers, and study area communities during project design and construction to avoid accidental rupture and thus avoid impacts to OPLC and PSE operations. Same as Option A, conformance with industry standards and regulatory requirements would ensure that potential hazards are identified and safeguards established during construction to minimize adverse effects from these hazards to minor levels.

## 16.7 HOW COULD OPERATION OF THE PROJECT AFFECT UTILITIES?

### 16.7.1 Operation Impacts Considered

Operational impacts to utilities include the potential for utility conflicts and service disruption, the types of coordination that would be needed with utility service providers in order to operate each alternative, and the potential for alternatives to conflict with applicable plans and policies. In addressing the potential for utility damage and service disruption, consideration was given to issues of corrosion from proximity to high-voltage lines, and the potential for accidental damage to nearby utilities from maintenance activities or as a result of catastrophic damage from natural hazards. The potential for an alternative to result in changes to PSE customer rates is also addressed.

Operation of utility systems in the combined study area is not expected to change as a result of any of the alternatives. None of the alternatives are anticipated to increase demand for other utility services (e.g., gas, water, wastewater) beyond the current capacity of service

providers. In addition to electricity (see Chapter 7 for information on electricity usage), the new transformers would require connections to water, wastewater, and stormwater systems. Some of the facilities under Alternative 2 would require more utility extensions and increased demand than other alternatives. However, it is anticipated that the new demand would not exceed the capacity of utilities, and no upgrades related to supply or transmission capacity would be anticipated. As a result, none of the alternatives would have adverse operational impacts on the services provided by those utilities.

#### 16.7.1.1 Consistency with Applicable Plans and Policies

The utilities goals and policies of the study area communities are focused on encouraging the provision of adequate public utilities and facilities, consistent with planned growth, and ensuring utility systems are constructed in a manner that minimizes negative impacts to existing utilities. Goals and policies related to energy, safety, land use (siting), and visual aspects of utilities are described in Chapter 7, Chapter 8, Chapter 10, and Chapter 11, respectively. None of the goals and policies of the study area communities specifically prohibit utility placement within new corridors. However, the use of existing or shared trenches or utility corridors is encouraged by many study area communities (Redmond, Kirkland, Bellevue, Newcastle, and King County), when such joint use can be accomplished in accordance with applicable safety considerations. Three study area communities - King County, Redmond, and Kirkland - have policies or regulations that would specifically prohibit combining transmission lines ('*high consequence land uses*') with hazardous material pipelines.

#### 16.7.1.2 Utility Conflicts and Service Disruption

For any alternative, if new lines or other facilities are co-located with other utilities, PSE would need to coordinate with other nearby utility providers during project design to avoid utility damage, service disruption, or issues with ongoing and future operations and maintenance activities. Depending on the location, new lines or facilities have the potential to conflict with future utility installation.

Earthquakes or other natural hazards (storms) could cause structural damage to electrical infrastructure under any alternative. As described in Chapter 3, the Eastside is located in a seismically active region, and existing infrastructure is at risk of damage in the event of an earthquake. Due to the close proximity of other utilities to existing electrical infrastructure (substations, transmission and distribution lines), damage to electrical infrastructure from an earthquake poses risks that could potentially damage nearby utilities. Similarly, electrical infrastructure could be damaged by lightning strikes that could generate fires. Both earthquakes and lightning strikes could also cause damage to nearby buried utilities.

Although not likely, high winds from storms could potentially cause transmission poles, conductors, or other electric infrastructure to break and fall, damaging nearby utilities and leading to service disruptions. The new transformers and power lines of Alternatives 1 and 3 and the energy storage facilities of Alternative 2 would be installed according to current industry standards established in the National Electric Safety Code by the Institute of Electrical and Electronics Engineers (IEEE), and safety standards of each jurisdiction that are designed to withstand high winds.

### 16.7.2 No Action Alternative

The proximity of natural gas mains and the two Olympic Pipeline regional lines to the existing 115 kV transmission line through PSE's easement presents potential operational risks to PSE. If a natural gas main or the Olympic Pipeline were to rupture or explode due to defects, corrosion, or an earthquake, there could be substantial and long-term power outages to PSE customers, resulting in a significant adverse impact. However, as described in Sections 16.3.3 and 16.8 (and in Chapter 8), conformance with industry standards and regulatory requirements ensure that potential hazards are identified and operations and maintenance procedures in place to minimize adverse effects from these hazards to minor levels.

Under the No Action Alternative, PSE would take steps to provide consistent power to existing and future customers through existing facilities, but the proposed electrical transmission capacity improvements would not occur. If electrical load growth occurs as PSE has projected, PSE's system would likely experience loads on the Eastside that would place the local and regional system at risk of damage. For example, the potential risk of transformer overheating associated with system overload during peak periods would be expected to increase under the No Action alternative, if system capacity is not increased. More frequent system overloading could increase the potential for transformers to catch fire or explode, with accompanying potential safety hazards. These hazards would be managed by load shedding and increased outages under the No Action Alternative. While not likely to occur, impacts from transformer overheating could range from minor to moderate, depending upon the location of the transformer overload.

Because electrical demand on the Eastside is expected to grow, PSE would face challenges in providing reliable service while continuing to meet this need without damaging the regional electrical grid. To address this risk in the near term, PSE would use Corrective Action Plans (CAPs), which are a series of operational steps used to prevent system overloads or large-scale loss of customers' power. CAPs generally involve shutting off or reducing load on overloaded equipment and rerouting the load to other equipment. Some CAPs can keep the entire system operating, but place large numbers of customers at risk if anything else on the system begins to fail. For example, PSE is already using CAPs to prevent winter overloads on the Talbot Hill transformer banks. When these CAPs are employed for Talbot Hill, up to approximately 68,800 customers are at risk of outages if another piece of equipment fails. Under more extreme conditions CAPs can also include temporarily shutting off power to some customers (referred to as load shedding). In the event of load shedding under CAPs, PSE prioritizes delivery of power to emergency and critical public services.

Under the No Action Alternative, less reliable service could result in power disturbances and, without additional capacity in the near future, increase the likelihood of power outages during extreme temperature periods in both summer and winter. As a result, the No Action Alternative could result in significantly reduced reliability of electrical service to some areas due to increasing load on the existing system, resulting in potentially moderate to significant negative impacts to electrical service reliability. Consequently, the No Action Alternative would be inconsistent with some local planning policies related to providing adequate power supply for anticipated growth.

## 16.7.3 Alternative 1: New Substation and 230 kV Transmission Lines

Impacts are described according to the major components associated with Alternative 1. The substation impacts are described first, followed by transmission line impacts.

### *16.7.3.1 Option A: New Overhead Transmission Lines*

#### 16.7.3.1.1 Consistency with Applicable Plans and Policies

Alternative 1 would be consistent with local planning policies stating a need for adequate power supply. Under Option A, it is anticipated that new overhead lines would be installed within existing transmission or other utility easements, or in new locations currently not dedicated to transmission. New locations could include areas along road rights-of-way, rail corridors, or over or through private or other public property. While not prohibited, locating utilities in new corridors is not encouraged by goals and policies of many study area communities. However, a new 230 kV line within PSE's existing 115 kV line easement may not be consistent with goals and policies of some study area communities that specifically discourage co-location of critical utilities with hazardous fluid pipelines like the Olympic Pipeline.

#### 16.7.3.1.2 Utility Conflicts and Service Disruption

Substation expansion and the new 230 kV transmission lines would be designed and placed to minimize future conflicts with existing or proposed utility lines. If transmission lines are located along road rights-of-way, the poles could limit the possible location of future stormwater control measures, such as biofiltration swales. Major service disruptions to utility customers during repair and maintenance are unlikely. Electric facilities would be located so that access to utilities for repair and maintenance could be maintained.

New overhead lines under Option A could be in operation near natural gas mains and the two Olympic Pipeline regional lines described earlier. There would be some risk to PSE and its customers from continuing to operate a transmission line within the same corridor as existing natural gas mains and the Olympic Pipeline. The same potential impacts that might occur during construction could also occur during ongoing operations. For example, maintenance activities on the transmission line could require heavy equipment to cross the buried Olympic Pipeline, or excavation at existing pole foundations could require excavation in proximity to the Olympic Pipeline. These same risks are already present with the existing 115 kV lines and would remain with a 230 kV line. As described under the No Action Alternative, conformance with industry standards and regulatory requirements ensure that potential hazards are identified and operations and maintenance procedures in place that minimize adverse effects from these hazards to minor levels.

#### 16.7.3.1.3 Corrosion

No impacts to utilities around the substation and new transformer relative to electric current are anticipated. If necessary, PSE would provide nonconductive pipe on underground utilities leaving the substation site to avoid damage to utility line coatings in the rare event of a possible fault condition at the substation site (Strauch, personal communication, 2016).

Compared to a 115 kV line, EMF is stronger with the higher voltage of a 230 kV line, but higher voltage requires more ground clearance which can mitigate this stronger field to some

extent. The closer to the ground the lines are, the stronger the electric field at the surface (Marrinan, personal communication, 2015).

Given the higher voltage of the 230 kV line, there is potential for the new line to increase cathodic-induced corrosion of steel or other metallic pipelines, if present, which could lead to long-term accidental system disruption of such pipelines. If existing utility lines were damaged by corrosion and taken out of service for repairs, it would temporarily impact the utility provider's ability to provide service to its customers. As described in Section 16.4, operators of natural gas and hazardous liquid pipelines must establish procedures to implement and maintain a corrosion control program for their piping systems under 49 CFR Part 192 (gas) and 49 CFR Part 195 (hazardous liquid pipelines). These procedures include design, installation, operation, and maintenance activities on a cathodic protection system.

If PSE's existing 115 kV easement is used for the new 230 kV line, there may be a need for changes to the cathodic protection on natural gas mains and the Olympic Pipeline to address the change in EMF. Criteria that pipeline owners use to determine the adequacy of cathodic protection on hazardous liquid pipelines are included in CFR Part 195.571, which incorporates by reference industry standards and practices developed by NACE (2007). As described in Section 16.4.3, cathodic inspection is conducted annually according to 49 CFR Part 195.573.

With appropriate cathodic-protection measures, which would be determined by the utility owner on a case-by-case basis in accordance with applicable federal requirements, any impacts would be minor.

### 16.7.3.2 Option B: Existing Seattle City Light 230 kV Transmission Corridor

#### 16.7.3.2.1 Consistency with Applicable Plans and Policies

Alternative 1, Option B would utilize existing 230 kV overhead transmission lines in SCL's existing easement. This option is consistent with the goals and policies of the study area communities that explicitly encourage the use of existing utility corridors.

As described in Chapter 2, SCL has not agreed to this option. Any use of the existing corridor would be subject to SCL agreement and review. SCL has policies related to the incidental use of real property and real property rights by others. These policies generally allow that incidental uses may be permitted provided they do not interfere with the primary use of the property for SCL purposes, do not create hazardous conditions or obstruct the operation and maintenance of the utility system, or limit SCL's ability to serve its customers (City of Seattle, 1996).

#### 16.7.3.2.2 Utility Damage and Service Disruption

As with Alternative 1, Option A, the new 230 kV transmission line would be designed and placed to minimize future conflicts with existing and proposed utility lines. PSE would work with other utility service providers during design of the project to coordinate the placement of the poles and transmission lines as well as any utility lines that would need to be replaced and relocated as part of the project.

New overhead lines under Alternative 1, Option B would be in operation over natural gas mains and the Olympic Pipeline, which cross the SCL easement in several locations. There would be some risk to PSE and its customers from continuing to operate a transmission line in proximity to natural gas mains and the Olympic Pipeline. The same potential impacts that might occur during construction could also occur during ongoing operations. For example, maintenance activities on the transmission line could require heavy equipment to cross the buried Olympic Pipeline, or excavation at existing pole foundations could require excavation in proximity to the Olympic Pipeline. In the event that a PSE maintenance activity were to damage or breach a natural gas main or the Olympic Pipeline, there could be significant impacts related to service disruption to PSE customers, SCL customers, and/or OPLC's customers while repairs are made or alternative delivery is implemented. As described for Option A, conformance with industry standards and regulatory requirements ensure that potential hazards are identified and operations and maintenance procedures developed that minimize adverse effects from these hazards to minor levels.

#### 16.7.3.2.3 Corrosion

Locating an additional 230 kV transmission line along SCL's easement would increase the potential for corrosion of any buried metallic pipelines present within the easement. With appropriate cathodic-protection measures, which would be determined by the utility owner on a case-by-case basis in accordance with applicable federal standards, impacts would be minor.

### *16.7.3.3 Option C: Underground Transmission Lines*

#### 16.7.3.3.1 Consistency with Applicable Plans and Policies

Alternative 1, Option C could utilize any of the transmission line alignments considered under Option A, including the existing 115 kV overhead line easement, or public road rights-of-way or new rights-of-way. Alignments along existing utility corridors would generally be consistent with the goals and policies of the study area communities that explicitly encourage the use of existing utility corridors. Alignments within new utility corridors may not be prohibited but are generally not encouraged by the goals and policies of the study area communities. In addition, a new underground 230 kV line within PSE's existing 115 kV line easement may not be consistent with goals and policies of some study area communities that specifically discourage co-location of critical utilities with hazardous fluid pipelines like the Olympic Pipeline.

#### 16.7.3.3.2 Utility Conflicts and Service Disruption

Major service disruptions to utility customers during repair and maintenance along the buried line are unlikely. However, if existing utility lines were damaged and taken out of service for repairs, it would temporarily impact service to customers. As described for construction, the new transmission line would be designed and placed to minimize future conflicts with proposed utility lines. Repair and maintenance along the line is generally accomplished through vaults, avoiding the need to disrupt nearby utilities to gain access.

Given the finite space within road rights-of-way for placement of utilities, the presence of underground lines and vaults (if located within road right-of-way) can present a barrier for other utility work in the future. For example, if located along road rights-of-way, the lines could limit the possible location of stormwater control measures, such as biofiltration swales.

PSE would work with other utility service providers during design and construction of the project to coordinate the placement of the transmission line and vaults as well as other utility lines being replaced and relocated as part of the project. With proper coordination, impacts are assumed to be minor.

If located within PSE's existing 115 kV line easement, the potential impacts associated with operation and maintenance activity in proximity to natural gas mains and the Olympic Pipeline would be the same as those described for Alternative 1, Option A. In the event that a PSE maintenance activity were to damage or rupture a gas main or the Olympic Pipeline, there could be service disruptions to PSE natural gas and OPLC's customers until repairs or alternative delivery methods are implemented. In addition, there would be some risk to PSE and its customers from operating a transmission line within the same corridor as existing natural gas and petroleum pipelines. An explosion, regardless of cause, would potentially damage an underground transmission line, leading to substantial power outages. In the event that a PSE maintenance activity were to damage or breach a natural gas main or the Olympic Pipeline, there could be service disruption to PSE natural gas or OPLC's customers while repairs are made or alternative delivery is implemented. As described for Option A, PSE would coordinate closely with OPLC, other utility providers, and study area communities during project design and construction to avoid accidental rupture and thus avoid impacts to OPLC and PSE operations. Same as Option A, conformance with industry standards and regulatory requirements would ensure that potential hazards are identified and safeguards established during operations and maintenance activities to minimize adverse effects from these hazards to minor levels.

No special co-location issues related to natural hazards or accidents have been identified for Alternative 1, Option C. In general, buried facilities perform well during a seismic event, although they can be subject to damage from liquefiable soils, if present. See Chapter 3 for additional discussion of seismicity in the region.

#### 16.7.3.3.3 Corrosion

Underground lines are typically constructed in a trefoil configuration and the EMF fields tend to cancel more completely. Underground lines are also shielded, which further cancels the EMF field. As a result, underground lines have a weaker field strength compared to overhead lines (Marrinan, personal communication, 2015). In the event that transmission lines were installed parallel to other utility lines over long distances and in very close proximity, it is theoretically possible, but unlikely, that the sustained electric or magnetic field from the line could negatively affect or corrode the other utility lines over time. However, it is likely such long parallel distances could be avoided, and bare copper conductors along the line would help prevent this type of corrosion from occurring. Therefore, impacts would be minor. No operational impacts to other utilities are expected.

### 16.7.3.4 Option D: Underwater Transmission Lines

#### 16.7.3.4.1 Consistency with Applicable Plans and Policies

Under Alternative 1, Option D, most construction would occur within new corridors currently not occupied by utilities. New locations would include submerged corridors under Lake Washington, and could include private or other public property where the line transitions from the lake bed to land and the substation. While not prohibited, locations in new corridors

where utilities are not already present is not encouraged by goals and policies of many study area communities.

#### 16.7.3.4.2 Utility Conflicts and Service Disruption

For the overland portion of the transmission lines under Alternative 1, Option D, the potential for major maintenance activities to damage nearby utilities or cause service disruptions would be the same as described for Options A or B (if overhead) and for Option C (if underground). Impacts would be minor.

No special co-location issues related to natural hazards or accidents have been identified for Alternative 1, Option D. Once completed, underwater transmission lines would generally be expected to perform very well in an earthquake event. See Chapter 3 for additional discussion of seismicity.

#### 16.7.3.4.3 Corrosion

Underwater transmission cables would be designed to require limited maintenance once installed. Cables used would be solid-state, with protective layers designed to provide superior corrosion protection, thereby reducing the need for repairs. In-water cables would be inspected regularly to confirm system integrity.

For the on-land portion of the transmission lines under Alternative 1, Option D, the potential for corrosion of nearby buried metallic pipelines would be the same as described for Options A or B (if overhead) and for Option C (if underground). Measures would be implemented to help prevent corrosion from occurring. With appropriate cathodic-protection measures, which would be determined by the utility owner on a case-by-case basis in accordance with applicable federal standards, any impacts would be minor.

### 16.7.4 Alternative 2: Integrated Resource Approach

A number of the Alternative 2 study area communities have energy policies that would support the types of actions and features of this alternative (see Chapter 7 for more information on energy policies).

In order to ensure consistent electrical service to existing and future PSE customers, this alternative would require additional measures to address uncertainties inherent in relying on voluntary participation and non-transmission resources. This would include strengthening of voluntary requirements and additional incentives to encourage participation. It would also require increased monitoring of electric power use, demand, and trends to support ‘just-in-time’ electrical management. If measures do not bring about the needed conservation, there could be reliability issues that could place the local and regional system at risk, similar to the No Action Alternative.

The discussion of individual components below acknowledges that there could be significant impacts to relying on a single strategy or component to meet PSE’s objectives for Energize Eastside. A combination of the components would be needed, but uncertainties about the feasibility and performance of certain technologies, customer participation levels, and achievable conservation result in a risk to reliability. Given the uncertainty in implementing

this solution within the timeframe when capacity is anticipated to be needed, this alternative could have moderate to significant impacts on electric service reliability.

#### 16.7.4.1 Energy Efficiency Component

To meet the project objectives for Energize Eastside, existing energy efficiency and conservation efforts would need to be substantially accelerated and expanded on the Eastside. Additional studies would be required to determine efficiency potential on the Eastside and the costs to substantially accelerate and expand programs. Given uncertainties about the ability to increase participation, energy efficiency and conservation efforts would need to be implemented together with other demand-side reduction strategies.

Implementation of the energy efficient component is not anticipated to cause impacts to other (non-electric) utilities. The potential for damage, service disruption, or increased demand for other utility services is considered low.

#### 16.7.4.2 Demand Response Component

In order to address the electric deficiency projected for the Eastside, adoption of this program within the Eastside would have to be substantially accelerated and expanded in the near future. Given uncertainties about participation, demand response would need to be implemented together with other demand-side reduction strategies and would not be considered a stand-alone option.

The potential for damage, service disruption, or increased demand for other (non-electric) utility services is considered low.

#### 16.7.4.3 Distributed Generation Component

Distributed generation would involve building new small-scale energy generation facilities at various sites across the Eastside. These facilities would use renewable energy sources such as wind, solar, or waste, or petroleum products such as diesel or natural gas to provide electrical power.

New distributed generation resources would need to be capable of producing power when needed at peak times, such as during a winter cold snap or a summer warm spell, or be associated with an energy storage system that would allow use of the energy during peak periods. For an energy generating resource to be effective, it also has to be reliable, which means it must be well-maintained and capable of producing a specified amount of energy when needed. If adequate system redundancy is not provided, electrical power production would likely not meet the demand during certain times. Also, if distributed generation is not located at or near the load, effectiveness would be reduced.

The potential for damage or service disruption to other (non-electric) utilities as a result of operations and maintenance is considered low. Depending on the type of facility, there could be additional demand for utilities (e.g., natural gas, water, wastewater) to serve the facility, but the additional demand is not expected to exceed the ability of utilities to provide service.

#### 16.7.4.4 Energy Storage Component

The Eastside system has constraints during off-peak periods that could prevent an energy storage system from maintaining sufficient charge to eliminate or sufficiently reduce normal overloads over multiple days. Also, the existing Eastside transmission system does not have sufficient capacity to fully charge a baseline storage configuration as described in Chapter 2. These and other technical challenges suggest that energy storage could be considered only as a partial solution that would need to be implemented together with other demand-side reduction strategies.

There is a low potential for damage or service disruption to other (non-electric) utilities as a result of operations and maintenance. Depending on the utility extensions and connections needed for a battery storage facility, there could be additional demand for utilities to serve the storage sites, but the additional demand is not expected to exceed the ability of utilities to provide service.

#### 16.7.4.5 Peak Power Generation Component

Increased demand for natural gas and water to supply peak generation plants during peak times could require upgrades to major gas and water supply lines. While upgrades or extensions of gas and water distribution lines could be needed, this new demand is not expected to adversely affect the natural gas supply over the long term.

### 16.7.5 Alternative 3: New 115 kV Lines and Transformers

#### 16.7.5.1 Consistency with Applicable Plans and Policies

Where constructed in existing corridors where other utilities are present, Alternative 3 would be generally consistent with the goals and policies of the study area communities that explicitly encourage the use of existing utility corridors.

#### 16.7.5.2 Utility Conflicts and Service Disruption

Same as Alternative 1, the new 115 kV transmission lines under Alternative 3 would be designed and placed to minimize future maintenance conflicts with existing and proposed utility lines. Alternative 3 would involve construction of more miles of new transmission line than Alternative 1 and would likely include more line installation along public road rights-of-way. However, potential for utility damage or service disruption during operations and maintenance activities would remain low with appropriate design and placement.

New overhead lines under Alternative 3 could be in operation near natural gas mains and the Olympic Pipeline, depending on utility or road rights-of-way used. The same potential impacts that might occur during construction could also occur during ongoing operations. For example, maintenance activities on the transmission line could require heavy equipment to cross the buried Olympic Pipeline, or excavation at existing pole foundations could require excavation in proximity to the Olympic Pipeline. Given conformance with existing regulations and practices now in place for pipeline safety, adverse effects from these hazards would be minimized to minor levels.

#### 16.7.5.3 Corrosion

The potential risk of new 115 kV lines to induce corrosion on buried metallic pipelines would be slightly reduced compared to 230 kV lines because of the reduced voltage. However, there would still be an increased corrosion potential for any buried metallic pipelines, if present along the transmission line alignment. With appropriate cathodic-protection measures, which would be determined by the utility owner on a case-by-case basis, impacts would be minor.

## 16.8 WHAT MITIGATION MEASURES ARE AVAILABLE FOR POTENTIAL IMPACTS TO UTILITIES?

A substantial set of federal, state, and local regulations and practices are in place to minimize the potential for utility conflicts and disruptions during both construction and operation, including regulations specific to work near petroleum pipelines (see Section 16.3.3). PSE would be required to design, construct, and operate new facilities according to industry standards and applicable requirements.

This section presents general mitigation measures identified to avoid or reduce the potential utility impacts expected to occur during construction or operation. As part of project final design, specific mitigation measures for effects on utilities would be developed during the ongoing coordination process between PSE, SCL, OPLC, and other local and regional utility providers. Some of the potential mitigation measures for effects on utilities are the following:

**Coordination with Other Utility Providers:** PSE would site new transmission lines according to industry best practices, which includes proper positioning and design (separation and grounding) relative to other utilities. For all alternatives, coordination with the individual utility providers would be required to determine whether or not existing and future utilities could be affected and how best to avoid or minimize those impacts. PSE would work with other utility service providers during design and construction of the project to coordinate the placement of new facilities and ensure protection of other utilities. In some instances, vibration and settlement monitoring may be required where construction would occur near existing utilities.

**Coordination with Other Projects:** PSE would coordinate all construction needs and impacts of this project with the other infrastructure and development projects in the combined study area. This would typically be done as part of the permitting process with each community affected by potential construction.

**Utility Location:** PSE would follow regulatory requirements to correctly locate and plan for other utility locations such as gas lines or the OPLC pipelines prior to start of construction, including showing pipeline locations on plans and requiring contractors to field locate utilities. Prior to the start of construction, existing utilities would be located and field-verified where feasible to avoid conflicts with the proposed facilities.

**Utility Relocations:** PSE and its contractors would be required to develop construction sequence plans and coordinate schedules for utility work to minimize service disruptions and provide ample advance notice when service disruptions are unavoidable, consistent with

utility owner policies. Relocation plans and service disruptions would be reviewed and approved by the affected utility providers before construction begins. PSE would develop a plan for public outreach to inform customers of potential service outages and construction schedules. The public outreach effort would be coordinated with other utility service providers.

## 16.9 ARE THERE ANY CUMULATIVE IMPACTS TO UTILITIES AND CAN THEY BE MITIGATED?

Construction of the Energize Eastside Project, in combination with other concurrent construction activities, may result in temporary adverse cumulative effects by increasing the potential for service outages or damage to existing infrastructure. Utility outages could affect businesses and residential customers. Specific construction-related cumulative effects will be identified for the project-level EIS, when reasonably foreseeable projects can be identified.

Once construction is completed, the Energize Eastside Project would result in cumulative long-term benefits through upgrades of utility infrastructure in accordance with anticipated future development, thereby reducing the risk of future service disruptions.

## 16.10 ARE THERE ANY SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS TO UTILITIES?

Under the No Action Alternative, Alternative 1, and Alternative 3, there is a risk of damage and subsequent disruptions to utility customers whenever construction or operations and maintenance occur near buried natural gas or petroleum pipelines. However, that risk is not considered an unavoidable significant impact because the probability of damage occurring is minimized by conformance with industry standards, regulatory requirements, and construction and operational procedures that address pipeline safety.

Both the No Action Alternative and Alternative 2 have potential unavoidable significant impacts to utilities. Under the No Action Alternative, PSE would be required to implement CAPs (load shedding) if electrical load growth occurs as PSE has projected, resulting in potentially significant risks to service reliability. Under the No Action Alternative, less reliable service could result in power disturbances and, without additional capacity in the near future, increase the likelihood of power outages during extreme temperature periods in both summer and winter.

Under Alternative 2, uncertainties about the feasibility and performance of certain technologies, customer participation levels, and achievable conservation would result in a risk to reliability. Given the uncertainty in implementing an integrated resource solution within the timeframe when capacity is expected to be needed, this alternative could have moderate to significant impacts on electric service reliability.

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# CHAPTER 18. DISTRIBUTION LIST

The following parties have received the Draft EIS by electronic link, compact disc, or printed copy:

## Federal Agencies

Army Corps of Engineers

Environmental Protection Agency

Federal Highway Administration

Postal Service

## Tribal Governments

Duwamish Tribe

Muckleshoot Indian Tribe

Snoqualmie Nation

Suquamish Tribe

Tulalip Tribes

## Regional

Puget Sound Clean Air Agency

Puget Sound Regional Council

Sound Transit

## Washington State

Attorney General's Office

Department of Agriculture

Department of Archaeology and Historic Preservation

Department of Commerce

Department of Community Development

Department of Corrections

Department of Ecology SEPA Unit

Department of Fish and Wildlife

Department of Health

Regional Department of Housing and Urban Development

Department of Natural Resources

Department of Social and Health Services

Department of Transportation

Parks & Recreation Commission

Recreation Conservation Office

## Local

Beaux Arts Village

City of Bellevue Fire Department

City of Bothell

City of Clyde Hill

City of Covington

City of Issaquah

City of Kenmore

City of Kent

City of Kirkland

City of Medina

City of Mercer Island

City of Newcastle

City of Redmond

City of Renton

City of Renton Fire Department

City of Sammamish

City of Tukwila

City of Woodinville

East Bellevue Community Council

Houghton Community Council

King County Boundary Review Board

King County Department of Permitting & Environmental Review

King County Department of Transportation

King County Executive Office

King County Historic Preservation Program

King County Metro Transit

King County Department of Natural Resources & Parks

King County Parks and Recreation Division

King County Wastewater Division

King County Water and Land Resources Division

King Eastside Community Services Office

Seattle and King County Public Health

Seattle City Light

Seattle Public Utilities

Town of Hunts Point

Town of Yarrow Point

## Libraries

Bellevue Library

Fairwood Library

Lake Hills Library

Newcastle Library

Newport Way Library

Redmond Library

Renton Highlands Library

Renton Library

Seattle Public Library

University of Washington, College of Architecture & Urban Planning Library

## Other

Bellevue Chamber of Commerce

Bellevue Downtown Association

Bellevue School District #405

Cascade Water Alliance

Coal Creek Utility District

Comcast

Eastgate Public Health Center

Eastside Audubon Society

Eastlake Washington Audubon Society

Energy Facility Site Evaluation Council

Evergreen Health

Greater Seattle Chamber of Commerce

Issaquah School District

Lake Washington School District #414

Meydenbauer Bay Neighbors Association

Northshore Utility District

Olympic Pipeline Company

Puget Sound Energy

Puget Sound Partnership

Renton Chamber of Commerce

Qwest

West Bellevue Community Club

Woodinville Water District

# APPENDIX A. PSE CONSERVATION PROGRAM

Conservation means a reduction in energy demand. Conservation is achieved mainly by customers implementing voluntary energy efficiency improvements beyond those energy efficiency measures that are required by regulations.

PSE uses conservation goals as an important factor in developing load forecasts. For the Eastside, the current conservation goal is to conserve approximately 110 MW of power beyond the baseline load growth expected through 2024.

Table A-1 below shows the total conservation that PSE expects to achieve systemwide and for the Eastside. Values are for winter peak load. These loads are modeled on a typical winter cold spell of 23 degrees Fahrenheit. Values are shown for the entire PSE system and for the Eastside. "System Peak Net of 100% Conservation" means the peak load that would occur during a cold weather event, assuming PSE has attained its annual target for conservation measures. "System Peak 100% Conservation 2014" refers to the cumulative amount of conservation targeted to be attained by a given year, with 2014 as the baseline. Similar values are provided for the Eastside area.

**Table A-1. Energy Conservation Systemwide and for the Eastside through 2024**

| | 2014 System Peak Net of 100% Conservation | System Peak 100% Conservation 2014 | 2014 Eastside Peak Net of 100% Conservation | Eastside Peak 100% Conservation 2014 |
|---|---|---|---|---|
| **Year** | **MW (23° F)** | **MW (23° F)** | **MW (23° F)** | **MW (23° F)** |
| **2014-15** | 4,803 | 91 | 619 | 21 |
| **2015-16** | 4,820 | 177 | 641 | 31 |
| **2016-17** | 4,844 | 262 | 667 | 41 |
| **2017-18** | 4,891 | 341 | 688 | 51 |
| **2018-19** | 4,891 | 424 | 697 | 61 |
| **2019-20** | 4,904 | 490 | 708 | 74 |
| **2020-21** | 4,856 | 614 | 722 | 86 |
| **2021-22** | 4,850 | 694 | 730 | 96 |
| **2022-23** | 4,863 | 767 | 742 | 107 |
| **2023-24** | 4,888 | 832 | 764 | 110 |
| **2024-25** | 4,961 | 852 | 783 | 113 |

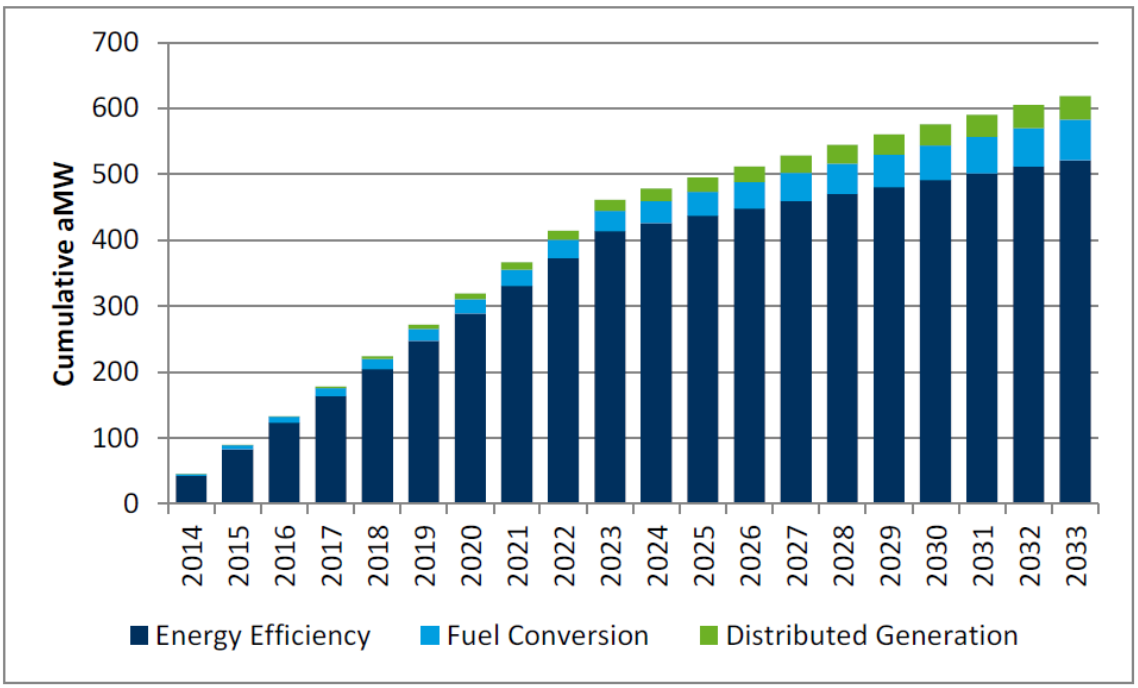
Source: PSE Solutions report

The types of conservation measures that PSE expects to implement to achieve its conservation goals include the following:

- Energy Efficiency: Weatherization, efficient lighting, etc.
- Fuel Conversion: Converting from  electric to gas
- Distributed Generation: Customer combined heat and power (CHP), solar, wind, etc.
- Distribution Efficiency: Measures implemented on PSE distribution systems
- Demand Response: Capacity savings programs

Figure A-1 shows PSE's projected potential for achievable electric conservation by resource type. Energy Efficiency is by far the largest contributor to total energy savings in PSE's conservation program, accounting for approximately 90 percent of total energy saving systemwide by 2024. Distribution efficiency and demand response are included in the Energy Efficiency category in this chart.

**Figure A-1. Achievable Potential Electrical Conservation by Resource Type**




Source- PSE IRP 2013- Appendix N (Figure 2)

Fuel conversion (from electric to gas) and distributed generation (smaller sources of power such as solar, wind, and other generation types) represent a small but growing component of PSE's conservation program. PSE does not consider distributed generation to be cost effective because it is expensive and therefore the projected energy savings from distributed generation is very small.

In the past, PSE has conducted pilot programs with demand response. Those programs are included in the forecast for future implementation as part of the energy efficiency component shown in this graph.

# APPENDIX B. POTENTIAL CONSTRUCTION EQUIPMENT

**Table B-1. Alternative 1 (Options A and B) and Alternative 3**

| Alternative & Option or Component | Construction Task | Equipment |
|---|---|---|
| **Alternative 1 (Options A and B) and Alternative 3** | | |
| Overhead Transmission Line and Poles | Removal of conductors from existing poles | • Bucket truck |
| | Removal of existing wooden poles | • Line truck or trackhoe to remove the old pole<br>• Backhoe to fill the hole |
| | Installation of foundations for new steel poles | • Auger or vacuum truck to create holes<br>• Dump truck for hauling spoils<br>• Concrete truck for drilled pier foundations<br>• Backhoe to load the spoils into the dump truck<br>• Crane to install rebar cage if required<br>• Concrete pump truck if access to the site is challenging<br>• Vacuum truck for site and street cleanup<br>• Heavy-duty flatbed trucks or semi-trucks for site deliveries of equipment and construction materials |
| | Assembly and erection of steel poles | • Heavy duty trucks to deliver materials<br>• Crane for setting the poles (size dependent upon weight of poles)<br>• Bucket truck or crane<br>• Basket for working on set structure (dependent upon structure height)<br>• Auxiliary rubber tire vehicle to run the hydraulics needed for jacking the poles together<br>• Vacuum truck for site and street cleanup<br>• Heavy-duty flatbed trucks or semi-trucks for site deliveries of equipment and construction materials |
| | Installation of new conductors | • Bucket truck or crane basket for working on set structure (dependent upon structure height) |
| | Stringing of power lines | • Bucket truck or crane basket for working on set structure (dependent upon structure height)<br>• Conductor reel trailer for hauling conductor reels<br>• Tensioner for applying tension to conductor coming off reels during power line pull<br>• Puller for pulling rope/hard line with attached conductor |

| Alternative & Option or Component | Construction Task | Equipment |
|---|---|---|
| | Regrading surfaces around new poles and work areas | • Bulldozer<br>• Trackhoe<br>• Backhoe<br>• Concrete mixers and/or pavers |
| New Transformer(s) and Substation or Substation Expansion | Construct new or expanded substation | • Small and heavy duty trucks for delivery of materials and equipment<br>• Bulldozer<br>• Trackhoe<br>• Backhoe<br>• Concrete mixers<br>• Crane for unloading and placing transformer(s)<br>• Vacuum truck for site and street cleanup<br>• Heavy-duty flatbed trucks or semi-trucks for site deliveries of equipment and construction materials |

**Table B-2. Alternative 1, Option C**

| Alternative & Option or Component | Construction Task | Equipment |
|---|---|---|
| **Alternative 1 (Option C)** | | |
| Underground Transmission Line and Vaults | Excavation of trench and cable pulling | • Excavators or backhoes<br>• Dump trucks<br>• Bulldozers<br>• Concrete mixers<br>• Cranes<br>• Conductor reel trailer for hauling conductor reels<br>• Tensioner for applying tension to conductor coming off reels during power line pull<br>• Puller for pulling rope/hard line with attached conductor<br>• Vacuum truck for site and street cleanup<br>• Heavy-duty flatbed trucks or semi-trucks for site deliveries of small equipment and construction materials |

**Table B-3. Alternative 1, Option D**

| Alternative & Option or Component | Construction Task | Equipment |
|---|---|---|
| **Alternative 1 (Option D)** | | |
| Underwater Cable Installation | Create cable landing sites and install vaults | • Excavator or backhoe for open-cut and vault area trenching and loading dump truck<br>• Dump truck for hauling spoils<br>• Pile driver for sheet piles<br>• Dredge for in-water conduit near shoreline<br>• Concrete truck for poured in place vaults<br>• Crane for lifting miscellaneous materials<br>• Mixer truck and compaction grout pump to inject thermal backfill<br>• Vacuum truck for site and street cleanup<br>• Heavy-duty flatbed trucks or semi-trucks for site deliveries of small equipment and construction materials<br>• Puller for pulling rope/hard line with attached conductor |
| | Install cable underwater | • Submarine cable laying vessel (lay barge) designed to lay the cable in one continuous piece |

**Table B-4. Alternative 2**

| Alternative & Option or Component | Construction Task | Equipment |
|---|---|---|
| **Alternative 2** | | |
| Energy efficiency, Demand response | Install minor equipment and modify buildings. | • Small trucks for delivery of materials |
| Distributed generation | Install smaller generation equipment, typically during construction of a new building | • Small and heavy duty trucks for delivery of materials and equipment<br>• Grading equipment for ground level installations<br>• Crane for rooftop installations |
| Energy storage | Construct battery facility near substation | • Small and heavy duty trucks for delivery of materials and equipment<br>• Bulldozer<br>• Trackhoe<br>• Backhoe<br>• Concrete mixers<br>• Crane for unloading and placing batteries |
| Peak Power Generation | Construct generation facility near substation | • Small and heavy duty trucks for delivery of materials and equipment<br>• Bulldozer<br>• Trackhoe<br>• Backhoe<br>• Concrete mixers<br>• Crane for unloading and placing batteries |

# APPENDIX C. ENDANGERED AND THREATENED SPECIES

**Table C-1. Federal and State Endangered and/or Threatened Species in the Energize Eastside Study Areas**

| Species | Federal/ State Status | Habitat Potentially Present in Study Areas? |
|---|---|---|
| **Birds** | | |
| Bald Eagle | Federal Species of Concern and State Sensitive | Yes |
| Common loon | State Sensitive | Yes |
| Great blue heron | State Monitored | Yes |
| Green heron | State Monitored | Yes |
| Marbled murrelet | Federal and State Threatened | No |
| Northern Goshawk | State Candidate | Yes |
| Northern Spotted owl | Federal Threatened and State Endangered | No |
| Osprey | State Monitored | Yes |
| Peregrine falcon | Federal Species of Concern and State Sensitive | Yes |
| Pileated woodpecker | State Candidate | Yes |
| Purple martin | State Candidate | Yes |
| Trumpeter swan | State Priority | Yes |
| Vaux's swift | State Candidate | Yes |
| Western grebe | State Candidate | Yes |
| Yellow-billed cuckoo | Federal Threatened and State Candidate | No |
| **Mammals** | | |
| Townsend's big-eared bat | State Candidate | Yes |
| Keen's myotis | State Candidate | No |
| Long-legged myotis | State Monitored | Yes |
| Western long-eared bat | State Monitored | Yes |
| **Reptiles and Amphibians** | | |
| Western toad | State Candidate | Yes |

| Species | Federal/ State Status | Habitat Potentially Present in Study Areas? |
|---|---|---|
| Oregon spotted frog | Federal Threatened Species and State Endangered | No |
| Western pond turtle | State Endangered | Yes |
| **Fish** | | |
| Coastal-Puget Sound bull trout | Federal Threatened Species and State Candidate | Yes |
| Puget Sound Chinook salmon | Federal Threatened Species and State Candidate | Yes |
| Puget Sound-Strait of Georgia coho salmon | Federal Species of Concern | Yes |
| Puget Sound Steelhead trout | Federal Threatened Species | Yes |
| River lamprey | Federal Species of Concern, State Candidate | Yes |

# APPENDIX D. SOIL TYPES AND GROUNDWATER IN STUDY AREAS

**Table D-1. Soil Types and Groundwater in Study Areas**

| Soil Series | Typical Depth to Groundwater (inches) | Percent of Total Study Area** |
|---|---|---|
| Alderwood | 18-37 | 44.7 |
| Everett | 80+ | 10.7 |
| Arents | 80+ | 8 |
| Beausite | 80+ | 6.3 |
| Ovall | 80+ | 3.4 |
| Kitsap | 18-36 | 2.7 |
| Urban Land | N/A* | 2.6 |
| Indianola | 80+ | 2.2 |
| Seattle Muck | 0 | 2.2 |
| Bellingham | 0-12 | 1.3 |
| Neilton | 80+ | 1 |
| Puyallup | 48-60 | 0.9 |
| Sammamish | 12-24 | 0.9 |
| Briscot | 12-24 | 0.8 |
| Ragnar | 80+ | 0.8 |
| Norma | 0 | 0.6 |
| Earlmont | 24-36 | 0.5 |
| Pits | N/A* | 0.5 |
| Puget | 0 | 0.5 |
| Mixed Alluvial Land | 12-36 | 0.4 |
| Pilchuck | 24-48 | 0.4 |
| Tukwila Muck | 0 | 0.3 |
| Riverwash | 0-24 | 0.2 |
| Shalcar Muck | 0 | 0.2 |
| Snohomish | 0-12 | 0.2 |
| Sultan | 24-36 | 0.2 |

*N/A = not applicable due to complete disturbance of mine pit or urban area.
**Soil series representing less than 0.1 percent of the total study area were not included as part of the analysis.
Source: NRCS, 2015

# APPENDIX E. PLANNING DOCUMENTS REFERENCED FOR THIS ANALYSIS

**Table E-1. Comprehensive Planning Documents Referenced for this Analysis**

| Comprehensive Plan | Date of Adoption / Draft Date |
|---|---|
| City of Bellevue Comprehensive Plan | Updated August 2015 |
| City of Clyde Hill 2015-2035 Comprehensive Plan | Updated Spring 2015 |
| City of Issaquah Comprehensive Plan | Updated June 2015 |
| City of Kirkland 2015 Comprehensive Plan (Kirkland 2035) | Updated December 2015 |
| City of Medina Comprehensive Plan 2015 Amendment | Updated October 2015 |
| City of Newcastle Comprehensive Plan | 2015 Draft |
| City of Redmond Comprehensive Plan (Redmond 2030) | Amended in 2015 |
| City of Renton Comprehensive Plan | Updated June 2015 |
| City of Sammamish Comprehensive Plan | 2015 Draft |
| King County Comprehensive Plan 2012 (2013 Update) | Updated 2013 |
| Town of Beaux Arts Village Comprehensive Plan | 2014 Draft |
| Town of Hunts Point Comprehensive Plan Update | 2014 Draft |
| Town of Yarrow Point Comprehensive Plan | Updated September 2015 |

**Note:** In accordance with the GMA, four of the study area communities are in the process of updating their comprehensive plans (Newcastle, Sammamish, Beaux Arts Village, and Hunts Point). For purposes of this SEPA analysis, those draft documents were used since they appear to be nearing completion with some degree of public process already integrated, and therefore they appear likely to form the basis for this project's land use approvals.

**Table E-2. Shoreline Master Program Requirements/Documents Referenced for this Analysis**

| Shoreline Master Program (SMP) | Date of Adoption / Draft Date |
|---|---|
| City of Bellevue SMP | Comprehensive Plan and Land Use Code Amendments* |
| City of Clyde Hill SMP | N/A |
| City of Issaquah SMP | 2013 |
| King County SMP | 2013 |
| City of Kirkland SMP | 2010 |
| City of Medina SMP | 2014 |
| City of Newcastle | N/A |
| City of Redmond SMP | 2009 |
| City of Renton SMP | 2011 |
| City of Sammamish SMP | 2011 |
| Town of Beaux Arts Village SMP | 2014 |
| Town of Hunts Point SMP | 2015 |
| Town of Yarrow Point SMP | 2012 |

* Amendments to the Bellevue Comprehensive Plan and the Land Use Code updating the city's shoreline policies and the Shoreline Overlay District were used for this analysis as they represented an update to the City's Shoreline Master Program.

# APPENDIX F. POTENTIALLY APPLICABLE COMPREHENSIVE PLAN AND SHORELINE MASTER PROGRAM GOALS AND POLICIES

**Table F-1. King County Planning Goals and Policies**

| King County Planning Document | Section* | Topic* | Goal or Policy and Text |
|---|---|---|---|
| **King County Comprehensive Plan** 2012 (2013 Update) | Environment | Greenhouse Gas Emissions | **Policy E-201:** King County should participate in and support appropriate local, regional, and national efforts and organizations focused on reducing greenhouse gas emissions and preparing for climate change impacts. |
| | | | **Policy E-227:** King County should support appropriate comprehensive approaches to reduce greenhouse gas emissions, such as market-based emissions reduction programs and products, renewable energy standards for electricity production, and vehicle efficiency performance standards. |
| | Economic Development | Land Use | **Policy ED-404:** Through local subarea planning and partnerships with other agencies and organizations, King County should use zoning, incentives, or other measures to ensure that an appropriate proportion of the land adjacent or near to major public infrastructure facilities is used to capitalize on the economic benefit of that infrastructure. The surrounding land uses should be compatible with the economic development uses or a buffer provided as necessary. |
| | Services, Facilities, and Utilities | Sustainability | **Policy F-203:** When service providers are planning and designing facilities, King County should encourage them to use sustainable development practices. |
| | | Essential Public Facilities | **Policy F-226:** Proposed new or expansions to existing essential public facilities should be sited consistent with the King County Comprehensive Plan. Listed existing essential public facilities should be preserved and maintained until alternatives or replacements for such facilities can be provided. |
| | | | **Policy F-227:** King County and neighboring counties, if advantageous to both, should share essential public facilities to increase efficiency of operation. Efficiency of operation should take into account the overall value of the essential public facility to the region and the county and the extent to which, if properly mitigated, expansion of an existing essential public facility located in the county might be more economical and environmentally sound. |
| | | | **Policy F-228:** King County should strive to site essential public facilities equitably so that no racial, cultural, or socio-economic group is unduly impacted by essential public facility siting or expansion decisions. No single community should absorb an inequitable share of these facilities and their |

| King County Planning Document | Section* | Topic* | Goal or Policy and Text |
|---|---|---|---|
| | | | impacts. Siting should consider equity, environmental justice and environmental, economic, technical and service area factors. The net impact of siting new essential public facilities should be weighted against the net impact of expansion of existing essential public facilities, with appropriate buffering and mitigation. Essential public facilities that directly serve the public beyond their general vicinity shall be discouraged from locating in the Rural Area. |
| | | | **Policy F-229:** A facility shall be determined to be an essential public facility if it has one or more of the following characteristics:<br>a. The facility meets the Growth Management Act definition of an essential public facility;<br>b. The facility is on a state, county or local community list of essential public facilities;<br>c. The facility serves a significant portion of the county or metropolitan region or is part of a countywide service system; or<br>d. The facility is the sole existing facility in the county for providing that essential public service. |
| | | | **Policy F-230:** Siting analysis for proposed new or expansions to existing essential public facilities shall consist of the following:<br>a. An inventory of similar existing essential public facilities in King County and neighboring counties, including their locations and capacities;<br>b. A forecast of the future needs for the essential public facility;<br>c. An analysis of the potential social and economic impacts and benefits to jurisdictions receiving or surrounding the facilities;<br>d. An analysis of the proposal's consistency with policies F-226 through F-229;<br>e. An analysis of alternatives to the facility, including decentralization,<br>f. conservation, demand management and other strategies;<br>g. An analysis of economic and environmental impacts, including mitigation, of any existing essential public facility, as well as of any new site(s) under consideration as an alternative to expansion of an existing facility;<br>h. Extensive public involvement; and<br>i. Consideration of any applicable prior review conducted by a public agency, local government, or citizen's group. |

| King County Planning Document | Section* | Topic* | Goal or Policy and Text |
|---|---|---|---|
| | | Service Reliability | **Policy F-301:** Energy providers' resource and facility plans should be consistent with the King County Comprehensive Plan and should provide for a reliable source of energy in the event of natural disaster or other potential threats of disruption to service. |
| | | Alternative Energy/New Technology | **Policy F-303:** King County should encourage land uses and development that will improve energy efficiency, and should support the expansion of renewable energy resources through development regulations, prudent variances and active incentive programs when the benefits of doing so outweigh the costs. |
| | | | **Policy F-307:** King County should foster the development and increased use of clean, renewable and alternative fuel and energy technologies |
| | | | **Policy F-311:** King County should encourage its energy utilities to provide energy efficiency services and renewable energy options to all their customers. Additionally, the County should encourage the state and energy utilities to mitigate the environmental and greenhouse gas emissions impacts of energy and, as conservation and alternative energy sources demonstrate capacity to address energy needs, phase out existing fossil fuel based power plants, especially coal based sources. |
| | | | **Policy F-321:** King County encourages:<br>a. the use of solar energy;<br>b. the siting of roads, lots, landscaping and buildings for improved solar orientation;<br>c. the use of passive solar design and active solar technologies; and<br>d. the protection of solar access. |
| | | Utility Corridors/ Facilities | **Policy F-324:** To address the cumulative effects of multiple energy facilities, King County should continue to participate in state and federal processes for licensing, authorizing, or certifying, and any such renewals, of existing and proposed power generation projects within King County. King County's review of individual projects in the state and federal processes should consider consistency with designated land uses and environmental protection goals. Specifically, power generation projects should:<br>a. Have climate change impacts considered and mitigated to the greatest extent practical; |

| King County Planning Document | Section* | Topic* | Goal or Policy and Text |
|---|---|---|---|
| | | | b. Be consistent with, and preferably directly incorporated in, utility integrated resource plans;<br>c. Use renewable resources to the greatest extent practical;<br>d. Include public engagement;<br>e. Not significantly interfere with commercial forestry operations;<br>f. Be located and operated in a manner such that impacts to salmonid fish and wildlife are minimized;<br>g. Avoid unstable and erosion-prone areas;<br>h. Include performance bonding to fund erosion control;<br>i. Provide full mitigation for construction and operation impacts;<br>j. Avoid, to the extent practicable, diminishing scenic values; and<br>k. Incorporate adequate public safety measures. |
| | | | **Policy F-325:** King County and the utilities should identify and preserve corridors to accommodate future electric power transmission and distribution lines. Corridor designation should include:<br>a. Identification of appropriate shared uses and recognition of the values provided by nonutility uses, such as recreation;<br>b. Recognition of county roads as utility corridors; and<br>c. Evaluation of proposed facility plans on a system-wide basis, rather than project-by-project. |
| | | | **Policy F-326:** When new, expanded or upgraded transmission is required, use of existing corridors that have above-ground utilities should be evaluated first. King County should facilitate appropriate corridor sharing among different utility types and owners. |
| | | | **Policy F-327:** New electrical distribution lines should be installed underground where reasonably feasible and not a health or safety concern. The county should encourage underground placement of existing distribution lines through such tools as local improvement districts. |
| | | Health and Safety | **Policy F-328:** King County will monitor scientific research on potential human health effects of extremely low frequency electric and magnetic fields (EMF). If federal or state agencies promulgate rules to reduce exposure to EMF — through changes in the use of appliances, construction practices, the location of electrical infrastructure or other activities — the county shall inform its citizens and take appropriate actions. |

| King County Planning Document | Section* | Topic* | Goal or Policy and Text |
|---|---|---|---|
| | | Hazardous Liquid and Gas Transmission Pipelines | **Policy F-331:** King County recognizes that federal and state regulatory programs govern the design, construction, and operation of hazardous liquid and gas transmission pipelines. To preserve the safety and reliability of the hazardous liquid and gas transmission pipeline system, land use, zoning, and regulations shall be consistent with state and federal requirements. |
| | | | **Policy F-334:** When new, expanded, or upgraded hazardous liquid or gas transmission pipelines are required, use of existing corridors should be evaluated first. King County should facilitate appropriate corridor sharing among different utility types and owners. |
| | | | **Policy F-338:** Land uses shall be restricted within hazardous liquid and gas transmission pipeline rights-of-way. Passive recreational uses, such as hiking trails, may be allowed if the risk to life and property is assessed and determined to be minimal. |
| | | | **Policy F-339:** King County should promote the safety and reliability of the hazardous liquid and natural gas transmission pipeline systems by requiring developers, contractors, and excavators to notify the state, pipeline operators, and utilities through the one-number locator service, before beginning excavation or construction. |
| | Parks, Open Space and Cultural Resources | Parks and Recreation | **Policy P-109:** King County shall provide local parks, trails and other open spaces in the Rural Area. Local parks, trails and other open spaces that complement the regional system should be provided in each community in Rural Areas to enhance environmental and visual quality and meet local recreation needs. |
| | Rural Area and Natural Resource Lands | Land Use | **Policy R-655:** Public services and utilities within and adjacent to APDs shall be designed to minimize significant adverse impacts on agriculture and to maintain total farmland acreage and the area's historic agricultural character. |
| | Shorelines | Shoreline Management | **Policy S-203:** King County, when determining allowable uses and resolving use conflicts in the shoreline jurisdiction, shall apply the following preferences and priorities in the order listed below:<br>Reserve shoreline areas for water-dependent and associated water related uses. Harbor areas, established pursuant to Article XV of the State Constitution, and other areas that have reasonable commercial navigational |

| King County Planning Document | Section* | Topic* | Goal or Policy and Text |
|---|---|---|---|
| | | | accessibility and necessary support facilities, such as transportation and utilities, should be reserved for water-dependent and water-related uses that are associated with commercial navigation, unless adequate shoreline is reserved for future water-dependent and water-related uses and unless protection of the existing natural resource values of such areas preclude such uses. Shoreline mixed-use developments may be allowed if they include and support water dependent uses and address specific conditions that affect water dependent uses. |
| | | | **Policy S-313:** ensure that public and private development proposals protect and restore the aesthetic quality of shorelines |
| | | | **Policy S-536:** King County shall limit the size of new over-water structures in the Aquatic Shoreline Environment to the minimum necessary to support the structure's intended use. |
| | | | **Policy S-538:** King County shall require all developments and uses on navigable waters or their beds in the Aquatic Shoreline Environment to be located and designed to minimize interference with surface navigation, to consider impacts to public views, and to allow for the safe, unobstructed passage of fish and wildlife and materials necessary to create or sustain their habitat, particularly those species dependent on migration. |
| | | | **Policy S-539:** King County shall not allow uses in the Aquatic Shoreline Environment that adversely impact the ecological processes and functions of critical saltwater and freshwater habitats, except when necessary to achieve the objectives of RCW 90.58.020, and then only when the adverse impacts are mitigated according to the sequence described in WAC 173-26-201(2)(e) as necessary to assure no net loss of shoreline ecological processes and functions. |
| | | | **Policy S-701:** King County shall give preference to uses in the shoreline that are consistent with the control of pollution and prevention of damage to the natural environment or are unique to or dependent upon the shoreline. |

| King County Planning Document | Section* | Topic* | Goal or Policy and Text |
|---|---|---|---|
| | | Utility Corridors/ Facilities | **Policy S-760:** Utility facilities shall be designed and located to assure no net loss of shoreline ecological processes and functions, preserve the natural landscape, and minimize conflicts with present and planned land and shoreline uses, while meeting the needs of future populations in areas planned to accommodate growth. |
| | | | **Policy S-762:** Transmission facilities for the conveyance of services, such as power lines, cables, and pipelines, shall be located outside of the shoreline jurisdiction where feasible. Transmission facilities located within the shoreline jurisdiction shall assure no net loss of shoreline ecological processes and functions. |
| | | | **Policy S-763:** Utilities should be located in existing developed rights-of-way and corridors to the maximum extent practical. |
| | | | **Policy S-764:** Unless no other feasible alternative location exists, King County should discourage:<br>a. Locating pipelines and cables in water, on tidelands or roughly parallel to the shoreline; and<br>b. The development of facilities that may require periodic maintenance that disrupts shoreline ecological processes and functions. |

* The *Section* column indicates the element/chapter of the comprehensive plan where the goal or policy text was found. The *Topic* column indicates the subject matter that is covered by the goal or policy text.

**Table F-2. Beaux Arts Village Planning Goals and Policies**

| Beaux Arts Village Planning Document | Section* | Topic* | Goal or Policy and Text |
|---|---|---|---|
| **Town of Beaux Arts Village 2014 Comprehensive Plan (Draft)** 2014 | Land Use | Views and Aesthetics | **Plan Statement:** Maintain desirability of residential character |
| **Town of Beaux Arts Village Shoreline Master Program 2014** | Utilities | | Policy 6.14.1:<br>A. Repair, maintenance, expansion and upgrades to existing primary utilities, including the City of Bellevue's sanitary sewer line and the Town's municipal water or stormwater management systems, should be allowed.<br>B. New primary utilities should be prohibited. |

* The *Section* column indicates the element/chapter of the comprehensive plan where the goal or policy text was found. The *Topic* column indicates the subject matter that is covered by the goal or policy text.

**Table F-3. Bellevue Planning Goals and Policies**

| Bellevue Planning Document | Section* | Topic* | Goal or Policy and Text |
|---|---|---|---|
| **City of Bellevue Comprehensive Plan** 2015 | Citizen Engagement | Land Use | **Policy CE-4:** Balance the interests of the commercial and residential communities when considering modifications to zoning or development regulations. |
| | Capital Facilities | Essential Public Facilities | **Policy CF-16:** Define essential public facilities, consistent with the Growth Management Act. |
| | | | **Policy CF-17:** Require essential public facilities to be sited and designed according to city standards and criteria in order to minimize potential impacts to the community, while recognizing the public importance and difficult-to-site nature of such facilities. |
| | | | **Policy CF-18:** Participate in inter-jurisdictional efforts to site County-wide or statewide essential public facilities. Pursue agreements among jurisdictions to mitigate against the disproportionate burden that may fall on the jurisdiction |

| Bellevue Planning Document | Section* | Topic* | Goal or Policy and Text |
|---|---|---|---|
| | | | which becomes the site of a facility. |
| | | | **Policy CF-19:** Impose conditions of approval or other measures within the scope of the city's authority to mitigate environmental, compatibility, public safety, or other impacts of the essential public facility. |
| | | | **Policy CF-20:** Work to site or expand essential public facilities in ways that equitably balance social, environmental, and economic impacts to achieve citywide and regional planning objectives. |
| | | | **Policy CF-21:** Locate Secure Community Transition Facilities, as defined by RCW 71.09.020 now or as hereafter amended, outside of single family and multifamily residential districts. Provide a separation between Secure Community Transition Facilities and residentially developed property in other land use districts. |
| | Environment | Alternative Energy/New Technology | **Policy EN-4:** Promote and invest in energy efficiency and renewable energy resources as an alternative to nonrenewable resources. |
| | Land Use | Land Use | **Goal:** To develop and maintain a land use pattern that protects natural systems and retains trees and open space; maintains and strengthens the vitality, quality and character of Bellevue's neighborhoods; and focuses development activity in Downtown and other commercial and residential centers. |
| | | | **Policy LU-2:** Retain the city's park-like character through the preservation and enhancement of parks, open space, and tree canopy throughout the city. |
| | | | **Policy LU-29:** Help communities to maintain their local, distinctive neighborhood character, while recognizing that some neighborhoods may evolve. |
| | | | **Policy LU-1:** Promote a clear strategy for focusing the city's growth and development as follows:<br>1. Direct most of the city's growth to the Downtown regional growth center and to other areas designated for compact, mixed use development served by a full range of transportation options.<br>2. Enhance the health and vitality of existing single family and multifamily residential neighborhoods. |

| Bellevue Planning Document | Section* | Topic* | Goal or Policy and Text |
|---|---|---|---|
| | | | 3. Continue to provide for commercial uses and development that serve community needs. |
| | | Views and Aesthetics | **Policy LU-13:** Support neighborhood efforts to maintain and enhance their character and appearance. |
| | | | **Policy LU-14:** Protect residential areas from the impacts of nonresidential uses of a scale not appropriate to the neighborhood. |
| | Housing | Neighborhoods | **Policy N-1:** Maintain neighborhoods as safe and welcoming environments for everyone to enjoy. |
| | Parks and Recreation | Views and Aesthetics | **Plan Statement:** Define and enhance neighborhood character by using open space as visual relief to separate and buffer between uses. |
| | | Natural Features | **Policy PA-5:** Obtain, for preservation, natural areas that are sensitive to urbanization or represent a valuable natural and aesthetic resource to the community. |
| | | Utility Corridors/ Facilities | **Policy PA-7:** Maximize use of public lands by collaborating with other City projects and programs to incorporate utility, storm drainage, underutilized right-of-way and other public lands into the parks and open space system. |
| | | Vegetation | **Policy PA-29:** Design, construct, operate, and maintain parklands and facilities to preserve the ecology of natural systems on parklands. |
| | | | **Policy PA-30:** Protect and retain, in a natural state, significant trees and vegetation in publicly and privately-dedicated greenbelt areas. |
| | | | **Policy PA-31:** Manage Bellevue's forest resources, including street trees, formal plantings, and self-sustaining natural stands, to ensure their long term vitality. |
| | | Land Use | **Policy PA-37:** Require a public review process for the conversion to non-recreational use of park lands and facilities. |
| | Urban Design | Views and Aesthetics | **Policy UD-1:** Enhance the appearance, image and design character to make Bellevue an inspiring place to be. |
| | | | **Policy UD-2:** Preserve trees as a component of the skyline to retain the image of a "City in a Park." |

| Bellevue Planning Document | Section* | Topic* | Goal or Policy and Text |
|---|---|---|---|
| | | | **Policy UD-3:** Foster and value the preservation of open space as a dominant element of the city's character. |
| | | | **Policy UD-6:** Encourage the green and wooded character of existing neighborhoods. |
| | | | **Policy UD-7:** Support neighborhood efforts to maintain and enhance their character and appearance. |
| | | | **Policy UD-62:** Views of water, mountains, skylines or other unique landmarks from public places should be identified and preserved as valuable civic assets. |
| | Utilities | Alternative Energy/New Technology | **Plan Statement:** employment of new technology that improves utility services and reliability while balancing aesthetic, health and safety, economic, and environmental factors. |
| | | Utility Corridors/ Facilities | **Plan Statement:** Aesthetic impact of utilities can be reduced by using existing facilities, where feasible. Examples of facilities that might be shared are towers; electrical, telephone and light poles; substation sites; trenches; and easements. |
| | | | **Utilities Goals:**<br>• To develop and maintain all utilities at the appropriate levels of service to accommodate the city's projected growth.<br>• To ensure reliable utility service is provided in a way that balances public concerns about infrastructure safety and health impacts, consumer interest in paying a fair and reasonable price for service, potential impacts on the natural environment, and aesthetic compatibility with surrounding land uses.<br>• Utility facilities are permitted and approved by the city in a fair and timely manner and in accord with development regulations, to encourage predictability.<br>• New technology to improve utility services and reliability is used in balance with health and safety, economic, aesthetics, and environmental factors. |
| | | | **Policy UT-1:** Manage utility systems effectively in order to provide reliable, sustainable, quality service. |
| | | | **Policy UT-2:** Build and manage city-owned utility infrastructure assets to |

| Bellevue Planning Document | Section* | Topic* | Goal or Policy and Text |
|---|---|---|---|
| | | | reduce the likelihood of risks to public safety, property and environment, and disruption due to asset failure. |
| | | | **Policy UT-3:** Use design and construction standards that are environmentally sensitive, safe, cost-effective, and appropriate. |
| | | | **Policy UT-6:** Ensure that the location, type, and size of all public facilities is determined and/or approved by the city. |
| | | | **Policy UT-7:** Base the extension and sizing of system components on the land use plan of the area. System capacity will not determine land use. |
| | | | **Policy UT-8:** Design, construct, and maintain facilities to minimize their impact on surrounding neighborhoods. |
| | | | **Policy UT-9:** Encourage the joint use of public facilities such as the development of a storm and surface water detention area as passive recreation. |
| | | | **Policy UT-10:** Emphasize cost effective management of city utility systems over their lifetime, including planning for their renewal and replacement, balancing risk, and maintaining desired service levels. Forecast future capital and maintenance costs and manage rates so that customer rate revenue funds the cost of ownership equitably across generations. |
| | | | **Policy UT-11:** Educate and inform utility providers, consumers and the community about the costs and benefits of emerging technologies. |
| | | | **Policy UT-12:** Develop and periodically update functional utility system plans that forecast system capacity and needs for at least a 20 year planning horizon. |
| | | | **Policy UT-13:** Consider Low Impact Development principles to minimize impervious surfaces and native vegetation loss on all infrastructure improvement projects. |
| | | | **Policy UT-45:** Coordinate with non-city utility providers to ensure planning for system growth consistent with the city's Comprehensive Plan and growth forecasts. |

| Bellevue Planning Document | Section* | Topic* | Goal or Policy and Text |
|---|---|---|---|
| | | | **Policy UT-46:** Support new and emerging information and telecommunications technologies that would benefit utility service delivery by being sustainable, appropriate and viable. |
| | | | **Policy UT-47:** Defer to the serving utility the implementation sequence of utility plan components. |
| | | | **Policy UT-48:** Coordinate with the appropriate jurisdictions and governmental entities in the planning and implementation of multi-jurisdictional utility facility additions and improvements. |
| | | | **Policy UT-49:** Require effective and timely coordination of all public and private utility activities including trenching and culvert replacements. |
| | | | **Policy UT-51:** Maintain Bellevue's competitive advantage and attraction as a highly connected community. |
| | | | **Policy UT-57:** Require notification to the city prior to a utility's maintenance or removal of vegetation in city right-of-way. |
| | | | **Policy UT-58:** Require the undergrounding of all new electrical distribution lines except that interim installation of new aerial facilities may be allowed if accompanied by a program to underground through coordination with the city and other utilities. Require the undergrounding of all existing electrical distribution lines where a change in use or intensification of an existing use occurs, unless delayed installation is approved as part of a specific program to coordinate undergrounding of several utilities or in conjunction with an undergrounding program for several sites or when related to street improvements. |
| | | | **Policy UT-59:** When implementing street projects, determine whether the relocation of distribution facilities underground is required. If so, determine the manner of payment: tariff schedule, capital improvement program, or the formation of a local improvement district. |
| | | | **Policy UT-60:** Work with Puget Sound Energy, telecom providers, state regulatory agencies, and other responsible parties to develop funding tools that enable full mitigation of the neighborhood impacts of deploying electrical and telecommunications infrastructure. |

| Bellevue Planning Document | Section* | Topic* | Goal or Policy and Text |
|---|---|---|---|
| | | | **Policy UT-61:** Allow new aerial telecommunication lines on existing systems provided that they shall be designed to address visual impacts and are required to be placed underground at the time of undergrounding electrical distribution lines. |
| | | | **Policy UT-61:** Support neighborhood efforts to underground existing electrical transmission and distribution lines. |
| | | | **Policy UT-64:** Require the reasonable screening and/or architecturally compatible integration of all new utility and telecommunication facilities. |
| | | | **Policy UT-65:** Protect Bellevue's aesthetic quality and infrastructure investment from unnecessary degradation caused by the construction of telecommunication infrastructure. |
| | | | **Policy UT-66:** Encourage directional pruning of trees and phased replacement of improperly located vegetation in the right-of-way. Perform pruning and trimming of trees in an environmentally sensitive and aesthetically acceptable manner and according to professional arboricultural specifications and standards. |
| | | | **Policy UT-68:** Encourage the use of utility corridors as non-motorized trails. The city and utility company should coordinate the acquisition, use, and enhancement of utility corridors for pedestrian, bicycle and equestrian trails and for wildlife corridors and habitat. |
| | | | **Policy UT-69:** Avoid, when reasonably possible, locating overhead lines in greenbelt and open spaces as identified in the Parks and Open Space System Plan. |
| | | | **Policy UT-71:** Facilitate and encourage conservation of resources. Discussion: Items the city should consider in implementing this policy include conserving the use of electric energy in its own facilities, and adopting practical and cost-effective energy building codes. |
| | | | **Policy UT-72:** Encourage cooperation with other jurisdictions in the planning and implementation of multi-jurisdictional utility facility additions and improvements. Decisions made regarding utility facilities shall be made in a manner consistent with, and complementary to, regional demand and resources, and shall reinforce an interconnected regional distribution network. |

| Bellevue Planning Document | Section* | Topic* | Goal or Policy and Text |
|---|---|---|---|
| | | | **Policy UT-74:** Encourage system practices intended to minimize the number and duration of interruptions to customer service. |
| | | | **Policy UT-77:** Require all utility equipment support facilities to be aesthetically compatible with the area in which they are placed by using landscape screening and/or architecturally compatible details and integration. |
| | | | **Policy UT-91:** Encourage the public to conserve electrical energy through public education. |
| | | | **Policy UT-92:** Encourage city and utility involvement with regional or statewide agencies when and if they are developing policies regarding exposure to electric and magnetic fields (EMF) or other utility issues. |
| | | | **Policy UT-93:** Review new accepted scientific research of potential health impacts associated with electrical and telecommunications facilities and make changes to policies if the situation warrants. |
| | | | **Policy UT-94:** Require in the planning, siting, and construction of all electrical facilities, systems, lines, and substations that the electrical utility strike a reasonable balance between potential health effects and the cost and impacts of mitigating those effects by taking reasonable cost effective steps. |
| | | | **Policy UT-95:** Work with Puget Sound Energy to implement the electrical service system serving Bellevue in such a manner that new and expanded transmission and substation facilities are compatible and consistent with the local context and the land use pattern established in the Comprehensive Plan.<br>Discussion: Where feasible, electrical facilities should be sited within the area requiring additional service. Electrical facilities primarily serving commercial and mixed use areas should be located in commercial and mixed use areas, and not in areas that are primarily residential. Further, the siting and design of these facilities should incorporate measures to mitigate the visual impact on nearby residential areas. These considerations must be balanced with the community's need to have an adequate and reliable power supply. |
| | | | **Policy UT-96:** Require siting **a**nalysis through the development review process for new facilities, and expanded facilities at sensitive sites, including a consideration of alternative sites. |

| Bellevue Planning Document | Section* | Topic* | Goal or Policy and Text |
|---|---|---|---|
| | | | Discussion: Sensitive facility sites are those new facilities and existing facilities proposed to be expanded where located in or in close proximity to residentially-zoned districts such that there is potential for visual impacts absent appropriate siting and mitigation. The city will update Map UT-7 to the extent needed to stay current with changes in Puget Sound Energy's system planning. |
| | | | **Policy UT-97:** Avoid, minimize and mitigate the impacts of new or expanded electrical facilities through the use of land use regulations and performance standards that address siting considerations, architectural design, site screening, landscaping, maintenance, available technologies, and other appropriate measures. |
| | | | **Policy UT-99:** Work with and encourage Puget Sound Energy to plan, site, build and maintain an electrical system that meets the needs of existing and future development, and provides highly reliable service for Bellevue customers.<br>Discussion: Providing highly reliable service is a critical expectation for the service provider, given the importance of reliable and uninterrupted electrical service for public safety and health, as well as convenience. Highly reliable service means there are few and infrequent outages, and when an unavoidable outage occurs it is of short duration and customers are frequently updated as to when power is likely to be restored. A highly reliable system will be designed, operated and maintained to keep pace with the expectations and needs of residents and businesses as well as evolving technologies and operating standards as they advance over time. |
| | | | **Policy UT-100:** Encourage the prioritization of restoring electrical service to water and wastewater utility facilities following power outages. |
| | | | **Policy UT-101:** Administer applicable regulations and franchise agreement authority over the Seattle City Light and Olympic Pipeline infrastructure located in Bellevue. |
| | | Energy | **Policy UT-70:** Facilitate the conversion to cost-effective and environmentally sensitive alternative technologies and energy sources. |

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**Table F-4. Clyde Hill Planning Goals and Policies**

| Clyde Hill Planning Document | Section* | Topic* | Goal or Policy and Text |
|---|---|---|---|
| **Clyde Hill Comprehensive Plan** 2015 | Environment | Energy | **ENV Policy 6.4:** Support implementation of Washington State's Renewable Portfolio Standard and federal policy on reducing greenhouse gas emissions from power production. |
| | Land Use | Utilities | **LU Policy 1.7:** Provide policy guidelines that protect views and helps balance the sometimes conflicting benefits of views and trees. |
| | Utilities | Utilities | **UTIL Policy 1.1:** Continue to provide technical assistance to those neighborhoods that wish to pursue the undergrounding of electrical, telephone, and cable lines. |
| | | | **UTIL Policy 1.8:** Work with electrical utility to address reliability in electrical service. |

* The *Section* column indicates the element/chapter of the comprehensive plan where the goal or policy text was found. The *Topic* column indicates the subject matter that is covered by the goal or policy text.

**Table F-5. Hunts Point Planning Goals and Policies**

| Hunts Point Planning Document | Section* | Topic* | Goal or Policy and Text |
|---|---|---|---|
| **Draft Comprehensive Plan Update for the Town of Hunts Point** 2014 | Implementation | Views and Aesthetics | The Plan states that its tree code regulates the removal and replacement of significant trees to "soften the visual impacts of development" and protect the Town's wooded and sylvan character |
| **Shoreline Master Program** 2015 | Shoreline Use Policies | Utilities | **Policy 6.12**<br>B. In areas where utilities must cross shoreline jurisdiction, they shall do so by the most direct route feasible, unless such a route would negatively impact an environmentally critical area, obstruct public access to the shoreline, or interfere with the navigability of a waterbody regulated by this SMP.<br>C: Use of construction methods that avoid greater impact shall be used when feasible, which may include directional boring, use of sleeves or other construction methods which reduce or avoid temporary and long-term adverse ecological impacts. |

| Hunts Point Planning Document | Section* | Topic* | Goal or Policy and Text |
|---|---|---|---|
| | | | D. High voltage electric transmission lines are prohibited within shoreline jurisdiction.<br>J. New accessory utility lines, including electricity and communications, shall be located underground. Existing above ground lines shall be moved underground when properties are redeveloped or in conjunction with major system upgrades or replacements. |

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### Table F-6. Issaquah Planning Goals and Policies

| Issaquah Planning Document | Section* | Topic* | Goal or Policy and Text |
|---|---|---|---|
| **City of Issaquah Comprehensive Plan** 2015 | Introduction and Vision 2040 | Energy | Care for the natural environment by…reducing greenhouse gas emission and air pollutants. |
| | | Parks and Recreation | The public realm is a community value and we strive to connect all aspects of the public realm through trails, shared use routes and other connections. |
| | | Public Services | The region will support development with adequate public facilities and services in a coordinated, efficient and cost effective manner that supports local and regional growth planning objectives. |
| | | Utilities and Public Services | Ensure City utilities are maintained and improved while minimizing disruptions to affected areas when utility improvements and new construction are required. |
| | | | Coordinate utilities and public facilities to ensure needed utility services will be available when development occurs. |
| | | | Encourage utility conservation efforts that minimize demand for natural resources. |
| | | | Provide efficient and cost-effective public services. |
| | | | Provide high-quality public safety services and well-maintained and dependable public facilities…The cost of providing and maintaining quality services and facilities is shared equitably, balancing the needs of the community with those of the individual. |

| Issaquah Planning Document | Section* | Topic* | Goal or Policy and Text |
|---|---|---|---|
| | | Vegetation | As part of our fundamental value and identity of forested character, tree cutting will be minimized outside Central Issaquah through stronger protection of the forested hillsides. Protection of our remaining forested hillsides and tree canopy enhancement on developed hillsides will ensure that Issaquah's Alps will provide the forested transition from our adjacent natural areas outside the Urban Growth Boundary. |
| | Economic Vitality Element | Views and Aesthetics | **EV Policy A3:** Plan for utility and other infrastructure assets to be available in commercial areas, as addressed in the Utility element. |
| | Land Use Element | Vegetation | **LU Policy A5** Maintain the forested character of older developed hillsides such as Squak Mountain, Cougar Mountain (not including Talus) Tiger Mountain and the Plateau (such as Overdale Park) by requiring that new and infill development should be made compatible through: limited clearing/grading provisions; protection and preservation of existing tree canopy; limiting size of development and number of buildings within clusters; limiting lot size and height provisions; and providing links to sidewalks and bike paths since a vehicular grid may be difficult in hillside development. For those hillside neighborhoods that have recently undergone dense urban development, such as Issaquah Highlands, Talus and Lakeside, protect and preserve the remaining forested hillsides and restore the area over time so that it once again attains the forested character so valued by the community. Restoration adds to habitat, erosion protection and offsetting the urban heat island effects and can include tree plantings in parks, critical area buffers, and other locations where appropriate. |
| | | | **LU Goal B.** Achieve and maintain an overall tree canopy of at least 50% for reasons such as, but not limited to, offsetting the urban heat island effects, sequestering carbon dioxide emissions, and creating an inviting pedestrian environment. |
| | | | **LU Policy B1** Address the management of trees on two distinct levels.<br>a. Identify trees in our urban environments that create difficult conditions for the maintenance of tree health, including limited root and canopy space, poor soil quality inconsistent water, light and heat as well as pollution and mechanical and chemical damage. |

| Issaquah Planning Document | Section* | Topic* | Goal or Policy and Text |
|---|---|---|---|
| | | | b. Preserve the forest ecosystems found in Native Growth Protection and open space areas through maintenance and restoration including planting of appropriate trees, removal of invasive plants and adequate drainage and watering. |
| | | | **LU Policy B2** Retain existing trees in critical areas and their buffers, along designated pedestrian corridors and in other green spaces. Increase and enhance the City's Tree Canopy through a program of tree planting in public areas, including street trees in planter strips, public parks, open spaces and City facilities. Consider programs that create incentives for residents and businesses to plant trees on their private property. |
| | | | **LU Policy B3** Maintain and strengthen, where possible, Tree City USA status. |
| | | Parks and Recreation | **LU Policy A11** Support the goals of the Mountains to Sound Greenway Project. |
| | | Views and Aesthetics | **LU Policy A12** Integrate natural features such as wetlands, riparian corridors and forested hillside views into the site design as amenities and protect them as environmental resources. Require natural resources management practices into site development and operation by:<br>a. incorporating natural drainage practices into park development to provide community amenities and watershed benefits, where appropriate and feasible;<br>b. integrating the Green Necklace into the riparian corridors to achieve multiple benefits, including enhanced fish and wildlife habitat, trail connections and environmental education; and<br>c. allowing flexibility in building design, orientation, spacing and landscaping. |
| | | | **LU Policy E4** Enhance Riparian corridors and wetlands to integrate the views and open space they provide into all developments, where applicable. |

| Issaquah Planning Document | Section* | Topic* | Goal or Policy and Text |
|---|---|---|---|
| | | | **LU Policy H9** Preserve, to the extent possible while achieving other City goals, existing views of the Issaquah Alps, Mount Rainier and the Sammamish Plateau from public spaces including circulation facilities, parks and open space using methods such as increasing distances between high-rise buildings, retaining or creating view corridors, and strategic placement of building bulk or height. |
| | | | **LU Policy H10** Minimize the view impact of hillside development from the valley floor and other hillsides by strategically integrating the architecture, siting and landscaping into the natural environment. Techniques might include:<br>• using color hues which help buildings blend into the forested hillsides;<br>• using non-reflective surfaces to reduce glare;<br>• shifting buildings so they are not in a horizontal row; or<br>• strategically locating trees and other landscaping to reduce perceived bulk and retain the forested hillside appearance. |
| | | Critical Areas | **LU Policy C3** Require new development and substantial redevelopment to comply with adopted standards and buffers to protect critical areas. |
| | | Climate | **LU Goal F.** Encourage innovative climate solutions which advance the City towards a carbon neutral community. |
| | | | **LU Policy F1** Educate residents, businesses and developers regarding ways to limit the community's impact upon climate change such as through development and redevelopment requirements, improved efficiency, carbon sequestration and other climate solutions. |
| | | | **LU Policy F2** Encourage all development and infrastructure in the public and private sectors which:<br>a. Use less energy and have a lower climate impact, and incorporate into developments, where possible. |
| | | | **LU Policy F3** Reduce the city-wide greenhouse gas emissions, compared to a 2007 baseline, below 25% by 2020, below 50% by 2030 and below 80% by 2050. |

| Issaquah Planning Document | Section* | Topic* | Goal or Policy and Text |
|---|---|---|---|
| | | | **LU Policy F4** Reduce the impacts of climate through education, incentives, policies and regulations that require reduction and mitigation of greenhouse gas and carbon dioxide equivalent emissions in all land uses and by providing incentives for innovative climate solutions which advance the City towards a carbon neutral community. |
| | | | **LU Policy F6** Consider establishing a program to support energy efficiency retrofits of existing buildings which will not be redeveloped in the short term. |
| | | Alternative Energy | **LU Policy F7:** Work with Puget Sound Energy and other state and federal programs to expand Issaquah participation in the Green Power Program, a voluntary way for residents and businesses to buy renewable energy equal to the amount of electricity they use. |
| | | General | **LU Policy M5:** Proactively coordinate with regional jurisdictions and agencies to ensure that regional funding priorities do not overlook the needs of Issaquah. |
| | | Utility Corridors/ Facilities | **LU Policy N8:** Control impacts of development on the following when annexing.<br>• land use, including density, design, signage, landscaping and open space provisions;<br>• surface and groundwater (wellhead protection and aquifer recharge area and flooding);<br>• critical areas and natural resources;<br>• parks and recreation;<br>• utilities;<br>• transportation;<br>• housing;<br>• schools;<br>• economic vitality; and<br>• Issaquah's Treasures. |
| | Housing Element | Energy | **H Policy A8** Encourage energy efficiency and other sustainability and conservation measures into new and preserved housing, as well as the use of environmentally sensitive housing development practices. |

| Issaquah Planning Document | Section* | Topic* | Goal or Policy and Text |
|---|---|---|---|
| | Human Services Element | Energy | **HS Policy K1** Support utility assistance programs for low income households, including financial assistance, weatherization and conservation programs in order to help reduce individual household utility costs and provide for increased housing stability. |
| | Parks and Recreation Element | Views and Aesthetics | **P Policy B5.4 Scenic Visual Resources**: Preserve the quality of surrounding scenic and visual resources provided by the natural open space areas, such as the forested hillsides of the "Issaquah Alps." Encourage orienting park development such that and facilities and activities preserve these picturesque vistas for all to enjoy. |
| | Utilities and Public Services Element | Land Use | **Goal A.** Facilitate the development of all utilities and public services at the appropriate levels of service to accommodate Issaquah's planned growth and ensure reliability of utilities and public services. |
| | | Essential Public Facilities | **U Policy I1:** Essential public facilities shall be sited and designed to ensure compatibility with the surrounding neighborhood. |
| | | Health and Safety | **U Policy A2:** Ensure utility provision maximizes public safety, minimizes adverse environmental impacts, and is compatible with surrounding land uses. Balance public concerns over the potential safety and health impacts of utility and public service infrastructure, consumers' interest in paying a fair and reasonable price for the utility and public service provider's product or service, the natural environment and the potential impacts of utility or public service infrastructures, and the community's desire that utility and public service projects be aesthetically compatible with surrounding land uses. |
| | | Utilities | **U Policy A4** Manage public facilities systems in order to provide reliable, quality service and require that the location, type and size of all public facilities be determined and/or approved by the City. |
| | | | **U Policy B4** Promote the efficiency of utility placement both in cost and timing through methods such as:<br>a. collocate public and private utilities in shared trenches or utility corridors where possible;<br>b. coordinate facility planning so utilities may locate in transportation corridors and other dedicated rights-of-way; |

| Issaquah Planning Document | Section* | Topic* | Goal or Policy and Text |
|---|---|---|---|
| | | | c. provide timely notice to utilities or coordinate with them when construction/repair of existing and new roadway, bridges or sidewalks is anticipated;<br>d. provide expeditious permitting, recognizing that avoiding utility project delay can minimize service disruptions and associated costs for residents and business;<br>e. design new public infrastructure to allow for projected future utilities that may be placed within those facilities at a later time; and<br>f. encourage joint use of utility corridors for utilities, recreation and appropriate nonmotorized connections. |
| | | | **U Policy F2:** Require that all maintenance, repair and installation activities by utilities are in compliance with the city codes and policies including critical areas regulations. |
| | | | **U Policy F3:** Require the undergrounding of all new electrical distribution lines where it is reasonably feasible and in accordance with State rules, regulations and tariffs. |
| | | | **U Policy F4:** Encourage the consolidation of facilities such as towers, poles, antenna, substation sites, trenches, and easements, and rights-of-way where reasonably feasible and in accordance with prudent utility practice to minimize adverse impacts on adjacent land uses. |
| | | | **U Policy F5:** Decisions regarding utility facilities shall be made consistent with the City's land use goals, regional demand and resources, and shall reinforce an interconnecting regional distribution network. |
| **City of Issaquah Shoreline Master Program**<br>2013 | Utilities - Regulations | Shoreline Management | **Policy 5.18.1:**<br>New public or private utilities, including utility production and processing facilities and transmission facilities, should be located outside of the shoreline area unless they are required for an authorized shoreline use |
| | | Utility Corridors/ Facilities | **Policy 5.18.1:**<br>Utilities should be located in existing rights-of-way and corridors wherever possible; joint use of rights-of-way and corridors should be encouraged; new utility facilities should be located and designed to preserve natural shoreline features and to avoid public recreation and public access areas. |

| Issaquah Planning Document | Section* | Topic* | Goal or Policy and Text |
|---|---|---|---|
| | | Views and Aesthetics | **Policy 5.18.1:** Utility facilities and corridors should be located to protect scenic views, and wherever possible, utility facilities should be placed underground or conversely alongside or under bridges. |

* The *Section* column indicates the element/chapter of the comprehensive plan where the goal or policy text was found. The *Topic* column indicates the subject matter that is covered by the goal or policy text.

### Table F-7. Kirkland Planning Goals and Policies

| Kirkland Planning Document | Section* | Topic* | Goal or Policy and Text |
|---|---|---|---|
| **City of Kirkland Comprehensive Plan** 2015 | Community Character Element | Views and Visual Resources | **Goal CC-3:** Accommodate change within the Kirkland community and the region in a way that maintains Kirkland's livability and beauty. |
| | | | **Goal CC-4:** Maintain and enhance Kirkland's built and natural environment by strengthening the visual identity of Kirkland and its neighborhoods. |
| | | | **Policy CC-4.5: Protect public scenic views and view corridors.** Public views of the City, surrounding hillsides, Lake Washington, Seattle, the Cascades and the Olympics are valuable not only for their beauty but also for the sense of orientation and identity that they provide. Almost every area in Kirkland has streets and other public spaces that allow our citizens and visitors to enjoy such views. View corridors along Lake Washington's shoreline are particularly important and should continue to be enhanced as new development occurs. Public views can be easily lost or impaired and it is almost impossible to create new ones. Preservation, therefore, is critical.<br>Private views are only protected where specifically mentioned in some of the neighborhood plan chapters of the Comprehensive Plan and in the City's development regulations. |
| | | | **Policy CC-4.6:** Preserve and enhance natural landforms, vegetation, and scenic areas that contribute to the City's identity and visually define the community, its neighborhoods and districts. |
| | | | **Policy CC-4.10:** Maintain and enhance the appearance of streets and other public spaces. |

| Kirkland Planning Document | Section* | Topic* | Goal or Policy and Text |
|---|---|---|---|
| | | | **Policy CC-4.11:** Minimize impacts on residential neighborhoods. |
| | Economic Development | Views and Visual Resources | **Policy ED 4.1:** Encourage construction and maintenance of infrastructure systems for utilities, transportation, and telecommunication that optimize service delivery to the business community. |
| | Land Use Element | Views and Visual Resources | **Policy LU-1.3:** Encourage attractive site and building design that is compatible in scale and in character with existing or planned development. |
| | | | **Goal LU-6:** Establish a coordinated and connected system of open space throughout the City that:<br>• Preserves natural systems,<br>• Protects wildlife habitat and corridors,<br>• Provides land for recreation, and<br>• Preserves natural landforms and scenic areas. |
| | | Land Use | **Policy LU-1.4**: Create effective transitions between different land uses. |
| | | | **Policy LU-1.5**: Regulate land use and development in environmentally sensitive areas to ensure improve and protect environmental quality and avoid unnecessary public and private costs. |
| | | | **Policy LU-4.1**: Maintain and enhance the character of Kirkland's residential areas. |
| | | | **Policy LU-4.4:** Consider neighborhood character and integrity when determining the extent and type of land use changes. |
| | | Parks and Recreation | **Policy LU-6.3:** Consider the City's streets and the Cross Kirkland Corridor as integral parts of the overall open space network. |
| | | Alternative Energy/New Technology | **Policy LU-7.2:** Decrease energy use, promote renewable energy, and promote public health through land use strategies that promote a mix of housing, employment, and services at intensities sufficient to promote walking, bicycling, and transit. |
| | | Essential Public Facilities | **Policy LU-8.1:** Work cooperatively with King County, the State and/or other cities to site essential public facilities. |

| Kirkland Planning Document | Section* | Topic* | Goal or Policy and Text |
|---|---|---|---|
| | | | **Policy LU-8.2:** Consider the following in siting essential public facilities:<br>• Accessibility to the people served;<br>• Public involvement;<br>• Protection of neighborhoods;<br>• Preservation of natural resources;<br>• The cost-effectiveness of service delivery;<br>• Location near transit and mixed-use centers; and<br>• The goals and policies of the City's Comprehensive Plan. |
| | | | **Policy LU-8.3:** Design essential public facilities as well as government and community facilities to reduce incompatibility with adjacent land uses. |
| | Parks, Recreation, and Open Space Element | Views and Visual Resources | The City should pursue opportunities to provide appropriate public access (e.g. trails, viewpoints wildlife viewing areas, and boat landings) within natural areas to support passive recreation and environmental education. |
| | | Parks and Recreation | **Goal PR-3:** Protect, preserve, and restore publicly-owned natural resource areas. |
| | | | **Policy 3.1:** Maintain and enhance Kirkland's waterfront parks to connect residents with the water, provide unique recreational experiences, and support tourism. |
| | | | **Policy 4.2:** Develop, enhance and maintain signature greenways and trails that stretch across the community and that connect residents to the City's many parks, natural areas, recreation facilities and other amenities.<br>Kirkland Waterfront: The City should strive to create a continuous pedestrian and bicyclist greenway along the lakeshore through parks, neighborhood greenway improvements, and trail easements.<br>Cross Kirkland Corridor: Develop or improve parks adjacent to the Cross Kirkland Corridor to provide additional amenities and create pleasant destinations or stopping points along the trail. |
| | Shoreline Area Element | Shoreline Management | **Policy SA-2.1:** Designate properties as Natural in order to protect and restore those shoreline areas that are relatively free of human influence or that include intact or minimally degraded shoreline functions that are sensitive to potential impacts from human use. |

| Kirkland Planning Document | Section* | Topic* | Goal or Policy and Text |
|---|---|---|---|
| | | | Any use or development activity that would potentially degrade the ecological functions or significantly alter the natural character of the shoreline area should be severely limited or prohibited, as follows:<br>Roads, utility corridors, and parking areas that can be located outside of Natural designated shorelines should be prohibited unless no other feasible alternative exists. Roads, bridges and utilities that must cross a Natural designated shoreline should be processed through a Shoreline Conditional Use. |
| | | | **Policy SA-25.1:** Locate new utilities and related appurtenances outside of the shoreline area, unless this location is reasonably necessary for the efficient operation of the utility.<br>To minimize potential impacts, these facilities should be located outside of the shoreline area, and in particular, outside of the aquatic environment, where feasible. If necessary within the shoreline, utility facilities should be located and designed in a manner that preserves the natural landscape and shoreline ecology, and minimizes conflicts with present and planned land uses.<br>Alternative energy use such as solar- and wind-based energy systems should be encouraged within the shoreline environment, provided that any potential adverse impacts are minimized. |
| | | | **Policy SA-25.2:** Minimize impacts from the location, design, and maintenance of utility facilities located within the shoreline. |
| | | Utility Corridors /Facilities | **Policy SA-25.3:** Encourage consolidation of utilities within existing rights-of-way or corridors. |
| | Utilities Element | Views and Visual Resources | **Policy U-1. 78:** Install new and, where feasible, existing utility distribution lines underground. Undergrounding utilities can be especially effective along major routes with good regional views; especially of Lake Washington and within view corridors. The City should explore prioritizing the undergrounding of existing utility lines in these areas. |
| | | | **Policy U-7.6**: Screen above ground equipment cabinets and other structures associated with electrical distribution without hindering access as required by the provider. |

| Kirkland Planning Document | Section* | Topic* | Goal or Policy and Text |
|---|---|---|---|
| | | | **Policy U-7.7:** Require siting analysis in the development review process for new and expanded electrical transmission and substation facilities to address land use and sensitive areas and provide mitigation to minimize visual and environmental impacts.<br>New or expanded aerial transmission lines should be sited and designed to minimize impacts to critical areas, preserve trees, and reduce visual impacts, especially where views of Lake Washington, the Olympic Mountains and view corridors are affected. |
| | | Utility Corridors/ Facilities | **Policy U-1.8:** Install new and, where feasible, existing utility distribution lines underground. |
| | | | **Policy U-1.9:** Encourage the joint use of utility corridors and facilities consistent with prudent utility practice. |
| | | | **Policy U-7.5**: Require new and, where feasible, existing electrical distribution lines in the right of way to be underground. |
| | | | **Goal U-8:** Facilitate the development and maintenance of non-City-managed utilities at the appropriate levels of service. |
| | | | **Policy U-8.1:** Work with non-City-managed utilities and review facility plans to ensure that they reflect and support Kirkland's land use plan. Likewise, the City should work with providers to ensure that utilities are available to support land uses and to maintain appropriate levels of service**.** |
| | | | **Policy U-8:3:** Coordinate with the appropriate utility provider when considering land use decisions in the vicinity of proposed facility locations to ensure land use compatibility. |
| | | Health and Safety | **Goal U-3:** Protect public health and environmental quality through appropriate and efficient design, installation, and maintenance of sanitary sewer facilities infrastructure. |
| | | | **Policy U-7.7:** Require siting analysis in the development review process for new and expanded electrical transmission and substation facilities to address land use and sensitive areas and provide mitigation to minimize visual and environmental impacts.<br>In addition, while the impacts of exposure to electric and magnetic fields (EMF) on health remains a question, minimizing potential risk is appropriate. |

| Kirkland Planning Document | Section* | Topic* | Goal or Policy and Text |
|---|---|---|---|
| | | | Accepted low-cost methods should be considered to reduce exposure without unduly burdening the utility provider. The city should be involved with regional or statewide agencies when and if they develop policies regarding exposure to EMF. Periodic review of the state of scientific research on EMF may warrant changes to policies. |
| | | Hazardous Liquid and Gas Transmission Pipelines | During development review and construction of projects in the vicinity of the pipeline, setting requirements for avoidance of damage and coordination between Kirkland and the pipeline operator, Olympic Pipeline Company, or its successor can help avoid problems. |
| | | | **Goal U-6:** Reduce the risk to public safety and the environment in the event of a hazardous liquid pipeline failure. |
| | | | **Policy U-6.1**: Establish standards to minimize pipeline damage.<br>Require development activity near pipelines to provide the following information in order to evaluate the proposal:<br>• Location of the liquid pipeline corridor in relation to proposed structures,<br>utilities, or clearing and grading activities.<br>• Proposed techniques to minimize the potential disturbance to the pipeline<br>prior to and during construction.<br>• Potential stormwater discharge impacts to the pipeline, and mitigation measures to prevent erosion.<br>• Setbacks and other site design techniques to minimize the potential hazard.<br>• Emergency plans as appropriate. |
| | | | **Policy U-6.2**: Coordinate with the pipeline operator when developments are proposed near the hazardous liquid pipeline corridor to reduce the potential for problems.<br>The City and operator should communicate and coordinate their review. Methods include the following:<br>• Notifying the pipeline operator of proposed development projects located<br>near the pipeline corridor. |

| Kirkland Planning Document | Section* | Topic* | Goal or Policy and Text |
|---|---|---|---|
| | | | • Receiving verification that the pipeline operator has received and reviewed the proposal, and provided comments prior to City review of development activity.<br>• Seeking the pipeline operator's participation in preconstruction meetings if warranted.<br>• Seeking monitoring by the pipeline operator of development that involves land disturbance or other significant work within or near the pipeline corridor. |
| | | | **Policy U-6.3:** Prohibit new high consequence land uses from locating near a hazardous liquid pipeline corridor. Design proposed expansions of high consequence land uses to avoid increasing the level of risk in the event of a pipeline failure, and where feasible, to reduce the risk.<br>Land uses with high-density on-site populations that cannot be readily evacuated or protected in the event of a pipeline failure are considered "high consequence land uses." Examples are schools and multifamily housing exclusively for the elderly or the handicapped.<br>Uses such as these carry a relatively higher risk and have higher potential consequences in the event of a pipeline failure and therefore are not as appropriate as other uses near pipelines. Facilities that serve critical "lifeline" or emergency functions, such as fire and police facilities or utilities that provide regional service, are also considered "high consequence land uses." |
| | | | **Policy U-6.4:** Require maintenance of the hazardous liquid pipeline corridor through a franchise agreement or other mechanisms.<br>The pipeline operator can help reduce the likelihood of accidental damage by adequately maintaining the pipeline corridor.<br>Dense vegetation such as blackberry bushes can impede visibility and access. Instead, the pipeline corridor can be properly maintained with grass or other low-growing vegetation that enables easy inspection while preventing erosion. Ensuring that the pipeline locations are marked and that missing markers are replaced is also important, as is periodic aerial inspection of the pipeline corridor to detect potential problems. Kirkland can assist this effort when permits are necessary for inspections or repair with prompt permit processing. |

| Kirkland Planning Document | Section* | Topic* | Goal or Policy and Text |
|---|---|---|---|
| | | | The pipeline operator should maintain the pipeline corridor on a continual basis by:<br>• Maintaining vegetation to enable visibility and access for inspection while ensuring that such maintenance does not contribute to soil erosion;<br>• Using plant species and plantings that prevent erosion;<br>• Ensuring that above and below grade pipeline markers containing information, such as operator name and number and facility type, are in place; and<br>• Conducting periodic visual inspections of the corridor. |
| | | | **Policy U-6.6:** Continue to work with other jurisdictions, state and federal governments, and the pipeline operator to seek improvements in safety measures for hazardous liquid pipelines.<br>Working with other jurisdictions and agencies as part of a unified approach to addressing pipeline safety issues is important. This unified approach can address issues such as maintaining a model franchise agreement, periodic review of the pipeline operator's safety action plan to identify any deficiencies, and advocacy of City concerns regarding pipeline safety regulations. |
| | | Alternative Energy/New Technology | **Goal U-7 (related to Alternatives 2 and 3):** Promote energy infrastructure that is energy-efficient, addresses climate change, and protects the community character. |
| | | | **Policy U-7.1:** Encourage the public to conserve energy through public education. |
| | | | **Policy U-7.2:** Participate in regional efforts to increase renewable electricity use 20% beyond 2012 levels countywide by 2030, phase out coal fire electricity sources by 2025, limit construction of new natural gas based electricity power plants, and support development of increasing amounts of renewable energy sources. |
| | | | **Policy U-7.3:** Work with and encourage PSE to provide clean and renewable energy that meets the needs of existing and future development, and provides sustainable, highly reliable, and energy efficient service for Kirkland customers. |
| | | | **Policy U-7.4:** Promote the use of small to large scale renewable energy production facilities. |

| Kirkland Planning Document | Section* | Topic* | Goal or Policy and Text |
|---|---|---|---|
| | | Health and Safety | **Policy U-8.6:** Coordinate emergency response for utility disaster recovery. During disasters, effective incident coordination between utility providers and emergency management is imperative. Plans should include provisions for mitigating impact of collapsed electrical poles and towers, pipeline failures of all kinds (water, sewer, petroleum), for restoration of service as quickly as possible, and for the citywide implementation of emergency management plans. |

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**Table F-8. Medina Planning Goals and Policies**

| Medina Planning Document | Section* | Topic* | Goal or Policy and Text |
|---|---|---|---|
| **City of Medina Comprehensive Plan** 2015 | Parks and Open Space Goals and Policies | Views and Aesthetics | **Policy PO-P3:** The City shall seek to acquire view rights to preserve the views of view parks |
| | Utilities Plan | Utilities | **Policy UT-P1:** The City shall coordinate with applicable service providers to seek repairs and upgrades to existing utility facilities as necessary to maintain and/or improve efficiency, reliability, and/or capacity. |
| | Utilities | Utilities | **UT-P2:** The City shall provide leadership and seek to develop a plan to underground remaining above-ground utility lines. |
| **Shoreline Master Program** 2014 | Shoreline Management Sub-Element | Views and Aesthetics | **Policy SM-P12.1:** All development and uses on waters, or their beds, should be located and designed with consideration to public views. |
| | | | **Policy SM-P12.4:** Public's visual access to all shoreline areas should be preserved and enhanced through development regulations, such as setbacks and high limits that ensure view corridors. |
| | | Shoreline Management | **Policy SM-P15.2:** One of the policies stated in the SMP is that new utilities should be located outside of the shoreline jurisdiction "unless no other feasible location exists" (SM-P15.2; SMP). Should they be required in the shoreline, utility facilities and corridors need to be located in manner that preserves that |

| Medina Planning Document | Section* | Topic* | Goal or Policy and Text |
|---|---|---|---|
| | | | natural landscape, minimizes conflict with neighboring land uses, and minimizes impacts on the aesthetic qualities of the shoreline. |
| | | Utility Corridors/ Facilities | **Policy SM-P15.3:** It is suggested that facilities be placed underground whenever possible. Joint use of rights-of-way is also encouraged under the SMP. |
| | | | **Policy SM-P15.5:** Joint use of rights-of-way is also encouraged under the SMP. |

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### Table F-9. Newcastle Planning Goals and Policies

| Newcastle Planning Document | Section* | Topic* | Goal or Policy and Text |
|---|---|---|---|
| **Newcastle 2035 – 2015 Comprehensive Plan Update (Final Draft)** 2015 | Land Use Element | Land Use | **Land Use Goals**<br>**LU-G3:** preserve the existing character, scale, and neighborhood quality as new development occurs<br>**LU-G8:** Strive to preserve and enhance natural features, such as stream channels, that contribute to the City's scenic beauty.<br>**LU-G13:** The City shall identify lands useful for public purposes such as utility and transportation corridors, landfills, sewage treatment facilities, storm water management facilities, recreation, schools, and other public uses. |
| | | | **Policy LU-P17:** Non-residential uses may be allowed in new residential developments when proposed uses are determined to be both viable and beneficial to the surrounding neighborhood. |
| | | Views and Aesthetics | **Policy LU-P19:** Specifically, the Plan encourages placement of utility lines in shared utility corridors and recommends that aesthetics be considered during design and maintenance. In general, the Plan states that design guidelines should be used to "promote the aesthetic vision of the community" |

| Newcastle Planning Document | Section* | Topic* | Goal or Policy and Text |
|---|---|---|---|
| | | Water Resources | **Policy LU-P58:** Stream crossings for streets, utilities, and other development should be avoided where reasonable alternatives have lesser impacts on habitats. Stream channels should not be placed in culverts unless absolutely necessary for property access. Where no reasonable alternatives are possible, impacts on habitats shall be minimized with compensatory mitigation provided as appropriate. |
| | Utilities Element | Utilities | The Utilities Element addresses utilities not owned or operated by the City of Newcastle. The goal and supporting policies emphasize coordinated utility planning, including co-location of utility lines in shared utility corridors. The City of Newcastle recommends that the aesthetics and safety of utility corridors be considered in their design and maintenance. |
| | | | **Utilities Goals:**<br>**UT-G1:** To ensure that utilities including electricity, natural gas, and telecommunications transmission are available or can be provided to serve the projected population growth within the planning area in a manner which is fiscally and environmentally responsible, justified by projected future demand, aesthetically acceptable to the community and safe for nearby inhabitants. |
| | | Utility Corridors/ Facilities | **Policy UT-P1:** The City shall require that the undergrounding of new utility distribution lines, with the exception of high voltage electrical transmission lines. |
| | | | **Policy UT-P2:** The City shall require the undergrounding of existing utility distribution lines where physically feasible as streets are widened and/or areas are redeveloped based on coordination with local utilities. |
| | | | **Policy UT-P3:** The City shall promote co-location of major utility transmission facilities such as high-voltage electrical transmission lines and water and natural gas trunk pipelines within shared utility corridors, to minimize the amount of land allocated for this purpose and the tendency of such corridors to divide neighborhoods. |
| | | | **Policy UT-P4:** The City of Newcastle shall promote co-location of utility distribution facilities and share trenches in coordination of construction timing to minimize construction related disruption to the public and to reduce the cost of public utility delivery. |

| Newcastle Planning Document | Section* | Topic* | Goal or Policy and Text |
|---|---|---|---|
| | | | **Policy UT-P6:** The City shall promote conservation measures to reduce the need for additional utility distribution facilities in the future. |
| | | | **Policy UT-P7:** Where found to be safe, the City shall promote recreational use of utility corridors such as trails, sport courts, and similar facilities. |
| | | | **Policy UT-P8** The City shall encourage utility providers to limit disturbance to vegetation within major utility transmission corridors to what is necessary for the safety and maintenance of transmission facilities. |
| | | | **Policy UT-P10** The City should require utility providers to design and construct overhead transmission lines in a manner that is environmentally sensitive, safe, and aesthetically compatible with surrounding land uses. |
| | | | **Policy UT-P12:** The City should encourage the replacement of outdated equipment with technologically updated or advanced alternatives, providing that the cost of the updated equipment is fiscally reasonable. |
| | | | **Policy UT-P14** The City should require utility providers to minimize visual and other impacts of transmission towers and overhead transmission lines on adjacent land uses through careful siting and design. |
| | | | **Policy UT-P15** The City should require new telecommunications and electric utility distribution lines to be installed underground within the City where practical in accordance with rules, regulations, and tariffs applicable to the serving utility. |
| | | | **Policy UT-P16** The City should require new, modified, or replacement transmission structures (such as lattice towers, monopoles, and the like) to be designed to minimize aesthetic impacts appropriate to the immediate surrounding area whenever practical. |
| | | | **Policy UT-P17** The City should require an analysis from utilities that states either the direct benefits to the City of high capacity transmission lines or the necessity of high capacity transmission lines through the City. |
| | | | **Policy UT-P19** The City shall require utility providers to mitigate the loss of significant trees from the construction of new or expanded transmission facilities. |

| Newcastle Planning Document | Section* | Topic* | Goal or Policy and Text |
|---|---|---|---|
| | | | **Policy UT-P20** The City shall, where appropriate, require reasonable landscape screening of site-specific above-ground utility facilities in order to diminish visual impacts. |
| | | Health and Safety | **Policy UT-P5:** The City shall monitor current research efforts to determine whether electrical or magnetic fields pose a potential health danger. The City shall coordinate with other jurisdictions to pursue development of land use regulations consistent with the findings. |
| | Housing Element | Land Use | **Policy HO-P2:** The City shall protect the quality and character of existing single family neighborhoods as described in the Land Use Element. |
| | | Health and Safety | **Policy HO-P8.A:** The City should plan for neighborhoods that promote active living and limit exposure to harmful environments. |

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### Table F-10. Redmond Planning Goals and Policies

| Redmond Planning Document | Section* | Topic* | Goal or Policy and Text |
|---|---|---|---|
| **City of Redmond Comprehensive Plan** 2030<br>2015 | Goals Vision Framework Policies | Goals | **Goals for Redmond**<br>• To conserve agricultural lands and rural areas, to protect and enhance the quality of the natural environment, and to sustain Redmond's natural resources as the City continues to accommodate growth and development.<br>• To retain and enhance Redmond's distinctive character and high quality of life, including an abundance of parks, open space, good schools and recreational facilities.<br>• To emphasize choices and equitable access in housing, transportation, stores and services.<br>• To support vibrant concentrations of retail, office, service, residential and recreational activity in Downtown and Overlake. |

| Redmond Planning Document | Section* | Topic* | Goal or Policy and Text |
|---|---|---|---|
| | | Utilities | Infrastructure and services meet the needs of a growing population and promote a safe and healthy community. The planning and placement of utilities in Redmond has supported the community's vision for the location and amount of growth. Long-term planning for utilities has contributed to a high quality of life for Redmond residents and businesses by ensuring efficient utility delivery. Proper utility planning has also protected Redmond's natural environment and resources. |
| | | Shoreline Management | **Policy FW-7:** Protect and restore the natural resources and ecological functions of shorelines, maintain and enhance physical and visual public access, and give preference to uses that are unique or dependent on shoreline locations. |
| | | Views and Aesthetics | **Policy FW-9:** Support Redmond as an urban community that values clean air and water, views of stars at night, and quiet neighborhoods. |
| | | | **Policy FW-38:** Maintain Redmond as a green city with an abundance of trees, forested areas, open space, parks, wildlife habitats, riparian corridors, access to shorelines and other elements of its beautiful natural setting. |
| | | | **Policy FW-40:** Ensure that building and site design maintain and enhance Redmond's character, retain identities unique to neighborhoods and districts, and create places that are high-quality, attractive and inviting to people. |
| | | Alternative Energy/New Technology | **Policy FW-10:** Additionally, promote efficient energy performance and use of energy sources that move beyond fossil fuels. |
| | | Land Use | **Policy FW-12:** Ensure that the land use pattern accommodates carefully planned levels of development, fits with existing uses, safeguards the environment, reduces sprawl, promotes efficient use and best management practices of land, provides opportunities to improve human health and equitable provision of services and facilities, encourages an appropriate mix of housing and jobs, and helps maintain Redmond's sense of community and character. |
| | | | **Policy FW-13:** Ensure that the land use pattern in Redmond meets the following objectives:<br>• Takes into account the land's characteristics and directs development |

| Redmond Planning Document | Section* | Topic* | Goal or Policy and Text |
|---|---|---|---|
| | | | away from environmentally critical areas and important natural resources;<br>• Supports the preservation of land north and east of the city outside of the Urban Growth Area, for long-term agricultural use, recreation and uses consistent with rural character;<br>• Provides for attractive, affordable, high-quality and stable residential neighborhoods that include a variety of housing choices;<br>Advances sustainable land development and best management practices, multimodal travel and a high quality natural environment. |
| | | | **Policy FW-22:** Make each neighborhood a better place to live or work by preserving and fostering each neighborhood's unique character and preparation for a sustainable future, while providing for compatible growth in residences and other land uses, such as businesses, services or parks. |
| | | | **Policy FW-26:** Foster Old Town's identity as a destination that has retained its historic identity and traditional downtown character; ensure that it is linked through attractive pedestrian connections to the rest of Downtown and provides an inviting atmosphere in which to shop, stroll or sit during the day and evening. |
| | | Parks and Recreation | **Policy FW-29:** Maintain and promote a vibrant system of parks and trails that are sustainably designed, preserve various types of habitat and protect the natural beauty of Redmond. |
| | | Public Services and Facilities | **Policy FW-31:** Plan, finance, build, rehabilitate and maintain capital facilities and services consistent with the following principles:<br>• Ensure that capital facilities are sustainable, well designed, attractive and safe;<br>• Provide facilities and services that protect public health and safety;<br>Ensure adequate provision of needed infrastructure and services; |
| | Community Character and Historic Preservation | Views and Aesthetics | **Policy CC-18:** Use design standards and design review to accomplish the following:<br>• Ensure the elements of design, proportion, rhythm and massing are correct for proposed structures and the site; |

| Redmond Planning Document | Section* | Topic* | Goal or Policy and Text |
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| | | | • Retain and create places and structures in the city that have unique features; • Ensure that building scale and orientation are appropriate to the site;<br>• Encourage the use of high-quality and durable materials, as well as innovative building techniques and designs;<br>• Promote environmentally friendly design and building techniques such as LEED for the construction or rehabilitation of structures;<br>• Minimize negative impacts, such as glare or unsightly views of parking; • Incorporate historic features whenever possible;<br>• Maintain integrity of zones such as Old Town with unique or historic qualities; and<br>• Ensure that the design fits with the context of the site, reflecting the historic and natural features and character. |
| | | | **Policy CC-23:** Encourage landscaping that:<br>• Creates character and a sense of place,<br>• Retains and enhances existing green character,<br>• Preserves and utilizes native trees and plants, • Enhances water and air quality,<br>• Minimizes water consumption,<br>• Provides aesthetic value,<br>• Creates spaces for recreation,<br>• Unifies site design,<br>• Softens or disguises less aesthetically pleasing features of a site, and<br>• Provides buffers for transitions between uses or helps protect natural features. |
| | Capital Facilities | Health and Safety | **Future Vision for Redmond:** Infrastructure and services meet the needs of a growing population and promote a safe and healthy community. |
| | | Land Use | **Policy CF-18:** Identify lands useful for public purposes in functional plans and in the appropriate elements of the Comprehensive Plan. Identify alternative sites or lands more generally where acquisition is not immediate. Identify lands specifically when acquired and used for public purposes on the Land Use Map, or in the appropriate elements of the Comprehensive Plan where not otherwise identified by City or other governmental agency functional plans. |

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| | Land Use Policies | Land Use | **Policy LU-14:** Encourage the provision of needed facilities that serve the general public, such as facilities for education, libraries, parks, culture and recreation, police and fire, transportation and utilities. Ensure that these facilities are located in a manner that is compatible with the City's preferred land use pattern. |
| | | Public Services and Facilities | **Policy LU-15:** Support equitable delivery of and access to human services by allowing these uses in suitable locations and encouraging their creation through incentives or bonuses and other innovative measures. |
| | | Essential Public Facilities | **Policy LU-16:** Allow essential public facilities in those zones in which they would be compatible. Classify the type of land use review, such as whether the use is permitted or conditionally allowed, based on the purpose of the zone and the facility's potential for adverse impacts on uses and the environment. Consider allowing all essential public facilities in the Manufacturing Park zone if such uses are not compatible elsewhere. |
| | | Parks and Recreation | **Policy LU-64:**<br><u>Urban Recreation and Open Space Designation</u><br>Allowed Uses.<br>Implement this designation through the Urban Recreation zone. Permit uses that fit a constrained area, such as public parks; trails; agricultural uses, including the keeping of animals compatible with the size of the property; riding stables and farm residences. Consider allowing uses, such as ball fields, outdoor private recreation areas, such as golf courses used primarily for nonmotorized recreation; limited accessory uses, such as a restaurant, and regional utilities.<br><u>Urban Recreation, Semirural</u><br>Environmental hazards, such as flooding and seismic hazards, limit the suitability of the Sammamish and Bear Creek Valleys for development. The valleys are also subject to development limitations due to the need to provide for groundwater recharge, the presence of important fish habitats and likely wetlands, and the need to provide appropriate transitions to agricultural and rural areas north and east of Redmond. Significant infrastructure constraints, including transportation and utilities, also affect the type of uses suitable for these places. |

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| | Neighborhoods – Bear Creek | Views and Aesthetics | Bear Creek is unique in Redmond: it is a residential area adjacent to Downtown that contains large, ecologically important open spaces enjoyed not only by those who live there, but also by those whose only link with the neighborhood is a commute on Avondale Road.<br>Bear Creek continues to be a safe neighborhood where people feel connected to one another. The neighborhood has a green character. It retains a significant tree canopy, and those in the neighborhood take advantage of the latest in energy efficient and low-impact development techniques. The Bear/Evans Creek valley—the neighborhood's front yard—continues to have a rural-agricultural feel.<br>**Policy N-BC-3:** Preserve the public view corridor from Avondale Road through the Keller Farm toward Mount Rainier. |
| | Neighborhoods – Education Hill | Views and Aesthetics | **Policy N-EH-2:** Identify public view corridors unique to the Education Hill Neighborhood, such as those of the Sammamish River and Sammamish Valley, Bear Creek Valley and the Cascade Mountains, Lake Sammamish and Mount Rainier. Design streets, trails and parks, as well as elements adjacent to the public right-of-way, to preserve and enhance those view corridors, while considering safety and privacy concerns of private property owners. |
| | | | **Neighborhood Vision:** Education Hill is an attractive, green area. Critical areas, such as streams and unstable slope areas, have been protected from development. Most of the slopes overlooking the Sammamish and Bear Creek Valleys are maintained in a native, undeveloped condition to protect the environment and preserve the woodland views valued by neighborhood residents.<br>Panoramic views from various locations on Education Hill further add to the neighborhood's character and identity and include vistas of Bear Creek Valley and the Cascade Mountains to the east; Mount Rainier, Downtown Redmond, Lake Sammamish and the Cascade foothills to the south; and the Sammamish River and Sammamish Valley to the west. |
| | Neighborhoods - Idylwood | Utility Corridors/ Facilities | **Policy N-ID-27:** Promote undergrounding utility lines along West Lake Sammamish Parkway, NE 24th Street and NE 36th Street. Coordinate undergrounding of utility lines with significant street improvement projects as feasible. |

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| | | | Utilities throughout the Idylwood Neighborhood offer possible opportunities for upgrade over the next 20 years. The electrical and communication infrastructure is the most visible and significant component for residents. The elevated conduit experiences many issues during wet and windy weather, in part due to the proximity of dense, mature vegetation. The neighborhood supports priority undergrounding along corridors that provide the backbone of the electrical infrastructure for the Idylwood Neighborhood. |
| | Neighborhoods – North Redmond | Utilities | The State Growth Management Act (GMA) and King County Countywide Planning Policies direct cities to be the provider of local urban services to urban areas. North Redmond property owners within the Urban Growth Area (UGA) who decide to subdivide their land are required to install urban water and sewer systems. Policies in the Utility Element of the Comprehensive Plan seek to achieve the following: to protect the environment by minimizing disruption of the natural and built environment when placing utilities, to encourage provision of utilities in an economical fashion, and to minimize disruption that results from the provision of utilities to the natural vistas and to open spaces within the neighborhood. As development in North Redmond continues, it is ever important to ensure that reliable and consistent utility services are available to its residents. |
| | | Views and Aesthetics | **Policy N-NR-9:** Promote the preservation of public view corridors through a variety of techniques, such as innovative site design. |
| | | | **Policy N-NR-10:** Preserve scenic, public view corridors toward the Cascades and the Sammamish Valley. Public view corridors are defined along NE 116th Street, 172nd Avenue NE, NE 122nd Street to 162nd Place NE, 154th Place NE, Redmond-Woodinville Road, and along the easement of the Redmond/Puget Sound Energy Trail. |
| | | | **Policy N-NR-28:** Preserve and enhance, or reestablish, dense vegetation within the Wedge subarea. Select and maintain species for required tree preservation, common landscaping, visual screening, building setbacks, front yards and other required landscape areas to provide vegetation that is multistory at maturity, native, noninvasive and appropriate to the site. |

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| | | Utility Corridors/ Facilities | **Policy N-NR-78:** Require the undergrounding of all new utilities in North Redmond and as older utility lines are updated, with the exception of the Puget Sound Energy high voltage transmission lines. Coordinate the undergrounding of existing overhead utilities as street construction or maintenance occurs in these service areas. |
| | | | **Policy N-NR-79:** Minimize excavation, clearing and grading within the Wedge subarea, as feasible, by combining all utility easements and by combining other corridors and easements such as:<br>• Street right-of-way,<br>• Nonmotorized paths, and<br>• Other existing unvegetated corridors. |
| | Neighborhoods – Sammamish Valley | Views and Aesthetics | **Policy N-SV-4:** Development of the area adjacent to the Sammamish Valley, west of Redmond Woodinville Road, and north of NE 116th Street shall be required to protect significant tree stands, views from the valley and maintain the rural quality of the site. Development of the area shall be required to protect agricultural lands and to minimize the potential of trespass and overspray. Measures to protect agricultural lands include setbacks on new development, density limitations, and stormwater measures to prevent runoff from flooding agricultural lands. |
| | Neighborhoods – Willows/Rose Hill | Views and Aesthetics | The following policy applies to the Willows Corridor north of the Puget Sound Energy transmission line right-of-way. This policy is intended to maintain the desired features of the Willows Corridor, allow for the continued use of the area by high technology businesses, protect development from natural hazards, and minimize the impacts of development on sensitive areas and the Sammamish Valley. The design concepts set forth in the policy below shall be implemented through regulations that use criteria to achieve the concepts.<br>**Policy N-WR-G-1:** Developments within the Willows Corridor north of the Puget Sound Energy transmission line right-of-way shall be designed to ensure the following:<br>• Important natural features of the hillside corridor are preserved.<br>• The area maintains a pastoral and parkway appearance. |

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| | | | • Buildings are visually compatible with the forested hills and open pastures of the Willows Corridor. Buildings and parking do not dominate views of the Willows Corridor.<br>• Developments are visually separated from each other and Willows Road with areas of open space.<br>• High-quality site and building designs are maintained.<br>• Pedestrian and bicycle links to Willows Road are provided.<br>• Nearby residential uses to the west are visually buffered from the development through screening by topography, trees or other measures. |
| | | | The purpose of the open space is to provide visual relief from the massing and scale of the built environment |
| | | | Development in the Willows Corridor must be managed to protect the valley from negative impacts, such as increases in stormwater. Development must also be set back from the valley to preserve view corridors and so it does not interfere with agricultural practices north of NE 116th Street. |
| | Parks, Arts, Recreation, Culture and Conservation | Views and Aesthetics | **Policy PR-34:** Encourage the acquisition of resource parkland to protect environmental resources, represent significant natural and visual assets, provide circulation linkages, wildlife corridors and habitat, and ensure adequate separation and buffers between various land uses. |
| | | | **Policy PR-49:** Encourage King County to develop and maintain the trail on the west side of the Sammamish River to enhance access to and views of the Sammamish River. |
| | | | **Policy PR-52:** As a complement to the citywide pedestrian pathway system, the City should develop a visual system for enhancing connections to the shoreline and identifying shoreline areas, considering such elements as street graphics, landscaping, street furniture or artwork. (SMP) |
| | Shoreline Master Program | Views and Aesthetics | **Policy SF-3:** Provide a comprehensive and focused system of physical, visual and cultural access to Redmond's shorelines. |
| | | | **Policy SF-5:** Maintain shoreline views. |

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| | | | **Policy SL-38:** Maintain public view corridors as identified in RZC 21.42, Identification of Citywide Public View Corridors, where required, within the shoreline and from upland areas to the shoreline in shoreline developments, through appropriately designed building setbacks, height and bulk, clustering of structures, density bonuses where allowed, or similar design strategies. |
| | | | **Policy SL-39:** Encourage shoreline development that provides views of the water from the development, using appropriate building location and design, thoughtful selection and location of landscaping, and other design strategies. |
| | | | **Policy SL-40:** Maintain view corridors from Avondale Road and Union Hill Road in the Bear Creek Design District land north of Bear and Evans Creeks and east of Avondale Road, subject to the nexus and proportionality tests laid out by the U.S. Supreme Court. |
| | | | **Policy SL-74:** Locate utilities, where feasible, within existing utility corridors. Locate above-ground utilities away from fish and wildlife habitat, public access areas, and view corridors. |
| | | | **Policy SL-81:** Prohibit outdoor lighting levels for security, building and parking lot lighting, and intensive recreational uses in the shoreline that exceed the minimum necessary for safe and effective use. Screen all lighting, except for minimum pedestrian lighting, from the shoreline through landscaping, shields or other design measures. |
| | | Shoreline Management | **Policy SL-50** Avoid location of nonwater-dependent and nonwater-related uses, activities, and development, except for essential transportation and utilities facilities, waterward of the ordinary high water mark. Transportation and utilities facilities may be allowed where no feasible alternative exists and negative impacts to salmon and steelhead habitat are mitigated. |
| | | Utility Corridors/ Facilities | **Policy SL-73:** Locate regional utilities outside of the shoreline. Locate such facilities away from public access areas and view corridors and away from the shoreline to the farthest location possible where a nonshoreline location is not feasible. |
| | Utilities | Utilities | **Policy UT-2:** Design and maintain public utility facilities to meet service standards identified in the Capital Facilities Element and corresponding functional plans. |

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| | | | **Map UT-1:** Shows the locations of major existing electrical facilities. |
| | | | **Map UT-2:** Shows proposed major electrical facilities. |
| | | Alternative Energy/New Technology | **Policy UT-3:** Encourage the use of innovative technologies to:<br>• Provide and maintain utility services;<br>• Reduce the negative impacts of additional utility service demands;<br>• Improve the existing service; and<br>• Reduce, where appropriate, the overall demand on utility systems. |
| | | | **Policy UT-59:** Work with energy service providers to promote an affordable, reliable and secure energy supply that increases development and use of renewable and less carbon-intensive sources, and that minimizes demand and consumption. |
| | | | **Policy UT-71:** Encourage and provide opportunities to convert existing homes or businesses to natural gas from oil and less efficient electric space and water heating equipment. |
| | | | **Policy UT-72:** Facilitate efforts to develop a natural gas fuel infrastructure. This may include:<br>• Updating regulations to address this technology,<br>• Training fire and police personnel so they are well versed with this technology,<br>• Taking leadership or cooperating with other jurisdictions in building a natural gas fueling facility for government vehicles, and<br>Identifying areas for the potential siting of a biomass production facility. |
| | | | **Policy UT-73:** Promote, support, and increase the use of clean alternative energy by:<br>• Advocating for the development of renewable energy sources;<br>• Facilitating development and use of innovative technologies, such as alternative fuels and on-site renewable energy; and<br>• Providing incentives for development that incorporates renewable energy. |
| | | Utility Corridors/ Facilities | The electrical transmission system is a utility system that fills an essential public need. Therefore, zoning should allow the siting of major transmission lines at or above 115 kilovolt capacity and substation facilities in areas where it |

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| | | | is reasonably necessary to provide efficient service. With coordination between the utility and the City in advance of facility siting, problems of conflicting land uses may be reduced or avoided. |
| | | | **Policy UT-9:** Promote the efficiency of utility placement both in cost and timing through methods such as the following:<br>• Collocate public and private utilities in shared trenches or utility corridors, provided that such joint use is consistent with limitations as may be prescribed by applicable legal and safety considerations;<br>• Coordinate facility planning so that utilities may locate in transportation corridors and other dedicated rights-of way;<br>• Design new public infrastructure to allow for projected future utilities that may be placed within those facilities at a later time; and<br>Encourage joint use of utility corridors for utilities, recreation and appropriate nonmotorized connections. |
| | | | **Policy UT-12:** Design, locate and construct facilities to minimize adverse impacts to the environment and to protect environmentally sensitive areas. Take into account both individual and cumulative impacts. Minimize impacts through actions such as:<br>• Using construction methods and materials to prevent or minimize the risk of overflows into watercourses and water bodies;<br>• Locating utility corridors in existing cleared areas;<br>• Locating utility facilities and corridors outside of wetlands;<br>• Minimizing crossings of fish-bearing watercourses;<br>• Using biostabilization, riprap or other engineering techniques to prevent erosion where lines may need to follow steep slopes; and<br>• Minimizing corridor widths. |
| | | | **Policy UT-13:** Require underground installation of all new utility distribution lines, except where underground installation would cause greater environmental harm than alternatives or where the Washington Utilities and Transportation Commission tariff structure is not consistent with this policy. Consider new technologies such as wireless transmission as they become available. |

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| | | | **Policy UT-62:** Allow electrical utility facilities as a permitted use where appropriate to ensure that land is available for the siting of electrical facilities. |
| | | Views and Aesthetics | **Policy UT-15:** Require reasonable screening or architecturally compatible design of above ground utility facilities, such as transformers and associated vaults. Promote high-quality design of utility facilities through measures such as:<br>• Use of varied and interesting materials,<br>• Use of color,<br>• Additions of artwork, and<br>• Superior landscape design. |
| | | Land Use | **Policy UT-58:** Work with energy service providers to ensure energy facility plans reflect and support Redmond's Land Use Plan and that energy resources are available to support the Land Use Plan. |
| | | | **Policy UT-61:** Recognize the current Electrical Facilities Plan, authored by Puget Sound Energy, as the facility plan for electrical utilities serving Redmond and the vicinity. Use this plan, where it is consistent with Redmond's land use goals, as a guide in identifying and preserving utility corridors and locating electrical facilities. |
| | | | **Policy UT-63:** Coordinate with Puget Sound Energy or any successor when considering land use designations or new development in the vicinity of proposed facility locations that might affect the suitability of the designated areas for location of facilities. |
| | | Energy | **Policy UT-59:** Work with energy service providers to promote an affordable, reliable, and secure energy supply that increases development and use of renewable and less carbon-intensive sources, and that minimizes demand and consumption. |
| | | Health and Safety | **Policy UT-67:** Require designs that incorporate known and accepted low-cost technological methods of reducing magnetic fields or the exposure to them when siting high voltage electrical facilities until further research provides more information on the health effects of electromagnetic fields. Methods may include:<br>• Line configurations that reduce field strength, |

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| | | | • Sufficient right-of-way widths, and<br>• Sufficient height of lines from the ground for high-voltage transmission facilities. |
| | | | **Policy UT-68:** Periodically review the state of scientific research on ELF/EMF and modify policies and regulations, if warranted, by changing knowledge or if new state or federal regulation requires changes. |
| | | Hazardous Liquid and Gas Transmission Pipelines | **Policy UT-89:** Require proposed developments, expansions of existing uses and construction projects, both public and private, located near hazardous liquid pipeline to:<br>• Show the location of the liquid pipeline corridors in relation to proposed structures, utilities, or clearing and grading activities;<br>• Use techniques prior to and during construction to minimize the potential for disturbing the pipeline;<br>• Identify and mitigate potential erosion over pipelines from storm water discharge;<br>• Use setbacks and other site design techniques to minimize the potential hazard; and<br>• Develop emergency plans as appropriate. |
| | | | **Policy UT-90:** Coordinate with the pipeline operator when developments are proposed near a hazardous liquid pipeline corridor to reduce the potential for problems. Methods include but are not limited to:<br>• Notifying the pipeline operator of proposed development projects located within one-quarter mile of a pipeline corridor;<br>• Seeking the pipeline operator's participation in preconstruction meetings for projects located within 150 feet of a pipeline corridor;<br>• Requesting the operator to determine if additional measures above the normal locating process are necessary to physically verify the pipeline locations before proceeding to develop; and<br>• Seeking monitoring by the pipeline operator of development that involves land disturbance or other significant work within the pipeline corridor, or within 30 feet of a pipeline, whichever is greater. |

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| | | | **Policy UT-91:** Prohibit new high consequence land uses from locating near a hazardous liquid pipeline corridor. Design proposed expansions of existing high consequence land uses to, at a minimum, avoid increasing the level of risk in the event of a pipeline failure, and where feasible, to reduce the risk. |
| | | | **Policy UT-92:** Require appropriate mitigation measures that help reduce adverse impacts in the event of a pipeline failure to be used by commercial, industrial, multifamily, or other development which, because of proximity to a hazardous liquid pipeline corridor, poses safety concerns due to characteristics of the occupants, development, or site. |
| | | | **Policy UT-115:** New or expanded structures and other significant land disturbance shall be setback from hazardous liquid pipelines to minimize the likelihood of accidental damage to the pipelines. Required setbacks shall not deny all reasonable economic use of property. |
| | | | **Policy UT-117:** Locating new high consequence land uses near a hazardous liquid pipeline corridor represents an unusually high risk and shall not be allowed. Proposed expansions to high consequence land uses located near pipeline corridors shall at a minimum be designed to avoid increasing the level of risk in the event of a pipeline failure, and where feasible, reduce the risk. |
| | | | **Policy UT-118:** Commercial, industrial, multi-family or other development which, because of proximity to a hazardous liquid pipeline corridor, poses safety concerns due to characteristics of the occupants, development or site, shall use appropriate mitigation measures to help reduce adverse impacts in the event of a pipeline failure. |

* The *Section* column indicates the element/chapter of the comprehensive plan where the goal or policy text was found. The *Topic* column indicates the subject matter that is covered by the goal or policy text.

**Table F-11. Renton Planning Goals and Policies**

| Renton Planning Document | Section* | Topic* | Goal or Policy and Text |
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| **City of Renton Comprehensive Plan** 2015 | Land Use | Views and Aesthetics | **Goal L-BB:** Maintain a high quality of life as Renton grows by ensuring that new development is designed to be functional and attractive. |
| | | | **Goal L-FF:** Strengthen the visual identity of Renton and its Community Planning Areas and neighborhoods through quality design and development. |
| | | | **Policy L-48:** Accommodate change within the Renton community in a way that maintains Renton's livability and natural beauty. |
| | | | **Policy L-55:** Protect public scenic views and public view corridors, including Renton's physical, visual and perceptual linkages to Lake Washington and the Cedar River. |
| | | | **Policy L-56:** Preserve natural landforms, vegetation, distinctive stands of trees, natural slopes, and scenic areas that contribute to the City's identity, preserve property values, and visually define the community and neighborhoods. |
| | | | **Policy L-60:** Thoughtfully balance the need for appropriate lighting levels for safety and security to avoid light intrusion and glare impacts, and to preserve the night sky. |
| | | Essential Public Facilities | **Policy L-6:** Site and design essential public facilities to be efficient and convenient while minimizing impacts on surrounding uses. Facilities should be sited on an arterial street, where there is good access to transportation, including transit service, location, and where parking requirements are appropriate to the use. If the use is people intensive, it should be in a Center, compatible with surrounding uses, and co-located with other uses when possible. |
| | | Land Use | **Policy L-7:** Coordinate with King County to ensure consistent land development policies in the Potential Annexation Area. |
| | | GHG Emissions | **Policy L-44:** Support and implement the Mayor's Climate Protection Agreement, climate pledges and commitments undertaken by the City, and other multi-jurisdictional efforts to reduce greenhouse gases, address climate change, sea-level rise, ocean acidification, and other impacts to global conditions. |

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| | Housing and Human Services Element | Health and Safety | **Policy CF-7:** Protect public health, enhance environmental quality and promote conservation of man-made and natural resources through appropriate design and installation of public facilities. |
| | | | **Goal HHS-A:** Adopt best available housing practices and implement innovative techniques to advance the provision of affordable, fair, healthy, and safe housing for renters, homeowners, and the homeless. Adopt a strategic housing plan tailored to achieve this goal. |
| | | | **Goal HHS-H:** Actively work to increase the availability of healthy, equitable and affordable housing for people in all demographic groups and at all income levels and promote a balance of housing and the amenities needed by residents at the neighborhood level, such as childcare, availability of fresh food, recreational opportunities, and medical care. |
| | | | **Policy HHS-21:** Support the development of housing and neighborhoods that are sited, designed, constructed, and maintained to promote environmentally healthy and safe living. "Environmental health," in this context, includes factors of the natural and built environment that affect human health, such as physical, chemical, and biological factors external to a person. |
| | | | **Policy U-2:** Promote the health and safety of Renton citizens from environmental hazards associated with utility systems through the proper design and siting of utility facilities. |
| | Shoreline Management Program | Shoreline Management | **SHORELINE MANAGEMENT GOALS**<br>The City adopts the goals and principles of the Shoreline Management Act as provided in RCW 90.58.020 and as particularly relevant to Renton.<br>1. The shoreline jurisdiction is one of the most valuable and fragile of the City's natural resources. There is appropriate concern throughout the watershed and the greater Puget Sound Region relating to the utilization, protection, restoration, and preservation of the shoreline jurisdiction.<br>2. Ever increasing pressures of additional use are being placed on the shoreline jurisdiction, which in turn necessitates increased coordination in its management and development.<br>3. Much of the shoreline jurisdiction and the uplands adjacent thereto are in private ownership. Unrestricted construction on the privately owned |

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| | | | or publicly owned shorelines is not in the best public interest; therefore, coordinated planning is necessary in order to protect the public interest associated with the shoreline jurisdiction while recognizing and protecting private property rights consistent with the public interest.<br>4. There is a clear and urgent demand for a planned, rational, and concerted effort, jointly performed by federal, state, and local governments, to prevent the inherent harm in an uncoordinated and piecemeal development of the City's shoreline jurisdiction.<br>5. It is the intent of the City to provide for the management of the shoreline jurisdiction by planning for and fostering all reasonable and appropriate uses. The Shoreline Master Program is designed to ensure the development in a manner that, while allowing for limited reduction of rights of the public in the navigable waters, will promote and enhance the public interest.<br>6. The City's shoreline policies are intended to protect against adverse effects to the public health, the land and its vegetation and wildlife, and the waters of the state and their aquatic life, while protecting generally public rights of navigation and corollary rights incidental thereto.<br>7. In the implementation of the Shoreline Master Program, the public's opportunity to enjoy the physical and aesthetic qualities of natural shorelines shall be preserved to the greatest extent feasible consistent with the overall best interest of the state, the county, and the people generally. To this end, uses shall be preferred which are consistent with control of pollution and prevention of damage to the natural environment or are unique to or dependent upon use of the state's shoreline.<br>8. Alterations of the natural condition of the shoreline, in those limited instances when authorized, shall be given priority for single family residences and their appurtenant structures; ports; shoreline recreational uses including but not limited to parks, marinas, piers, and other improvements facilitating public access to shorelines; industrial and commercial developments that are particularly dependent on their location on or use of the shoreline jurisdiction; and other development that will provide an opportunity for substantial numbers of the people to enjoy the shorelines. |

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| | | | 9. Permitted uses in the shorelines zone shall be designed and conducted in a manner to minimize, insofar as practical, any resultant damage to the ecology and environment of the shoreline jurisdiction and any interference with the public's use of the water. |
| | | | **Objective SH-A:** Provide for use of the limited water resource consistent with the goals of the Shoreline Management Act by providing a preference for water-oriented uses. |
| | | | **Objective SH-B:** Provide that the policies, regulations, and administration of the Shoreline Master Program ensure that new uses, development, and redevelopment within the shoreline jurisdiction do not cause a net loss of shoreline ecological functions. |
| | | | **Objective SH-D:** The resources and amenities of all shorelines and the ecological processes and functions they provide, such as wetlands, upland and aquatic vegetation, fish and wildlife species and habitats, as well as scenic vistas and aesthetics should be protected and preserved for use and enjoyment by present and future generations. Natural shorelines are dynamic with interdependent geologic and biological relationships. Alteration of this dynamic system has substantial adverse impacts on geologic and hydraulic mechanisms important to the function of the water body and can disrupt elements of the food chain. |
| | | | **Policy SH-1:** Reasonable and appropriate shoreline uses and activities should be planned for:<br>1. Short-term economic gain or convenience in development should be evaluated in relationship to potential long-term effects on the shoreline.<br>2. Preference should be given to those uses or activities which enhance the natural functions of shorelines, including reserving appropriate areas for protecting and restoring ecological functions to control pollution and prevent damage to the natural environment and public health.<br>3. Provide for the following priority in shoreline use and modification of the shoreline:<br>a. Water-dependent and associated water related uses are the highest priority for shorelines unless protection of the existing natural resource values of such areas precludes such uses.<br>b. Water-related and water-enjoyment uses that are compatible with |

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| | | | ecological protection and restoration objectives, provided that adequate area is reserved for future water-dependent and water-related uses.<br>c. Multiple use developments may be allowed if they include and support water-oriented uses and contribute to the objectives of the act including ecological protection and restoration and/or public access.<br>d. Limit non-water-oriented uses to those locations where access to the water is not provided or where the non-water-oriented uses contribute to the objectives of the Act, including ecological protection and restoration and/or public access.<br>e. Preserve navigational qualities, and the infrastructure that supports navigation, to support water-oriented use.<br>4. Recognize existing single-family residential uses and neighborhood character and ensure that existing uses, new uses, and alteration of facilities:<br>a. Do not result in a net loss of shoreline ecological functions.<br>b. Avoid disturbance of unique and fragile areas.<br>c. Are provided with adequate public services including water, sanitary sewer, and stormwater management.<br>5. Future shoreline subdivision, multi-family developments, and planned urban developments of more than four units should provide public benefits, including ecological protection and restoration, and/or public or community access.<br>6. New residential developments should provide open space areas at or near the shoreline through clustering of dwellings. |
| | | | **Policy SH-2:** Aesthetic considerations should be integrated with new development, redevelopment of existing facilities, or for general enhancement of shoreline areas and should include:<br>1. Identification and preservation of areas with scenic vistas and areas where the shoreline has high aesthetic value as seen from both upland areas, areas across the water, and recreational and other uses on the water.<br>2. Appropriate regulations and criteria should ensure that development provides designs that contribute to the aesthetic enjoyment of the |

| Renton Planning Document | Section* | Topic* | Goal or Policy and Text |
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| | | | shoreline for a substantial number of people and provide the public with the ability to reach, touch, and enjoy the water's edge and view the water and shoreline.<br>3. Regulations and criteria for building siting, maximum height, setbacks, screening, architectural controls, sign regulations, designation of view corridors, and other provisions should ensure that development minimizes adverse impacts on views of the water from public property or views enjoyed by a substantial number of residences. |
| | | | **Policy SH-3:** All shoreline policies, regulations, and development shall recognize and protect private rights consistent with the public interest and, to the extent feasible, shall be designed and constructed to protect the rights and privacy of adjacent property owners. Shoreline uses and activities should be discouraged if they would cause significant noise or odor or unsafe conditions that would impede the achievement of shoreline use preferences on the site or on adjacent or abutting sites. |
| | | | **Policy SH-4:** When necessary, Shoreline modifications should emulate and allow natural shoreline functions to the extent feasible and where needed utilize bioengineering or other methods with the least impact on ecological functions. |
| | | | **Policy SH-5:** Native shoreline vegetation should be conserved to maintain shoreline ecological functions and mitigate the direct, indirect and/or cumulative impacts of shoreline development, wherever feasible. |
| | | | **Policy SH-6:** Existing natural resources should be conserved through regulatory and non-regulatory means that may include regulation of development within the shoreline jurisdiction, ecologically sound design, and restoration programs, including:<br>1. Water quality and water flow should be maintained at a level to permit recreational use, to provide a suitable habitat for desirable forms of aquatic life, and to satisfy other required human needs.<br>2. Aquatic habitats and spawning grounds should be protected, improved and, when feasible, increased to the fullest extent possible to ensure the likelihood of salmon recovery for listed salmon stocks and to increase the populations of non-listed salmon stocks. |

| Renton Planning Document | Section* | Topic* | Goal or Policy and Text |
|---|---|---|---|
| | | | 3. Wildlife habitats should be protected, improved and, if feasible, increased.<br>4. Unique natural areas should be designated and maintained as open space for passive forms of recreation and provide opportunities for education and interpretation. Access and use should be restricted, if necessary, for the conservation of these areas. |
| | | | **Policy SH-10**: Shoreline areas having historical, cultural, educational, or scientific value should be identified and protected. |
| | | | **Policy SH-14:**<br>2. New over-water structures should be limited to water-dependent use and the length, width, and height of over-water structures should be limited to the smallest reasonable dimensions.<br>3. Shoreline developments should be designed to maintain or enhance aesthetic values and scenic views. |
| | | | **Policy SH-16:** Future economic uses and activities should utilize the shoreline to achieve the use and other goals of the Act and The Shoreline Master Program, including:<br>1. Economic uses and activities should locate the water-oriented portion of their development along the shoreline.<br>2. New over-water structures should be limited to water-dependent use and the length, width, and height of over-water structures should be limited to the smallest reasonable dimensions.<br>3. Shoreline developments should be designed to maintain or enhance aesthetic values and scenic views. |
| | Utilities | Utility Corridors/ Facilities | **GOAL U-O:** Promote the availability of safe, adequate, and efficient electrical service within the City and its planning area, consistent with the regulatory obligation of the utility to serve customers. |
| | | | **Goal U-P:** Promote the safe transport and delivery of natural gas and other fuels with the planning area. |

| Renton Planning Document | Section* | Topic* | Goal or Policy and Text |
|---|---|---|---|
| | | | **Policy U-3:** Promote the co-location of new utility infrastructure within rights-of-way and utility corridors and coordinate construction and replacement of utility systems with other public infrastructure projects to minimize construction-related costs and disruptions. |
| | | | **Policy U-72:** Coordinate with local and regional electricity providers to ensure the siting and location of transmission and distribution facilities is accomplished in a manner that minimizes adverse impacts on the environment and adjacent land uses. |
| | | | **Policy U-73:** Encourage electricity purveyors to make facility improvements and additions within existing utility corridors wherever possible. |
| | | | **Policy U-74:** Require underground electricity infrastructure installation to be coordinated with the City of Renton Public Works Department to prevent cross-boring through existing water, sewer, or natural gas lines. |
| | | | **Policy U-75:** Coordinate with local and regional purveyors of natural gas for the siting of transmission and distribution infrastructure within the Renton Planning Area. |
| | | | **Policy U-77:** Allow extension of natural gas distribution infrastructure within the Renton Planning Area, provided such facilities are consistent with development assumptions in the Land Use Element of the Comprehensive Plan. |
| | | Health and Safety | **Policy U-78:** Require underground natural gas infrastructure installation to be coordinated with the City of Renton Public Works Department to prevent cross-boring through existing utility lines. |

* The *Section* column indicates the element/chapter of the comprehensive plan where the goal or policy text was found. The *Topic* column indicates the subject matter that is covered by the goal or policy text.

**Table F-12. Sammamish Planning Goals and Policies**

| Sammamish Planning Document | Section* | Topic* | Goal or Policy and Text |
|---|---|---|---|
| **City of Sammamish Comprehensive Plan (Draft)**<br>2015 | Environmental Element | Land Use | **Policy EC.1.4:** Consider identifying and protecting where appropriate the following special areas:<br>a. Natural areas including significant trees,<br>b. Scenic areas such as designated view corridors,<br>c. Natural drainage areas, including the Erosion Hazard Near Sensitive Water Bodies and Wetland Management Areas designated locations and the those areas draining to Erosion<br>d. Hazard Near Sensitive Water Bodies and Wetland Management Areas,<br>e. Urban landscaped areas such as public or private golf courses and parks,<br>f. Land reserved as open space or buffers tracts as part of development, including parcels subject to density averaging, where appropriate, and<br>g. Lands designated as open space under the Current Use taxation-open space established according to King County for tax assessment purposes. |
| | | | **Policy EC.1.21:** Encourage the preservation of open space through incentives, such as the King County Public Benefit Rating System (PBRS) or other programs to encourage land donation. |
| | | | **Policy EC.1.23:** Establish a system of publicly owned natural areas to:<br>a. Protect the integrity of wildlife habitat and conservation sites,<br>b. Protect corridors between natural areas, where feasible<br>c. Preserve outstanding examples of Sammamish's diverse natural heritage, and<br>d. Provide a broad range of opportunities for educational, interpretive and recreational programs to meet community needs, and.<br>e. Facilitate completion of the vision of an Emerald Necklace, an approximately 28-mile nonmotorized greenbelt encircling the Plateau. |
| | | Alternative Energy/New Technology | **Policy EC.7.3:**<br>**Goal:** Be a regional model in mitigating and adapting to climate change.<br>**Policy:** Consider a multi-pronged approach to climate change mitigation, including support for energy efficiency, vehicle trip reduction, and environmental protection. |

| Sammamish Planning Document | Section* | Topic* | Goal or Policy and Text |
|---|---|---|---|
| | Housing Element | Views and Aesthetics | **Goal H.1:**<br>Neighborhood Vitality and Character<br>Promote safe, attractive, and vibrant residential and mixed-use neighborhoods. Encourage housing design that is sensitive to quality, design, and intensity within neighborhoods and with surrounding land uses. Land use policies and regulations should emphasize compatibility with existing neighborhood character. In areas where the existing character is in transition, new development should be designed to incorporate the qualities of well-designed neighborhoods. |
| | | | **Policy H.1.1:** Ensure that new development and redevelopment are sensitive to the context of existing and planned neighborhood character. |
| | Land Use Element | Land Use | **Policy LU.2.2:** Promote complementary and compatible development and smooth transitions between differing land uses. |
| | | | <u>Residential Districts</u><br>The residential districts implement Comprehensive Plan policies for housing quality, diversity (such as townhomes, cottage housing, apartments, duplex, and single-family detached), and affordability, and efficient use of land, public services, and energy. The R-1 district should be applied in areas with, or in proximity to, lands with area-wide environmental constraints, wildlife corridors, or in established neighborhoods of the same density. In the R-1 district, the primary uses are single detached dwellings clustered as appropriate in relation to environmental constraints. The R-4 through R-8 districts, provide for predominantly single detached dwelling units at varying densities. The R-12 through R-18 districts allow for a mix of multifamily development at a variety of densities. Minimum residential densities should be met in the R-8, R-12, R-18, TC-A, and TC-B districts. In all residential districts, accessory uses and complementary nonresidential uses may be allowed. |
| | | | <u>Neighborhood Business</u><br>The Neighborhood Business District provides small scale convenient daily retail and personal services for a limited service area, minimizes the impacts of commercial activities on nearby properties, and provides for limited residential development not to exceed R-8 density. |

| Sammamish Planning Document | Section* | Topic* | Goal or Policy and Text |
|---|---|---|---|
| | | | Community Business<br>The Community Business District provide convenience and comparison retail and personal services for local service areas serving neighborhoods that cannot be served conveniently by larger commercial centers. Compared to the Neighborhood Business District, a wider range of uses are permitted, including small-scale office and mixed-use developments. |
| | | | Office<br>The Office District provides for pedestrian and transit-oriented, high-density employment office uses together with the potential for complementary retail and urban density residential development in certain locations. |
| | | | Town Center<br>The Town Center designations create a focused mixed-use center for the City, provide opportunity for a variety of housing types and retail and office uses; provide for a comprehensive system of parks, open spaces and trails; establish an efficient circulation system; provide community and civic facilities; establish a distinctive design character; and promote sustainability, including an integrated stormwater management system. The planned development pattern encourages the most intensive development in core mixed use development areas.<br>Designations within Town Center include the following:<br>• Town Center A—Commercial focus<br>• Town Center B—Residential focus<br>• Town Center C—Lower intensity residential<br>• Town Center D—Civic campus<br>• Town Center E—Reserve<br>The Town Center subarea plan and implementing development regulations provide additional guidance for town center development. |
| | | | Public Institution<br>This classification recognizes publicly owned facilities and sites that offer governmental, utility, recreational, educational, and emergency response services, respectively, to the community. |

| Sammamish Planning Document | Section* | Topic* | Goal or Policy and Text |
|---|---|---|---|
| | | Views and Aesthetics | **Policy LU.2.3:** Recognize and preserve the natural environment as an important element of the City's identity. |
| | | | **Policy LU.2.4:** Where appropriate, develop design guidelines and development regulations to support the following:<br>a. Compatibility with natural site features<br>b. Retention of trees and native vegetation<br>c. Low impact development<br>d. Development at a scale and character appropriate to the site<br>e. Design that supports the human scale<br>f. Design that reflects community character<br>g. Landscaping to enhance building and site appearance and function<br>h. Integrated and connected access for bicycles, pedestrians and vehicles<br>i. Balanced consideration of automobile and pedestrian/bicycle mobility and safety<br>j. Usable passive and active open space, including community gathering places<br>k. Cohesive design character that minimizes visual clutter<br>l. Sense of personal safety |
| | | | **Goal LU.3:** Preserve and enhance the natural features, quality, character and function of the City's residential neighborhoods. |
| | | | **Policy LU.3.4:** Consider establishing a program to acquire property for public purposes consistent with the policies of this comprehensive plan. This evaluation should include consideration of the feasibility of both fee simple acquisition and the acquisition of development rights, as well as identification of potential funding sources, grants, and gifting strategies. Priorities for acquisition may include: protection of environmentally sensitive areas, preservation of view corridors, preservation of parcels that convey a unique sense of the community's character or historical tradition, parcels to provide breaks in development patterns along designated arterials, passive and active recreation opportunities. |
| | | | **Goal LU.5:** Ensure that public facilities support and strengthen community character. |

| Sammamish Planning Document | Section* | Topic* | Goal or Policy and Text |
|---|---|---|---|
| | | | **Goal LU.6:** Promote development design that maintains a harmonious relationship with the natural environment. |
| | | Vegetation | **Policy LU.6.2:** Maximize tree retention and assure restoration where tree retention is not feasible. |
| | | Alternative Energy/New Technology | **Goal LU.9:** Encourage sustainable development.<br>**Policy LU.9.1:** Identify and adopt zoning code amendments to allow distributed energy generation (solar, wind, etc.) compatible with surrounding uses and adopt incentives that promote distributed generation. |
| | Utilities Element | Introduction | **Goal UT.1:** Promote and encourage development and maintenance of all utilities at levels of service adequate to accommodate existing and projected growth. |
| | | Utility Corridors/ Facilities | **UT.1.1:** Support the timely expansion, maintenance, operation, and replacement of utility infrastructure in order to meet anticipated demand for growth identified in the Land Use Element. |
| | | | **UT.1.2:** Utilize franchise agreements with private utility providers and interlocal agreements with public utility providers as a means to protect and advance adopted City goals and policies. |
| | | | **Goal UT 2:** Support coordination with service providers to minimize cost and service disruption |
| | | | **UT 2.1:** Coordinate the timing of construction activities with public and private utilities to minimize disruption to the public and reduce costs of utility delivery |
| | | | **UT 2.2:** Promote co-location of new public and private utility distribution facilities in shared trenches. |
| | | | **UT.3.1:** Promote the undergrounding of utilities where physically and financially feasible and in coordination with local utilities. |
| | | | **Goal UT.4:** Facilitate citywide utility services that are consistent, reliable, equitable, competitive, and financially sustainable. |
| | | Utilities | **Policy UT.4.1:** Coordinate with utility providers to ensure that services are provided at competitive rates citywide. |

| Sammamish Planning Document | Section* | Topic* | Goal or Policy and Text |
|---|---|---|---|
| | | Views and Aesthetics | **Goal UT.3:** Encourage placement, siting and design of utilities to support community character and promote uninterrupted service. |
| | | | **Policy UT.3.2:** Encourage aesthetically compatible design of above-ground utility facilities |
| | | | **Policy UT.3.3:** Minimize the visual impacts of telecommunications facilities and towers in the community. |
| | | Parks and Recreation | **Policy UT.3.4:** Promote recreational use of utility corridors, such as trails, sports courts, or similar facilities. |
| | | Alternative Energy/New Technology | **Policy UT.4.2:** Seek to maximize effectiveness and efficiency of utility services provided to Sammamish residents. |
| | | | **Goal UT.5:** Encourage the use of innovative measures and new technologies to reduce overall demand and enhance service to city residents. |
| | | | **Policy UT.5.1:** Encourage opportunities for individual businesses or homeowners to become more energy independent by reducing energy use and/or generating a portion of their energy needs on site. |
| | | | **Policy UT.5.2:** Remove barriers in the city codes to the use of alternative energy sources for homes and businesses, including such technologies as solar panels, wind-powered turbines, biomass/biogas, and fuel cells. |
| | | | **Policy UT.5.3:** Support renewable energy production by encouraging businesses and homeowners to consider purchase of green power through programs such as Puget Sound Energy's Green Power Program. |
| | Shoreline Element | Utility Corridors/ Facilities | a. New public or private utilities should be located inland from the land/water interface, preferably outside of shoreline jurisdiction, unless: They have a water-dependent component such as a water intake or outfall; or Water crossings are unavoidable; or Other locations are infeasible; or They are required for authorized shoreline uses consistent with this Program.<br>b. Utilities should be located and designed to avoid public recreation and public access areas and significant natural, historic, archaeological or cultural resources.<br>c. Development of pipelines and cables, particularly those running roughly parallel to the shoreline, and development of facilities that may require |

| Sammamish Planning Document | Section* | Topic* | Goal or Policy and Text |
|---|---|---|---|
| | | | periodic maintenance that would disrupt shoreline ecological functions, should be discouraged except where no other reasonable alternative exists.<br>d. When existing utilities located within shoreline jurisdiction require maintenance or other improvements to address public health and safety, the maintenance/improvement should be designed and implemented to minimize additional impacts on the shoreline environment and consideration should be given to correcting past impacts caused by the utility.<br>e. Public utility development should use low impact development stormwater management techniques and other methods that protect, enhance, and restore shoreline ecological functions where reasonable.<br>f. When new utilities are to be located within shoreline jurisdiction, they should be installed in such a manner to achieve no net loss of ecological function. City of Sammamish Shoreline Master Program |
| **City of Sammamish Shoreline Master Program Update** 2011 | 25.03.020 Conservation Goals | Views and Aesthetics | The following goals address the preservation of natural resources, scenic vistas, aesthetics, and vital shoreline areas for fisheries and wildlife and for the benefit of present and future generations.<br>• Acquire (i.e., through purchase, easements, donation or other agreement), and maintain as open space, shorelines with unique or valuable natural attributes for public benefit.<br>• Preserve, enhance and/or protect shoreline resources (i.e., wetlands and other fish /wildlife habitats) for their ecological functions and values, and aesthetic and scenic qualities.<br>• Maintain natural dynamic processes of shoreline formation and sustainability through effective stewardship, management, and use of shorelines<br>• Where feasible, enhance or restore areas that are biologically and/or aesthetically degraded while maintaining appropriate use of the shoreline.<br>• Maintain or enhance shoreline vegetation to protect water quality, fish and wildlife habitat, and other ecological functions and processes.<br>• Implement policies that can help reverse impacts caused by existing or past development activities that adversely affect ecological or shoreline functions such as untreated stormwater discharges. |

| Sammamish Planning Document | Section* | Topic* | Goal or Policy and Text |
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| | | | • Manage the City's programs, services, and operational infrastructure in a manner that achieves no net loss of ecological or shoreline functions.<br>• Achieve no net loss of ecological functions of Sammamish shorelines |
| | 25.03.030 Public Access Goals | Utility Corridors/ Facilities | Ensure that public utility and transportation rights-of-way, including street ends that abut the shoreline, are made available for public access and use where appropriate (see RCW 35.79.035). |
| | 25.03.070 Transportation and Public Facility Goals | Utility Corridors/ Facilities | The following **goals** address the general location and extent of existing and proposed thoroughfares, transportation/circulation routes, as well as other public utilities and facilities.<br><br>1. Develop efficient circulation systems in harmony with the topography and other natural characteristics of the shoreline and in a manner that assures the safe movement of people and goods while minimizing adverse effects on shoreline use and development or on shoreline ecological functions and processes.<br>2. Provide and/or enhance physical and visual public access to shorelines along public roads (i.e. turnouts and viewpoints) in accordance with the public access goals.<br>3. Limit circulation systems in the shoreline jurisdiction to those that serve permitted and/or preferred shoreline uses.<br>4. Limit transportation infrastructure in shoreline jurisdiction to the minimum necessary to accomplish its purpose. |
| | 25.04.040 Recreational Use Policies | Parks and Recreation | (3) Public recreational development should be located where existing infrastructure (utilities and roads) is adequate, or may be provided without significant damage to shoreline features commensurate with the number and concentration of anticipated users. |
| | 25.04.060 Utility Use Policies | Utility Corridors/ Facilities | 1. New public or private utilities should be located inland from the land/water interface, preferably outside of shoreline jurisdiction, unless:<br>a. They have a water-dependent component such as a water intake or outfall; or<br>b. Water crossings are unavoidable; or<br>c. Other locations are infeasible; or<br>d. They are required for authorized shoreline uses consistent with this Program. |

| Sammamish Planning Document | Section* | Topic* | Goal or Policy and Text |
|---|---|---|---|
| | | | 2. Utilities should be located and designed to avoid public recreation and public access areas and significant natural, historic, archaeological or cultural resources.<br>3. Development of pipelines and cables, particularly those running roughly parallel to the shoreline, and development of facilities that may require periodic maintenance that would disrupt shoreline ecological functions, should be discouraged except where no other reasonable alternative exists.<br>4. When existing utilities located within shoreline jurisdiction require maintenance or other improvements to address public health and safety, the maintenance/improvement should be designed and implemented to minimize additional impacts on the shoreline environment and consideration should be given to correcting past impacts caused by the utility.<br>5. Public utility development should use low impact development stormwater management techniques and other methods that protect, enhance, and restore shoreline ecological functions where reasonable.<br>When new utilities are to be located within shoreline jurisdiction, they should be installed in such a manner to achieve no net loss of ecological function. |
| | 25.07.010 Summary of Uses, Approval Criteria, and Process | Land Use | Utilities are permitted in the Lake Sammamish Shoreline Residential, Lake Sammamish Urban Conservancy, Pine and Beaver Lakes Shoreline Residential, Pine and Beaver Lakes Urban Conservancy. |
| | Archaeological, Historic and Cultural Resources Policies | Shoreline Management | Shoreline use and development should not significantly and negatively impact, destroy, or damage any site having historic, cultural, scientific or educational value. |
| | Critical Areas and Environmental Protection | Shoreline Management | New shoreline uses and developments should occur in a manner that maintains existing natural shorelines, assures no net loss of shoreline ecological functions and processes and protects critical areas and associated buffers within the shoreline jurisdiction as designated in SMC 21A.50. |

| Sammamish Planning Document | Section* | Topic* | Goal or Policy and Text |
|---|---|---|---|
| | Policies | | New shoreline uses and developments should be designed and conducted in accordance with the regulations of this Program to avoid, minimize and mitigate damage to the ecology and environment. These regulations are designed to protect shoreline ecological functions and processes. Shoreline ecological functions that should be protected include, but are not limited to, fish and wildlife habitat, conservation and recovery of threatened or endangered species, food chain support and water temperature maintenance. Shoreline processes that should be protected include, but are not limited to, water flow; infiltration; groundwater recharge and discharge; sediment delivery, transport, and storage; organic matter input; and nutrient and pathogen removal. |
| | Dredging Policies | Shoreline Management | New development should be sited and designed to avoid the need for maintenance dredging.<br>When allowed, dredging should be planned and operated to minimize adverse impacts to shoreline ecology, to existing shoreline uses, and to minimize interference with navigation. |
| | Flood Hazard Reduction Policies | Shoreline Management | New development within the floodplains associated with the City's shorelines that would individually or cumulatively increase the risk of flood damage should be discouraged. |
| | Shoreline Use Policies | Shoreline Management | The following uses/developments should be given preference consistent with the priority listed below for locating within the shoreline jurisdiction when they are consistent with City zoning regulations and located, designed, and maintained in a manner that is consistent with this Program:<br>i. Water-dependent and water-related use/development; and<br>ii. Public uses and developments that provide physical and/or visual access to the shoreline for substantial numbers of people, and<br>iii. Single-family residences developed consistent with the policies of 25.04.030(1).<br>Non-water-oriented uses/developments should be limited to those shoreline locations where water-oriented uses are inappropriate.<br>Non-water-oriented uses/developments should be allowed only when they demonstrably contribute to the objectives of the Shoreline Management Act. |

| Sammamish Planning Document | Section* | Topic* | Goal or Policy and Text |
|---|---|---|---|
| | Site Planning Policies | Shoreline Management | New shoreline uses and developments should be designed in a manner that directs land alteration to the least sensitive portions of the site to maximize vegetation conservation; minimize impervious surfaces and runoff; protect riparian, nearshore and wetland habitats; protect fish and wildlife and their habitats; protect archaeological, historic and cultural resources; and preserve aesthetic values. |
| | | | New shoreline uses and developments should not deprive other uses and users of reasonable access to navigable waters and/or restrict access of treaty tribes to their "usual and accustomed" areas. |
| | Views and Aesthetics Policies | Views and Aesthetics | New shoreline uses and developments should be encouraged to minimize obstructions of the public's visual access to the water and shoreline from public lands, rights-of way and other public property.<br>New shoreline uses and developments should not significantly detract from shoreline scenic and aesthetic qualities that are derived from natural or cultural features, vegetative cover and historic sites/structures. |
| | Water Quality, Stormwater and Nonpoint Pollution Policies | Shoreline Management | New shoreline uses and developments are encouraged to minimize impervious surface and incorporate low impact development stormwater management techniques where reasonable to minimize surface water runoff and prevent water quality degradation. |

*The *Section* column indicates the element/chapter of the comprehensive plan where the goal or policy text was found. The *Topic* column indicates the subject matter that is covered by the goal or policy text.

# APPENDIX G. APPLICABLE POLICIES AND CODE REQUIREMENTS FOR VIEWS AND VISUAL RESOURCES

**Table G-1. Planning Policies**

| Plans | Protected Views and Visual Resources | Guidance for Reducing Visual Impacts |
|---|---|---|
| **King County** | | |
| King County Comprehensive Plan 2013 Update (including the King County SMP) | Shorelines (Plan Policy S-313) | N/A |
| | Parks, trails and other open spaces in the Rural Area (Plan Policy P-109) | N/A |
| King County Municipal Code (KCMC)<br>*Current through April 15, 2015* | The Code does not include any policies or regulations that guide development of new utilities to reduce impacts to views or visual resources. | |
| **Beaux Arts Village** | | |
| Town of Beaux Arts Village 2015-2035 Comprehensive Plan (2015) | Residential Character | N/A |
| Beaux Arts Village Municipal Code (BAVC)<br>*Current through April 9, 2013* | The Code does not include any policies or regulations that guide development of new utilities to reduce impacts to views or visual resources. | |
| Beaux Arts Village SMP 2014 | Shorelines | Utilities prohibited in the urban conservancy, shoreline residential, and aquatic shoreline areas. |
| | | All development on navigable water should consider impacts to public views |
| **Bellevue** | | |
| Bellevue Comprehensive Plan 2015 | Views of water, mountains, and skylines from public places (Plan Policy UD-23) | N/A |
| | N/A | Requires utility equipment and support facilities be aesthetically compatible with surrounding area (Plan Policy UD-53). |

| Plans | Protected Views and Visual Resources | Guidance for Reducing Visual Impacts |
|---|---|---|
| | N/A | Consolidate utility facilities and co-locate multiple utilities (Plan Policy UT-43). |
| | N/A | States preference for use of new technology to reduce visual impacts. |
| | Green belts and open spaces per Parks and Open Space System Plan | Avoid locating overhead lines in greenbelts or open spaces (Plan Policy UT-45). |
| | Factoria Boulevard (Plan Policy S-FA-32) | N/A |
| | Views of Richards Creek, Kelsey Creek, and Mercer Slough (Plan Policy S-RV-13) | N/A |
| | Pathways and access points with views of Sunset Creek, Richards Creek, Coal Creek, and Mercer Slough (Plan Policy S-FA-18) | N/A |
| | Unique open spaces, landmarks, and viewpoints (Plan Policy S-RV-24.) | N/A |
| | Single-family neighborhood views in Eastgate (Plan Policy S-EG-20.) | N/A |
| | Bellevue Community College (Plan Policy S-EG-30.) | N/A |
| Bellevue City Code<br>*Current through August 3, 2015* | N/A | Visual and aesthetic impacts associated with the EPF must be mitigated to the greatest extent technically feasible (BCC 20.20.350C.5.b). |
| | N/A | Electrical utility facilities shall be sight-screened through landscaping and fencing (BCC 20.20.255). |
| Bellevue SMP (In Progress) | Shoreline Master Program is currently in progress. | |

| Plans | Protected Views and Visual Resources | Guidance for Reducing Visual Impacts |
|---|---|---|
| **Clyde Hill** | | |
| City of Clyde Hill 2015-2035 Comprehensive Plan | Lake Washington, the Seattle Skyline, Maydenbauer Bay, Kirkland, and downtown Bellevue | N/A |
| Clyde Hill Municipal Code (CHMC)<br>*Current through June 9, 2015* | The natural visual character of the city , including its views of Lake Washington, the mountain ranges, treed areas, and the Seattle skyline (CHMC 17.50.010) | N/A |
| | Views and visual resources that create a special character for the community and support property values (CHMC 17.77.020) | N/A |
| Clyde Hill SMP (N/A) | Clyde Hill does not have an SMP | |
| **Hunts Point** | | |
| 2014 Draft Comprehensive Plan Update for the Town of Hunts Point | Hunt Point's wooded and sylvan character | Tree Code regulates removal and replacement of significant trees to soften visual impacts. |
| Hunts Point Municipal Code (HPMC)<br>*Current through April 13, 2015* | View corridors of wetlands (HPMC 16.15.010) | N/A |
| Town of Hunts Point SMP 2015 | Shorelines | High voltage electric transmission lines are prohibited within shoreline jurisdiction (Policy 6.12) |
| **Issaquah** | | |
| City of Issaquah Comprehensive Plan 2015 | Tree Canopy | N/A |
| | Hillside Views | Integrate hillside views into site design as amenities and protect them as environmental resources (LU Policy A12). |

| Plans | Protected Views and Visual Resources | Guidance for Reducing Visual Impacts |
|---|---|---|
| | N/A | Integrate views and open space provided by riparian corridors and wetlands into all developments, where applicable (LU Policy E4). |
| | N/A | Encourage new trails and viewing points along Issaquah Creek (LU Policy H4). |
| | Views of Issaquah Alps, Mount Rainier, and the Sammamish Plateau from public spaces (LU Policy H9) | N/A |
| | Hillside | Minimize the view impact of hillside development from the valley floor and other hillsides by strategically integrating the architecture, siting and landscaping into the natural environment (LU Policy H10). |
| | Surrounding Land Uses | Ensure utility provision is compatible with surrounding land uses. Balance public concerns over utility infrastructure (such as safety, price, and natural environment) with the community's desire that utility and public service projects be aesthetically compatible with surrounding land uses (U Policy A2). |
| | Parks and Open Space | Preserve and enhance the beauty of the City of Issaquah through the parks and open spaces that make up the City's park system (P Policy B5). |
| | Landscapes and Vistas from Parks | Promote retention and replication of the area's natural beauty and ecology (mountains, plantings, water etc.), sounds and vistas in the park system (P Policy B5.2). |
| | Natural Open Space Areas, such as the Forested Hillsides of the Issaquah Alps (P Policy B5.4) | N/A |
| | Open Space and Views | Preserve open space and views in accordance with view policies found in the Land Use Element (EV Policy D8). |

| Plans | Protected Views and Visual Resources | Guidance for Reducing Visual Impacts |
|---|---|---|
| | Surround Land Uses | Provide opportunities for artists' and design professionals' involvement and review in early design phases of community facilities, amenities and infrastructure in order to enhance the aesthetics of these projects (C Policy C2). |
| Issaquah Municipal Code (IMC) *Current through April 20, 2015* | N/A | Fence height should be 8 feet tall or less. Preferred materials for fences are listed, as well as exemptions for use of hedging (IMC 18.07.120). |
| | Shorelines | Preference for underground utilities (IMC 18.07.480). |
| City of Issaquah SMP 2013 | Public's views of the water | Shoreline uses and development should be designed and maintained to minimize obstructions of the public's views of the water. |
| | N/A | Development in shoreline areas should consider the scale, arrangement and modulation of site buildings and elements to achieve a balance of open space and development. |
| **Kirkland** | | |
| Kirkland 2035 (2015) | Public views of the City, surrounding hillsides, Lake Washington, Seattle, the Cascades, the Olympics, and view corridors along Lake Washington's shoreline (Plan Policy CC-4.5). | Require siting analysis in the development review process for new and expanded electrical transmission and substation facilities to address land use and sensitive areas and provide mitigation to minimize visual and environmental impacts (Policy U-7.7). |
| | Natural landforms, vegetation, and scenic areas that contribute to the City's identity and visually define the community (Plan Policy CC-4.6). | N/A |
| | Public Spaces (Plan Policy CC-4.10) | N/A |
| | N/A | Screen above ground equipment associated with electrical distribution without hindering access as required by the provider (Policy U-7.6). |

| Plans | Protected Views and Visual Resources | Guidance for Reducing Visual Impacts |
|---|---|---|
| Kirkland Zoning Code (KZC)<br>*Current through June 16, 2015* | Shorelines | Locate utility facilities outside of the shoreline. If required in shoreline, place where it will not obstruct scenic views (KZC 83.240). |
| | | Utilities shall provide screening of facilities from the lake and adjacent properties in a manner that is compatible with the surrounding environment (KZC 83.240). |
| | | No permit shall be issued for any new or expanded or structure more than 35 feet above average grade level that will obstruct the view to the lake of a substantial number of residences on or adjoining the shoreline, except where this Chapter does not prohibit a height of more than 35 feet and only when overriding considerations of the public interest will be served (KZC 83.240). |
| | | Development within the shoreline areas located west of Lake Washington Boulevard and Lake Street South shall include public view corridors that provide the public with an unobstructed view of the water. The intent of the corridor is to provide an unobstructed view from the adjacent public right-of-way to the lake and to the shoreline on the opposite side of the lake (KZC 83.240). |
| Kirkland SMP (2010) | Lake Washington | Maximize public access, use, and visual access to the lake within Carillon Point and the surrounding commercial area (Policy SA-7.3). |
| | | Enhance the physical and visual linkages to Lake Washington in the Juanita Business District (Policy SA-7.4). |
| | Shorelines | Provide a high quality shoreline environment where the public enjoys access to and views of the lake (Goal SA-1) |
| | | Locate utility facilities and corridors to protect scenic views and prevent impacts to the aesthetic qualities of the shoreline (Policy SA-25.4). |

| Plans | Protected Views and Visual Resources | Guidance for Reducing Visual Impacts |
|---|---|---|
| | | Require new development or redevelopment to include establishment or preservation of appropriate shoreline vegetation. Proper plant selection and design should be done to ensure that views are not diminished (Policy SA-3.3). |
| | | Minimize tree clearing and thinning activities along the shoreline and require mitigation for trees that are removed (Policy SA-16.2). |
| | | Locate utility facilities and corridors to protect scenic views and prevent impacts to the aesthetic qualities of the shoreline (Policy SA-25.4). |
| | Public View Corridors | Preserve public view corridors along the City's street networks and public parks (Policy SA-26.1). |
| | | Locate and design new development to provide view corridors of Lake Washington from Lake Washington Boulevard and Lake Street South south of the Central Business District (Policy SA-26.2). |
| **Medina** | | |
| City of Medina Comprehensive Plan (2015) | Views from parks and open spaces (Plan Policy PO-P3) | N/A |
| | The Country Club and Golf Course | N/A |
| | Large tracts of public and private open space that can be viewed from residential lots and City streets | N/A |
| | Views of Seattle, Mercer island, and Mount Rainer from the Medina Beach Property | N/A |
| | Lake and territorial views from residences | N/A |

| Plans | Protected Views and Visual Resources | Guidance for Reducing Visual Impacts |
|---|---|---|
| Medina Municipal Code (MMC)<br>*Current through July 13, 2015* | Views from adjoining properties and streets | All electrical utilities should be housed in buildings and structures that minimize visual impacts (MMC 20.32.040). |
| | Views of a "significant number" of nearby residential properties | Combine utility corridors and placing utility infrastructure underground whenever feasible (MMC 20.64.060). |
| | Shoreline | Regional utility facilities involved in production, processing and transmission must be located outside of the shoreline jurisdiction "unless no other feasible option exists" (MMC 20.64.060). |
| City of Medina, Washington SMP (2014) | Views of Lake Washington from public parks (Plan Policy SM-P12.1) | N/A |
| | Scenic views of a significant number of nearby residential properties (Plan Policy SM-P12.1) | Locate regional utility facilities outside of the shoreline jurisdiction or in a manner that doesn't obstruct residential views (Plan Policy SM-P12.1). |
| | Public's visual access to shoreline areas (Plan Policy SM-P12.4) | N/A |
| | N/A | Locate new utilities outside of the shoreline "unless no other feasible location exists" If unavoidable, locate utility facilities and corridors in manner that preserves that natural landscape, minimizes conflict with neighboring land uses, and minimizes impacts on the aesthetic qualities of the shoreline (Plan Policy SM-P15.2). |
| | N/A | Place facilities underground whenever possible (Plan Policy SM-P15.3). |
| | N/A | Promotes joint use of rights-of-way (Plan Policy SM-P15.5). |
| | Visual access to the shoreline (SM-P5.1) | N/A |
| **Newcastle** | | |
| Draft 2015 Update to the City of Newcastle Comprehensive Plan | Existing neighborhood scale and character (Plan Policy LU-G3) | N/A |

| Plans | Protected Views and Visual Resources | Guidance for Reducing Visual Impacts |
|---|---|---|
| | Natural features, such as stream channels that contribute to the City's scenic beauty (Plan Policy LU-G8) | N/A |
| | N/A | Placement of utility lines in shared utility corridors and recommends that aesthetics be considered during design and maintenance (Plan Policy LU-P19). |
| | N/A | Promote co-location of major utility transmission facilities (Plan Policy UT-P3). |
| | N/A | Limit disturbance to vegetation within major utility transmission corridors (Plan Policy UT-P8). |
| | N/A | Require utility providers to design and construct overhead transmission lines in a manner that is aesthetically compatible with surrounding land uses (Plan Policy UT-P10). |
| | N/A | Require utility providers to minimize visual impacts of transmission towers and overhead transmission lines on adjacent land uses through careful siting and design (Plan Policy UT-P14). |
| | N/A | Require new, modified, or replacement transmission structures (such as lattice towers, monopoles, and the like) to be designed to minimize aesthetic impacts appropriate to the immediate surrounding area whenever practical (Plan Policy UT-P16). |
| | N/A | Require utility providers to mitigate the loss of significant trees from the construction of new or expanded transmission facilities (Plan Policy UT-P19). |
| | N/A | Require reasonable landscape screening of site-specific above-ground utility facilities in order to diminish visual impacts (Plan Policy UT-P20). |
| Newcastle Municipal Code (NMC) *Current through May 5, 2015* | The Code does not include any policies or regulations that guide development of new utilities to reduce impacts to views or visual resources. | |

| Plans | Protected Views and Visual Resources | Guidance for Reducing Visual Impacts |
|---|---|---|
| City of Newcastle SMP (N/A) | The City of Newcastle does not have an SMP. | |
| **Redmond** | | |
| Vision 2030 City of Redmond Comprehensive Plan | Views of Mount Rainier, Mount Baker, the Cascade Mountains, Lake Sammamish, the Sammamish River, Bear and Evans Creeks, and the open and pastoral vistas in the northern Sammamish River Valley | N/A |
| | Unique public views that provide a sense of place | N/A |
| | View corridors should, such as:<br>• From Avondale Road and Union Hill Road in the Bear Creek Design District land north of Bear and Evans Creeks and east of Avondale Road (Plan Policy SL-40).<br>• Scenic, public view corridors toward the Cascades and the Sammamish Valley (Plan Policy NR-10).<br>• NE 116th Street (Plan Policy NR-10)<br>• 172nd Avenue NE (Plan Policy NR-10)<br>• NE 122nd Street to 162nd Place NE (Plan Policy NR-10)<br>• 154th Place NE (Plan Policy NR-10)<br>• Redmond-Woodinville Road (Plan Policy NR-10) | N/A |

| Plans | Protected Views and Visual Resources | Guidance for Reducing Visual Impacts |
|---|---|---|
| | • Along the easement of the Redmond/Puget Sound Energy Trail (Plan Policy NR-10)<br>• Sammamish River (Plan Policy N-EH-2)<br>• Sammamish Valley(Plan Policy N-EH-2)<br>• Bear Creek Valley(Plan Policy N-EH-2)<br>• Cascade Mountains(Plan Policy N-EH-2)<br>• Lake Sammamish(Plan Policy N-EH-2)<br>• Mount Rainier(Plan Policy N-EH-2)<br>• Avondale Road through the Keller Farm toward Mount Rainier (Plan Policy N-BC-3) | |
| | Visual access to shorelines, including existing parks and trails adjacent to the shorelines and a in a few places from view corridors or from major arterials or bridges | Place utilities within existing utility corridors and have regional transmission lines be located outside of the shoreline and away from view corridors (Plan Policy SL-73 and SL-74). |
| | The river; views of surrounding hillsides, mountains, and tree line; large open spaces, such as the Sammamish River, Downtown Central Park, the Redmond Central Connector, Anderson Park and Bear Creek | |
| | Tree stands, views from the valley, and rural area adjacent to the Sammamish Valley, west of Redmond- Woodinville | N/A |

| Plans | Protected Views and Visual Resources | Guidance for Reducing Visual Impacts |
|---|---|---|
| | Road, and north of NE 116th Street (Plan Policy N-SV-4) | |
| | The Willows Corridor, north of the Puget Sound Energy transmission line right-of-way (Plan Policy N-WR-G-1) | N/A |
| | Natural vistas and open spaces within neighborhoods. | Burry all new utilities and older utility lines that are being updated in North Redmond, as well as those located in the Idlywood neighborhood. An exception is made for PSE's high-voltage transmission lines (Policy N-NR-78 and N-ID-27). |
| | N/A | Burry utility lines along West Lake Sammamish Parkway, NE 24th Street, and NE 36th Street (Plan Policy N-ID-27). |
| | Education Hill's panoramic views of Bear Creek Valley, the Cascade Mountains, Mount Rainier, Downtown Redmond, Lake Sammamish, the Cascade foothills, the Sammamish River, and the Sammamish Valley | N/A |
| | Views of Lake Sammamish and Marymoor Park from the Idylwood neighborhood | N/A |
| | Woodland views from neighborhood residences | Keep the slopes overlooking the Sammamish and Bear Creek Valleys undeveloped. |
| | N/A | Throughout the plan, landscaping is encouraged to provide aesthetic value, unify site design, and soften or disguise "less aesthetically pleasing features of a site" (Comp Plan; CC-23). The Plan requires "reasonable screening or architecturally compatible design of above ground utility facilities, such as transformers and associated vaults" (Policy UT-15; Comp plan). It suggests promoting well-designed utility facilities through use of color, varied and interesting materials, art work, and superior landscape design. |

| Plans | Protected Views and Visual Resources | Guidance for Reducing Visual Impacts |
|---|---|---|
| | Views associated with shoreline areas | N/A |
| Redmond Zoning Code (RZC)<br>*Current through June 16, 2015* | Appearance of Public Ways | Underground electrical facilities if economically-feasible (RZC 21.17). |
| | Shoreline Views | Underground electrical facilities or integrate them with trails or other open space connections to the shoreline (RZC 21.68). |
| Redmond SMP (2009) | Bear/Evans Creek Valley | Public shoreline views along the Bear/Evans Creek Valley are protected to some degree by Citywide Shoreline Public Views.<br>Minimize negative visual impacts on adjacent or nearby residential uses and recreational uses in the Agriculture and Urban Recreation zones and shoreline areas. The use of certain materials, shapes and colors and landscaping may be required in order to minimize visual impacts (200.170.45-080). |
| | Shorelines | Where feasible, visual and physical access to the shoreline should be required. |
| | Lake Sammamish, open and pastoral vistas in the northern Sammamish River valley, and Mount Rainier along Bear and Evans Creeks | N/A |
| | Public view corridors as identified in 20D.42.50. | Site development should blend with natural landforms and be designed to maximize scenic views identified as public view corridors. |
| | | Locate regional utilities outside of the shoreline. Locate such facilities away from public access areas and view corridors and away from the shoreline to the farthest location possible where a non-shoreline location is not feasible (SL-73). |
| | | Locate utilities, where feasible, within existing utility corridors.<br>Locate above-ground utilities away from view corridors (SL-7 4). |

| Plans | Protected Views and Visual Resources | Guidance for Reducing Visual Impacts |
|---|---|---|
| **Renton** | | |
| City of Renton Comprehensive Plan (2015) | High volume of trees and clear mountain views | N/A |
| | Public scenic views and public view corridors, such as "physical, visual, and perceptual linkages to Lake Washington and Cedar River" (Policy L-55). | N/A |
| | Natural forms, vegetation, distinctive stands of trees, natural slops, and scenic areas that "contribute to the City's identity, preserve property values, and visually define the community neighborhoods" (Policy L-56). | N/A |
| | Lakes and shorelines | N/A |
| | Views of the water from public property or views enjoyed by a substantial number of residences | N/A |
| | N/A | Design shoreline developments to maintain or enhance aesthetic values and scenic views (Policy SH-16). |
| | N/A | Make facility improvements and additions within existing corridors wherever possible (Policy U-73). |
| City of Renton Municipal Code (RMC)<br>*Current through November 16, 2015* | Shoreline | Design shoreline use and development to maintain shoreline scenic and aesthetic qualities derived from natural features, such as shore forms and vegetative cover (RMC 4-3-090.D.3) |
| | | Prohibits utilities in the Shoreline Natural shoreline environment designation (RMC 4-3-090.E.1). |
| | N/A | Visual prominence of structures must be minimized, including light, glare, and reflected light (RMC 4-3-090.D.3). |

| Plans | Protected Views and Visual Resources | Guidance for Reducing Visual Impacts |
|---|---|---|
| | N/A | Aboveground utilities must be screened with masonry, decorative panels, and/or evergreen trees, shrubs, and landscaping sufficient to form an effective sight barrier within a period of five (5) years (RMC 4-6-090). |
| City of Renton SMP 2011 | Scenic and aesthetic qualities derived from natural features of the shoreline, such as vegetative cover and shore forms (Ordinance No. 5633). | N/A |
| | Shoreline | Reduce the visual prominence of structures, including an associated light and glare (Ordinance No. 5633). |
| | | Prohibits utilities in the Shoreline Natural shoreline environment designation (Ordinance No. 5633). |
| **Sammamish** | | |
| City of Sammamish Comprehensive Plan (2015 Draft) | Streams, lakes, forested areas and other natural features | N/A |
| | Parks and recreation facilities | N/A |
| | View corridors and parcels that convey a unique sense of the community's character | N/A |
| | N/A | Bury utilities if it is "physically and financially feasible." If unavoidable, have above-ground utility facilities be aesthetically compatible with the surrounding area. |
| | N/A | Minimize visual impacts associated with towers in the community. |
| Sammamish Municipal Code (SMC)<br>*Current through March 17, 2015* | The Code does not include any policies or regulations that guide development of new utilities to reduce impacts to views or visual resources. | |

| Plans | Protected Views and Visual Resources | Guidance for Reducing Visual Impacts |
|---|---|---|
| City of Sammamish SMP Update August 2011 | Lakes, rivers, and streams, and all tributary waters and wetlands in the City (Including Lake Sammamish, Pine Lake, Beaver Lake) | N/A |
| | Visual access to shorelines | N/A |
| **Yarrow Point** | | |
| Town of Yarrow Point Comprehensive Plan 2015-2035 | N/A | Long-term vision for electrical utility infrastructure is to have it placed underground. |
| Yarrow Point Municipal Code (YPMC)<br>*Current through June 10, 2014* | N/A | Underground existing and new electrical facilities (YPMC 12.12.020). |
| Town of Yarrow Point SMP 2012 | N/A | Utilities that must be located within the shoreline should be placed in existing rights-of-way or corridors. |

Note: For this programmatic EIS, subarea plans were not reviewed unless their goals and polices were embodied in the community-wide comprehensive plan.

# APPENDIX H. HISTORIC AND CULTURAL SITES

| Site # | Site Name | ALT 1 | ALT 2 | ALT 3 | Isolated Artifact | Precontact Component | Human Remains | Submerged | Residential | Historic Refuse / Scatter | Infrastructure | Industrial | Railroad | NRHP Status |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 45-KI-0008 | - | ● | ● | ● | | ● | | | | | | | | Not Evaluated |
| 45-KI-0009 | - | ● | ● | ● | | ● | | | | | | | | Listed |
| 45-KI-0010 | - | ● | ● | ● | | ● | | | | | | | | Not Evaluated |
| 45-KI-0051 | Earlington Woods | ● | ● | ● | | ● | ● | | | | | | | Not Evaluated |
| 45-KI-0211 | Renton Coal Mine | ● | ● | ● | | | | | | | | ● | | Potentially Eligible |
| 45-KI-0266 | - | ● | ● | ● | | ● | | | | | | | | Not Evaluated |
| 45-KI-0285 | Seattle and Walla Walla RR | ● | ● | ● | | | | | | | | | ● | Not Evaluated |
| 45-KI-0404 | Submerged Vessel | ● | - | - | | | | ● | | | | | | Not Evaluated |
| 45-KI-0425 | Submerged Vessel | ● | - | - | | | | ● | | | | | | Not Evaluated |
| 45-KI-0427 | Submerged Aircraft | ● | - | - | | | | ● | | | | | | Determined Not Eligible |
| 45-KI-0430 | Tradition Lake Peeled Cedar | - | - | ● | | ● | | | | | | | | Not Evaluated |
| 45-KI-0433 | Submerged RR coal cars | ● | - | - | | | | ● | | | | | | Potentially Eligible |
| 45-KI-0439 | Renton Sears-Fred Meyer Store Site | ● | ● | ● | | ● | | | | ● | | | | Not Evaluated |
| 45-KI-0451 | Seattle, Lake Shore & Eastern RR | ● | ● | ● | | | | | | | | | ● | Determined Not Eligible |
| 45-KI-0452 | Gilman Water Company/Old Issaquah Water Works | - | - | ● | | | | | | | ● | | | Determined Not Eligible |
| 45-KI-0453 | Poured Concrete Block Foundation | - | - | ● | | | | | | | | ● | | Determined Not Eligible |
| 45-KI-0457 | - | - | - | ● | | ● | | | | | | | | Not Evaluated |
| 45-KI-0466 | Bear/Evans Creek Site | - | - | ● | | ● | | | | ● | ● | | | Not Evaluated |
| 45-KI-0467 | Union Hill Road Site | - | - | ● | | ● | | | | ● | | | | Not Evaluated |
| 45-KI-0481 | Tradition Lake Site | - | - | ● | | ● | | | | | | | | Not Evaluated |

| Site # | Site Name | ALT 1 | ALT 2 | ALT 3 | Isolated Artifact | Precontact Component | Human Remains | Submerged | Residential | Historic Refuse / Scatter | Infrastructure | Industrial | Railroad | NRHP Status |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 45-KI-0488 | - | - | - | ● | | ● | | | | ● | | | | Not Evaluated |
| 45-KI-0492 | Marymoor Trench B | ● | ● | ● | | ● | | | | | | | | Not Evaluated |
| 45-KI-0493 | Marymoor Trench F | ● | ● | ● | | ● | | | | | | | | Not Evaluated |
| 45-KI-0501 | Renton High School Indian Site | ● | ● | ● | | ● | | | | | | | | Not Evaluated |
| 45-KI-0537 | Concrete foundations | - | - | ● | | | | | ● | | | | | Determined Not Eligible |
| 45-KI-0538 | Columbia and Puget Sound RR | ● | ● | ● | | | | | | | | | ● | Potentially Eligible |
| 45-KI-0542 | - | ● | ● | ● | | | | | | ● | | | | Not Evaluated |
| 45-KI-0543 | Moore Farmstead | ● | ● | ● | | | | | ● | | | | | Not Evaluated |
| 45-KI-0587 | Little Cedar River Fishing Site | ● | ● | ● | | ● | | | | | | | | Not Evaluated |
| 45-KI-0686 | Henry Moses Aquatic Center Site | ● | ● | ● | | ● | | | | | | | | Not Evaluated |
| 45-KI-0698 | Historic Road Grade | - | - | ● | | | | | | | ● | | ● | Potentially Eligible |
| 45-KI-0699 | - | - | - | ● | | | | | | | | | ● | Potentially Eligible |
| 45-KI-0701 | - | - | - | ● | | | | | | ● | | | | Potentially Eligible |
| 45-KI-0704 | Maxwell Corduroy Road | - | - | ● | | | | | | | ● | | | Potentially Eligible |
| 45-KI-0718 | Eastside Terrace Site | ● | ● | ● | | ● | | | | | | | | Not Evaluated |
| 45-KI-0739 | - | - | - | ● | | | | | | ● | | | | Potentially Eligible |
| 45-KI-0748 | Forbes Lake East Mitigation Area Historic Site | ● | ● | ● | | | | | ● | ● | | | | Potentially Eligible |
| 45-KI-0751 | ELSP-ISO-01 | - | - | ● | ● | | | | | ● | | | | Determined Not Eligible |
| 45-KI-0758 | Coal Creek Mine | ● | ● | ● | | | | | | | | ● | | Potentially Eligible |

| Site # | Site Name | ALT 1 | ALT 2 | ALT 3 | Isolated Artifact | Precontact Component | Human Remains | Submerged | Residential | Historic Refuse / Scatter | Infrastructure | Industrial | Railroad | NRHP Status |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 45-KI-0759 | Bob Bridge Toyota Site | ● | ● | ● | | | | | | ● | | | | Potentially Eligible |
| 45-KI-0767 | Talbot Road Dam and Retaining Walls | ● | ● | ● | | | | | | | ● | | | Potentially Eligible |
| 45-KI-0771 | 1349-1 Milk Can | - | - | ● | ● | | | | ● | | | | | Not Evaluated |
| 45-KI-0814 | Floating Dry Docks YFD 48 and 51 | ● | - | - | | | | ● | | | | ● | | Potentially Eligible |
| 45-KI-0821 | - | ● | ● | ● | | | | | | | ● | | | Potentially Eligible |
| 45-KI-0823 | Borrow Pit | - | - | ● | | | | | | | | ● | | Potentially Eligible |
| 45-KI-0824 | Bullitt House | - | - | ● | | | | | ● | | | | | Potentially Eligible |
| 45-KI-0825 | Gauthier Mill / Milwaukee RR Tie Mill | - | - | ● | | | | | | | | ● | | Potentially Eligible |
| 45-KI-0829 | Campbell Lumber Company Mill | - | - | ● | | ● | | | | | | ● | | Not Evaluated |
| 45-KI-0830 | SLP-08-01 | - | - | ● | ● | ● | | | | | | | | Not Evaluated |
| 45-KI-0834 | - | - | - | ● | | ● | | | | | | | | Not Evaluated |
| 45-KI-0835 | - | - | - | ● | ● | ● | | | | | | | | Not Evaluated |
| 45-KI-0836 | - | - | - | ● | ● | ● | | | | | | | | Not Evaluated |
| 45-KI-0837 | - | - | - | ● | ● | ● | | | | | | | | Not Evaluated |
| 45-KI-0839 | Bear Creek Site | ● | ● | ● | | ● | | | | | | | | Not Evaluated |
| 45-KI-0848 | Renton Glass Company Factory ruins and retaining wall | ● | ● | ● | | | | | | | | ● | | Determined Not Eligible |
| 45-KI-0941 | Marymoor Pet Garden | ● | ● | ● | | ● | | | | | | | | Not Evaluated |
| 45-KI-0945 | Historic Lake Washington Boulevard | ● | ● | ● | | | | | | | ● | | | Not Evaluated |
| 45-KI-0956 | MUT-10-01 | ● | ● | ● | ● | ● | | | | | | | | Not Evaluated |

| Site # | Site Name | ALT 1 | ALT 2 | ALT 3 | Isolated Artifact | Precontact Component | Human Remains | Submerged | Residential | Historic Refuse / Scatter | Infrastructure | Industrial | Railroad | NRHP Status |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 45-KI-0969 | Bridle Trails Listerine Bottle | ● | ● | ● | ● | | | | | ● | | | | Potentially Eligible |
| 45-KI-0985 | - | - | - | ● | | | | | | | ● | | | Potentially Eligible |
| 45-KI-0988 | SP NHPP 07 | - | - | ● | ● | ● | | | | | | | | Not Evaluated |
| 45-KI-1008 | - | ● | ● | ● | | | | | | ● | | | | Potentially Eligible |
| 45-KI-1009 | Moses Homestead | ● | ● | ● | | | | | ● | ● | | | | Potentially Eligible |
| 45-KI-1010 | Renton High School Ball Field Site | ● | ● | ● | | ● | | | | | | | | Not Evaluated |
| 45-KI-1034 | Zackuse Cemetery | - | - | ● | | | ● | | | | | | | Not Evaluated |
| 45-KI-1037 | ELST01 | ● | - | ● | | | | | | ● | | | | Determined Not Eligible |
| 45-KI-1038 | ELST01 | ● | - | ● | | | | | | | ● | | | Determined Not Eligible |
| 45-KI-1039 | ELST03 | ● | - | ● | | | | | | ● | | | | Determined Not Eligible |
| 45-KI-1095 | 15 Mile Isolate | - | - | ● | ● | ● | | | | | | | | Not Evaluated |
| 45-KI-1100 | Anderson Farmstead Fire/Burn Pit | - | - | ● | | | | | ● | ● | | | | Potentially Eligible |
| 45-KI-1101 | - | - | - | ● | | ● | | | | | | | | Not Evaluated |
| 45-KI-1107 | Reilly Tar & Chemical Wharf and T-Dock | ● | - | - | | | | ● | | | | ● | | Potentially Eligible |
| 45-KI-1116 | - | ● | ● | ● | ● | ● | | | | | | | | Not Evaluated |
| 45-KI-1117 | - | ● | ● | ● | | | | | | | ● | | | Potentially Eligible |
| 45-KI-1118 | - | ● | ● | ● | | | | | | | ● | | | Potentially Eligible |
| 45-KI-1156 | Hemingray-10 | - | - | ● | ● | | | | | | ● | | | Not Evaluated |
| 45-KI-1172 | ELST Flaked Pebble | - | - | ● | ● | ● | | | | | | | | Not Evaluated |

| Site # | Site Name | ALT 1 | ALT 2 | ALT 3 | Isolated Artifact | Precontact Component | Human Remains | Submerged | Residential | Historic Refuse / Scatter | Infrastructure | Industrial | Railroad | NRHP Status |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 45-KI-1173 | St. Andrew's Lutheran Church Memorial Garden | ● | ● | ● | | ● | | | | | | | | Not Evaluated |
| 45-KI-1174 | St. Luke's Lutheran Church Memorial Garden | ● | ● | ● | | ● | | | | | | | | Not Evaluated |
| 45-KI-1175 | Cross of Christ Lutheran Church Garden of Remembrance | ● | ● | ● | | ● | | | | | | | | Not Evaluated |
| 45-KI-1176 | Maclean Site | - | - | ● | | ● | | | | | | | | Not Evaluated |
| 45-KI-1177 | Issaquah-Fall City Road Segment | - | - | ● | | | | | | | ● | | | Potentially Eligible |
| 45-KI-1178 | Peterson Farm | ● | ● | ● | | | | | ● | | | | | Potentially Eligible |
| 45-KI-1198 | - | - | - | ● | | | | | ● | | | | | Potentially Eligible |
| 45-KI-1199 | Superior Coal & Improvement RR Grade | - | - | ● | | | | | | | | | ● | Potentially Eligible |
| 45-KI-1206 | - | ● | ● | ● | | | | | | ● | | | | Not Evaluated |
| 45-KI-1210 | Black River Pilings | ● | ● | ● | | | | | | | ● | | | Potentially Eligible |
| 45-KI-1216 | - | - | - | ● | | ● | | | | | | | | Not Evaluated |
| 45-KI-1217 | EL105 | ● | ● | ● | | ● | | | | ● | | | | Not Evaluated |
| 45-KI-1218 | - | ● | ● | ● | | | | | | ● | | | | Determined Not Eligible |
| 45-KI-1227 | ELST Wall 25 | - | - | ● | | ● | | | | | | | | Not Evaluated |
| 45-KI-1228 | ELST Wall 4 | - | - | ● | | ● | | | | | | | | Not Evaluated |
| 45-KI-1229 | ELST Wall 24 | - | - | ● | | | | | | ● | | | | Potentially Eligible |
| 45-KI-1238 | - | - | - | ● | | | | | ● | ● | | | | Potentially Eligible |
| 45-KI-1262 | - | - | - | ● | ● | ● | | | | | | | | Not Evaluated |

# APPENDIX I. REGISTERED HISTORIC PROPERTIES

| Map # | Site # | Property Name | Address | Year Built | ALT 1 | ALT 2 | ALT 3 | Determ. Eligible NRHP | NRHP Listed | WHR Listed | Washington Heritage Barn Register Listed | Designated King County Landmark |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| - | 45-KI-0786 | Burial | Not Mapped | - | ● | ● | ● | - | - | - | - | - |
| - | 45-KI-0794 | Charles and Judy Cramer Farm | Not Mapped | 1911 | - | - | ● | - | - | - | ● | - |
| - | 45-KI-0853 | First Presbyterian Church of Bellevue Memorial Garden | Not Mapped | - | ● | ● | ● | - | - | - | - | - |
| - | 45-KI-0854 | Midlakes Pioneer Cemetery | Not Mapped | - | ● | ● | ● | - | - | - | - | - |
| - | 45-KI-0855 | Sunset Hills Memorial Park | Not Mapped | - | ● | ● | ● | - | - | - | - | - |
| - | 45-KI-0860 | House of Mercy All-Muslim Cemetery | Not Mapped | - | - | - | ● | - | - | - | - | - |
| - | 45-KI-0868 | Hillside Cemetery | Not Mapped | - | - | - | ● | - | - | - | - | - |
| - | 45-KI-0875 | Tahoma National Cemetery | Not Mapped | - | - | - | ● | - | - | - | - | - |
| - | 45-KI-0876 | Kirkland Cemetery | Not Mapped | - | ● | ● | ● | - | - | - | - | - |
| - | 45-KI-0885 | Cedar Lawns Memorial Park | Not Mapped | - | - | - | ● | - | - | - | - | - |
| - | 45-KI-0886 | Old Redmond Cemetery | Not Mapped | - | - | - | ● | - | - | - | - | - |
| - | 45-KI-0887 | Greenwood Memorial Park | Not Mapped | - | ● | ● | ● | - | - | - | - | - |
| - | 45-KI-0888 | Mt. Olivet Cemetery | Not Mapped | - | ● | ● | ● | - | - | - | - | - |
| - | 45-KI-0948 | St. Margaret's Episcopal Church Columbarium | Not Mapped | - | ● | ● | ● | - | - | - | - | - |
| - | 45-KI-1034 | Zackuse Cemetery | Not Mapped | - | - | - | ● | - | - | - | - | - |
| 1 | - | Conrad Olson Farmstead | 18834 NE 95th Street | 1905 | - | - | ● | - | - | - | - | ● |
| 2 | 45-KI-612 | John George Kellet House | 526 10th Avenue | 1889 | ● | ● | ● | - | - | ● | - | - |
| 3 | 45-KI-186 | William A. Jones House / Kirkland Land & Improvement Company House / Loomis House | 304 8th Avenue W | 1889 | ● | ● | ● | - | ● | ● | - | ● |
| 4 | 45-KI-188 | Joshua Sears Building | 701 Market Street | c.1891 | ● | ● | ● | - | ● | ● | - | - |
| 5 | 45-KI-189 | Masonic Lodge Building | 700 Market Street | 1890 | ● | ● | ● | - | ● | ● | - | - |
| 6 | 45-KI-195 | Peter Kirk House | 620 Market Street | c.1892 | ● | ● | ● | - | ● | ● | - | ● |
| 7 | 45-KI-187 | Dr. Trueblood House | 127 7th Avenue | 1889 | ● | ● | ● | - | ● | ● | - | - |
| 8 | - | Perrigo House (Community Landmark) | 17325 NE 85th Place | 1909 | - | - | ● | - | - | - | - | ● |
| 9 | 45-KI-572 | Kirkland Woman's Club | 407 First Street | 1925 | ● | ● | ● | - | ● | ● | - | ● |
| 10 | - | First Church of Christ, Scientist | NW corner of Market Street and Lake Avenue W | 1922 | ● | ● | ● | - | - | - | - | ● |
| 11 | - | Kirkland Ferry Clock | NW corner of Kirkland Avenue and Lake Street | 1935 | ● | ● | ● | - | - | - | - | ● |

| Map # | Site # | Property Name | Address | Year Built | ALT 1 | ALT 2 | ALT 3 | Determ. Eligible NRHP | NRHP Listed | WHR Listed | Washington Heritage Barn Register Listed | Designated King County Landmark |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 12 | 45-KI-631 | *Tourist II* (Auto Ferry) | 25 Lake Shore Plaza, Marina Park | 1924 | ● | ● | ● | - | ● | ● | - | - |
| 13 | - | Old Redmond School | 16600 NE 80th Street | 1922 | ● | ● | ● | - | - | - | - | ● |
| 14 | - | Redmond Methodist Church (Community Landmark) | 16540 NE 80th Street | 1908 | ● | ● | ● | - | - | - | - | ● |
| 15 | - | Odd Fellows Hall | 7979 Leary Way | 1903 | ● | ● | ● | - | - | - | - | ● |
| 16 | - | Lodge Hall (Community Landmark) | 7875 Leary Way | 1903 | ● | ● | ● | - | - | - | - | ● |
| 17 | - | Orson and Emma Wiley House | 16244 Cleveland Street | c.1916 | ● | ● | ● | - | - | - | - | ● |
| 18 | - | Brown's Garage | 16389 Redmond Way | 1920 | ● | ● | ● | - | - | - | - | ● |
| 19 | - | Redmond State Bank | 7841 Leary Way | 1911 | ● | ● | ● | - | - | - | - | ● |
| 20 | 45-DT-0219 | Redmond City Park | 7802 168th Ave. NE | c.1938 | ● | ● | ● | - | ● | ● | - | ● |
| 21 | - | Bill Brown Saloon | 7824 Leary Way | 1913 | ● | ● | ● | - | - | - | - | ● |
| 22 | 45-KI-190 | Justice William White House | 7729 Leary Way | 1889 | ● | ● | ● | ● | - | - | - | ● |
| 23 | - | Haida House Replica No. 4 | 7447 159th Place NE | 1980 | ● | ● | ● | - | - | - | - | ● |
| 24 | - | Redmond Cemetery | 7000 – 180th Avenue NE | c.1890 | - | - | ● | - | - | - | - | ● |
| 25 | 45-KI-590 | Louis S. Marsh House | 6604 Lake Washington Boulevard | 1929 | ● | ● | ● | - | ● | ● | - | ● |
| 26 | 45-KI-9 | Marymoor Prehistoric Indian Site | Vicinity of Marymoor Park | - | ● | ● | ● | - | ● | ● | - | - |
| 27 | 45-KI-191 | James W. Clise House | 6046 Lake Sammamish Parkway NE | 1904 | ● | ● | ● | - | ● | ● | - | - |
| 28 | 45-KI-192 | Old Dutch Windmill | 6046 Lake Sammamish Parkway NE | c.1905 | ● | ● | ● | - | - | ● | - | - |
| 29 | 45-KI-196 | The Yellowstone Road | 196th Avenue NE Between the Fall City Highway and 80th NE | 1913 | - | - | ● | - | ● | ● | - | ● |
| 30 | 45-KI-1143 | Walter Cooper Dairy Farm | 5703 208th Ave NE | 1925 | - | - | ● | - | - | - | ● | - |
| 31 | 45-KI-797 | Bill Johnson Barn | 20306 NE 50th Street | 1933 | - | - | ● | - | - | - | ● | - |
| 32 | 45-KI-802 | Louis Hilger Barn | 22627 NE Redmond-Fall City Rd | 1912 | - | - | ● | - | - | - | ● | - |
| 33 | 45-KI-193 | The Moorings | 1401 92nd Avenue NE | 1918 | - | ● | ● | - | - | ● | - | - |
| 34 | 45-KI-173 | James G. Eddy House and Grounds | 1005 Evergreen Point Road | 1927 | - | ● | ● | | ● | ● | | |
| 35 | 45-KI-172 | Old Ferry Dock Building – Medina | 501 Evergreen Point Road | 1913 | ● | ● | ● | | | ● | | |
| 36 | 45-KI-970 | Twin Valley Dairy | 410 130th Place SE | 1933 | ● | ● | ● | - | - | - | ● | - |

| Map # | Site # | Property Name | Address | Year Built | ALT 1 | ALT 2 | ALT 3 | Determ. Eligible NRHP | NRHP Listed | WHR Listed | Washington Heritage Barn Register Listed | Designated King County Landmark |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 37 | 45-KI-262 | Wilburton Trestle | Burlington Northern Railroad crossing Mercer Slough | 1904 | ● | ● | ● | - | - | ● | - | - |
| 38 | 45-KI-659 | Jacob and Emma Reard House | 1705 212th Ave SE | 1895 | - | - | ● | ● | - | - | - | ● |
| 39 | 45-KI-606 | Winters, Frederick W., House | 2102 Bellevue Way SE | 1929 | ● | ● | ● | - | ● | ● | - | - |
| 40 | 45-KI-618 | Ray Brandes House | 2202 212th Ave SE | 1953 | - | - | ● | - | ● | ● | - | - |
| 41 | - | Issaquah-Fall City Road Heritage Corridor | Sammamish Plateau and Snoqualmie Valley | 1883-1926 | - | - | ● | - | - | - | - | ● |
| 42 | 45-KI-142 | Pickering Farm | 21809 SE 56th Street | 1890 | - | - | ● | - | ● | ● | - | - |
| 43 | 45-KI-140 | Pacific Coast Company House No. 75 | 7210 138th Avenue SE | c.1870 | ● | ● | ● | - | ● | ● | - | ● |
| 44 | 45-KI-0793 | Victor Taumala Barn | 21003 SE 75th Street | 1922 | - | - | ● | - | - | - | ● | - |
| 45 | - | Hailstone Feed Store and Gasoline Station | 232 Front Street | 1941 | - | - | ● | - | - | - | - | ● |
| 46 | 45-KI-141 | Newcastle Cemetery | SW of 69th Way off 129th Avenue SE | c.1870 | ● | ● | ● | - | - | ● | - | ● |
| 47 | - | Thomas Rouse Road (Community Landmark) | 136th SE & 144th Place SE | 1880 | ● | ● | ● | - | - | - | - | ● |
| 48 | 45-KI-595 | Issaquah Depot (Gilman Station) | 50 Rainier Boulevard North | 1889 | - | - | ● | - | ● | ● | - | ● |
| 49 | 45-KI-637 | Issaquah Sportsmen's Club | 23600 SE Evans Street | 1937 | - | - | ● | - | ● | ● | - | ● |
| 50 | 45-KI-790 | Colasurdo Barn | 14339 S.E. May Valley Road | 1949 | ● | ● | ● | - | - | - | ● | - |
| 51 | 45-KI-209 | Renton Fire Station | Houser Way and Mill Avenue | 1939 | ● | ● | ● | - | - | ● | - | - |
| 52 | 45-KI-74 | Renton Substation, Snoqualmie Falls Power Company | 1017 South 3rd Street | 1898 | ● | ● | ● | - | - | ● | - | - |
| 53 | 45-KI-211 | Renton Coal Mine Hoist Foundation | Vicinity of Grady Way and Benson Road | 1890 | ● | ● | ● | - | - | ● | - | - |
| 54 | - | Elliott Farm* | 14207 Maple Valley Highway | 1911 | ● | ● | ● | - | - | - | - | ● |

# APPENDIX J. DESCRIPTION OF APPLICABLE HISTORIC REGISTERS

## WASHINGTON HERITAGE REGISTER

Established in 1971 (Senate Bill 363, RCW 27.34.200, and Chapter 25-12 WAC), the Washington Heritage Register (WHR) is maintained by the Department of Archaeology and Historic Preservation (DAHP). As of June 2015, a total of 441 properties were listed on the WHR statewide. Properties listed on the National Register of Historic Places (NRHP) are also automatically listed on the WHR, while some properties are only listed on the WHR. Listing in the WHR is honorary and does not restrict private property owners from altering these resources. However, SEPA review requires consideration of properties listed in or eligible for the WHR. To qualify for listing on the WHR, the following criteria must be met:

- A building, site, structure, or object must be at least 50 years old. If newer, the resource should have documented exceptional significance.
- The resource should have a high to medium level of integrity; it should retain important character-defining features from its historic period of construction.
- The resource should have documented historical significance at the local, state, or federal level.
- Advisory Council on Historic Preservation review and listing requires the consent of the owner.

## WASHINGTON HERITAGE BARN REGISTER

Created in 2007 under Substitute House Bill 2115, this register commemorates barns that are historically significant to the agricultural, economic, and cultural development of the State of Washington. As of June 2015, a total of 572 heritage barns were designated across Washington. Listing on the register is honorary and does not protect the resource from demolition nor require review of alterations. To qualify for listing on the Washington Heritage Barn Register, the following criteria must be met:

- The barn must be over 50 years old.
- The barn must retain a significant degree of historic and architectural integrity.

## KING COUNTY LANDMARKS

Historic properties in King County may be recognized at the local level for their historic significance through a landmark nomination process administered by the King County Landmarks Commission (Chapter 20.62 King County Code [KCC]). Most King County Landmarks are in unincorporated King County; some are County-owned buildings within city limits.

Designation criteria for King County Landmarks are defined in Chapter 20.62 KCC as follows:

A. A historic resource may be designated as a King County landmark if it is more than 40 years old, or in the case of a landmark district, contains resources that are more than 40 years old, and possess integrity of location, design, setting, materials, workmanship, feeling, and association; and meet at least one of the following designation criteria:

   A1. Is associated with events that have made a significant contribution to the broad patterns of local, state or national history; or

   A2. Is associated with the lives of persons significant in local, state or national history; or

   A3. Embodies the distinctive characteristics of a type, period, style or method of design or construction, or that represents a significant and distinguishable entity whose components may lack individual distinction; or

   A4. Has yielded, or may be likely to yield, information important to prehistory or history; or

   A5. Is an outstanding work of a designer or builder who has made a substantial contribution to the art.

B. A historic resource may be designated a community landmark because it is an easily identifiable visual feature of a neighborhood or the county and contributes to the distinctive quality or identity of such neighborhood or county because of its association with significant historical events or historic themes, association with important or prominent persons in the community or county, or recognition by local citizens for substantial contribution to the neighborhood or community. An improvement or site qualifying for designation solely by virtue of satisfying criteria set out in this section shall be designated a community landmark and shall not be subject to the provisions of KCC 20.62.080.

C. Cemeteries, birthplaces, or graves of historical figures, properties owned by religious institutions or used for religious purposes, structures that have been moved from their original locations, reconstructed historic buildings, properties primarily commemorative in nature, and properties that have achieved significance within the past 40 years shall not be considered eligible for designation. However, such a property shall be eligible for designation if it is:

   C1. An integral part of districts that meet the criteria set out in KCC 20.62.040A or if it is:

   C2. A religious property deriving primary significance from architectural or artistic distinction or historical importance; or

   C3. A building or structure removed from its original location but which is significant primarily for its architectural value, or which is the surviving structure most importantly associated with a historic person or event; or

C4. A birthplace, grave or residence of a historical figure of outstanding importance if there is no other appropriate site or building directly associated with his or her productive life; or

C5. A cemetery that derives its primary significance from graves of persons of transcendent importance, from age, from distinctive design features, or from association with historic events; or

C6. A reconstructed building when accurately executed in a suitable environment and presented in a dignified manner or as part of a restoration master plan, and when no other building or structure with the same association has survived; or

C7. A property commemorative in intent if design, age, tradition, or symbolic value has invested it with its own historical significance; or

C8. A property achieving significance with the past 40 years if it is of exceptional importance (King County, 2015).

The Landmarks Commission manages changes to designated landmarks through the Certificate of Appropriateness (COA) process (King County, 2015). Once a property has been designated, owners considering making significant alterations to the features of the resource that have been designated as significant, or seeking to move or demolish the resource, must file a COA with the Commission's Historic Preservation Officer for design review. The COA process includes an initial consultation meeting with the applicant, Historic Preservation Officer, and members of the Commission's Design Review Committee. If all parties agree to recommend approval of the COA, the COA is presented to the Commission at the next regularly scheduled meeting. If the parties disagree, a public hearing is scheduled before the Commission within 45 days. If, after the public hearing, the Commission declines the COA, a written report clarifying the basis for the decision is prepared and distributed to all interested parties. All Commission decisions may be appealed to the King County Council within 30 days of the notice of the decision.

## REFERENCES:

King County Historic Preservation Program. 2015. King County and City Landmarks List. Available at http://www.kingcounty.gov/~/media/property/historic_preservation/documents/resources/T06_KCLandmarkList.ashx?la=en. Last updated: July 14, 2015. Accessed July 23, 2015.

# APPENDIX K. INTERVIEW QUESTIONS FOR FIRE DEPARTMENTS

**The following questions were asked of each study area fire department in July and August, 2015.**

1. Is your department meeting service (response) targets?
2. What kind of technical response teams do they have?
3. Do they have the ability (appropriate equipment and training) to respond to electrical fires?
4. Do they have the ability to respond to a downed 230 kV transmission line on a house; across a street ROW?
5. Have you had to respond to incidences involving 115 kV transmission lines?
6. Is responding to 230 kV transmission line incidences a different level of complexity than responding to 115 kV incidences?
7. How does the department coordinate with PSE when there are downed lines?
8. Have you ever responded to a substation or transformer explosion and fire (Bellevue Fire Department and Eastside Fire and Rescue only)?
9. Do you have the training and capability to respond to a substation fire?

# APPENDIX L. INTERVIEW QUESTIONS FOR POLICE DEPARTMENTS

**The following questions were asked of study area police department in July, 2015.**

1. Have you had any problems with existing transmission corridors in your service area
    a. If yes, where and what was the nature of the problem (e.g., littering, drugs, violent crime…)
    b. Were these problems effectively dealt with or is it an ongoing issue?
2. Would you consider that a new transmission corridor is better sited (from the perspective of minimizing potential for crime) if it's located through a densely populated area or through a more remote area?
3. Have you had any problems, or do you see electric substations as places that attract crime (such as graffiti or other property crimes?). Would you say the level of problem depends on whether it's located in densely populated area vs. a more remote location?

# APPENDIX M. PIPELINE SAFETY REQUIREMENTS AND PLANS RELATING TO PETROLEUM PIPELINES

**Table M-1. Federal and State Laws and Regulations for Pipelines**

| Federal and State Laws and Regulations | Summary |
|---|---|
| **Federal** | |
| Natural Gas Pipeline Safety Act of 1968; now called the Pipeline Safety Law, 49 USC Section 60101 et seq. | Gives the federal government authority over pipeline safety for transporting hazardous liquids, natural gas, and other gases. The intent is for states to assume responsibility for intrastate pipeline safety, while the federal government retains responsibility for interstate pipeline safety. |
| Title 49, Code of Federal Regulations (CFR) Part 194 for hazardous liquid pipelines | Contains requirements for oil spill response plans to reduce the environmental impact of oil discharged from onshore oil pipelines. |
| Title 49, CFR Part 195 for hazardous liquid pipelines | Addresses safety in design, construction, testing, operation, maintenance, and emergency response for pipeline facilities. Require spill response/emergency response plans. |
| Title 49 CFR Part 195.571 | Contains criteria to determine the adequacy of cathode protection. Incorporates by reference industry standards and practices developed by the National Association of Corrosion Engineers (NACE). |
| Liquid Pipeline Integrity Management in High Consequence Areas for Hazardous Liquid Operators (49 CFR Parts 195.450 and 195.452); also called The Liquid IM Rule | Specifies how pipeline operators must identify, prioritize, assess, evaluate, repair, and validate the integrity of hazardous liquid pipelines that could, in the event of a leak or failure, affect High Consequence Areas. Includes requirements for regular inspection and monitoring. |
| **State** | |
| Washington Pipeline Safety Act of 2000 (E2SHB 2420) | With this Act, the Washington Utilities and Trade Commission (UTC) was directed and obtained the authority from the OPS to inspect interstate pipelines in Washington State. |
| Underground Utilities – Damage Prevention Law RCW 19.122 | Addresses public health and safety and prevention of disruption of vital utility services through a comprehensive damage prevention program. |
| WAC 173-182 – Oil Spill Contingency Plan | Establishes covered vessel and facility oil spill contingency plan requirements (Part II), drill and equipment verification requirements (Part III), primary response contractor standards (Part IV) and recordkeeping and compliance information (Part V). |

**Table M-2. Olympic Pipeline Response Plans**

| Plans | Summary |
|---|---|
| Facility Response Plan BP Pipelines (North America) U.S. Pipelines and Logistics: Northwest Pipeline District | The Facility Response Plan (FRP) provides guidelines to respond to a spill from the Olympic Pipeline (and the Cherry Point Crude Line, Butane Pipeline and associated facilities).<br>The FRP is meant to supplement responders' training and experience during an actual response. Since each response is different, the FRP may not always contain all the information needed to manage a spill. This FRP is designed to satisfy the requirements of the Oil Pollution Act of 1990 (OPA 90), and has been prepared in accordance with the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) (40 CFR 300), and the Northwest Area Contingency Plan (NWACP).<br>Specifically, this Plan is intended to satisfy the requirements of:<br>• Pipeline and Hazardous Materials Safety Administration (PHMSA), U.S. Department of Transportation (49 CFR 194)<br>• Washington Administrative Code (WAC) 173-182<br>• Oregon Administrative Rule (OAR) 340-141 |
| Operations Maintenance and Emergency Response Manual BP Pipelines (North America) U.S. Pipelines and Logistics: Northwest Pipeline District | Addresses how OPLC responds operationally to an emergency. |

PHMSA
U.S. Department of Transportation
Pipeline and Hazardous Materials Safety Administration

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# Standards & Rulemakings

Welcome to the Office of Pipeline Safety's (OPS) Standards and Rulemakings page. In addition to information on pipeline safety standards and the agency's rulemakings, you can also find information on special permits, advisory bulletins, state waivers, notices and interpretations of the pipeline safety regulations listed in the Code of Federal Regulations (CFR), Title 49 Parts 190 to 199.

## Latest Rulemakings

80 FR 61610
Pipeline Safety: Safety of Hazardous Liquid Pipelines.

80 FR 39916
Pipeline Safety: Operator Qualification, Cost Recovery, Accident and Incident Notification, and Other Pipeline Safety Proposed Changes

80 FR 41460
Pipeline Safety: Expanding the Use of Excess Flow Valves in Gas Distribution Systems to Applications Other Than Single-Family Residences

80 CFR 43836
Pipeline Safety: Pipeline Damage Prevention Programs, Action: Final Rule

80 FR 29263
Pipeline Safety: Issues Related to the Use of Plastic Pipe in the Gas Pipeline Industry, Action: NPRM

80 FR 12762
Pipeline Safety: Miscellaneous Changes to Pipeline Safety Regulations, Action: Final Rule

80 CFR 168
Pipeline Safety: Periodic Update of Regulatory References to Technical Standards and Miscellaneous Updates, Action: Final Rule

78-FR 58897
Pipeline Safety: Update the administrative civil penalty maximums. ACTION: Final rule

78 FR 49996
Pipeline Safety: Periodic Updates of Regulatory References to Technical Standards and Miscellaneous Amendments, Action: NPRM

78 FR 46560
Pipeline Safety: Class Location Requirements, Action: NPRM

77 FR 48112
Pipeline Safety: Administrative Procedures; Updates and Technical Corrections; Notice of Proposed Rulemaking (NPRM).

77 FR 19800
PHMSA 2009-0192; Pipeline Safety: Pipeline Damage Prevention Programs; Notice of Proposed Rulemaking (NPRM). Recorded presentation on the NPRM

77 FR 5472
PHMSA-2010-0026; Pipeline Safety: Miscellaneous Changes to Pipeline Safety Regulations; Notice of proposed rulemaking (NPRM); Extension of comment period.

77 FR 5472
PHMSA-2011-0009; Pipeline Safety: Expanding the Use of Excess Flow Valves in Gas Distribution Systems to Applications Other Than Single-Family Residences; Advance notice of proposed rulemaking (ANPRM); extension of comment period.

For additional rulemaking activities click here

## Pipeline Regulations & Applicable Laws

Pipeline Reauthorization Bill 2011
Pipeline Safety Regulations (Title 49 CFR Parts 190-199)
PIPES Act of 2006

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You can also read the text-only version.

Pipeline Safety Statutes: 49 U.S.C. Chapters 601 & 603

**Standards Incorporated by Reference**

Introduction to Standards Incorporated by Reference

**Additional Resources**

Agency Guidance

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WASHINGTON UTC UTILITIES AND TRANSPORTATION COMMISSION

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- Railroads

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PO Box 47250
1300 S Evergreen Pk Dr SW
Olympia WA 98504

# Pipeline Safety in Washington State

The Utilities and Transportation Commission (commission) is responsible for developing and enforcing safety standards for natural gas and hazardous liquid pipelines located within the state. The commission also inspects the portions of interstate natural gas and hazardous liquid pipelines located within Washington state; the standards and enforcement actions are the responsibility of the federal Office of Pipeline Safety (OPS).

## How long has the state had a pipeline safety program?

The commission has had a gas pipeline safety program since 1955 and a hazardous liquid pipeline safety program since 1996. In 2001, the state program was expanded to allow the commission to inspect interstate pipelines during construction, operation and after incidents. In some cases the commission and OPS staff may conduct joint inspections. Commission staff inspectors also investigate consumer and local government inquiries and complaints, Integrity Management Program inspections and operator qualification inspections.

## Why do we need both a state and a federal program?

Gaining state authority in 2001 to inspect interstate pipelines was a key recommendation of the Governor's Fuel Accident Prevention and Response Task Force. The expanded state role resulted in more pipeline inspections and improved follow-up on safety issues. The federal program is not staffed to provide this level of service, with no federal inspectors assigned to Washington state. In contrast, the state program is authorized to have 7 inspectors. Also, state inspectors develop ongoing expertise with specific pipeline facilities and operators, develop expertise in local conditions and can be more responsive to the concerns of local citizens and governments.

## How many miles of pipelines are in the state?

There are currently 21,526 miles of natural gas pipelines and 74 miles of hazardous liquid pipelines located completely within the state. There are 1,656 miles of interstate natural gas pipelines and 710 miles of interstate hazardous liquid pipelines.

January 2009

# Pipeline Safety

**How does the commission conduct inspections?**
The commission conducts two types of inspections. Field inspections involve physical testing and visual inspection of pipeline facilities. Audit inspections review the records maintained by a pipeline company to make sure that scheduled maintenance is being performed and that operator training and certification is current. Both types of inspections are essential to a comprehensive pipeline safety program. Major pipelines are scheduled to be inspected at least annually.

**What happens if commission staff find a problem with a pipeline?**
It depends on the nature of the problem and whether the pipeline is located completely within the state or across state borders. For pipelines within the state, the commission can take enforcement action if a problem is identified and not corrected. For interstate pipelines, the commission will report inspection results to OPS. OPS will have 90 days from the state report to start an enforcement action, seek additional information, notify the state of any delay in enforcement or decline to take action.

**Does the UTC deal with more than inspection and enforcement?**
Yes. A key element of the commission pipeline safety program is preventing pipeline damage, particularly through developing and distributing a training program for contractors, and improving the state's "Call Before You Dig" system. The program also includes a citizen advisory committee to advise state, federal and local agencies on pipeline safety issues.

**How is the program funded?**
A mix of federal and state funds currently fund the program.

**How do I contact the Pipeline Safety Program?**
If you have questions about the commission's Pipeline Safety program, call 360-664-1160.

**For more information**
**Consumer Help Line**
888-333-WUTC (9882)
consumer@utc.wa.gov

WASHINGTON
UTC
UTILITIES AND TRANSPORTATION COMMISSION
www.utc.wa.gov

Home > Public Safety > Pipeline Safety > About Pipeline Safety

# About Pipeline Safety

## About the Pipeline Safety Program

The commission is responsible for developing and enforcing safety standards for natural gas and hazardous liquid pipelines located within the state. The commission also inspects the portions of interstate natural gas and hazardous liquid pipelines located within Washington state; the standards and enforcement actions are the responsibility of the federal Pipeline and Hazardous Materials Safety Administration (PHMSA).

**RESOURCES**

Program Fact Sheet

Join the Pipeline Listserv

## Washington State Pipelines

There are 32 pipeline operators in Washington operating over 41,000 miles of pipelines. 21 of the pipelines carry natural gas and 11 carry hazardous liquid such as gasoline and jet fuel. There are 10 interstate pipelines in Washington - 5 carry liquid and 5 carry natural gas. Interstate lines typically are large diameter lines operating at very high pressure.

The commission also regulates a liquefied natural gas facility, an underground natural gas storage site, propane storage sites, and natural gas master meters. Master meters are small natural gas distribution systems operated by schools, hospitals or by residential complexes such as apartment buildings and mobile home parks.

## Mission Statement

The mission of the Pipeline Safety Program is to ensure public health, safety and environmental quality by:

- Conducting quality inspections of hazardous liquid and natural gas pipeline companies
- Improving safety laws and regulations
- Educating local communities on pipeline safety issues
- Providing technical assistance to pipeline operators, local governments and communities, and
- Enforcing laws and regulations in a fair & equitable manner

## Program History

The pipeline safety program began inspecting natural gas systems operating within the state of Washington in 1955. Intrastate hazardous liquid pipelines were added to UTC's authority in 1996.

In 2000, the Legislature approved the Pipeline Safety Act - HB 2420 (.pdf) directing the program to seek federal approval to include inspections of all interstate pipelines. In 2001, the Legislature adopted the Pipeline Safety Funding Bill - SB 5182 (.pdf)

In 2003, after working closely with the U.S. Department of Transportation, Pipeline and Hazardous Materials Safety Administration (PHMSA) for two years, the pipeline safety program became the lead inspector for all interstate pipeline inspections and incidents within the state of Washington. The UTC can make recommendations to PHMSA but does not have enforcement authority over interstate pipelines.

The program is supported through a combination of federal grants and pipeline fees.

Pipeline Program Fees

## Program Organization

The pipeline safety director manages the pipeline safety program. The chief pipeline safety engineer directs all compliance activities by the program's eight pipeline inspectors. The operations manager oversees administrative support functions, budget work and program policies development and management and policy and outreach manager oversees rule and legislative changes and the program's damage prevention efforts.

There is diversity among the inspectors from engineers to inspectors with extensive work experience with pipeline companies. All inspectors are federally certified, having completed training in all federal and state pipeline safety regulations, as well as advanced investigator training.

## Contact

UTC Pipeline Safety Program
Phone - (360) 664-1150
E-mail - pipelinesafety@utc.wa.gov
Staff Contact List

The UTC's offices are at 1300 South Evergreen Park Drive just off of Highway 101 in Olympia.

Map and Directions

Home > Public Safety > Pipeline Safety

## Pipeline Safety

The commission is responsible for developing and enforcing safety standards for natural gas and hazardous liquid pipelines located within the state. The commission also inspects the portions of interstate natural gas and hazardous liquid pipelines located within Washington state; the standards and enforcement actions are the responsibility of the federal Pipeline and Hazardous Materials Safety Administration (PHMSA).

### Pipelines We Regulate

- List of Pipelines We Inspect
- Pipelines by County
- Inspection Reports by Company
- Enforcement Actions
- Pipeline Maps

### Pipeline News and Activities

- Read recent headlines
- Join the Listserv to receive Pipeline News and Activities

### Call Before You Dig

- Washington Dig Law
- National Safe Digging Month
- Call Before You Dig Information
- Request a Locate
- Damage Prevention Seminars

### Reports and Studies

- Washington Pipeline Incidents
- Land Use Report
- More...

### Pipeline Siting in Washington

- Intrastate Facilities
- Interstate Gas Facilities
- Small Facilities

### Citizens Committee on Pipeline Safety (CCOPS)

- Citizens Committee

**MORE INFORMATION**

- About Pipeline Safety
- Publications
- File a Complaint
- Pipeline Safety Program Evaluations

**LAWS AND RULES**

- Underground Utilities - Damage Prevention Law - RCW 19.122
- Gas and Hazardous Pipelines Law - RCW 81.88
- UTC Safety Rules - Natural Gas - WAC 480-93
- UTC Safety Rules - Hazardous Liquid - WAC 480-75

**EXTERNAL RESOURCES**

- Call Before You Dig
- Washington 811
- Department of Ecology
- Pipeline Safety Trust
- Federal Pipeline Safety Rules and Regulations
- PHMSA - Pipeline Safety Awareness
- PHMSA - Office of Pipeline Safety
- PHMSA - Pipeline News
- NAPSR - National Association of Pipeline Safety Representatives
- NARUC - National Association of Regulatory Utility Commissioners
- PHMSA - WA Damage Prevention Information

**CONTACTS**

- Pipeline Safety Staff

http://www.utc.wa.gov/publicSafety/pipelineSafety/Pages/default.aspx 11/3/2015

PUB. L. 104–287, §5(89)

This makes a clarifying amendment to 49:50101(a) and (b)(3), 50102, 50104(b)(1), and 50105, as redesignated by clause (88)(D) of this section, because 49:47106(d) was struck by section 108(1) of the Federal Aviation Administration Authorization Act of 1994 (Public Law 103–305, 108 Stat. 1573).

AMENDMENTS

1996—Pub. L. 104–287, §5(88)(D), renumbered section 49104 of this title as this section.

Subsec. (b)(1). Pub. L. 104–287, §5(89), substituted "section 47127" for "sections 47106(d) and 47127".

### §50105. Fraudulent use of "Made in America" label

If the Secretary of Transportation decides that a person intentionally affixed a "Made in America" label to goods sold in or shipped to the United States that are not made in the United States, the Secretary shall declare the person ineligible, for not less than 3 nor more than 5 years, to receive a contract or grant from the United States Government related to a contract made under section 106(k), 44502(a)(2), or 44509, subchapter I of chapter 471 (except section 47127), or chapter 481 (except sections 48102(e), 48106, 48107, and 48110) of this title or subtitle B of title IX of the Omnibus Budget Reconciliation Act of 1990 (Public Law 101–508, 104 Stat. 1388–353). The Secretary may bring a civil action to enforce this section in any district court of the United States.

(Pub. L. 103–272, §1(e), July 5, 1994, 108 Stat. 1300, §49105; renumbered §50105 and amended Pub. L. 104–287, §5(88)(D), (89), Oct. 11, 1996, 110 Stat. 3398.)

HISTORICAL AND REVISION NOTES
PUB. L. 103–272

| *Revised Section* | *Source (U.S. Code)* | *Source (Statutes at Large)* |
|---|---|---|
| 49105 ..... | 49 App.:2226b. | Nov. 5, 1990, Pub. L. 101–508, §9130, 104 Stat. 1388–372; Oct. 31, 1992, Pub. L. 102–581, §118(a), 106 Stat. 4883. |

PUB. L. 104–287, §5(89)

This makes a clarifying amendment to 49:50101(a) and (b)(3), 50102, 50104(b)(1), and 50105, as redesignated by clause (88)(D) of this section, because 49:47106(d) was struck by section 108(1) of the Federal Aviation Administration Authorization Act of 1994 (Public Law 103–305, 108 Stat. 1573).

REFERENCES IN TEXT

Subtitle B of title IX of the Omnibus Budget Reconciliation Act of 1990, referred to in text, is subtitle B (§§9101–9131) of title IX of Pub. L. 101–508, Nov. 5, 1990, 104 Stat. 1388–353, as amended, known as the Aviation Safety and Capacity Expansion Act of 1990. Sections 9102 to 9105, 9107 to 9112(b), 9113 to 9115, 9118, 9121 to 9123, 9124 "Sec. 613(c)", 9125, 9127, and 9129 to 9131 of title IX of Pub. L. 101–508 were repealed by Pub. L. 103–272, §7(b), July 5, 1994, 108 Stat. 1379, the first section of which enacted subtitles II, III, and V to X of Title 49, Transportation. For complete classification of this Act to the Code, see Tables. For disposition of sections of former Title 49, Transportation, see table at the beginning of Title 49.

AMENDMENTS

1996—Pub. L. 104–287, §5(89), substituted "section 47127" for "sections 47106(d) and 47127".

Pub. L. 104–287, §5(88)(D), renumbered section 49105 of this title as this section.

## SUBTITLE VIII—PIPELINES


| Chapter | | Sec. |
|---|---|---|
| **601.** | **Safety** ..... | **60101** |
| **603.** | **User Fees** ..... | **60301** |
| **605.** | **Interstate Commerce Regulation** .... | **60501** |


### CHAPTER 601—SAFETY


Sec.
60101. Definitions.
60102. Purpose and general authority.
60103. Standards for liquefied natural gas pipeline facilities.
60104. Requirements and limitations.
60105. State pipeline safety program certifications.
60106. State pipeline safety agreements.
60107. State pipeline safety grants.
60108. Inspection and maintenance.
60109. High-density population areas and environmentally sensitive areas.
60110. Excess flow valves.
60111. Financial responsibility for liquefied natural gas facilities.
60112. Pipeline facilities hazardous to life and property.
60113. Customer-owned natural gas service lines.
60114. One-call notification systems.
60115. Technical safety standards committees.
60116. Public education programs.
60117. Administrative.
60118. Compliance and waivers.
60119. Judicial review.
60120. Enforcement.
60121. Actions by private persons.
60122. Civil penalties.
60123. Criminal penalties.
60124. Biennial reports.
60125. Authorization of appropriations.
60126. Risk management.
60127. Population encroachment and rights-of-way.
60128. Dumping within pipeline rights-of-way.
60129. Protection of employees providing pipeline safety information.
60130. Pipeline safety information grants to communities.
60131. Verification of pipeline qualification programs.
60132. National pipeline mapping system.
60133. Coordination of environmental reviews.
60134. State damage prevention programs.
60135. Enforcement transparency.
60136. Petroleum product transportation capacity study.
60137. Pipeline control room management.


AMENDMENTS

2006—Pub. L. 109–468, §§2(b)(3), 6(b), 8(b), 12(b), Dec. 29, 2006, 120 Stat. 3489, 3491, 3492, 3495, added items 60134 to 60137.

2002—Pub. L. 107–355, §§6(c), 9(c), 11(b), 13(a)(2), 15(b), 16(b), 20(a)(2)(B), Dec. 17, 2002, 116 Stat. 2993, 2995, 2997, 3001, 3006, 3008, 3010, substituted "Purpose and general authority" for "General authority" in item 60102 and "Population encroachment and rights-of-way" for "Population encroachment" in item 60127 and added items 60129 to 60133.

1996—Pub. L. 104–304, §§5(f)[(b)], 15(c)[(b)], 16(b), 18(b)(2), 20(e), Oct. 12, 1996, 110 Stat. 3800, 3803, 3804, substituted "State pipeline safety program certifications" for "State certifications" in item 60105, "State pipeline safety agreements" for "State agreements" in item 60106, "State pipeline safety grants" for "State grants" in item 60107, and "Biennial reports" for "Annual reports" in item 60124 and added items 60126, 60127, and 60128.

# TITLE 49 CFR PART 194 – RESPONSE PLANS FOR ONSHORE OIL PIPELINES

**Subpart A–General**

Sec.
194.1 Purpose.
194.3 Applicability.
194.5 Definitions.
194.7 Operating restrictions and interim operating authorization.

**Subpart B–Response Plans**

194.101 Operators required to submit plans.
194.103 Significant and substantial harm; operator's statement.
194.105 Worst case discharge.
194.107 General response plan requirements.
194.109 Submission of state response plans.
194.111 Response plan retention.
194.113 Information summary.
194.115 Response resources.
194.117 Training.
194.119 Submission and approval procedures.
194.121 Response plan review and update procedures

**Appendix A -** Guidelines for the Preparation of Response Plans.

**Appendix B -** High Volume Areas.

**Authority**: 33 U.S.C. 1231, 1321(j)(1)(C), (j)(5) and (j)(6); §2, E.O. 12777, 56 FR 54757, 3 CFR, 1991 Comp., p. 351; 49 CFR 1.53.

**ELECTRONIC CODE OF FEDERAL REGULATIONS**

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**e-CFR data is current as of October 30, 2015**

Title 49 → Subtitle B → Chapter I → Subchapter D → Part 195

TITLE 49—Transportation

Subtitle B—OTHER REGULATIONS RELATING TO TRANSPORTATION (CONTINUED)

CHAPTER I—PIPELINE AND HAZARDOUS MATERIALS SAFETY ADMINISTRATION, DEPARTMENT OF TRANSPORTATION (CONTINUED)

SUBCHAPTER D—PIPELINE SAFETY

PART 195—TRANSPORTATION OF HAZARDOUS LIQUIDS BY PIPELINE

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Subpart A—GENERAL


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| §195.0 | Scope. |
| §195.1 | Which pipelines are covered by this Part? |
| §195.2 | Definitions. |
| §195.3 | What documents are incorporated by reference partly or wholly in this part? |
| §195.4 | Compatibility necessary for transportation of hazardous liquids or carbon dioxide. |
| §195.5 | Conversion to service subject to this part. |
| §195.6 | Unusually Sensitive Areas (USAs). |
| §195.8 | Transportation of hazardous liquid or carbon dioxide in pipelines constructed with other than steel pipe. |
| §195.9 | Outer continental shelf pipelines. |
| §195.10 | Responsibility of operator for compliance with this part. |
| §195.11 | What is a regulated rural gathering line and what requirements apply? |
| §195.12 | What requirements apply to low-stress pipelines in rural areas? |


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Subpart B—ANNUAL, ACCIDENT, AND SAFETY-RELATED CONDITION REPORTING


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| §195.50 | Reporting accidents. |
| §195.52 | Immediate notice of certain accidents. |
| §195.54 | Accident reports. |
| §195.55 | Reporting safety-related conditions. |
| §195.56 | Filing safety-related condition reports. |
| §195.58 | Report submission requirements. |
| §195.59 | Abandonment or deactivation of facilities. |
| §195.60 | Operator assistance in investigation. |
| §195.61 | National Pipeline Mapping System. |
| §195.63 | OMB control number assigned to information collection. |
| §195.64 | National Registry of Pipeline and LNG Operators. |

Subpart C—DESIGN REQUIREMENTS

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| §195.102 | Design temperature. |
| §195.104 | Variations in pressure. |
| §195.106 | Internal design pressure. |
| §195.108 | External pressure. |
| §195.110 | External loads. |
| §195.111 | Fracture propagation. |
| §195.112 | New pipe. |
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| §195.116 | Valves. |
| §195.118 | Fittings. |
| §195.120 | Passage of internal inspection devices. |
| §195.122 | Fabricated branch connections. |
| §195.124 | Closures. |
| §195.126 | Flange connection. |
| §195.128 | Station piping. |
| §195.130 | Fabricated assemblies. |
| §195.132 | Design and construction of aboveground breakout tanks. |
| §195.134 | CPM leak detection. |

Subpart D—CONSTRUCTION

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| §195.204 | Inspection—general. |
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| | Repair, alteration and reconstruction of aboveground breakout tanks that have been in service. |
| §195.206 | Material inspection. |
| §195.207 | Transportation of pipe. |
| §195.208 | Welding of supports and braces. |
| §195.210 | Pipeline location. |
| §195.212 | Bending of pipe. |
| §195.214 | Welding procedures. |
| §195.216 | Welding: Miter joints. |
| §195.222 | Welders and welding operators: Qualification of welders and welding operators. |
| §195.224 | Welding: Weather. |
| §195.226 | Welding: Arc burns. |
| §195.228 | Welds and welding inspection: Standards of acceptability. |
| §195.230 | Welds: Repair or removal of defects. |
| §195.234 | Welds: Nondestructive testing. |
| §§195.236-195.244 | [Reserved] |
| §195.246 | Installation of pipe in a ditch. |
| §195.248 | Cover over buried pipeline. |
| §195.250 | Clearance between pipe and underground structures. |
| §195.252 | Backfilling. |
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| §195.258 | Valves: General. |
| §195.260 | Valves: Location. |
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| §195.266 | Construction records. |


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| §195.303 | Risk-based alternative to pressure testing older hazardous liquid and carbon dioxide pipelines. |
| §195.304 | Test pressure. |
| §195.305 | Testing of components. |
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| §195.308 | Testing of tie-ins. |
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| §195.402 | Procedural manual for operations, maintenance, and emergencies. |
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| §195.406 | Maximum operating pressure. |
| §195.408 | Communications. |
| §195.410 | Line markers. |
| §195.412 | Inspection of rights-of-way and crossings under navigable waters. |
| §195.413 | Underwater inspection and reburial of pipelines in the Gulf of Mexico and its inlets. |
| §§195.414-195.418 | [Reserved] |
| §195.420 | Valve maintenance. |
| §195.422 | Pipeline repairs. |
| §195.424 | Pipe movement. |
| §195.426 | Scraper and sphere facilities. |
| §195.428 | Overpressure safety devices and overfill protection systems. |
| §195.430 | Firefighting equipment. |
| §195.432 | Inspection of in-service breakout tanks. |
| §195.434 | Signs. |
| §195.436 | Security of facilities. |
| §195.438 | Smoking or open flames. |
| §195.440 | Public awareness. |
| §195.442 | Damage prevention program. |
| §195.444 | CPM leak detection. |
| §195.446 | Control room management. |

HIGH CONSEQUENCE AREAS

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| §195.450 | Definitions. |

PIPELINE INTEGRITY MANAGEMENT

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| §195.452 | Pipeline integrity management in high consequence areas. |

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| §195.551 | What do the regulations in this subpart cover? |
| §195.553 | What special definitions apply to this subpart? |
| §195.555 | What are the qualifications for supervisors? |
| §195.557 | Which pipelines must have coating for external corrosion control? |
| §195.559 | What coating material may I use for external corrosion control? |
| §195.561 | When must I inspect pipe coating used for external corrosion control? |
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| §195.565 | How do I install cathodic protection on breakout tanks? |
| §195.567 | Which pipelines must have test leads and what must I do to install and maintain the leads? |
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| §195.588 | What standards apply to direct assessment? |
| §195.589 | What corrosion control information do I have to maintain? |
| Appendix | Appendix A to Part 195—Delineation Between Federal and State Jurisdiction—Statement of Agency Policy and Interpretation |

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| Appendix | Appendix B to Part 195—Risk-Based Alternative to Pressure Testing Older Hazardous Liquid and Carbon Dioxide Pipelines |
| Appendix | Appendix C to Part 195—Guidance for Implementation of an Integrity Management Program |

Need assistance?

CERTIFICATION OF ENROLLMENT

**ENGROSSED SECOND SUBSTITUTE HOUSE BILL 2420**

Chapter 191, Laws of 2000

(partial veto)

56th Legislature
2000 Regular Session

PIPELINE SAFETY

EFFECTIVE DATE: 3/28/00

Passed by the House March 9, 2000
Yeas 98 Nays 0

CLYDE BALLARD
**Speaker of the House of Representatives**

FRANK CHOPP
**Speaker of the House of Representatives**

Passed by the Senate March 8, 2000
Yeas 47 Nays 0

BRAD OWEN
**President of the Senate**

Approved March 28, 2000, with the exception of section 25, which is vetoed.

GARY F. LOCKE
**Governor of the State of Washington**

CERTIFICATE

We, Timothy A. Martin and Cynthia Zehnder, Co-Chief Clerks of the House of Representatives of the State of Washington, do hereby certify that the attached is **ENGROSSED SECOND SUBSTITUTE HOUSE BILL 2420** as passed by the House of Representatives and the Senate on the dates hereon set forth.

TIMOTHY A. MARTIN
**Chief Clerk**

CYNTHIA ZEHNDER
**Chief Clerk**

FILED

March 28, 2000 - 3:30 p.m.

**Secretary of State**
**State of Washington**

**ENGROSSED SECOND SUBSTITUTE HOUSE BILL 2420**

AS AMENDED BY THE SENATE

Passed Legislature - 2000 Regular Session

**State of Washington 56th Legislature 2000 Regular Session**

**By** House Committee on Appropriations (originally sponsored by Representatives Linville, G. Chandler, Morris, Ericksen, Quall, Kastama, Santos, Grant, Stensen, Keiser, Poulsen, Wensman, Scott, Rockefeller, Reardon, Kenney, Cody, Lovick, Cooper, Koster, Haigh, McDonald, Van Luven, Lantz, Wood, Regala, Edmonds, Hurst, Dunshee, Constantine, Dickerson, Wolfe, Ogden, Ruderman and McIntire)

Read first time 02/08/2000. Referred to Committee on .

AN ACT Relating to oil and gas pipeline safety; amending RCW 81.88.040, 19.122.020, and 19.122.030; adding new sections to chapter 81.88 RCW; adding a new section to chapter 43.110 RCW; adding new sections to chapter 80.28 RCW; adding new sections to chapter 19.122 RCW; adding a new section to chapter 48.48 RCW; prescribing penalties; and declaring an emergency.

BE IT ENACTED BY THE LEGISLATURE OF THE STATE OF WASHINGTON:

NEW SECTION. **Sec. 1.** (1) The intent of this act is to protect the health and safety of the citizens of the state of Washington and the quality of the state's environment by developing and implementing environmental and public safety measures applicable to persons transporting hazardous liquids and gas by pipeline within the state of Washington. The legislature finds that public safety and the environment may best be protected by adopting standards that are equal to, or more stringent than, those adopted by the federal government, so long as they do not impermissibly interfere with interstate commerce.

(2) The legislature recognizes that additional federal authority is needed to implement a comprehensive pipeline safety program and by this act and other measures directs the state to seek that authority.

**Chapter 19.122 RCW**

**UNDERGROUND UTILITIES**

Complete Chapter | RCW Dispositions

## RCW Sections

19.122.010 Intent.

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## Chapter 173-182 WAC

Last Update: 7/16/14

## OIL SPILL CONTINGENCY PLAN

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## 173-182-010
## Purpose.

The purpose of this chapter is to establish covered vessel and facility oil spill contingency plan requirements (Part II), drill and equipment verification requirements (Part III), primary response contractor standards (Part IV) and recordkeeping and compliance information (Part V).

(1) The provisions of this chapter, when followed, should be implemented and construed so that they will:

(a) Maximize the effectiveness and timeliness of oil spill response by plan holders and response contractors;

(b) Ensure continual readiness, maintenance of equipment and training of personnel;

(c) Support coordination with state, federal, and other contingency planning efforts;

(d) Provide for the protection of Washington waters, natural, cultural and significant economic resources by minimizing the impact of oil spills; and

(e) For covered vessels, provide the highest level of protection that can be met through the use of best achievable technology and those staffing levels, training procedures, and operational methods that constitute best achievable protection as informed by the BAP five year review cycle (WAC 173-182-621) and as determined by ecology.

(2) The planning standards described in this chapter do not constitute clean-up standards that must be met by the holder of a contingency plan. Failure to remove a discharge within the time periods set out in this section does not constitute failure to comply with a contingency plan, for purposes of this section or for the purpose of imposing administrative, civil, or criminal penalties under any other law so that all reasonable efforts are made to do so. In a spill or drill deployment of equipment and personnel shall be guided by safety considerations. The responsible party must take all actions necessary and appropriate to immediately collect