energizeEASTSIDE

PSE PUGET SOUND ENERGY

Energize Eastside Transmission Capacity Project

April 13, 2016

Background

Electricity is currently delivered to the Eastside area[1] through two 230 kV/115 kV bulk electric substations – Sammamish substation in Redmond and Talbot Hill substation in Renton – and distributed to neighborhood distribution substations using 115 kV transmission lines. Although PSE has made many system improvements in the Eastside area over the years, the primary 115 kV lines that connect the Sammamish and Talbot Hill substations – the backbone of the Eastside electrical system– have not been upgraded since the 1960s. Since then, the Eastside's population has grown from approximately 50,000 to nearly 400,000. Growth is expected to continue.

As required by federal regulations, PSE performs annual comprehensive electric transmission planning studies to determine if there are potential system performance violations (*e.g.,* transformer and line overloads) under various operational scenarios and forecasted electrical use. Studies performed in 2013 and 2015 demonstrated PSE could not meet federal reliability requirements by the winter of 2017/18 and the summer of 2018 without the addition of 230 kV/115 kV transformer capacity in the Eastside area.

To respond to the deficiencies identified in the transmission planning studies, PSE launched the Energize Eastside project in December 2013. The project entails installing approximately 18 miles of new 230 kV transmission line between the existing Sammamish and Talbot Hill substations and the construction of a new 230 kV/115 kV electric substation in the central Bellevue area.

System Reliability Planning

The performance requirements of any integrated transmission system are heavily regulated at both the federal and regional levels. PSE's regulators include the Federal Energy Regulatory Commission (FERC), the North American Electric Reliability Corporation (NERC) and the Western Electricity Coordinating Council (WECC). As certified by FERC, NERC is the regulatory authority that develops and enforces reliability standards. NERC has delegated the task of monitoring and enforcing the federal reliability standards to WECC, a regional entity that has authority over the western region, including PSE.

The NERC standards mandate that certain forecasts and studies must be completed to determine if the system has sufficient capability to meet expected loads now and in the future. When completing transmission planning studies, contingencies are simulated to determine if the electric system meets the NERC mandatory performance requirements[2] for a given set of forecasted demand levels, generation configurations and levels, and multiple system component outages.

Even if these outage scenarios are unlikely, federal regulations require that the appropriate planning is performed. This conservative planning methodology is implemented to prevent large scale, cascading, transmission system blackouts, like those that have occurred in the recent

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1 For the purpose of this project, the Eastside is defined as the area between Renton and Redmond, bounded by Lake Washington to the west and Lake Sammamish to the east.

2 The transmission planning standards that were in effect in 2012-2013 were: TPL-001-3, TPL-002-0b 2nd Rev (TPL-002-2b),TPL-003-0b 2nd Rev (TPL-003-2b), and TPL-004-2. TPL-001-3, TPL-002-2b, TPL-003-2b, and TPL-004-2 are being retired as they are replaced in their entirety by TPL-001-4. Enforcement started 1/1/15. *See* http://www.nerc.com/pa/Stand/Reliability Standards/TPL-001-4.pdf.

past (e.g., the 2003 Northeast blackout that affected 55 million people in the Northeast and Midwest regions of the United States and into Canada).

The PSE transmission planning studies performed in 2013 and 2015 determined that thermal violations may occur under foreseeable operational scenarios within the next few years. The thermal violations are a result of running scenarios for several component outage contingencies that take into consideration demand (which is heavily dependent on seasonal temperatures) and levels of conservation.

Eastside Planning Study Results

PSE transmission planning studies demonstrated that, under certain contingencies, the delivery system on the Eastside cannot continue to meet the reliability requirements without significant infrastructure upgrades or by dropping load (*i.e.*, turning customers' power off at critical times). The Needs Assessment reports, published in 2013 and 2015, which PSE performed pursuant to the mandatory federal transmission planning standards, identified four major areas of concern:

1. Overload of PSE facilities in the Eastside area. Studies identified potential overloading of transformers at Sammamish and Talbot Hill substations. Transformers are a key piece of electrical equipment that allows the electricity to get from its generation source (*e.g.*, wind farm) to customers' homes and businesses. Additionally, several 115 kV transmission lines routing power around the Eastside area are at risk of overloading under certain conditions.
2. Small margin of error to manage risks from inherent load forecast uncertainties. PSE's planning studies rely in large part on load forecast data. Imbedded in PSE's load forecasts are several factors that include elements of risk, including conservation, weather, and block loads.
    - Conservation: To date, PSE customers have achieved 100 percent of the company's conservation goals, which are very aggressive according to industry experts. If 100 percent of conservation goals are not achieved, then the transmission system capacity will be surpassed sooner than expected.
    - Weather: PSE's load forecast assumes "every other year" cold weather, which is not as conservative as most other utilities that study system performance during the coldest and hottest weather in five or ten years. If the region experiences weather extremes outside of those used in the planning studies, electricity demand will surpass the transmission system capacity sooner than expected.
    - Block loads: These include large development projects that add significant load to the system. If block load growth increases more than anticipated, demand for electricity will surpass the transmission capacity sooner than expected.
3. Increased use and expansion of Corrective Action Plans (CAPs) to keep the system compliant.

    CAPs are a series of operational steps used to prevent system overloads or loss of customers' power. They are a short-term fix to alleviate potential operational conditions that could put the entire Western grid at risk. They protect against large-scale, cascading power outages; however, they can put large numbers of customers at increased risk of power outages. For example, to prevent winter overloads on the Talbot Hill transformer banks, PSE is already using CAPs, which increases outage risk to customers. As growth continues, additional CAPs will be needed.

4. Impacts to regional grid identified by ColumbiaGrid. Because the electric system is interconnected for the benefit of all, it is a federal requirement to study all electric transmission projects to ensure there are no adverse impacts to the reliability or operating characteristics of PSE's or any surrounding utilities' electric systems. ColumbiaGrid, the regional planning entity, produces a Biennial Transmission Expansion Plan that addresses

system needs in the Pacific Northwest, including the PSE system. PSE has to be mindful of those plans and understand the identified risks.

PSE's 2015 Supplemental Needs Assessment Report reconfirmed the earlier 2013 Needs Assessment Report by stating the following:

> *By winter of 2017-18, there is a transmission capacity deficiency on the Eastside that impacts PSE customers and communities in and around Kirkland, Redmond, Bellevue, Issaquah, Newcastle, and Renton along with Clyde Hill, Medina, and Mercer Island.* ***By winter of 2019-20, at an Eastside load level of approximately 706 MW, additional CAPs are required that will put approximately 63,200 Eastside customers at risk of outages.***
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> *The 2015 Needs Assessment also confirmed that by summer of 2018, there will be a transmission capacity deficiency on the Eastside that impacts PSE customers and communities in and around Kirkland, Redmond, Renton, Bellevue, Issaquah, and Newcastle along with Clyde Hill, Medina, and Mercer Island.* ***By summer of 2018, CAPs will be required to manage overloads under certain Category C contingencies and the use of these CAPs will place approximately 68,800 customers at risk and could require 74 MW of load shedding, affecting approximately 10,900 customers.***

To summarize, as early as the summer of 2018, PSE may have to turn the power off to tens of thousands of customers under certain forecasted conditions. This is necessary to prevent widespread outages to additional tens of thousands of customers in the Eastside area and beyond.

Solution to Meet the Need

As detailed above, PSE has identified a transmission capacity deficiency in the Eastside area, which has been confirmed by a third party assessment commissioned by the City of Bellevue.[3] In total, five studies have all confirmed the need to address this issue. Any solution to solve this deficiency needs to meet all NERC performance criteria, address all relevant PSE equipment overloads, and continue to meet the performance criteria for **at least** 10 years after construction. To define the project, objectives were established to evaluate potential solutions. These were also provided in Section 2.2.1 of the Phase I Draft Environmental Impact Statement (DEIS) (2016) and are provided below.

Electrical Performance Criteria

1. Applicable transmission planning standards and guidelines, including mandatory NERC and WECC standards (*e.g.*, NERC TPL-001-4 and WECC TPL-001-WECC-CRT-2);
2. Within study period (2015– 2024);
3. Less than or equal to 95 percent of emergency limits for lines;
4. Less than or equal to 90 percent emergency limit for transformers;
5. Normal winter load forecast with [both] 100 percent and 75 percent conservation;
6. Normal summer load forecast with 100 percent conservation;
7. Adjust regional flows and generation to stress cases similar to annual transmission planning assessment;
8. Take into account future transmission system improvement projects that are expected to be in service within the study period;
9. Minimal or no re-dispatching of generation;
10. No load shedding;
11. No new Remedial Action Schemes;
12. No Corrective Action Plans;

[3] Utilities Systems Efficiencies, Independent Technical Analysis of Energize Eastside for the City of Bellevue, April 28, 2015.

13. Must address all relevant PSE equipment violations;
14. Must not cause any adverse impacts to the reliability or operating characteristics of PSE's or surrounding systems; and
15. Must meet performance criteria listed above for 10 or more years after construction with up to 100 percent of the emergency limit for lines or transformers.

Non-electrical Criteria Summary

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

Alternatives Considered

The Phase 1 DEIS evaluated PSE's proposed Energize Eastside Project (a 230 kV overhead line), a No Action Alternative (as required by SEPA), and two other "action alternatives." These alternatives were developed by the partner Cities in cooperation with PSE, with the intent of providing options that could attain or approximate PSE objectives for the project at a lower environmental cost. The No Action Alternative provides a benchmark against which the proposed project and other action alternatives can be compared.

Alternative 1 included the 230 kV overhead lines but also includes options for locations, including underground and underwater options. Alternative 2 includes a variety of solutions that would require very limited new transmission lines next to existing substations and would need to be implemented in combination in order to meet the project objectives. Alternative 3 would involve installing enough 115 kV lines and transformers to address the project objectives without building 230 kV lines.

Route identification

After extensive study and evaluating and re-evaluating dozens of alternatives both independently and through the Phase I DEIS[4], PSE determined that the most effective solution that meets all criteria and complies with the federal performance requirements is the addition of a 230 kV/115 kV transformer in the center of the Eastside load area. This new transformer would be connected to new 230 kV transmission lines constructed between the Sammamish (Redmond) and Talbot Hill (Renton) substations – the Energize Eastside project.

With the Sammamish and Talbot Hill substation endpoints in mind, PSE and their consultants employed a graphical information system (GIS)-based Linear Routing Tool (LRT) to conduct a broad evaluation of possible transmission line routes within the approximate 255-square-mile study area. This study area encompasses the Sammamish substation in the north and Talbot Hill substation in the south. It is bounded on the west by Lake Washington and extends east to include the Bonneville Power Administration corridor near Soaring Eagle Regional Park (located north east of the City of Sammamish). Any new transmission line route would need to connect to a new 230 kV to 115 kV transformation site (substation) within this area in order to meet project objectives. Potential substation sites within the study area include the existing Lakeside substation (Richards Creek), as well as the future Westminster and Vernell substations sites, which are all located in the City of Bellevue.

Publically available data and GIS files where obtained for land ownership, land use, public and private rights-of-way (ROW), wildlife, vegetation, threatened and endangered (T&E) species, environmentally critical areas, topography, historical resources, and other factors that would

[4] PSE Eastside Transmission Solutions Report, King County Area, October 2013; Updated 2014 & Supplemental Eastside Solutions Study Report, Transmission System, King County, May 2015.

influence the location of the proposed transmission line. The data collection process was designed to provide geospatial information on criteria that could represent credible baseline opportunities and/or constraints for the location of an above-ground transmission line.

The LRT combined these data layers and created an output file called the suitability grid, which represents a summation of all the constraints and opportunities for every point (grid cell) across the entire study area. The LRT processed and combined the data layers to model preferred corridors across the suitability grid, while still connecting the corridors to one of the transformation site options within the study area. These preferred corridors were used to develop alternative routes. The full text of the Constraint and Opportunity Study for Linear Site Selection is available at energizeeastside.com/documents.

To provide for more flexibility in the route analysis, each route was partitioned at the crossing points, or nodes, to create unique segments. Each unique LRT segment was validated using professional engineering judgment and available ancillary resources, such as aerial photographs, to help assess whether they were feasible options. Once the segments were generated and validated, a composite score was calculated for each segment from the underlying suitability grid. A deterministic model was used that considered more than 500 combinations of segments and transformation (substation) sites. If parallel segments (*i.e.*, typically less than a block apart) were identified during the model evaluation, LRT scores were compared to determine which segments were used to develop routes.

The highest scoring segment combinations were taken to the Community Advisory Group (CAG) for evaluation. Through the CAG process, two principle routes were recommended for further evaluation. After evaluating the two routes recommended by the advisory group and taking a hard look at route designs, PSE identified a preferred route and three additional route options to undergo further analysis during Phase 2 of the EIS process. These include Oak 1 and Willow 1, the advisory group's recommendation, along with two variations: Oak 2 and Willow 2. Willow 2 is PSE's preferred route option.

Project Description

The preferred project alternative entails constructing a new 230 kV to 115 kV substation, called Richards Creek, which will be located on PSE-owned parcel 1024059130 in Bellevue. The Richards Creek substation property is located immediately south of the existing Lakeside 115 kV substation, which is situated on parcel 1024059083, in Bellevue. The new Richards Creek 230 kV to 115 kV transformer will provide a new electrical capacity source for the Eastside area.

To make the transformer functional, PSE will replace two existing 115 kV lines, which were last upgraded in the 1960s, with a 230 kV line and a high capacity 115 kV line. The high capacity 115 kV line will use the same conductor as the 230 kV line and therefore, will be built using the same components as the 230 kV line. Electricity will be transmitted to the Richards Creek substation and the voltage lowered, or "stepped down," from 230 kV to 115 kV for distribution to customers on the Eastside.

The existing transmission lines are located in PSE's Sammamish-Lakeside-Talbot Hill corridor, which was established in the late 1920s and early 1930s. Within this existing corridor, the proposed pole locations for the rebuilt lines will generally be in the same locations as the existing poles. In some instances, there may be advantages to moving pole locations to accommodate landowner preferences and/or reduce potential environmental impacts (*e.g.*, moving existing pole locations out of wetlands).

These facilities are needed to address the deficiency in electrical transmission capacity during peak periods that PSE identified through its system planning process. Combined with

aggressive conservation, the project will improve reliability for Eastside communities and supply the needed electrical capacity for anticipated growth and development on the Eastside. Additional details about the transmission line and substation are provided below.

Route Alternatives

To address key concerns identified in the Phase 1 DEIS, PSE performed additional engineering to identify ways to further minimize impacts. This analysis concludes that environmental impacts are minimized by locating the new 230 kV transmission line, to the extent possible, within the existing transmission line corridor.

Since 2013, PSE has engaged in an in-depth, multi-year public discussion to gather community feedback about the project, which has included open houses, mailers, small group meetings, and other activities. This public discussion also included a CAG process, which resulted in two recommended routes – Oak and Willow. In 2015, PSE conducted route-specific fieldwork along the two advisory group-recommended routes to learn more about on-the-ground conditions.

Through the public engagement process, including the recent Phase 1 DEIS comment period, PSE has learned that pole height and aesthetics (*i.e.,* view impacts) are of particular concern to residents in the corridor. To minimize pole heights through some areas where the DEIS has identified views as a key environmental concern that should be addressed, PSE developed two new alignments that are variations of the advisory group-recommended Oak and Willow routes.

Both new route alignments meet all federal regulations for transmission line design, operation and constructability. The four alignments use existing above-ground utility corridors, including a combination of the existing transmission line corridor and existing transmission and distribution line routes along public rights-of-way. Additionally, access to pole locations will be needed.

The northern and southern portions of these routes follow the existing Sammamish-Lakeside-Talbot Hill transmission line corridor. The route options vary in the Factoria (Bellevue) area. The route alignments are described below.

North of I-90 – North Section (Redmond and Bellevue)

The two existing 115 kV transmission lines that originate at the Sammamish substation (parcel: 0325059002) in Redmond and connect with the Lakeside substation in Bellevue will be removed and replaced with a 230 kV line and a high capacity 115 kV line. Specifically, the existing transmission line corridor heads south from the Sammamish station, then turns west for about 0.5 mile, where it turns south. The corridor continues south for about 3.7 miles to State Route 520 between 124th Avenue NE to the west and 140th Avenue NE to the east. The corridor continues south for approximately 3 miles to the existing Lakeside substation and proposed Richards Creek substation property. PSE is proposing a double circuit steel monopole configuration for this section. These poles will be typically around 100 feet tall; however, at highway crossings, taller poles may be needed to meet required traffic clearances.

South of Coal Creek Parkway and the Intersection with the Existing Transmission Line Corridor – South Section (Bellevue, Newcastle and Renton)

In the immediate vicinity of PSE's Somerset substation (parcel: 2124059052) located at the intersection of the existing transmission line corridor and Coal Creek Parkway, the corridor heads south-southwest for approximately 0.5 miles before turning south at approximately 128th Avenue SE and SE 60th Street. For approximately 2.5 miles, the corridor continues south to just north of Sierra Heights Elementary School, where the lines turn southwest for 0.6 miles. Approximately 300 feet north of NE 16th Street, the corridor then turns south again and

continues for about 1.4 miles where it again turns to the southwest for 0.7 mile. The corridor then changes direction again to the south-southeast where it crosses the Cedar River and then connects with the BPA corridor (0.5 mile), where it turns to the west-southwest for about 0.5 mile where it terminates at the existing PSE Talbot Hill substation.

PSE proposes that the two existing 115 kV lines be removed and be replaced with a 230 kV line and a high capacity 115 kV line. These will be placed on two separate single-circuit steel poles approximately 85 feet tall from the Somerset substation south to around 126th Avenue SE in Renton. From that point south to the Talbot Hill substation, PSE is proposing a double-circuit configuration on approximately 100-foot-tall, steel monopoles.

Middle Section Options (Bellevue)

PSE has proposed four route options to connect the North and South sections described above. These options all start at the Richards Creek substation and continue south along various alignments to the Somerset substation located along Coal Creek Parkway. The four route options are described below.

Willow 2 Route – Preferred Alternative

The Willow 2 route allows PSE to address some of the visual and vegetative impacts identified in the Phase 1 Draft EIS related to the unique topography of the Middle Section. Willow 2 is PSE's preferred route option as PSE believes it most effectively minimizes impacts, meets system requirements, and manages costs.

Willow 2 will have the following alignment and elements:

- Starting at the proposed Richards Creek substation, heading south along the existing transmission line corridor for about 0.9 mile to SE Newport Way, the existing two 115 kV lines will be removed and replaced with a double-circuit 230 kV line and a high capacity 115 kV line constructed on a single steel pole (approximately 100 feet tall).
- Around SE Newport Way or SE Allen Road, the high capacity 115 kV and 230 kV lines split paths. The 230 kV line will continue south-southwest for about 1 mile to the Somerset substation located along Coal Creek Parkway. The high capacity 115 kV line will depart from the existing corridor and head west along SE Newport Way for approximately 0.7 mile to Factoria Boulevard SE. As an option, the 115 kV line could follow SE Allen Road from the corridor to SE Newport Way.
- South of SE Newport Way, the two existing 115 kV lines will be removed from the corridor and replaced with a single 230 kV line. The 230 kV line will be constructed on steel H-frame style structures that will only be between 5 feet and 15 feet taller than the existing structures (based on preliminary design). This portion of the route will see a reduction of the number of poles, from four poles to two poles.
- To accommodate the high capacity 115 kV line along SE Newport Way (*i.e.*, for technical reasons), the existing double-circuit distribution and communication lines could be relocated underground because the new high capacity 115 kV line will be built to 230 kV standards, which do not allow distribution lines on the same poles. The new 115 kV line will be built on steel poles that will be approximately 80 feet tall.
- At Factoria Boulevard SE, the high capacity 115 kV lines will join an existing 115 kV line along Factoria Boulevard SE for about 0.25 mile. The existing 115 kV line located between SE Newport Way and Coal Creek Parkway SE will be rebuilt to a double- circuit line on steel poles that will be approximately 80 feet tall.
- The existing 115 kV line between Coal Creek Parkway SE and the Somerset substation (approximately 0.7 mile) will be rebuilt as a high capacity 115 kV line, which will look

essentially the same as the existing line; however the wood poles will be replaced with steel poles to support the heavier conductors (wires).

Willow 1 Route

Willow 1 is one of the two routes recommended by the advisory group in 2014. The route utilizes the existing transmission line corridor in its entirety. The pole types currently under consideration for this route are steel poles, typically ranging from 85 feet to 100 feet tall, depending on topography and location (as discussed earlier in the North of I-90 and South of Coal Creek sections). This design consideration minimizes structure height as well as takes into consideration proximity to other existing utilities in the corridor such as the Olympic Pipeline.

Specifics of this route are as follows:

- From the proposed Richards Creek substation south to SE Newport Way (approximately 0.9 mile), the existing 115 kV lines and wood H-frame structures will be replaced with double-circuit 230 kV and high capacity 115 kV lines on steel monopoles that will be approximately 100 feet tall. In this section, the number of poles will be reduced from four poles to one pole.
- South of SE Newport Way for about 1.2 miles through the remainder of the Middle Section, the line configuration will change from monopoles to two, separate circuits on approximately 85-foot tall poles. In this section the number of poles will be reduced from four poles to two poles.

Oak 1 Route

Oak 1 was also recommended by the CAG in 2014. The existing double 115 kV lines in the existing corridor will remain in place. A specific description of this route is as follows:

- Heading west from the proposed Richards Creek substation along SE 30th Street for approximately 0.4 mile to Richards Road, a 230 kV line will be added to the existing 115 kV, which will be rebuilt to a double-circuit configuration. The pole types currently under consideration this portion are steel monopoles, which are expected to range between 80 feet and 100 feet tall.
- At Richards Road, the alignment turns southwest for approximately 0.25 mile to I-90. The poles needed for crossing I-90 will be taller to meet travel clearance minimums (could typically be around 130 feet tall).
- Turning south at I-90 to follow Factoria Boulevard SE, the same double-circuit configuration will be used for about 1.2 mile to Coal Creek Parkway SE. The existing 115 kV single-circuit transmission line along Factoria Boulevard SE will be co-located on the poles as the second circuit.

Oak 2 Route

The Oak 2 route option would allow PSE to address some of the identified impacts related to the unique topography of the Factoria/Somerset area. These impacts are primarily related to visual and vegetation elements. This alternative is more complex, but key elements are as follows:

- Along the existing transmission line corridor, starting at the proposed Richards Creek substation heading south for about 1.9 miles to Coal Creek Parkway SE, the existing two 115 kV lines will be replaced with a 230 kV line. The 230 kV line will be constructed on steel H-frame style structures that will only be between 5 feet and 15 feet taller than the existing wood H-frame structures (based on preliminary design). This portion of the route will see a reduction of the number of poles, from four poles to two poles.
- One of the 115 kV lines being removed from the existing corridor will need to be relocated. The relocated 115 kV line will be converted to a high capacity 115 kV line. It

will leave the proposed Richards Creek substation and head west along SE 30th Street for approximately 0.4 mile to Richards Road. The existing 115 kV line along SE 30th Street will be co-located with the new high capacity 115 kV as a double-circuit on steel monopoles, which are expected to be around 80 feet tall.

- At Richards Road, the double circuit 115 kV alignment turns southwest for approximately 0.25 mile to I-90. The poles needed for crossing I-90 will be taller to meet travel clearance minimums.
- The double-circuit 115 kV lines will continue south of I-90 to SE 38th Street, where the high capacity 115 kV line will then run south along Factoria Boulevard SE to Coal Creek Parkway. This will be constructed on steel poles approximately 80 feet tall.
- The 115 kV line that is currently situated along Factoria Boulevard SE between SE 38th Street and Coal Creek Parkway SE will be moved to 124th Avenue SE (for approximately 1 mile). The new 115 kV line along 124th Avenue SE will be constructed on approximately 70-foot tall wood poles. It should be noted that the Seattle City Light double-circuit 230 kV corridor is currently situated along the west side of 124th Avenue SE.
- The existing 115 kV line between Coal Creek Parkway SE and the Somerset substation will be rebuilt as a high capacity 115 kV line, which will look essentially the same as the existing line; however, the wood poles will be replaced with steel poles to support the heavier conductors (wires).
- The existing 115 kV line located between 124th Avenue SE and Factoria Boulevard SE will be removed (approximately 0.2 mile).

Substation Site and Improvements

The Energize Eastside project entails building a new substation to house the required 230 kV to 115 kV transformer. In addition, new equipment or modifications to existing equipment will also be required as part of the project. The substation work is described below.

Richards Creek Substation

Richards Creek will be the new 230 kV to 115 kV substation located on PSE-owned property at 13600 SE 30th Street in Bellevue. The new 230 kV transmission lines from the Sammamish substation in Redmond and the Talbot Hill substation in Renton will supply bulk power to the Richards Creek substation.

The lot size is 368,456 square feet (8.46 acre) and is currently developed with a partially fenced asphalt and gravel storage yard. The proposed Richards Creek substation fenced footprint is 438 feet in the north-to-south direction by 215 feet in the west-to-east direction. The perimeter fence will be 8 feet high chain link fence including three strands of barbed wire. Access to the Richards Creek substation will be from SE 30th Street with the current access drive being replaced. The substation will be located on the property to provide the necessary separation from the existing Olympic Pipeline. The finished grade of the substation will be between 100 and 115 feet with the east side of the substation cut into the existing slope with a proposed 24-foot tall soldier pile wall. The substation will be built with capacity for two 230-115 kV transformers. However, at this time there will be one transformer, two 230 kV lines and one 115 kV transmission line proposed for Richards Creek substation. Additional electrical equipment, control house, security and stormwater systems will be constructed and installed to support the operation and protection of the substation and transmission system.

Sammamish and Talbot Hill Substation Improvements

Electrical equipment will need to be replaced and/or installed to accommodate the 230 kV lines that will be connected to the Sammamish and Talbot Hill substations. This work will take place within the exiting confines of those stations.

Somerset Substation Improvements

Somerset substation is an existing distribution substation located at 5200 Coal Creek Parkway SE, Bellevue WA, which currently is built out with one 115 kV to 12.5 kV transformer and four distribution feeders lines. The site area is 101,930 square feet (2.34 acres). The existing fenced footprint is approximately 293 feet by 80 feet and is access off of Coal Creek Parkway just south of Forest Drive SE. Only the Willow 2 and Oak 2 route options will require changes to the Somerset substation. Currently, the substation is only served by one transmission line. As part of the Willow 2 or Oak 2 options, the new high capacity 115 kV line will be looped through (in and out of), therefore having two 115 kV sources. To accommodate the necessary equipment and operational changes, it may be necessary to squared off the fence in the south east corner of the site, which could increasing the footprint around 200 square feet. There are three third-party communication facilities at the south end of the substation site, one of which may need to be removed or relocated.

Temporary Construction Facilities

Two types of temporary facilities will be necessary to construct the Energize Eastside project. These are equipment laydown, or staging areas, and wire stringing sites. Laydown areas are necessary to temporarily store construction equipment and transmission line components along the corridor. It is preferred to use existing open areas rather than develop new areas. The number and size of laydown areas can vary based proximity to the project area and number of available sites. Stringing sites are located along the transmission line corridor and are used as staging areas for new conductor or for pulling the wire along the poles.

Vegetation Management

Using existing transmission line rights-of-way is one of PSE's preferred routing criteria, as the vegetation in such corridors is already maintained to some degree. This includes selective removal of trees from beneath power lines or removal of hazardous trees that may fall into the electrical system as part of regular maintenance on all power line rights-of-way. Proper pruning, along with selective use of growth regulators and herbicides, are also among the methods employed. The method selected is dependent upon factors such as location, property use, and access.

An ideal integrated vegetation management scenario includes only shorter, native plants growing under the lines. PSE prefers that lower-growth-form plant communities composed of low-growing native ferns and shrubs and small-scale native and ornamental landscape trees be developed under the lines. This results in a diverse plant community that is both aesthetically pleasing and of increased value to resident wildlife.

Emphasis is placed on removal of large tree species, particularly where trees have been weakened through repeated trimming. In some cases disease or insect infestation can result in irreversible decline, weakening trees so they are more likely to cause problems during storms and high winds. Tree removal is especially important where pruning alone cannot achieve safe clearance from power lines.

Trimming, natural pruning techniques, or directional trimming will be used if proper line clearances can be achieved. Directional trimming concentrates on removing branches where the tree will normally shed them and direct future growth away from the electrical wires. While a

newly pruned tree might look different to some, natural pruning is designed to protect the health of the tree. It also minimizes re-growth and reduces trimming costs.

Directional pruning is the recommended method of the International Society of Arboriculture (ISA), American National Standards Institute (ANSI), and the National Arbor Day Foundation. Both tree removal and natural pruning will be performed by specially trained contract crews. Upon completion of tree work, the crews will clean up the site and any wood that is cut will be left on site in pieces of manageable size at the property owner's request.

Guidelines for 230 KV transmission lines

Keeping the wire and border zones clear around transmission lines is the most effective way to reduce tree-related power outages. The wire zone is the area directly underneath the transmission line, extending about 10 feet on either side of the lines. The border zone is located along those portions of the rights-of-way not located beneath the transmission lines.

PSE easements or rights-of-way typically include both the wire and border zones. Additionally, PSE may also remove trees outside these zones that pose a risk of falling into the transmission lines. To provide increased reliable service to our customers and respond to NERC's current standards, the organization in charge of improving the reliability and security of the bulk power system in North America, PSE has adopted vegetation management standards for transmission lines with voltages of 200 kV or greater.

Since the Energize Eastside project includes a 230 kV transmission line, vegetation along any of the route alternatives will be managed following PSE's NERC-approved Vegetation Management Plan. In general, this plan allows for plant species with a mature height of up to 15 feet to remain in the wire and border zones. To remain compliant with the federally approved plan, those species that have a mature height of greater than 15 feet are typically removed during construction of 230 kV systems. As proposed, the 230 kV and high capacity 115 kV line will be constructed in the existing corridor so no additional width is anticipated; however, changes in plant species composition are anticipated within the corridor so that the more restrictive 230 kV transmission line standards can be met.

Guidelines for 115 kV lines

Some of the alternatives for the Energize Eastside project include rebuilding or relocating 115 kV lines. NERC vegetation standards do not apply to PSE's 115 kV transmission or distribution line rights-of-way; however, in general, PSE will remove trees that mature at a height of greater than 25 feet near 115 kV lines. It should be noted that some trees within the corridor, with a height of greater than 25 feet, may be allowed to remain in the wire zone if they can be pruned in a manner that allows sufficient clearance from the lines.

Guidelines for Substations

Vegetation removal will be necessary to construct and operate the new Richards Creek substation. Typically tree species that are immediately adjacent to or that could fall into the substation are removed during initial construction and subsequence routine maintenance.