C

Scenic Views and Aesthetic Environment Methodology

energize EASTSIDE EIS

APPENDIX C. SCENIC VIEWS AND AESTHETIC ENVIRONMENT METHODOLOGY

1. INTRODUCTION

This appendix describes the process for assessing impacts to scenic views and the aesthetic environment as a result of the Energize Eastside project. Scenic views are the observation of a visual resource from a particular location, with visual resources generally defined as natural and constructed features of a landscape that are viewed by the public and contribute to the overall visual quality and character of an area. Such features often include distinctive landforms, water bodies, vegetation, or components of the built environment that provide a sense of place, such as city skylines. The aesthetic environment is the portion of the environment that influences human perception of the world. It is comprised of the natural (topography, presence of trees, water bodies) and built (buildings, utility infrastructure) environments. This appendix details the process used to identify impacts to scenic views and the aesthetic environment and how significance was assigned.

2. GUIDANCE USED

SEPA (WAC 197-11) requires all major actions sponsored, funded, permitted, or approved by state and/or local agencies to undergo planning to ensure that environmental considerations, such as impacts related to scenic views and the aesthetic environment, are given due weight in decision-making. Because the value of scenic views and the aesthetic environment is subjective, based on the viewer, it is difficult to quantify or estimate impacts. In particular, little guidance exists supporting a standard methodology for assessing visual impacts associated with transmission line projects. A number of methodologies were reviewed to inform the methodology used for this project. For this project, the assessment of impacts was generally based on methods described in the Federal Highway Administration (FHWA) *Guidelines for Visual Impact Assessment* (FHWA, 2015). FHWA guidelines do not specify thresholds for determining significant impacts, nor do state or local regulations. Therefore, significance was assigned based on criteria similar to those described in *The State Clean Energy Program Guide: A Visual Impact Assessment Process for Wind Energy Projects* (Vissering et al., 2011).

3. STUDY AREA

The FHWA Guidance suggests identifying an Area of Visual Effect (AVE) based on the physical constraints of the environment and the physiological limits of human sight (FHWA, 2015). This concept was used for determining the study area, which takes into account where the project would be visible given the topographical and human sight constraints. Impacts to scenic views and the aesthetic environment would only occur in places where the project would be visible. To identify areas where the project would be visible, a geographic information system (GIS) analysis was conducted.

Data Used to Determine Study Area

King County 2002/2003 Digital Surface Model (DSM)(King County, 2003a)

PSE GIS Alignment Data (PSE, 2016a)

Two sets of tools in ArcMap allow a user to run such an analysis: (1) Viewshed, and (2) Observer Points (ESRI, 2016). For this analysis, the viewshed tool was used because it allows use of lines as key visual elements. The viewshed tool creates a raster[1] that records the number of times an input point or polyline feature[2] can be viewed from a particular area. When polyline input is used, every node[3] and vertex[4] along each input line is processed as an individual observation point, so an area where multiple vertices can be viewed would have a higher raster value.

For this analysis, the EIS Consultant Team used the PSE alignment data (a GIS file that shows where the project would be located) as the input polyline to determine what areas of the landscape have line of sight to the proposed transmission line.[5] Applying an offset informs the viewshed model that the line being observed would be located above the ground (Figure C-1). The heights identified in Table C-1 were used to prescribe an offset height to the polyline in the viewshed analysis.[6]

Table C-1. PSE GIS Alignment Data - Proposed Maximum Pole Height by Segment

Segment	Option(s)	Proposed Maximum Pole Height (feet)
Redmond	N/A	120’
Bellevue North	N/A	100’
Bellevue Central	Existing Corridor	115’
Bellevue Central	Bypass 1	115’
Bellevue Central	Bypass 2	115’
Bellevue South	Existing Corridor	95’
Bellevue South	SE Newport Way	80’
Bellevue South	SE 30th St | Factoria Blvd | Coal Creek Parkway	125’
Bellevue South	124th Ave SE	80’
Newcastle	N/A	100’
Renton	N/A	125’

Source: PSE, 2016b.

[1] A raster is a matrix of cells (or pixels) organized into a grid where each cell contains a value representing information, such as whether or not a view can be seen.
[2] A polyline feature is a continuous line composed of one or more line segments.
[3] A node is a point at which lines intersect or branch.
[4] A vertex is an angular point of a polygon.
[5] Note: line of sight does not necessarily mean the object is within the range of human sight.
[6] Pole heights were assigned at the “option(s)” level, with the highest proposed pole option being used.

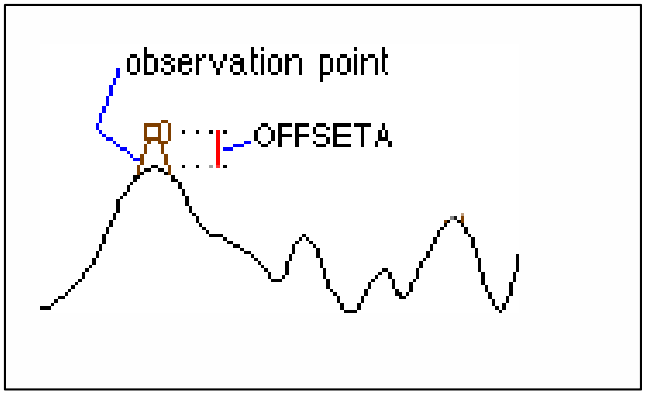

Figure C-1. Factoring Line Heights (ESRI, 2016)

The data used as the "ground" for this analysis were the King County Digital Surface Model (DSM). The King County DSM was used instead of bare earth data because it gives the heights of vegetation and buildings, in addition to taking into account the underlying topography. The EIS Consultant Team used DSM data because in urban environments views are often obstructed by vegetation and buildings, rather than by the topography of the landscape alone (GIS Geography, 2016).

Figure C-2 shows the output from the GIS analysis described above. The GIS analysis provides a rough approximation of where the project would be visible. It includes areas where the line would be so small that it is unrealistic that it would be distinguishable on the horizon. Also, in some instances dense areas of tree stands were misinterpreted by the GIS analysis as being a rise in topography from which views could be had, skewing the results to show more areas as being potentially impacted than would actually occur. In general, the highest concentrations of areas with views of the project corridor would be within one-quarter mile of the corridor. This is consistent with what is commonly found for transportation projects (FHWA, 2015).

For the purposes of this project, a study area with a one-quarter mile radius from the edge of the proposed transmission line corridor (including all segment options) was used. However, Interstate 405 (I-405) and all areas to the west of I-405 were removed because the freeway provides such a wide separation that the project is not expected to visually impact I-405 drivers or the neighborhoods west of the freeway. The study area focuses on areas where the proposed transmission line would be within the foreground view, where viewers are most likely to experience the scale of the project and observe details and materials. While the project would be visible at greater distances, significant scenic or aesthetic impacts are not probable given the project's scale relative to its largely mixed urban context.

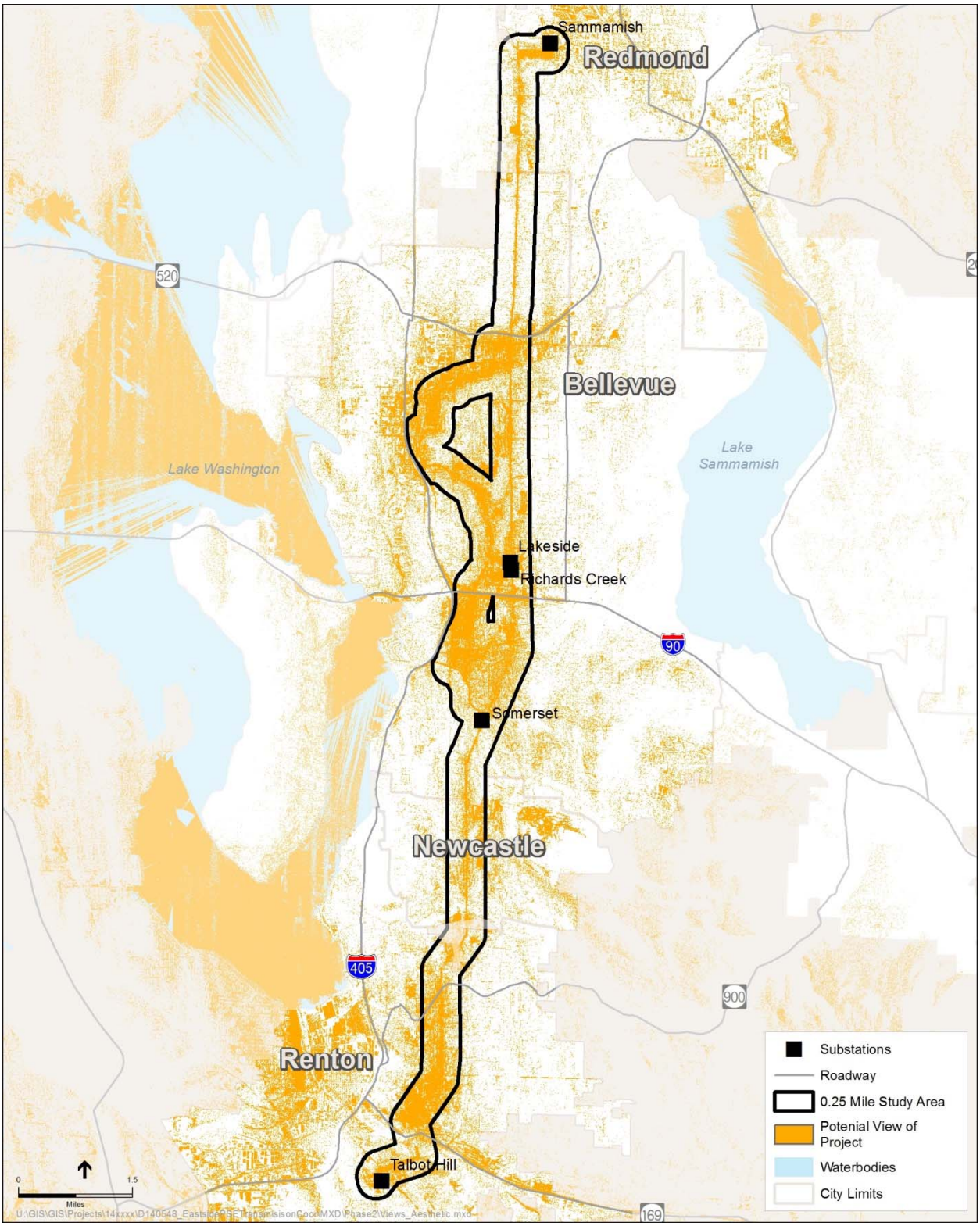

Figure C-2. Study Area

4. CHARACTERIZING THE AESTHETIC ENVIRONMENT

The existing aesthetic environment was characterized through an assessment of the visual character (what is present in the built and natural environments), the affected population (viewers), and the existing visual quality. Visual quality is based on consistency of visual character with viewer preferences. To assess the visual quality of the study area, the visual quality criteria described in the FHWA Guidance were used. These concepts were applied by the EIS Consultant Team in the manner described in the table below based on professional experience and consideration of viewer preferences stated in study area comprehensive plans and public comments received during the EIS process.

Table C-2. Application of FHWA Methodology to Determine Visual Quality

FHWA Visual Quality Criteria	FHWA Description	Application
Natural Harmony	What a viewer likes and dislikes about the natural environment. The viewer labels the natural environment as being either harmonious or inharmonious. Harmony is considered desirable; disharmony is undesirable.	**High:** A natural area that is relatively undisturbed by development. Could include secluded lakes, open plains, forests, etc. **Medium:** An area with a small amount of development that blends with the natural environment and does not disrupt the natural harmony of the area. **Low:** An area with a large amount of development where the built environment takes precedence in the viewshed over the underlying natural environment.
Built Order	What a viewer likes and dislikes about the built environment. The viewer labels the built environment as being either orderly or disorderly. Orderly is considered desirable; disorderly is undesirable.	**High:** A built environment with urban design that is identified in a comprehensive plan or other planning document as being aesthetically pleasing. **Medium:** An area with consistent building height and form. It does not overtly meet any set design standards, but also is not inconsistent with set design standards. **Low:** An area with inconsistent building height and form that does not meet set design standards (if they exist).
Utility Coherence	What the viewer likes and dislikes about the utility environment, which is comprised of the utility's geometrics, structures, and fixtures. The viewer labels the utility environment as being either coherent or incoherent. Coherent is considered desirable; incoherent is undesirable.	**High:** Minimal utility presence, small poles with few wires*. Configuration is consistent in height and form. Utility infrastructure blends with the rest of the aesthetic environment. **Medium:** Moderate utility presence. There could be larger, taller poles or more wires.* Configuration is consistent in height and form. Utility infrastructure blends with the rest of the aesthetic environment for the most part.

FHWA Visual Quality Criteria	FHWA Description	Application
		Low: High utility presence. There are larger, taller poles with configurations that are inconsistent in height and form. The utility infrastructure is the prominent feature in the viewshed and does not blend with the rest of the aesthetic environment.

*Note: Changes in wire diameter are not expected to be perceivable and therefore are not considered as part of this analysis (See Attachment 1).

5. CHARACTERIZING SCENIC VIEWS

Scenic views are views of visual resources that are considered special attributes of the study area and region. Visual resources associated with the study area were identified in the Phase 1 Draft EIS based on study area plans, regulatory codes (as summarized in Section 9), and scoping comments. These are listed in Table C-3. The visual resources evaluated in the Phase 2 Draft EIS were selected because there was the potential for significant scenic view impacts under the proposed project. The EIS Consultant Team determined that some of the visual resources identified in the Phase 1 Draft EIS were no longer applicable due to distance, topographic constraints, or the presence of dense vegetation between viewers and the visual resources. Table C-3 details why scenic views of certain Phase 1 visual resources were not evaluated further in the Phase 2 EIS.

Table C-3. Identification of Study Area Scenic Views

Visual Resource Identified in Phase 1	Included in Phase 2 GIS Analysis?	Reason
Mount Rainier	Yes	Scenic views could be impacted by the project.
Cascade Mountain Range	Yes	Scenic views could be impacted by the project.
Issaquah Alps (Cougar Mountain, Tiger Mountain, and Squak Mountain)	Yes	Scenic views could be impacted by the project. Used Cougar Mountain because it is in the foreground.
Lake Washington	Yes	Scenic views could be impacted by the project.
Lake Sammamish	Yes	Scenic views could be impacted by the project.
Seattle skyline	Yes	Scenic views could be impacted by the project.
Bellevue skyline	Yes	Scenic views could be impacted by the project.
Lake Sammamish	Yes	Scenic views could be impacted by the project.
Sammamish Valley	No	Topography makes is unlikely that scenic views would be impacted with the powerline in the foreground and background views would not be significant because the line would be too far away from the viewer.

Visual Resource Identified in Phase 1	Included in Phase 2 GIS Analysis?	Reason
Cedar River	No	Due to topographic constraints and the presence of dense vegetation within the Cedar River ravine, scenic views of the Cedar River are unlikely from outside of the ravine. No residential views of the river would be obstructed by the lines and, due to the topography, the line would be located high enough above the roadway that it would not impact drivers' views of the river. Therefore, impacts to views of the Cedar River are assessed as impacts to the aesthetic environment, with the primary viewers considered being users of the Cedar River Trail or Riverview Park.
Beaver Lake	No	Visual resource would not be visible from the Phase 2 study area.
Pine Lake	No	Visual resource would not be visible from the Phase 2 study area.

6. IMPACTS TO THE AESTHETIC ENVIRONMENT

The assessment of impacts to the aesthetic environment was based on the FHWA concepts of compatibility of impact (degree of contrast), sensitivity to the impact (viewer sensitivity), and degree of impact (whether it would result in a beneficial, neutral, or adverse impact).

6.1 Degree of Contrast

To assess impacts to the aesthetic environment, visual simulations were used to determine the degree of contrast produced by the project. The degree of contrast is the extent to which a viewer can distinguish between an object and its background. It was assessed by taking into consideration the project form, materials, and visual character in comparison to existing conditions and the surrounding areas.

Data Used To Assess Impacts to the Aesthetic Environment

GIS Shapefiles:

- ***Parks*** (Bellevue, 2015; Newcastle, 2015; Renton, 2015; Issaquah, 2015; Kirkland, 2015; Redmond, 2015; King County, 2015b)
- ***Water Bodies*** (Ecology, 2014)
- ***Land Use*** (King County, 2015a)
- ***Land Cover*** (NOAA, 2011)
- ***Topography*** (King County, 2003b)

Public Comments

The tool of identifying landscape units was not employed due to the length of the corridor and the diversity of the natural, cultural, and project landscapes; however, the concept of identifying unique natural, cultural, and project landscapes to select key views was used. For this assessment, the discussion was divided into the natural (topographic, land cover, water bodies) and built (building form, utility infrastructure) environments to reduce confusion associated with use of the terms "cultural" and "project" environments.

To assess changes to each component of the aesthetic environment, viewpoints were selected at various locations along the transmission line corridor to show different ways the natural and built

environments could be impacted; for instance, areas where the project corridor would cross unique topography, water bodies, vegetation, land uses (different land uses typically have different building forms and impacted viewers), or where the existing transmission infrastructure would be changed (e.g., different pole heights or configurations). Areas identified as being sensitive during the public scoping period were also used as viewpoints (Table C-4).

Visual simulations of what the project would look like at these viewpoints provide the foundation for assessing aesthetic impacts. The concept of discussing dynamic versus static viewsheds was adopted as part of the impacts analysis (view duration), but viewsheds were not identified as being dynamic or static.

Table C-4. Public Comments that Requested Visual Simulations

Suggested Viewpoint Location	Rationale behind why it was or was not included
Lower Somerset homeowners' view of Willow 2.	**Included** – covered via the Somerset Drive SE simulation.
Factoria Boulevard and Coal Creek Pkwy.	**Included** – covered via the 5365 Coal Creek Parkway simulation.
West viewing section of Somerset in Bellevue.	**Included** – covered via the Somerset Drive SE simulation.
Newport Way SE corridor from the on the west side of the street.	**Included** – covered via the 12919 SE Newport Way simulation.
Public parks and rights-of-way.	**Included** – covered via the Lake Boren Park simulation and 8030 128th Ave SE simulation.
Because of the topography of Newcastle, vantage points should include locations on the west and east boundaries of the route.	**Included** – 8030 128th Ave SE simulation looks to the east and Lake Boren Park simulation looks to the west.
Because of the topography of Newcastle, vantage points should include vantage points to the east of Coal Creek Parkway from which the project would be visible.	**Not included** – the transmission line would not be visible due to topography and the presence of dense vegetation.
Houses that line Somerset Drive SE, all of which will have the lines parallel to the view sides of the houses.	**Included** – covered via the Somerset Drive SE simulation.
Newport Way at the driveway of Monthaven Community.	**Included** – covered via the 13357 SE Newport Way simulation.
Skyridge/College Hill and Sunset communities.	**Included** – covered via the Skyridge Park (1990 134th Pl SE, Bellevue) simulation.
Skyridge hiking trail, which starts at the end of 134th Ave SE (dead end) and ends at the Skyridge Park playground. This is a new trail and has views of Richard's Valley, especially in the winter.	**Included** – covered via the Skyridge Park (1990 134th Pl SE, Bellevue) simulation.
Sunset Park should be considered for Route 2.	**Not included** – Sunset Park was considered, but

Suggested Viewpoint Location	Rationale behind why it was or was not included
	a simulation was not created. The EIS Consultant Team visited that portion of the site and determined that the presence of dense vegetation would reduce the likelihood that the project would be visible. The substation simulation provides a representative simulation.
Grand Connection just east of I-405 and the viewing platform at the western edge of the Bellevue Botanical Garden are two of these -- and high tension poles are unsightly.	**Not included** – There are no aesthetic guidelines applicable to the project that are associated with the Grand Connection. The Lake Hills Connector simulation is considered to be sufficient for representing the highest degree of adverse aesthetic impacts in this portion of the study area.
The viewing platform at the western edge of the Bellevue Botanical Garden.	**Not included** – EIS Consultant Team visited the site and confirmed that the project would not be visible due to the topography and presence of dense vegetation.
Residents east of 108th Street.	**Not included** – outside of study area. Assume commenter meant "108th Avenue."
Residents in western Wilburton.	**Included** – covered via NE 8th Street simulation.
Residents in the Spring District.	**Included** - covered via Spring District simulation.
Residents looking east from the central business district, west from Wilburton and southwest and south from the Spring District.	**Not included** – outside of study area.
Drivers on I-405.	**Not included** – outside of study area.

Table C-5 provides the list of viewpoints used in the EIS, the segment they are viewing, and the reasons supporting the selection of each viewpoint (i.e., unique natural or built environment or scoping comment). Table C-6 provides a list of viewpoints that were used to inform the analysis, but were not incorporated directly into the EIS. Figure C-3 shows all of the simulations created by Power Engineers and their locations, and the simulations area included as Attachment 2.

To the extent possible, these viewpoints were selected to align with visual simulations that had already been completed for the project. The visual simulations were created by Power Engineers. Their methods for creating the visual simulations are detailed in Attachment 2. Power Engineers collected photos using a full frame Canon 5D Mark II or III professional Digital Camera. All photos were taken with a 50mm. lens. In some extreme foreground situations a 28mm. lens may be used. Power Engineers developed an existing conditions 3D Model of the study area, including terrain and structures. The photos were registered into a 3D modeling program and 3D sun and atmosphere conditions were applied based on notes taken when the photo was shot. Power Engineers then used PLS-CAD model data (3D engineering designs developed for each transmission line structure) provided by PSE to create a 3D rendering. Photoshop was used to create foreground screening

elements (e.g., trees, structures, etc.) (Power Engineers, 2016). All of the renderings show brown poles because Patina[7] would be applied under all of the segment options.

6.2 Viewer Sensitivity

The evaluation of viewer sensitivity was also based on FHWA guidance, and considered viewer exposure and viewer awareness. Exposure considers the proximity, extent, and duration of views. Awareness considers viewer attention and focus, and whether affected views are protected by policy, regulation, or custom (FHWA, 2015). All viewers within the study area were considered to be close to the project. Viewer extent is specific to each component because it depends on the number of viewers impacted. This was assessed by identifying areas with higher residential density and recreational resources that are heavily used. The viewer extent of residential viewers was determined by assigning areas of high, medium, and low population density by assessing American Community Survey 2014 Census block data on a segment-by-segment basis within the quarter-mile radius study area (U.S. Census Bureau, 2014). Figure C-4 shows areas with high, medium, and low population density. The viewer extent of recreational users was assessed by identifying those recreation areas (parks, trails, outdoor recreation facilities) that lie within the study area, and determining whether or not the view or natural setting of the recreation areas is identified as a defining feature (based on findings in the Phase 1 Draft EIS; see Table 11-1 in the Phase 1 Draft EIS, and the recreation analysis in the Phase 2 Draft EIS; see Section 3.6)[8]. If a recreation area that is used for its views or natural setting would be impacted, how frequently the recreation area is used was assessed. The duration of views is consistent for all components, with residential viewers experiencing the longest view duration due to their stationary nature and fixed views of the transmission line. Recreational users have a shorter view duration that is confined to the time spent at the recreational resource, with park users having longer view duration and trail users, who are more mobile, having shorter view duration. Drivers would have the shortest view duration due to the speed at which they travel.

It was assumed that two groups were the most sensitive to changes in the aesthetic environment and scenic views: residents and recreational users in parks and other recreational settings. These two groups would have the greatest exposure to the project because they are often located near the project and would observe the project for longer durations (particularly residential viewers). They would also likely have the greatest awareness, given that these two types of viewers are most often protected by city policies (Section 9).

[7] Patina is a film applied to the surface of metals that turns brown as oxidation occurs over long periods of time.

[8] Please note: the study area for the scenic views and aesthetic environment assessment is larger than the study area used for the recreation analysis.

Table C-5. List of Viewpoints and Rationale for Selection

Key Viewpoint (KVP)	Location	Segment/ Option	Reason for selecting viewpoint (Natural Environment or Built Environment and why)
1	SE 30th St	All Segments/ Options	• Shows the new substation when taking into account grading and clearing.
2	Redmond Way	Redmond	• Representative of the natural environment along the segment (topography and vegetation). • Representative of the built environment (shows project configuration and height for entire segment).
3	13540 NE 54th Pl	Bellevue North	• Representative of the natural environment along the segment (topography and vegetation). • Representative of the built environment (single-family residential development; project configuration and height for entire segment).
4	13606 Main St	Bellevue Central – Existing Corridor	• Shows project from rise in topography. • Is identified in the Wilburton Subarea Plan as a key view.
5	13636 Main St	Bellevue Central – Existing Corridor	• Shows project from rise in topography, but from a side view. • Is identified in the Wilburton Subarea Plan as a key view.
6	12828 Bel-Red Rd	Bellevue Central – Bypass 1 and 2 Options	• Shows project surrounded by commercial and industrial uses. • Shows project from an area slated for increased density.
7	12253 NE 8th St	Bellevue Central – Bypass 1 and 2 Options	• Identified in the Wilburton Subarea Plan as a key view.
8	Lake Hills Connector	Bellevue Central – Bypass 1 and 2 Options	• Identified in the Wilburton Subarea Plan as a key view. • Shows how project would be viewed by future users of the Eastside Rail Corridor.
9	1680 Richards Rd	Bellevue Central– Bypass 2 Option	• Richards Rd is identified in Richards Valley Subarea Plan as an area where the City wants to preserve the vegetated appearance. • Shows impacts to an area with wetland land cover.

Key Viewpoint (KVP)	Location	Segment/ Option	Reason for selecting viewpoint (Natural Environment or Built Environment and why)
			• Shows the project impacts near the Woodridge Trail trailhead.
10	4122 Factoria Blvd SE	Bellevue South - Oak 1 and Oak 2 Options (Only used Oak 1 Option for EIS)	• Visual connections along Factoria Blvd are protected in the Factoria Subarea Plan. • Oak 1 Option was used in EIS because it is a taller pole configuration with a higher likelihood of aesthetic impacts.
11	5365 Coal Creek Pkwy	Bellevue South - Willow 2, Oak 1, Oak 2 Options (Only used Oak 1 Option for EIS)	• Identified via a public comment. • Oak 1 Option was used in EIS because it is a taller pole configuration with a higher likelihood of aesthetic impacts.
12	12513 SE 38th St	Bellevue South - Oak 2 Option	• Shows construction of poles where they do not currently exist.
13	4730 134th PL SE	Bellevue South Segment - All Options (Only used Willow 1 Option for EIS)	• Identified via public comment. • Shows the option with the tallest poles in the Somerset neighborhood.
14	12892 SE Newport Way	Bellevue South Segment - Willow 2 Option	• Shows a change in built environment from a 40-foot 12.5kV line on wooden poles to 75-foot steel monopoles. • Shows removal of underbuild and reduction in clutter.
15	8446 128th Ave SE	Newcastle	• Representative of the built environment (single-family residential development; project configuration and height for entire segment). • Shows the project from the ridge near the corridor.
16	Lake Boren Park	Newcastle	• View from recreational use. • Shows the project from a lower elevation looking up at the project.
17	1026 Monroe Ave NE	Renton	• Shows project surrounded by institutional and single-family residences.
18	318 Glennwood Court SE	Renton Segment	• Shows project surrounded by single-family residential development and placed on a ridge.

Table C-6. List of Other Simulations that Informed the Analysis

Location	Segment/Option
13505 NE 75th St	Redmond
267 140th Ave NE	Bellevue Central – Existing Corridor
106 136th Ave SE	Bellevue Central – Existing Corridor
13600 SE 5th St	Bellevue Central – Existing Corridor
13633 SE 5th St	Bellevue Central – Existing Corridor
13810 Lake Hills Connector	Bellevue Central – Existing Corridor
13711 SE 18th St	Bellevue Central – Existing Corridor
1990 134th Pl SE	Bellevue Central – Existing Corridor
2160 135th PL SE	Bellevue Central – Existing Corridor
1227 124th Ave NE	Bellevue – Bypass Options 1 and 2
11757 SE 5th St	Bellevue – Bypass Options 1 and 2
SE 8th St and Lake Hills Connector	Bellevue – Bypass Options 1 and 2
2070 132nd Ave SE	Bellevue Central Segment – Bypass Option 2
13630 SE Allen Rd	Bellevue South Segment - All Options
13744 SE Allen Rd	Bellevue South Segment - All Options
4411 137th Ave SE	Bellevue South Segment - All Options
4489 137th Ave SE	Bellevue South Segment - All Options
4901 Coal Creek Parkway	Bellevue South Segment - All Options
13300 SE 42nd PL	Bellevue South Segment - Willow 2 Option
13371 SE Newport Way	Bellevue South Segment - Willow 2 Option
13357 SE Newport Way	Bellevue South Segment - Willow 2 Option
4256 134th Ave SE	Bellevue South Segment - Willow 2 Option
12919 SE Newport Way	Bellevue South Segment - Willow 2 Option
12727 SE 73rd Pl	Newcastle
SE 84th St	Newcastle
12732 SE 80th Way	Newcastle
7954 129th Pl SE	Newcastle
3000 NE 4th St	Renton

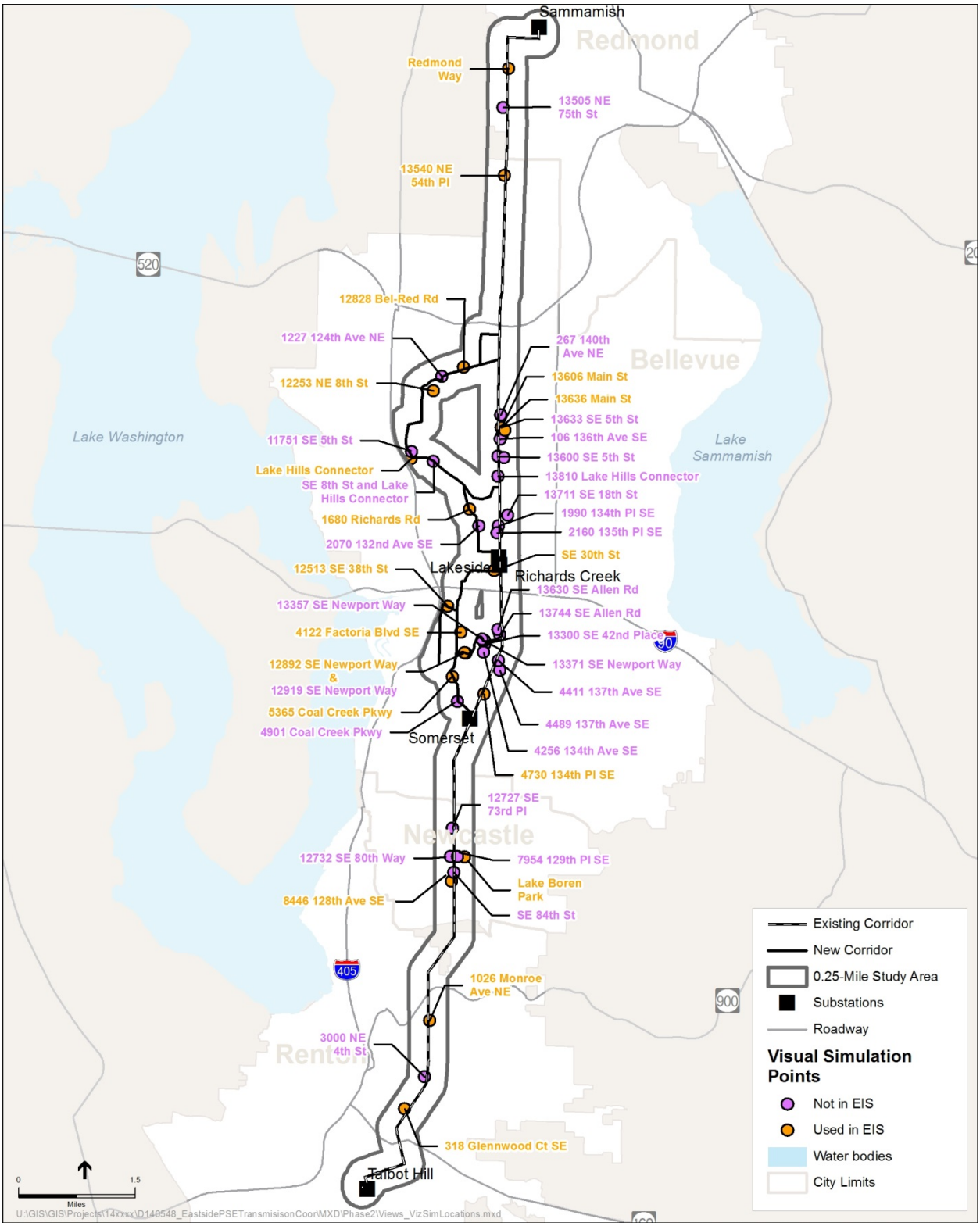

Figure C-3. Viewpoint Map

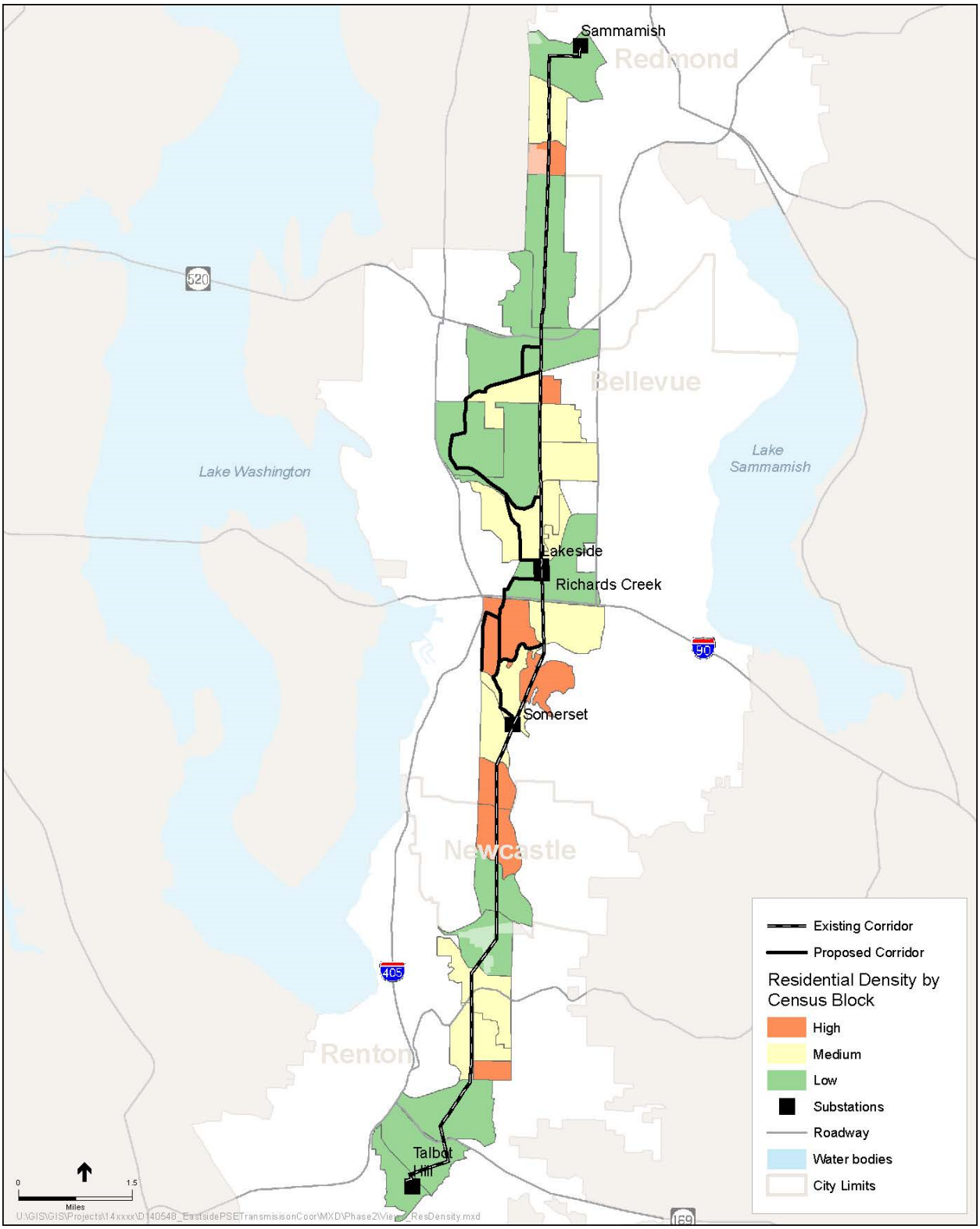

Figure C-4. Population Density Map

7. IMPACTS TO SCENIC VIEWS

The assessment of impacts to scenic views was based the potential for view obstruction and the FHWA concept of sensitivity to the impact (viewer sensitivity).

7.1 Scenic View Obstruction

A GIS analysis was conducted to identify areas from which a portion of the proposed transmission line would obstruct the view of an identified visual resource. This GIS analysis identified where visual resources can be seen based on the location and height of the visual resource and the topography of the surrounding area. This area was further refined based on a similar analysis that determined where the proposed transmission line could be seen based on the location of the segment, the proposed height of the poles, and the surrounding topography. The outputs from these two analyses were overlaid to determine where the project may impact scenic views. This is a conservative estimate that was qualitatively refined through identification of barriers to views (dense tree stands, etc.).

For this analysis, the viewshed tool was also used. To determine the area where scenic views can be observed, a process similar to the one used for the aesthetic environment study area was adopted. However, for this analysis, visual resources were used as observation points and their unique offsets were applied (Table C-7).

Table C-7. Visual Resources input into Viewshed Tool

Visual Resource	Offset Applied
Mount Rainier	Line of frontage at 14,411 feet (based on mountain height)
Cascade Mountain Range	Line of frontage at 5,000 feet (based on Typical King County DEM data height)
Issaquah Alps (Cougar Mountain)	Line of frontage at 1,600 feet (based on Typical King County DEM data height)
Lake Washington	Line along the eastern shoreline at 20 feet above sea level
Lake Sammamish	Line along the western shoreline at 30 feet above sea level
Seattle skyline	Line of downtown frontage with a height of 650 feet (slightly higher than Safeco Plaza)
Bellevue skyline	Line encompassing downtown Bellevue at 460 feet (slightly higher than Bellevue Towers Two)

To assess the areas that would be affected under different build scenarios, the heights of the existing and proposed lines were "burned" into the DSM to identify which areas with scenic views are already impacted by views of a transmission line and which areas with scenic views are not currently impacted, but would be after construction of the project (Table C-8). The heights used for the "proposed maximum pole heights" for the GIS analysis differ slightly from the final proposed maximum heights, due in part to design changes made during the course of the EIS assessment. These design changes were considered qualitatively as part of the impacts assessment, but the EIS Consultant Team decided not to rerun the scenic view obstruction analysis because in some instances

a more conservative pole height was used. In the instances where a less conservative pole height was used, the difference was considered to not substantially change the results of the GIS analysis.

Table C-8. Existing and Proposed Maximum Pole Height by Roadway

Segment	Height Used for the GIS Analysis
Redmond	120'
Bellevue North	100'
Bellevue Central Existing	115'
Bellevue Central Bypass 1	115'
Bellevue Central Bypass 2	115'
Bellevue South Oak 1	*Corridor:* 90' *SE 30th St /Factoria Blvd/Coal Creek Pkwy:* 125'
Bellevue South Oak 2	*Corridor:* 90' *SE 30th St /Factoria Blvd/Coal Creek Pkwy:* 125' *124th Ave SE:* 80'
Bellevue South Willow 1	95'
Bellevue South Willow 2	*Corridor:* 95' *Newport Way:* 80' *Factoria Blvd/Coal Creek Pkwy:* 90'
Newcastle	100'
Renton	125'

Source: PSE, 2016b.

To burn the lines into the DSM, a raster of the proposed alignment was created with a value of 0 assigned to everywhere except along the line, which was assigned a value equal to pole height (specified in Table C-8). Then, using a raster calculator, the line height was burned into the DSM to get a DSM+LINE (DLI) raster (Figure C-5).

Figure C-5. Factoring Line Heights

The following DLIs were created:

- One DLI as if no lines were present.
- One DLI where the existing transmission heights would be burned in.
- One DLI with the heights for the Redmond, North Bellevue, Newcastle, and Renton segments. These segments can be grouped into one DLI because there are no different pole height options.
- Four DLIs for the Bellevue South Segment options.
- Three DLIs for bypass Bellevue Central Segment options.

Each of the DLIs was used as the ground raster for a viewshed analysis to identify where the scenic resources would be viewable on the landscape, creating results for each pole height scenario. To understand the areas where views would be negatively impacted by the project, areas where scenic views are already impacted by the transmission line were subtracted from the area with scenic views that would be impacted by the proposed transmission line.

Figure C-6 shows the output from the GIS analysis described above. Similar to the GIS analysis conducted for the study area, some areas may have been identified as having scenic view impacts but in reality should not have been included because the line would be so small that it is unrealistic that it would be distinguishable on the horizon, or dense areas of tree stands were misinterpreted by the GIS analysis as being a rise in topography from which views could be had (rather than being considered hindrances to views). For areas where it was questionable if scenic views would actually be impacted, a field survey was conducted to verify. In general, areas where potential scenic views were identified had scenic views in the approximate vicinity; however, in some cases these views were less frequent than may have been shown by the analysis depending on the presence of dense vegetation. The only area that was completely eliminated from consideration was where scenic views were identified in the Liberty Ridge area. A field visit conducted on October 7, 2016 confirmed that scenic views from that location were not present due to the topography of the area. The EIS Consultant Team believes that the reason the GIS analysis identified this area as an area with potential scenic view impacts was because the DSM used was from 2002/2003. Since that time, significant grading has occurred to support development of the Liberty Ridge neighborhood. These changes to the topography are thought to have resulted in the loss of scenic views. In general, the highest concentrations of areas with scenic views that could be impacted by the project were within approximately 550 feet of the corridor.

7.2 Viewer Sensitivity

Viewer sensitivity was evaluated as described in Section 6.2.

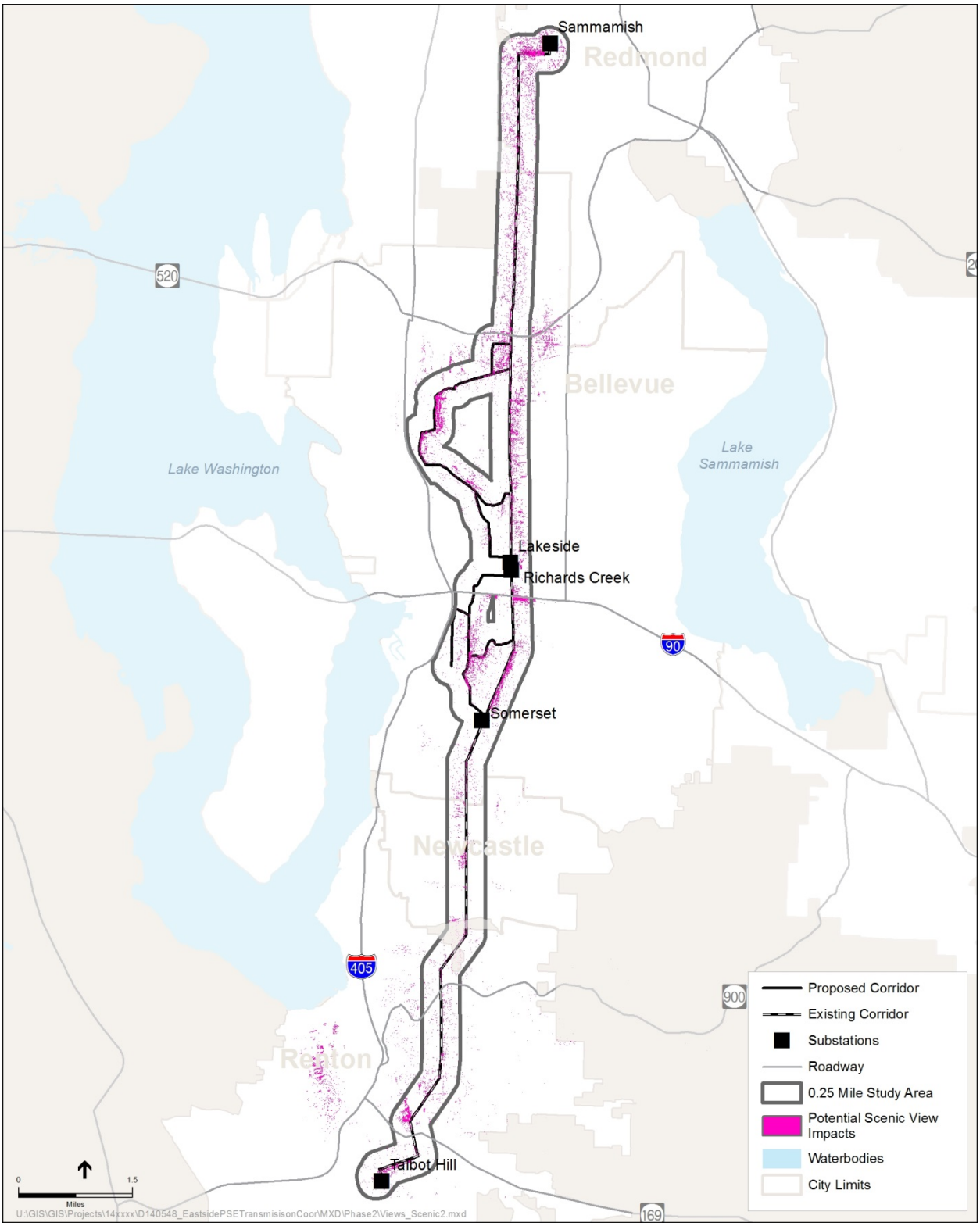

Figure C-6. Potential Areas Where Scenic Views May Be Impacted

8. THRESHOLD OF SIGNIFICANCE

The value of scenic views and the aesthetic environment is subjective, making it difficult to quantify or estimate impacts. There is no widely accepted definition of significant visual effects because the significance of an activity varies with the setting and viewer preferences. For this project, significance was determined based on criteria similar to those described in *The State Clean Energy Program Guide: A Visual Impact Assessment Process for Wind Energy Projects* (Vissering et al., 2011). These criteria, while not developed for transmission lines, were used for wind turbines, which can be similar in height and scale to utility poles and are widely studied for visual impacts. This guide suggests that the following criteria be considered when determining if a project would result in undue or unreasonable visual impacts: violation of aesthetic standards, dominance of the project in views from highly sensitive viewing areas, and failure to take reasonable mitigation measures (Vissering et al., 2011).

A review of policies and regulations applicable to the study area revealed that the existing regulatory framework was insufficient for determining significance because no clear written standards are included for impacts to scenic views or the aesthetic environment.

To develop a threshold for significance that reflects the policies of the Partner Cities, the EIS Consultant Team held a workshop in August 2016 with staff from the Partner Cities that would potentially experience scenic view or aesthetic impacts (Redmond, Bellevue, Newcastle, and Renton). The purpose of the workshop was to collaboratively define significance thresholds based on policies, past precedent, and practice within the Partner City jurisdictions.

During the workshop, city staff were provided with the following:

- A map showing where scenic views would be impacted along the entire corridor.
- Visual simulations showing key examples of how the project could change the aesthetic environment.
- A handout with each city's applicable policies and regulations.

The EIS Consultant Team walked through examples for each segment/option, and the group as a whole refined a set of significance criteria. The following significance criteria were adopted for the EIS evaluation and incorporate findings from the Partner Cities workshop:

Less-than-Significant:

- **Aesthetic environment -** The degree of contrast between the project and the existing aesthetic environment would be minimal, or viewer sensitivity is low.
- **Scenic views -** The area with impacted scenic views would not include a substantial number of sensitive viewers, including residential viewers, viewers from parks and trails, or viewers from outdoor recreation facilities; or the degree of additional obstruction of views compared to existing conditions would be minimal.

Significant:

- **Aesthetic environment -** The degree of contrast between the project and the existing aesthetic environment would be substantial and viewer sensitivity is high.
- **Scenic views -** The area with scenic views impacted includes a substantial number of sensitive viewers, including residential viewers, viewers from parks and trails, or viewers from outdoor recreation facilities; and the degree of additional obstruction of views compared to existing conditions would be substantial.

It was agreed that significant impacts should be assigned on a sub-option level.

9. SUMMARY OF PLANNING POLICIES AND CODE REQUIREMENTS

Table C-9. Planning Policies and Code Requirements

Plans	Protected Views and Visual Resources	Guidance for Reducing Visual Impacts
King County		
Eastside Rail Corridor Master Plan 2016	In some cases, bridges may also be locations for viewpoints.	N/A
	Existing landscape that does not need to be removed for trail construction will be evaluated to determine if it is consistent with public use, including aesthetics and overall trail design.	N/A
Redmond		
Vision 2030 City of Redmond Comprehensive Plan	Views of Mount Rainier, the Cascade Mountains, and Lake Sammamish.	N/A
	Unique public views that provide a sense of place	N/A
	Scenic, public view corridors toward the Cascades and the Sammamish Valley (Plan Policy NR-10).	N/A
	Views of surrounding hillsides, mountains, and tree line	N/A
	Tree stands and views from the valley (Plan Policy N-SV-4)	N/A
	Woodland views from neighborhood residences	N/A
	N/A	Throughout the plan, landscaping is encouraged to provide aesthetic value, unify site design, and soften or disguise “less aesthetically pleasing features of a site” (Policy CC-23). The Plan requires “reasonable screening or

Plans	Protected Views and Visual Resources	Guidance for Reducing Visual Impacts
		architecturally compatible design of above ground utility facilities, such as transformers and associated vaults" (Policy UT-15). It suggests promoting well-designed utility facilities through use of color, varied and interesting materials, art work, and superior landscape design.
Redmond Zoning Code (RZC) *Current through June 16, 2015*	Appearance of Public Ways	Underground electrical facilities if economically-feasible (RZC 21.17).
	Public view corridors and gateways should be protected (RZC 21.42)	N/A
Bellevue		
Bellevue Comprehensive Plan 2015	Urban design that exemplifies a "City in a Park" with tree-lined streets, public art, vast parks, natural areas, wooded neighborhoods, two large lakes, and mountain views.	N/A
	Views of water, mountains, and skylines from public places (Plan Policy UD-62).	Link increased intensity of development with increased view preservation (Plan Policy UD-48).
	N/A	Implement new and expanded transmission and substation facilities in such a manner that they are compatible and consistent with the local context and the land use pattern established in the Comprehensive Plan (Plan Policy UT-95).
	N/A	Conduct a siting analysis for new facilities and expanded facilities at sensitive sites (areas in close proximity to residentially-zoned districts) (Plan Policy UT-96).
	N/A	States preference for use of new technology to reduce visual impacts.
	Green belts and open spaces per Parks and Open Space System Plan.	Avoid locating overhead lines in greenbelts or open spaces (Plan Policy UT-69).
	Distinctive neighborhood character within Bellevue's diverse neighborhoods (Plan Policy N-9).	Design, construct, and maintain facilities to minimize their impact on surrounding neighborhoods (Plan Policy UT-8).

Plans	Protected Views and Visual Resources	Guidance for Reducing Visual Impacts
	Design boulevards adjacent to parks, natural areas and open spaces to reflect scenic elements of the surrounding areas and neighborhoods. Streetscape design should promote a safe and comfortable park-like experience for all users (Plan Policy UD-70). This includes: • Bel-Red Road • Lake Hills Connector • Richards Road • Factoria Blvd SE • Coal Creek Parkway • SE Newport Way	N/A
Bridle Trails Subarea Plan 2015	Wooded, natural, rural, and equestrian character of the Subarea (Plan Policy S-BT-3).	N/A
	N/A	Encourage retention of vegetation on the lower slopes of the bluff adjacent to SR 520 at approximately 136th Avenue NE to provide a visual separator between residential areas and the freeway (Plan Policy S-BT-42).
	Roadsides in Bridle Trails Subarea.	Improve roadsides to create a unified visual appearance (Plan Policy S-BT-43).
Bel-Red Subarea Plan 2015	Bel-Red Subarea street environment (Plan Policy S-BR-25; S-BR-39; S-BR-59).	N/A
	Bel-Red Subarea parks and open space system (Plan Policy S-BR-35).	N/A
Wilburton/NE 8th St Subarea Plan 2015	N/A	Utilities should be provided to serve the present and future needs of the Subarea in a way that enhances the visual quality of the community (where practical) (Plan Policy S-WI-44)
	Significant views from park lands (Plan Policy S-WI-11)	N/A

Plans	Protected Views and Visual Resources	Guidance for Reducing Visual Impacts
	Views of prominent landforms, vegetation, watersheds, drainage ways, Downtown and significant panoramas in the Subarea (Plan Policy S-WI-40). Key views include: • West from NE 8th Street and NE 5th Street on the ridge between 122nd and 123rd Avenue, • South from the Lake Hills Connector north of SE 8th Street, and • From SE 1st Street and Main Street at the power line right-of-way at 136th Avenue.	N/A
Southeast Bellevue Subarea Plan 2015	Existing residential character (Plan Policy S-SE-2)	N/A
Richards Valley Subarea Plan 2015	Views from Woodridge Hill and the wooded areas and wetlands in the valley.	
	Retain the remaining wetlands within the 100-year floodplain along Richards Creek and Kelsey Creek for the aesthetic value and character of the community (Plan Policy S-RV-5).	Develop sites in accordance with Sensitive Areas Regulations (Plan Policy S-RV-12).
	N/A	Use common corridors for new utilities if needed (Plan Policy S-RV-20).
	N/A	New development, should install a dense visual vegetative screen along Richards Road (Plan Policy S-RV-31).
	Eastgate I-90 Corridor	Encourage site design that includes visibly recognizable natural features such as green walls, façade treatments, green roofs, and abundant natural landscaping (Plan Policy S-RV-24).

Plans	Protected Views and Visual Resources	Guidance for Reducing Visual Impacts
	Streets and arterials	Disturb as little of the natural character as possible when improving streets and arterials (Plan Policy S-RV-26).
	Green and wooded character of the Richards Road corridor (Plan Policy S-RV-30).	N/A
Eastgate Subarea Plan 2015	View amenities of adjacent single-family neighborhoods (Plan Policy S-EG-22).	N/A
	N/A	Discourage new development from blocking existing views from public spaces (Plan Policy S-EG-23).
Factoria Subarea Plan 2015	Natural setting for residential areas	N/A
	Cohesiveness and compatibility of commercial districts	Manage change in the commercial district
	N/A	Protect single family neighborhoods from encroachment by more intense uses (Plan Policy S-FA-2).
	Pathways and access points with views of Sunset Creek, Richards Creek, Coal Creek, (Plan Policy S-FA-18).	N/A
	Visual connections along Factoria Boulevard (Plan Policy S-FA-32).	N/A
	N/A	Minimize disruptive effects of utility construction on property owners, motorists, and pedestrians (Plan Policy S-FA-35).
Newport Hills Subarea Plan 2015	Emphasize as a distinct visual element the preservation of existing trees on protected slopes and hilltops (Plan Policy S-NH-44).	Use these trees to screen incompatible land uses.
	N/A	Make edges between different land uses distinct without interfering with security or visual access (Plan Policy S-NH-48).
	Existing visual features such as trees and hilltops, views of water, and passive open	N/A

Plans	Protected Views and Visual Resources	Guidance for Reducing Visual Impacts
	space (Plan Policy S-NH-54).	
Bellevue City Code *Current through August 3, 2015*	N/A	Electrical utility facilities shall be sight-screened through landscaping and fencing (BCC 20.20.255.F).
City of Bellevue Draft SMP 2013	Shoreline	New or expanded utility systems and facilities shall be designed and aligned to minimize impacts to natural systems and features and shall minimize topographic modification.
		New or expanded utility systems and facilities shall be co-located underground and within existing or planned improved rights-of-way, driveways, and/or utility corridors whenever possible.
		Where the visual quality of the shoreline or surrounding neighborhood will be negatively impacted, new or expanded utility systems and facilities shall incorporate screening and landscaping sufficient to maintain the shoreline aesthetic quality and shall provide screening of facilities from the lake and adjacent properties in a manner that is compatible with the surrounding environment.
		New or expanded utilities shall incorporate shoreline public access, consistent with the requirement contained in LUC 20.25E.060.I, (Public Access). When allowed, utility facilities located above ground shall be: (1) Housed in a building that incorporates design features that are compatible with the character of the surrounding neighborhood or area, unless housing the facility in a structure would fundamentally interfere with the maintenance and operation of the facility. (2) Sight-screened, if the facility does not conform with the standards in paragraph E.3.b.ix.(1) of this section, with evergreen trees, shrubs, and other native landscaping

Plans	Protected Views and Visual Resources	Guidance for Reducing Visual Impacts
		materials planted in sufficient depth to form an effective sight barrier within five (5) years.
Newcastle		
City of Newcastle 2035 Comprehensive Plan	Existing character, scale, and neighborhood quality (Plan Policy LU-G3).	N/A
	Open space, wildlife habitats, recreational areas, trails, connection of critical areas, natural and scenic resources, as well as shoreline areas (Plan Policy LU-G6).	N/A
	Natural features that contribute to the City's scenic beauty (Plan Policy LU-G8).	N/A
	N/A	The City shall require that the undergrounding of new utility distribution lines, with the exception of high voltage electrical transmission lines (Plan Policy UT-P1).
	N/A	The City shall require the undergrounding of existing utility distribution lines where physically feasible as streets are widened and/or areas are redeveloped based on coordination with local utilities (Plan Policy UT-P2).
	N/A	The City shall promote collocation of major utility transmission facilities such as high voltage electrical transmission lines and water and natural gas trunk pipe lines within shared utility corridors, to minimize the amount of land allocated for this purpose and the tendency of such corridors to divide neighborhoods (Plan Policy UT-P3).
	N/A	The City shall encourage utility providers to limit disturbance to vegetation within major utility transmission corridors to what is necessary for the safety and maintenance of transmission facilities (Plan Policy UT-P8).
	N/A	The City should encourage utility providers to exercise restraint and sensitivity to neighborhood character in planting appropriate varieties and trimming tree limbs around aerial lines (Plan Policy UT-P9).

Plans	Protected Views and Visual Resources	Guidance for Reducing Visual Impacts
	N/A	The City should require utility providers to design and construct overhead transmission lines in a manner that is environmentally sensitive, safe, and aesthetically compatible with surrounding land uses (Plan Policy UT-P10).
	N/A	The City should require utility providers to minimize visual and other impacts of transmission towers and overhead transmission lines on adjacent land uses through careful siting and design (Plan Policy UT-P14).
	N/A	The City should require new, modified, or replacement transmission structures (such as lattice towers, monopoles, and the like) to be designed to minimize aesthetic impacts appropriate to the immediate surrounding area whenever practical (Plan Policy UT-P16).
	N/A	The City shall, where appropriate, require reasonable landscape screening of site-specific above-ground utility facilities in order to diminish visual impacts (Plan Policy UT-P20).
Renton		
City of Renton Comprehensive Plan (2015)	High volume of trees and clear mountain views.	N/A
	Public scenic views and public view corridors, such as “physical, visual, and perceptual linkages to Lake Washington and Cedar River” (Plan Policy L-55).	N/A
	Natural forms, vegetation, distinctive stands of trees, natural slops, and scenic areas that “contribute to the City’s identity, preserve property values, and visually define the	N/A

Plans	Protected Views and Visual Resources	Guidance for Reducing Visual Impacts
	community neighborhoods" (Plan Policy L-56).	
	Lakes and shorelines.	N/A
	Views of the water from public property or views enjoyed by a substantial number of residences.	N/A
	N/A	Design shoreline developments to maintain or enhance aesthetic values and scenic views (Plan Policy SH-16).
	N/A	Make facility improvements and additions within existing corridors wherever possible (Plan Policy U-73).
City of Renton Municipal Code (RMC) *Current through November 16, 2015*	Shoreline	Design shoreline use and development to maintain shoreline scenic and aesthetic qualities derived from natural features, such as shore forms and vegetative cover (RMC 4-3-090.D.3.a).
		Prohibits utilities in the Shoreline Natural shoreline environment designation (RMC 4-3-090.E.1).
	N/A	Visual prominence of structures must be minimized, including light, glare, and reflected light (RMC 4-3-090.D.3.b.vii).
	N/A	Aboveground utilities must be screened with masonry, decorative panels, and/or evergreen trees, shrubs, and landscaping sufficient to form an effective sight barrier within a period of five (5) years (RMC 4-6-090.11.a.xvi).
City of Renton SMP 2011	Scenic and aesthetic qualities derived from natural features of the shoreline, such as vegetative cover and shore forms (Ordinance No. 5633).	N/A

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