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.

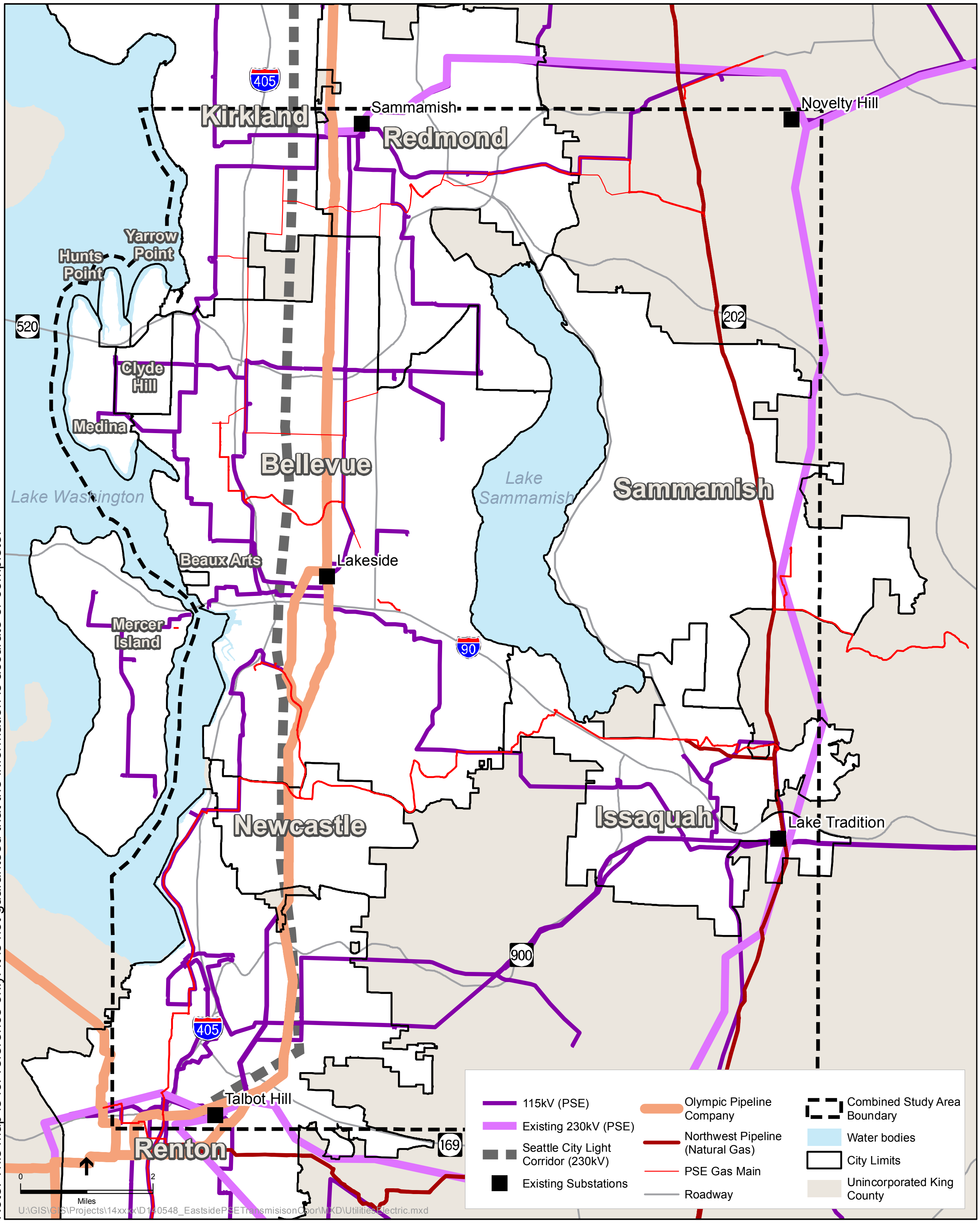
16.3 WHAT UTILITIES ARE PRESENT IN THE COMBINED STUDY AREA?

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.

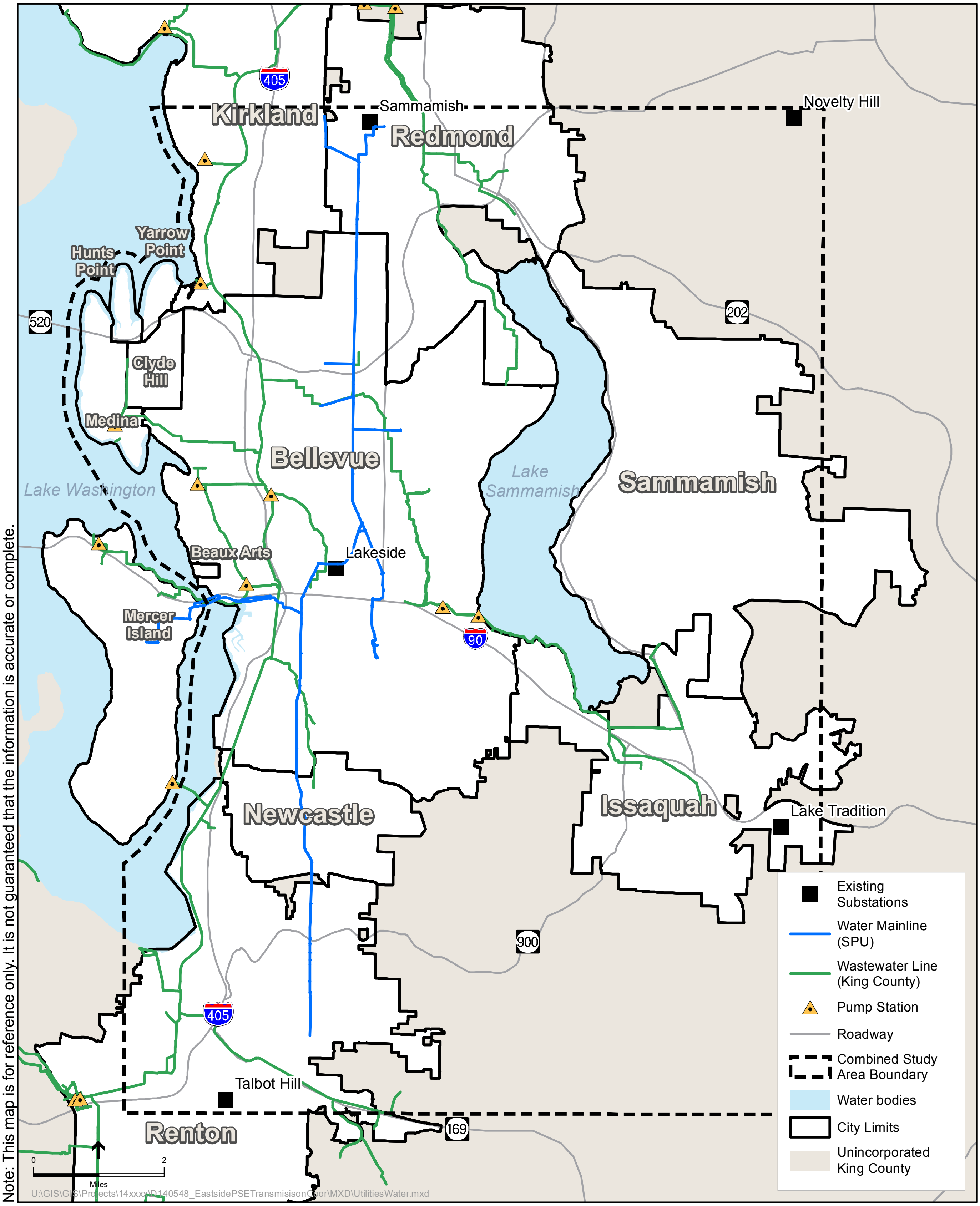


SOURCE: King County 2015; ESA 2015; WA Ecology 2014; Puget Sound Energy 2015; Seattle City Light 2015.
For more info visit www.energizeeastsideeis.org/map-electric-gas

Energize Eastside EIS 140548

Figure 16-1

Existing Electric Transmission and Natural Gas/Petroleum Pipelines



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

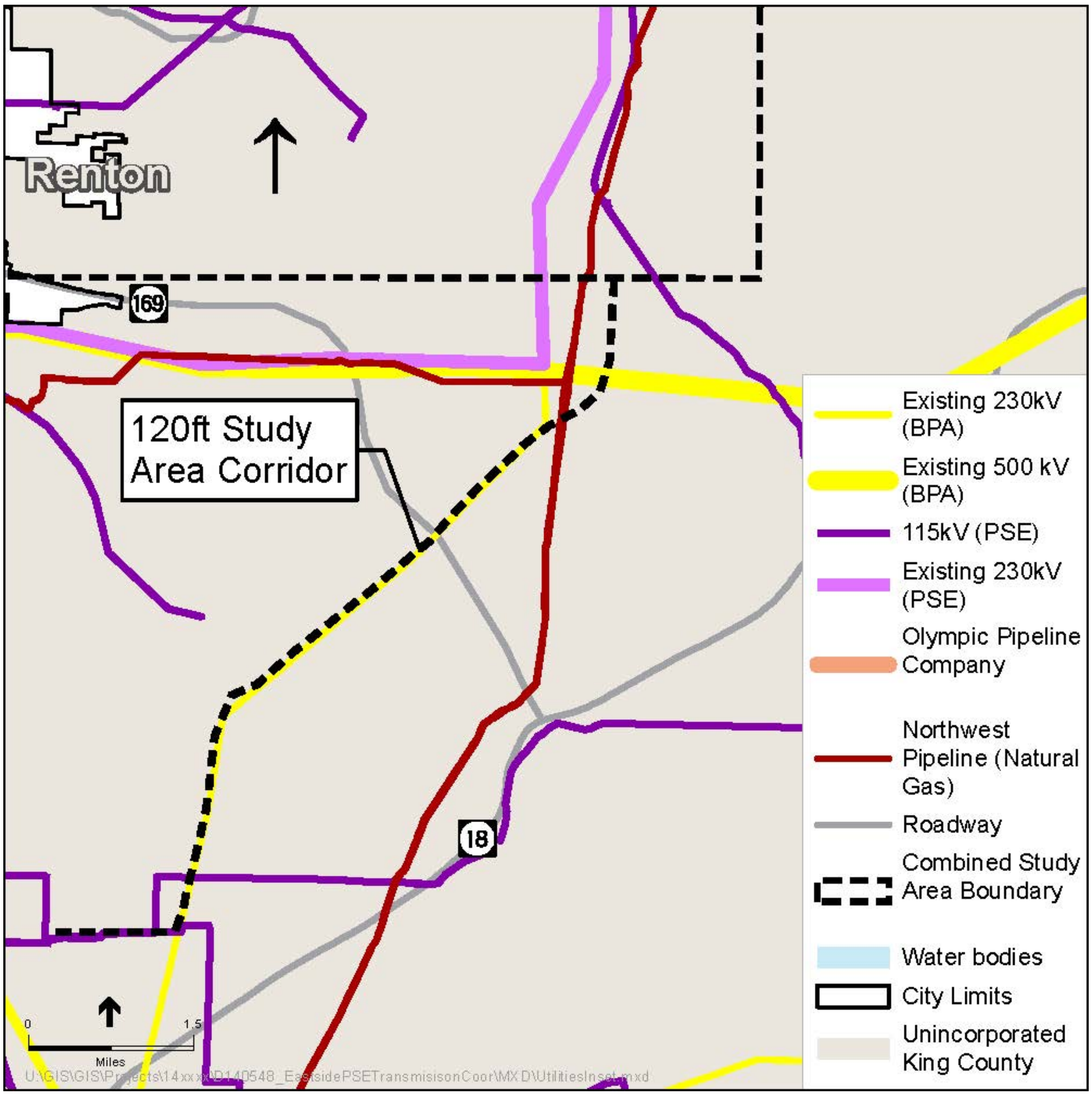
Seattle City Light (SCL), an electric utility owned by the City of Seattle, owns and maintains approximately 650 miles of transmission lines. These lines carry power from the electrical generating facilities to 14 major substations (City of Seattle, 2014). None of these substations are located directly 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).

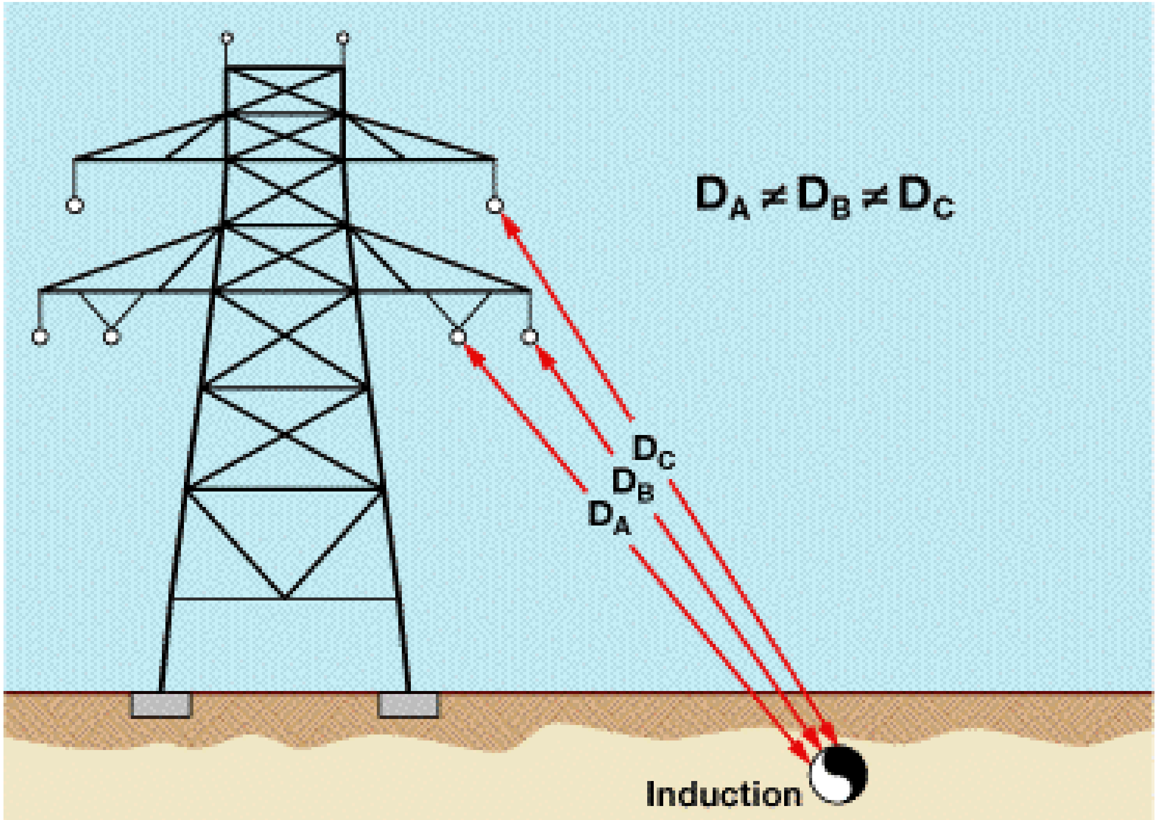
16.3.7 What is pipeline corrosion and why is it a concern?

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.