



# **Alternative Siting Analysis**

**South Bellevue Segment**

**LUC 20.20.225.D**

**September 2017**

The Alternative Siting Analysis that follows summarizes the years of study (including dozens of technical studies and two-phases of review under the State Environmental Policy Act (SEPA)) required to reach a decision point on how to best meet growing demand and ensure PSE's compliance with federal performance standards.

## **1.2 ALTERNATIVE SITING ANALYSIS PURPOSE AND OBJECTIVES (LUC 20.20.255.D)**

PSE proposes the Energize Eastside Project--the upgrading of 115 kV transmission lines to 230 kV lines in an existing transmission line corridor and the construction of the Richards Creek substation. In the Bellevue Comprehensive Plan, PSE's proposed route is on a "sensitive site." See Map UT-7. For new or expanded utility facilities on sensitive sites, an Alternative Siting Analysis is required in conjunction with the Conditional Use Permit process. See LUC 20.20.255.D.

Under the City's land use code, an Alternative Siting Analysis must: 1) identify, describe and map three alternative site options; 2) analyze whether each alternative site is feasible; 3) describe the technologies considered and how the proposed facilities will improve system reliability; and 4) describe community outreach related to the new or expanded facilities. See LUC 20.20.255.D. Where proposed sites are located within a Neighborhood Business or Residential Land Use District, the applicant must 1) describe whether the proposed location is a consequence of demands from customers within the district and 2) describe whether operational need requires locating the proposed facility in the district. *Id.* Using the location selection hierarchy, the applicant must then identify the preferred site alternative. *Id.* Finally, where the preferred site is in a Residential Land Use District, the applicant must demonstrate that the siting causes fewer site compatibility impacts than a nonresidential siting. *Id.*

## **2.0 ALTERNATIVES ANALYSIS**

After extensive study, PSE determined that the most effective solution to meet increased electricity demand and to comply with federal performance requirements is the addition of a 230 kV/115 kV substation in the center of the Eastside load area -- the Richards Creek substation -- and the upgrading of 115 kV transmission lines with 230 kV transmission lines constructed between the Sammamish (Redmond) and Talbot Hill (Renton) substations.<sup>1</sup> These facility upgrades, combined with continued aggressive conservation measures, is the Energize Eastside Project.<sup>2</sup> As confirmed by the City's independent consultants, this Project will improve

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<sup>1</sup> The existing transmission lines were last upgraded in the 1960s and are located in PSE's Sammamish – Lakeside – Talbot Hill transmission line corridor, which was established in the late 1920s and early 1930s.

<sup>2</sup> Notably, the City's Phase 2 DEIS concluded that "Under the No Action Alternative, PSE would continue to manage its system in largely the same manner as at present. This includes

reliability for Eastside communities and supply the needed electrical capacity for growth and development on the Eastside.

Siting of electrical transmission infrastructure through urbanized areas presents unique challenges. Finding the best way to route a transmission line is complex, as dozens of elements of both the natural and built environments need to be considered. This is especially true here as the proposed Project traverses the City from north to south.

The Project will be constructed in two phases, with the southern phase of the transmission line traversing 3.3 miles of the City. As a linear project, it necessarily travels through many land use districts. To limit the need to construct new facilities (and the associated environmental impacts), when looking at the entirety of the Energize Eastside Project, all transmission line route alternatives start at PSE's Sammamish substation in Redmond and end at the Talbot Hill substation in Renton. PSE considered various routing options for the entire line, including five route options in the South Bellevue Segment.

## **2.1 ROUTING ANALYSIS METHODOLOGY (LUC 20.20.255.D.1-2)**

PSE determined that the best approach to route selection would be to use a modern tool that employed a graphical information system (GIS)-based Linear Routing Tool (LRT) to conduct a broad evaluation of possible transmission line routes.

To further evaluate the Transformer plus Transmission Line solution, PSE contracted Tetra Tech, a consulting and engineering firm, who has developed an LRT. Details of the LRT assessment can be found in the Eastside 230 kV Project Constraint and Opportunity Study for Linear Site Selection (December 2013) (Attachment C). The LRT is a tool developed by Tetra Tech based on commercially-available geospatial technology and Tetra Tech's linear routing experience. It is a collaborative process that combines powerful analytical software with project experience, system planning, engineering, land use and local knowledge considerations. The LRT's innovative geospatial tool identifies the most suitable route alternatives based on modeled environmental and infrastructure factors and constraints.

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maintenance programs to reduce the likelihood of equipment failure, and stockpiling additional equipment so that in the event of a failure, repairs could be made as quickly as possible. *Implementation of the No Action Alternative would not meet PSE's objectives for the proposed project, which are to maintain a reliable electrical system and to address a deficiency in transmission capacity on the Eastside. Implementation of the No Action Alternative would increase the risk to the Eastside of power outages or system damage during peak power events.*" Phase 2 DEIS at 2-3.

Willow 1 route to limit environmental impacts and new impacts to adjacent uses. In addition, pipeline safety experts concluded that the Willow 1 route gives PSE the greatest assurance that the Energize Eastside Project will operate safely in the same corridor as BP's Olympic Pipeline.

## **2.3 ALTERNATIVE SITE DESCRIPTIONS**

*LUC 20.20.255D.2.a. Describe the sites identified in subsection D.1 of this section and the land use districts within which the sites are located.*

[...]

*LUC 20.20.255D.2.c. Describe which of the sites analyzed are considered practical or feasible alternatives by the applicant, and which of the sites analyzed are not considered practical or feasible, together with supporting information that justifies that conclusions reached. For sites located within a Neighborhood Business Land Use District, Residential Land Use District, and/or Transition Area (including the Bel-Red Office/Residential Transition (BR-ORT), the applicant shall:*

- i. Describe whether the electrical utility facility location is a consequence of needs or demands from customers located within the district area; and*
- ii. Describe whether the operational needs of the applicant require location of the electrical utility facility in the district or area.*

The Energize Eastside Project serves all of the potentially impacted land uses as in general, all land uses require electricity. The Energize Eastside Project will provide an upgraded, reliable transmission system serving the Eastside generally and adjacent uses specifically. The Project is needed because cumulatively, demand on the Eastside is increasing, including in areas along the South Bellevue Segment. The transmission line component of the project must run between the Sammamish and Talbot Hill substations. It must also connect with the proposed Richards Creek substation. The location of the substation is not dependent on being sited in a specific district; however, it does need to be situated in a location that the most reliable operation. Based on operational best practices, the ideal location for the new 230 kV substation is located in close proximity to PSE's existing 115 kV Lakeside substation. In addition, operationally, the transmission line must transverse through the City of Bellevue from the north to the south, making it impossible to completely avoid areas of residential zoning. The existing corridor (Willow 1) provides the shortest distance through the city and therefore, crosses the least amount of residential zoning.

As required under LUC 20.20.255.D.1 and LUC 20.20.255.D.2.c.i-ii, all siting alternatives are located in land use districts served by the South Bellevue Segment. The City of Bellevue's and

The subarea plan policies of each of the subareas within the Oak 1 Option support growth in similar land use patterns as those that currently exist.

There are 212 single-family and 287 multi-family residences within this option.

Phase 2 DEIS at 3.1-13. Approximately 18% of the Oak 1 route would impact Single and Multi-Family uses.

Consistent with the City's Phase 2 DEIS, PSE considers this route to be feasible. See LUC 20.20.255.D.2.c. PSE ultimately eliminated this route from consideration, however, because from a safety perspective, the Willow 1 route has the lowest potential AC interaction with the petroleum pipelines that share the corridor. Additionally, the Willow 1 route requires the fewest number of trees to be removed in order to comply with NERC standards and uses an existing transmission line corridor. The use of an existing corridor does not impose a new transmission line on new areas, does not require the acquisition of new easements, and is specifically identified on Bellevue's Comprehensive Plan UT-7 map as being expanded to 230 kV.

#### **2.3.4 Substation Alternatives**

The substation yard needs to be large enough to accommodate a new 230 kV-115 kV transformer and associated electrical equipment such as circuit breakers, electrical bus, and connections to the new transmission lines. It is expected that the substation's fenced yard will be approximately 2 acres. The main function of the substation is to step down the 230 kV voltage (bulk power) from the new transmission lines to 115 kV needed for use by the local distribution system. All substation locations are considered to be feasible. LUC 20.20.255.D.2.c.

Three 230-115 kV substation sites were considered for the Energize Eastside Project - referred to as Westminster, Vernell, and Richards Creek. These sites were selected for consideration because they are all owned by PSE; meet the objectives to site the 230 kV transformer at a central location between the existing 230 kV power sources at Sammamish substation in Redmond and Talbot substation in Renton; accommodate the necessary improvements to serve the required 230 kV transmission lines to bring power to the centralized transformer; and distribute power to the existing network of 115 kV transmission lines.. Of the three substation sites, only Richards Creek is located within the Southern Phase; however, since the primary objective of the Energize Eastside Project is to install a new transformation source in the central Bellevue area, their inclusion is relevant.



during PSE's 2009 annual reliability assessment, that if one of the Talbot Hill Substation transformers failed, it would significantly impair reliability on the Eastside. Replacement of a failed 230 kV transformer can take weeks, or even months, to complete depending on the level of failure and other site specific parameters. Since 2009, other reliability deficits have been identified. These include concerns over the projected future loading on the Talbot Hill Substation and increasing use of Corrective Action Plans (CAPs) to manage outage risks to customers in this portion of the PSE system.

In total, since 2009, five separate studies<sup>6</sup> (Attachment C) performed by four separate parties have confirmed the need to address Eastside transmission capacity:

- Electrical Reliability Study by Exponent, 2012 (City of Bellevue)
- Eastside Needs Assessment Report by Quanta Services, 2013 (PSE)
- Supplemental Eastside Needs Assessment Report by Quanta Services, 2015 (PSE)
- Independent Technical Analysis by Utility Systems Efficiencies, Inc., 2015 (City of Bellevue)
- Review Memo by Stantec Consulting Services Inc., 2015 (EIS consultant).<sup>7</sup>

The studies performed by PSE in 2013 and 2015 confirmed that the Eastside's existing grid will not meet federal reliability requirements by the winter of 2017/2018 and the summer of 2018 without the addition of 230 kV to 115 kV transformer capacity in the Eastside area.

### 3.6 ELECTRICAL UTILITY FACILITY COMPONENTS

*LUC 20.20.255.D.3c. Describe components of the proposed electrical utility facility that relate to system reliability.*

PSE's proposal is to install and operate a new 230 kV to 115 kV electrical transformer in the center of the Eastside load area. The ideal location for the new transformer is in close proximity to PSE's existing Lakeside 115 kV substation, which provides the connection to the existing 115 kV electrical system that serves the surrounding distribution substations. The new 230 kV to 115 kV transformer is the principal component that will allow the Eastside electrical system to reliably operate and meet Federal Planning standards. To operate the new transformer it must be served by approximately 18 miles of new high-capacity electric transmission lines (230 kV) extending from Redmond in the north and Renton to the south. The transformer would be

<sup>6</sup> These studies provide evidence relevant to the City's review under LUC 20.20.255.E.4 and LUC 20.20.255.D.3.b & c.

<sup>7</sup> The City's consultants evaluation concluded as follows: "...PSE['s] needs assessment was overall very thorough and applied methods considered to be the industry standard for planning of this nature. Based on the information that the needs assessment contains, I concur with the conclusion that there is a transmission capacity deficiency in PSE's system on the Eastside that requires attention in the near future." (DeClerck, Review Memo by Stantec Consulting Services Inc., July 31, 2015).