

CHAPTER 4. SHORT-TERM (CONSTRUCTION) IMPACTS AND POTENTIAL MITIGATION

This chapter describes short-term (construction) impacts that could result from construction of Alternative 1. Under the No Action Alternative, no construction would occur; therefore, the No Action Alternative is not evaluated below. For the purposes of this Phase 2 Draft EIS, impacts associated with routine maintenance of the existing transmission lines (e.g., occasional replacement or repair of poles, wires, and related equipment) are assessed as part of Chapter 3, *Long-Term (Operation) Impacts and Potential Mitigation*.



4.1 LAND USE AND HOUSING

4.1.1 Short-term (Construction) Impacts Considered

The magnitude of project-related impacts to land use and housing is classified as being less-than-significant, or significant as follows:

- **Less-than-Significant** – Construction activities are disruptive (e.g., noise and dust are generated) but not to the extent that current use of the property is altered and is for a duration that would not infringe on the use or access of the parcel or housing structures thereupon.
- **Significant** – Construction activities are disruptive and/or continue for an interval long enough to infringe on the current use of the parcels in the study area by causing a nuisance (e.g., noise, dust, etc.) that changes the use of the land or by impeding access to the parcels or housing structures thereupon.

4.1.2 Short-term (Construction) Impacts: Alternative 1 (New Substation and 230 kV Transmission Lines)

Construction of the project would entail the installation of poles and stringing of conductor wires. According to PSE, pole installation requires 3–7 days each (within a 2-month work window), no significant excavation is required, access to adjacent land uses would be maintained, and installation would not create significant noise. Any nuisance caused by the construction activities of Alternative 1 would be less-than-significant.



4.2 SCENIC VIEWS AND THE AESTHETIC ENVIRONMENT

4.2.1 Short-term (Construction) Impacts Considered

The Phase 1 Draft EIS described the types of project-related construction impacts that could affect the visual environment of the study area. Common construction-related impacts include clearing and grading or general construction activities (e.g., the presence of construction workers, vehicles, or equipment). Impacts would likely result from the creation of short-term, construction access roads; temporary vegetation clearing to facilitate construction; or the increased presence of construction vehicles, equipment, materials, and personnel, as well as the potential for increased light and glare associated with construction site lighting.

Project-related impacts to scenic views and the aesthetic environment are classified as being less-than-significant or significant as follows:

Less-than-Significant:

- **Aesthetic environment** - The degree of contrast created by construction activities (e.g., temporary access roads, temporary vegetation clearing, construction equipment, light and glare) would not be more intense in scale and duration than typical construction activities associated with linear projects, or viewer sensitivity would be low.
- **Scenic views** - The area with impacted scenic views would not include a substantial number of sensitive viewers; the degree of additional obstruction of views compared to existing conditions would be minimal; or the degree of scenic view blockage would be of short duration (1-3 years).

Significant:

- **Aesthetic environment** - The degree of contrast created by construction activities (e.g., temporary access roads, temporary vegetation clearing, construction equipment, light and glare) would be substantially more intense in scale and duration than typical construction activities associated with linear projects, and viewer sensitivity would be high.
- **Scenic views** - The area with scenic views impacted includes a substantial number of sensitive viewers, defined as residential viewers, viewers from parks and trails, or viewers from outdoor recreation facilities; the degree of additional obstruction of views compared to existing conditions would be substantial; and the degree of scenic view blockage would be of long duration (more than 3 years).

4.2.2 Short-term (Construction) Impacts: Alternative 1 (New Substation and 230 kV Transmission Lines)

During the Phase 1 Draft EIS evaluation, the EIS Consultant Team determined that construction impacts to the aesthetic environment and scenic views, due to their temporary nature, would be less-than-significant. Areas cleared for temporary construction activities (including construction access roads) would be replanted post construction; the presence of construction vehicles, equipment, materials, and personnel would end; and increased light and glare would terminate after construction. No further evaluation of construction (short-term) impacts to scenic views and the aesthetic environment was conducted for this Phase 2 Draft EIS.



4.3 WATER RESOURCES

4.3.1 Short-term (Construction) Impacts Considered

The project has the potential to cause minor impacts to water resources, in particular water quality, due to construction site runoff, dewatering discharge, accidental spills, temporary vegetation clearing, and operation of heavy equipment. The scale and proximity of construction activities to water resources determined the intensity of potential impacts. The analysis considered the cumulative impacts and potential mitigation measures to minimize or eliminate project impacts to water resources. For this analysis, the magnitude of project-related impacts is classified as being less-than-significant, or significant as follows:

- **Less-than-Significant** – Impacts to water resources would be considered less-than-significant if project activities would cause temporary or minor permanent alterations to or disturbance of water resources; impacts can be fully mitigated, according to permit requirements; or impacts are largely avoided by the implementation of BMPs.
- **Significant** – Impacts would be considered significant if project activities would cause the permanent or net loss of wetland or buffer acreage or impairment of functions that cannot be fully mitigated; would be in noncompliance with applicable water quality standards; or would cause groundwater contamination that cannot be avoided by construction BMPs.

Methods for Analyzing Short-term Impacts

The EIS Team used the same mapping methods used for long-term (operation) impacts to determine the short-term (construction) impacts. Impacts were also assessed based on project construction methods, the scale of construction activities, and proximity of these activities to water resources. The impact analysis considered the extent of vegetation clearing, construction grading, and other project actions.

4.3.2 Short-term (Construction) Impacts: Alternative 1 (New Substation and 230 kV Transmission Lines)

4.3.2.1 Richards Creek Substation

Construction of the Richard Creek substation facilities would require clearing and grading of approximately 2 acres. Clearing would expose bare soils and stormwater runoff from these areas could cause increased sedimentation and turbidity to Wetland BC and streams near the site if erosion from cleared areas is not controlled. Compliance with applicable permits and implementation of BMPs would control surface water runoff and erosion. Therefore, impacts would be less-than-significant.

The Richards Creek substation would not be in a wetland or require wetland fill, but portions of the substation, including the access road, would be in the Wetland BC buffer. Any impacts to the buffer would be mitigated in compliance with City of Bellevue requirements (Bellevue City Code 20.25H). See Section 3.3.5.2 for more discussion of wetland buffer impacts. The access road would cross Stream C, and constructing the road crossing could increase erosion and sedimentation to the stream. Compliance with City of Bellevue performance standards (LUC 20.25H.100) and implementation of BMPs would minimize impacts.

To avoid the wetland, the site would be excavated into the slope on the east side. This would require approximately 26,500 cubic yards of cut and 8,000 cubic yards of fill. A soldier pile retaining wall

would be installed. Excavation could encounter shallow groundwater and require dewatering as described in Section 4.3.2.2. Pump tests would be determined prior to construction to determine potential drawdown and appropriate mitigation. Most of the other substation facilities would be placed on concrete pads, requiring limited excavation. Therefore, no impacts to groundwater are anticipated.

The large area of clearing could reduce shading of the wetland, its buffer, and the stream segments located off-site. These water resources are already in degraded condition, and the clearing would cause little additional impact. Replanting of areas following construction and buffer enhancement would be required and make these impacts temporary and less-than-significant.

Table 4.3-1 describes construction impacts to water resources in the study area by segment. Because the impacts are similar for all segments, the table refers to Section 4.3.2.2.

4.3.2.2 Short-term (Construction) Impacts Common to All Segments

Construction impacts to water resources would primarily be associated with installing transmission poles, access roads, and staging areas. Construction of the new transmission line and poles would have similar impacts for all segments and could potentially cause temporary water quality impacts to nearby water bodies. Impacts would be temporary and minor with the implementation of BMPs and therefore less-than-significant.

Installation of the transmission poles would require excavation for pole foundations. Excavations would be 4 to 8 feet in diameter and could extend 25 to 50 feet deep. Poles in the existing corridor would be replaced in approximately the same location as existing poles, minimizing the amount of additional clearing and disturbance required. Existing poles would be removed and disposed of at an approved landfill. Some of the options are along a new corridor, and installing the transmission line would require disturbance of more streams, wetlands, and buffers than in the existing corridor. PSE would utilize existing roads for access and existing developed areas for staging to the extent possible, but it is likely that some new roads and staging areas would be required.

The preliminary design indicates that some of the poles would be in wetlands or buffers, although PSE would try to avoid this whenever feasible. Where unavoidable, installing poles in wetlands could require fill or disturbance of the wetland, which could potentially cause a loss of wetland acreage and/or function. Impacts to the acreage and function of wetlands and buffers are described as long-term impacts in Section 3.3.3.

Construction would require clearing of trees and vegetation within the clear zone (in the managed right-of-way), which could negatively affect the function of wetlands and buffers and reduce stream riparian vegetation. Clearing would also expose bare soil and potentially increase erosion and sedimentation during construction. Implementation of BMPs and sediment and erosion control plans would reduce potential impacts. Disturbed areas would be replanted and stabilized following construction to prevent future erosion. (See Section 3.4 regarding replacement vegetation.) Therefore, these impacts would be temporary and less-than-significant.

Installation of poles in wetlands or buffers would require the clearing of vegetation and excavation, which would disturb soils and could cause minor, temporary increases of erosion and sedimentation. Construction vehicles could compact soils and damage wetlands or buffers. PSE would implement BMPs and provide mitigation in compliance with applicable critical areas regulations, including mitigation requirements described in Appendix D. Specialized equipment, such as tracked vehicles,

would be used to minimize the extent of wetland disturbance. Implementation of BMPs and compliance with these requirements would result in less-than-significant impacts to wetlands and buffers.

No poles would be placed in stream beds, but the transmission line would cross streams in several locations, as described in Table 4.3-1. These crossings would consist of overhead transmission wires, which would not impact the stream directly. Restringing the wires would not require construction equipment or activities in the stream, so no impacts would occur. Construction would not require diversion or dewatering of any streams. For these reasons, impacts to streams would be less-than-significant.

The presence of construction vehicles and equipment in the vicinity of streams and wetlands could result in accidental spills of fuel, oil, hydraulic fluid, and other chemicals. These fluids could reach wetlands, streams, or groundwater if spills are not controlled. Construction contractors would be required to develop spill prevention plans prior to issuance of the clearing and grading permit, that would be implemented to minimize impacts, so these impacts would be less-than-significant.

Construction for pole installation would also require excavation up to 50 feet, which could encounter shallow groundwater. This could require dewatering to remove groundwater that seeps into excavation areas. The uncontrolled release of dewatering water could contaminate surface waters. Use of sediment tanks to settle soil particles and potentially filter or treat water pumped from the excavations would prevent contamination. Because the area of excavation for each pole would be limited to approximately 8 feet in diameter, any dewatering would be minimal and impacts would be less-than-significant.

Excavation also has the potential to change or interfere with the flow patterns of shallow groundwater, and dewatering could cause drawdown of groundwater levels. However, the limited extent of the excavations would not impact groundwater flows or levels. Pump tests would be conducted prior to construction to determine the potential for drawdown and settlement, and appropriate mitigation measures would be developed to minimize impacts.

PSE will establish staging sites to store equipment and materials. Generally, PSE will use already developed areas for staging, minimizing the need to clear new areas, but some new areas will likely be required. Clearing of these areas could increase erosion and sedimentation to adjacent water resources, but implementation of BMPs would minimize impacts. New staging areas would be restored following construction, so impacts would be temporary and less-than-significant.

4.3.2.3 Short-term (Construction) Impacts by Segment

Table 4.3-1 summarizes the short-term (construction) impacts for the Richards Creek substation and transmission line segments and options.

Table 4.3-1. Impacts to Water Resources in the Study Area by Segment

Location/Segment	Short-term Effect	Impact
Richards Creek Substation		
Sedimentation and turbidity	Increased sedimentation and turbidity could occur in the wetlands and stream reaches near the site if erosion from cleared areas is not controlled. Implementation of BMPs and compliance with City of Bellevue stormwater and clearing and grading regulations (LUC 24.06 and LUC 23.76) would minimize potential impacts.	Less-than-Significant
Impacts to wetlands and streams	No construction would occur in Wetland BC, but would occur within its wetland buffer. Construction in the buffer could increase erosion and sedimentation in Wetland BC. Construction of the access road crossing of Stream C could increase erosion and sedimentation to the stream. Compliance with City of Bellevue performance standards (LUC 20.25H.100) and implementation of BMPs would minimize impacts.	Less-than-Significant
Contamination from accidental spills or leaks	Oil, fuel, and other chemicals could inadvertently spill or leak from construction equipment and contaminate surface and groundwater. Implementation of spill prevention plans would minimize impacts.	Less-than-Significant
Contamination from dewatering	Excavation to install most substation facilities would be shallow and would not encounter groundwater. Installation of poles could encounter groundwater and require dewatering. No contamination from dewatering is anticipated because the dewatering would be minimal.	Less-than-Significant
Impacts to groundwater flow or water levels	Excavation to construct the substation would be shallow and would not impact groundwater flows or levels. Installation of poles could encounter groundwater, but the limited extent of excavation would not impact groundwater flows or levels.	Less-than-Significant
Reduced groundwater infiltration	Heavy construction equipment could compact soils and reduce the rate of surface water infiltration and groundwater recharge. Limiting the area of construction impact would minimize compaction.	Less-than-Significant

Location/Segment	Short-term Effect	Impact
Redmond Segment		
<p>Sediment and turbidity</p> <p>Contamination from accidental spills and leaks</p> <p>Contamination from dewatering</p> <p>Impacts to groundwater flows or water levels</p> <p>Reduced groundwater infiltration</p>	<p>See Section 4.3.2.2, <i>Impacts Common to All Segments</i></p>	<p>Less-than-Significant</p>
<p>Impacts to streams and wetlands</p>	<p>Replacement poles would be located in approximately the same location as they are currently. Approximately four poles would be located in wetlands and approximately seven poles would be located in buffers. Impacts from installing new poles and removing old poles from stream and wetland buffers would be less-than-significant.</p>	<p>Less-than-Significant</p>
<p>Number of stream crossings</p>	<p>The transmission line would cross one stream and the buffers of two others. Stringing the wires across the stream would not cause impacts because no construction activities would occur in the stream.</p>	<p>Less-than-Significant</p>
Bellevue North Segment		
<p>Sediment and turbidity</p> <p>Contamination from accidental spills and leaks</p> <p>Contamination from dewatering</p> <p>Impacts to groundwater flows or water levels</p> <p>Reduced groundwater infiltration</p>	<p>See Section 4.3.2.2, <i>Impacts Common to All Segments</i>.</p>	<p>Less-than-Significant</p>
<p>Impacts to streams and wetlands</p>	<p>No transmission poles would be located in streams, wetlands, or buffers, so no impacts would occur.</p>	<p>No Impact</p>
<p>Number of stream crossings</p>	<p>The transmission line would cross three streams in the existing corridor. No new clearing would be required. Stringing the wires across the streams would not cause impacts because no construction activities would occur in the streams.</p>	<p>Less-than-Significant</p>

Location/Segment	Short-term Effect	Impact
Bellevue Central Segment, Existing Corridor Option		
Sediment and turbidity Contamination from accidental spills and leaks Contamination from dewatering Impacts to groundwater flows or water levels Reduced groundwater infiltration	See Section 4.3.2.2, <i>Impacts Common to All Segments</i>	Less-than-Significant
Impacts to streams and wetlands	No transmission poles would be located in streams, wetlands, or buffers, so no impacts would occur.	None
Number of stream crossings	The transmission line would cross three streams in this option in the existing corridor. No new clearing would be required. Stringing the wires across the streams would not cause impacts because no construction activities would occur in the streams.	Less-than-Significant
Bellevue Central Segment, Bypass Option 1		
Sediment and turbidity Contamination from accidental spills and leaks Contamination from dewatering Impacts to groundwater flows or water levels Reduced groundwater infiltration	See Section 4.3.2.2, <i>Impacts Common to All Segments</i> .	Less-than-Significant
Impacts to streams and wetlands	Two poles would be in wetlands and three in stream buffers in this option. Impacts from installing new poles and removing old poles from stream and wetland buffers would be less-than-significant.	Less-than-Significant
Number of stream crossings	The corridor would cross nine streams. Stringing the wires across the streams would not cause impacts because no construction activities would occur in the streams. The new stream crossings would be cleared, potentially impacting streams. Impacts would be less-than significant because mitigation would minimize impacts.	Less-than-Significant

Location/Segment	Short-term Effect	Impact
Bellevue Central Segment, Bypass Option 2		
Sediment and turbidity Contamination from accidental spills and leaks Contamination from dewatering Impacts to groundwater flows or water levels Reduced groundwater infiltration	See Section 4.3.2.2, <i>Impacts Common to All Segments</i> .	Less-than-Significant
Impacts to streams and wetlands	Six poles are proposed in wetlands and three in stream buffers, some in the new corridor. Impacts from installing new poles and removing old poles from stream and wetland buffers would be less-than-significant.	Less-than-Significant
Number of stream crossings	The corridor would cross six streams. Stringing the wires across the streams would not cause impacts because no construction activities would occur in the streams. The new stream crossings would be cleared, potentially impacting streams. Impacts would be less-than-significant because mitigation would minimize impacts.	Less-than-Significant
Bellevue South Segment, Oak 1 Option		
Sediment and turbidity Contamination from accidental spills and leaks Contamination from dewatering Impacts to groundwater flows or water levels Reduced groundwater infiltration	See Section 4.3.2.2, <i>Impacts Common to All Segments</i> .	Less-than-Significant
Impacts to streams and wetlands	No transmission poles would be in streams, wetlands, or buffers, so no impacts would occur.	No Impacts

Location/Segment	Short-term Effect	Impact
Number of stream crossings	The corridor would cross 12 streams. The route parallels Coal Creek and would likely require crossings and buffer clearing. Stringing the wires across the streams would not cause impacts because no construction activities would occur in the streams. The new stream crossings would be cleared, potentially impacting streams. Impacts would be less-than significant because mitigation would minimize impacts.	Less-than-Significant
Bellevue South Segment, Oak 2 Option		
Sediment and turbidity Contamination from accidental spills and leaks Contamination from dewatering Impacts to groundwater flows or water levels Reduced groundwater infiltration	See Section 4.3.2.2, <i>Impacts Common to All Segments</i> .	Less-than-Significant
Impacts to streams and wetlands	Impacts would be the same as Oak 1.	Less-than-Significant
Number of stream crossings	The corridor would cross 15 streams. The route parallels Coal Creek and would likely require crossings and buffer clearing. Stringing the wires across the streams would not cause impacts because no construction activities would occur in the streams. The new stream crossings would be cleared, potentially impacting streams. Impacts would be less-than-significant because mitigation would minimize impacts.	Less-than-Significant
Bellevue South Segment, Willow 1 Option		
Sediment and turbidity Contamination from accidental spills and leaks Contamination from dewatering Impacts to groundwater flows or water levels Reduced groundwater infiltration	See Section 4.3.2.2, <i>Impacts Common to All Segments</i> .	Less-than-Significant

Location/Segment	Short-term Effect	Impact
Impacts to streams and wetlands	Two poles are proposed in wetlands (these would replace two existing poles) and one is proposed in a stream buffer. Three poles are proposed in buffers compared to seven existing. Impacts from installing new poles and removing old poles from stream and wetland buffers would be less-than-significant.	Less-than-Significant
Number of stream crossings	The corridor would cross seven streams, which is the same as existing conditions. No new clearing would be required. Restraining the wires across the stream would not cause impacts because no construction activities would occur in the stream. No new impacts would occur from stream crossings.	Less-than-Significant
Bellevue South Segment, Willow 2 Option		
Sediment and turbidity Contamination from accidental spills and leaks Contamination from dewatering Impacts to groundwater flows or water levels Reduced groundwater infiltration	See Section 4.3.2.2, <i>Impacts Common to All Components</i> .	Less-than-Significant
Impacts to streams and wetlands	Impacts would be the same as Willow 1.	Less-than-Significant
Number of stream crossings	The corridor would cross nine streams, which is the same as existing conditions. No new clearing would be required. Stringing the wires across the streams would not cause impacts because no construction activities would occur in the streams.	Less-than-Significant
Newcastle Segment		
Sediment and turbidity Contamination from accidental spills and leaks Contamination from dewatering Impacts to groundwater flows or water levels Reduced groundwater infiltration	See Section 4.3.2.2, <i>Impacts Common to All Components</i> .	Less-than-Significant
Impacts to streams and wetlands	No poles are proposed in wetlands, streams, or buffers, so no impacts would occur.	None

Location/Segment	Short-term Effect	Impact
Number of stream crossings	The corridor would cross two streams, which is the same as existing conditions. No new clearing would be required. Stringing the wires across the streams would not cause impacts because no construction activities would occur in the streams.	Less-than-Significant
Renton Segment		
Sediment and turbidity Contamination from accidental spills and leaks Contamination from dewatering Impacts to groundwater flows or water levels Reduced groundwater infiltration	See Section 4.3.2.2, <i>Impacts Common to All Components</i> .	Less-than-Significant
Impacts to groundwater	Portions of the segment are within Zone 2 of Renton's Wellhead Protection Area. Compliance with the city's construction standards would minimize impacts to groundwater.	Less-than-Significant
Impacts to streams and wetlands	One pole is proposed in a wetland buffer. Impacts from installing a pole in a wetland buffer would be less-than-significant.	No Impacts
Number of stream crossings	The corridor would cross four streams, which is the same as existing conditions. No new clearing would be required. Stringing the wires across the streams would not cause impacts because no construction activities would occur in the streams. No poles would be placed in the shoreline jurisdiction of the Cedar River.	Less-than-Significant

4.3.3 Mitigation Measures

The following construction-specific mitigation measures would be required or could be imposed to reduce construction impacts to water resources. Construction-specific mitigation measures were identified based on a review of regulations and standard construction BMPs, both of which would be required. Therefore, no potential mitigation measures are proposed to reduce construction-related impacts to water resources. However, some of the required and potential mitigation measures discussed in Section 3.3.6, such as compliance with critical areas ordinances, also have the potential to mitigate construction-related impacts.

4.3.3.1 Regulatory Requirements

All of the segments and options would need to comply with applicable federal, state, and local permit requirements for stormwater, streams, wetlands, and critical areas, and Shorelines of the State.

Compliance with these requirements would mitigate the potential for short-term adverse impacts to water resources. Mitigation measures required to comply with such regulations are not appealable.

Prior to Construction

- Apply for all necessary permits (BMPs specific to the site and project would be specified in the construction contract documents that the construction contractor would be required to implement).

During Construction

- Comply with code provisions for the protection of water resources from clearing and grading activities.
- Comply with all necessary permits:
 - National Pollutant Discharge Elimination System general permit for construction (issued by Ecology),
 - Hydraulic Project Approval (issued by WDFW), and
 - Construction Stormwater General Permit.
- Implement the Stormwater Pollution Prevention Plan and Temporary Erosion and Sediment Control Plan to mitigate potential increased sedimentation and turbidity from stormwater runoff. These plans will include BMPs to ensure that sediment originating from disturbed soils would be retained, with the limits of disturbance such as the following:
 - Temporary covering of exposed soils and stockpiled materials.
 - Silt fencing, catch basin filters, interceptor swales, or hay bales.
 - Temporary sedimentation ponds or sediment traps.
 - Installation of a rock construction entrance and street sweeping.
- Implement a Spill Prevention, Control, and Countermeasures Plan to minimize the potential for spills or leaks of hazardous materials. BMPs in the Spill Prevention, Control, and Countermeasures Plan would include the following:
 - Operating procedures to prevent spills.
 - Control measures such as secondary containment to prevent spills from entering nearby surface waters.
 - Countermeasures to contain, clean up, and mitigate the effects of a spill.
 - Construction vehicle storage and maintenance and fueling of construction equipment will be located away from streams and wetlands.
- Comply with a dewatering plan to monitor groundwater withdrawal during excavations and to avoid groundwater contamination. This would likely include collecting dewatering water from excavations and treating it before discharge to surface water or stormwater systems.
- Comply with construction standards applicable to Wellhead Protection Zone 4 (RZC 21.64.050D.4.b) in the City of Redmond.

- Comply with construction standards applicable to Wellhead Protection Area Zone 2 (RMC 4-4-030.C8) in the City of Renton. These standards include requirements for the following:
 - Secondary containment for hazardous materials.
 - Securing hazardous materials.
 - Removal of leaking vehicles and equipment.
 - Cleanup equipment and supplies.
- Monitor soils from construction-related excavation/grading for contamination; if contaminated soils are encountered, mitigate in accordance with federal, state, and local regulations.



4.4 PLANTS AND ANIMALS

The potential effects of short-term (project construction) activities on plant and animal resources in the study area were assessed on the basis of project construction methods, the scale of the construction activities, and the quality and proximity of typical species and habitat resources. The analysis considered the scale of the various project segments and options in determining potential impacts to species or their habitats, including noise disturbance, the disturbance or short-term alteration of available habitat, and construction area stormwater runoff.

Impacts were assessed based on the number and type of power transmission facilities installed, amount of ground disturbance during construction, the presence of natural or critical areas, and the proximity of construction areas to known or potential species habitats. These include known or potential nesting, migration, and rearing habitats within the study area.

4.4.1 Short-term (Construction) Impacts Considered

The project is expected to cause temporary (short-term) modifications of available fish and wildlife habitat, as well as potential direct impacts to fish and wildlife species. The scale and proximity of construction activities to these resources determined the intensity of potential impacts. The analysis considered the cumulative impacts and potential mitigation measures to minimize or eliminate project impacts to plant and animal resources. For this analysis, the magnitude of short-term impacts is classified as being less-than-significant or significant, as follows:

- **Less-than-Significant**—Impacts to fish and wildlife would be considered less-than-significant if project activities would cause temporary, or minor permanent, alterations or disturbances to study area habitats, including impacts that could be minimized but not fully mitigated; occur in developed areas with minimal or poor quality habitat; or when impacts are mitigated through compliance with tree protection or critical areas ordinances. This would include limited interference with the breeding, feeding, or movement of resident or migratory fish, bird, amphibian, or mammal species. This would also include activities that could cause harassment, injury, or death to common species, whose populations would not be substantially altered by such impacts.
- **Significant**—Impacts are considered significant where construction activities would cause the following: injury, death, or harassment of federal and state listed endangered or threatened species, or bald eagle and peregrine falcon (state sensitive and federal species of concern); a reduction of habitat quality or quantity that can substantially affect the critical survival activities (breeding, rearing, and foraging) of listed species; substantial interference with the breeding, feeding, or movement of native resident or migratory fish, bird, amphibian, or mammal species; or noncompliance with tree protection ordinances or critical areas ordinances.

Methods for Analyzing Short-term Impacts

The EIS Consultant Team used the same methods as for long-term (operation) impacts to determine the short-term (construction) impacts to plants and animals in the study area. Impacts were assessed based on the type and scale of construction activities and potential habitat modifications, and the likely presence of protected fish and wildlife species.

4.4.2 Short-term (Construction) Impacts: Alternative 1 (New Substation and 230 kV Transmission Lines)

4.4.2.1 Short-term (Construction) Impacts Common to All Components

A range of potential direct and indirect impacts to plants and animals could occur during construction, including the following: noise disturbance, habitat alteration or loss (vegetation clearing), degradation of aquatic habitat, and introduction of invasive plant species.

Disturbance from Construction Noise and Human Activity

Increased construction noise and human activity could cause some animal species to temporarily relocate to surrounding habitats, or in some instances to be displaced. This would be a significant adverse impact if listed species are harassed, lost, or permanently displaced. However, the construction activities would not cause excessive noise disturbances, and protected wildlife species are not known to occupy habitat within the study area. In addition, complying with environmental permit requirements would minimize the potential for impacts, such as avoiding construction during sensitive periods (i.e., nesting and breeding seasons). In addition, construction BMPs would be implemented for Alternative 1 to eliminate or substantially reduce such impacts.

Most of the construction activities would occur in discrete locations (i.e., individual pole locations) dispersed along the existing corridor and new corridor. The work areas would typically be limited to the immediate area around the pole locations, where vegetation could be removed to allow a safe working space for equipment, vehicles, and materials. The amount of ground disturbance would be limited. Disturbing these small isolated areas would require wildlife to move only short distances to avoid direct effects, and limit indirect effects to surrounding habitat. The pole locations would also be chosen to minimize the disturbance of sensitive or critical areas, by typically allowing placement within approximately 25 feet of the existing poles.

Loss of Habitat

Construction activities that disturb the vegetation and soil would result in the short-term loss or alteration of habitat for ground-oriented species, thereby decreasing the value of the habitat for wildlife. The primary factor resulting in habitat loss would be the amount of area needed to install the poles and wires along the corridor. The construction activities typically consist of excavating a hole using a vactor truck or auger, to minimize ground disturbance. The poles would either be placed directly in the hole and backfilled, or reinforced-steel anchor bolt cages would be installed and filled with concrete to secure the pole. After the poles are erected, either the existing wires would be transferred to the new poles, or new power lines would be strung between the poles. Stringing new wires would require additional staging areas to pull the wires and achieve the correct wire tension. Although no additional vegetation clearing is typically required, some minor grading or ground disturbance would sometimes be necessary, depending on site conditions. Overall, the amount of ground-disturbing activities associated with installing the poles and stringing the new conductors would be limited, and disturbed areas would be replanted to the extent practicable. As a result, these activities would have less-than-significant impacts to fish and wildlife habitat.

Sedimentation of Aquatic Habitats

Construction activities adjacent to streams or within wetlands have the potential to increase sedimentation of aquatic habitats, due to runoff from disturbed areas. While most segments and options avoid critical areas and their buffers, there are a few instances where pole placements could result in potential impacts. Such impacts would be significant if protected fish or other aquatic species are present. However, complying with state and local stormwater permit BMPs, including installing temporary erosion control measures prior to ground-disturbing activities, would minimize or eliminate potential impacts. In addition, the limited amount of disturbed area, and the flexibility of locating poles, would minimize the potential for turbid runoff from reaching sensitive habitats. As a result, expected impacts would be less-than-significant.

Contamination of Aquatic Habitats

Construction activities adjacent to critical areas or their buffers have the potential to result in accidental spills of oils, fuels, solvents, and other chemicals from construction equipment. If not controlled, such spills could enter nearby surface waters and adversely affect aquatic species. However, such impacts would be minimized or eliminated by fulfilling permit requirements and implementing Spill Prevention and Control Plans. As a result, expected impacts would be less-than-significant.

Invasive Plant Control

PSE would replant disturbed areas after construction to reduce the space and opportunity for invasive species to become established. PSE would also continue to selectively use herbicides for vegetation management, in accordance existing permits and associated BMPs. Therefore, less-than-significant impacts are expected.

4.4.2.2 Short-term (Construction) Impacts by Component and Segment

While the extent and duration of construction activities would vary among segments and options, the types of construction impacts would be similar for each. The primary difference between segments and options would be the number of construction sites (pole locations) within the segment or option, ranging from 11 to 104 poles per segment/option, and the availability and condition of access routes. For example, access along the Bellevue Central Bypass Options would generally be from existing roadways, and result in little or no access-related impacts, while access to the north portion of the Redmond Segment could require access through a vegetated greenbelt with wetland habitat features. Along most of the existing corridor, the new poles would be placed in the same general area as the existing poles, using existing access routes, also limiting potential impacts. The analysis of potential construction impacts considered both existing access routes as well as proposed temporary access routes for the project.

In addition to access-related impacts, project construction activities have the potential for direct and indirect impacts to fish and wildlife and their habitat. The installation of new poles would disturb or replace small areas of existing habitat, although these impacts would generally be offset by the removal of a similar, or slightly greater, number of existing poles. As described above, the potential short-term impacts of construction activities on fish, wildlife, and plant species are expected to be limited due to the low-impact construction methods needed to install the poles and string the conductors.

Impacts by segment (and the Richards Creek substation) are summarized in Table 4.4-1.

Table 4.4-1. Impacts to Plants and Animals by Segment and Option

Location/Segment	Short-term Effect	Impact
Richards Creek Substation		
Noise disturbance from ground-clearing activities	Increased noise levels could disturb or displace species on or near the site. Noise-generating activities would occur for a relatively short period of time (several weeks). Other construction noise would likely be similar to background levels in surrounding areas, and protected species are not known to occupy habitat in the vicinity.	Less-than-Significant
Habitat loss (temporary)	Much of the existing site is already disturbed, and used as a pole-storage area. As a result, potential impacts of construction access and construction staging during installation of the substation would be limited.	Less-than-Significant
Impacts to aquatic species	With the potential exception of lamprey, no protected aquatic species are expected to occur in the small streams adjacent to the substation site. Direct impacts to aquatic habitat would be avoided, and compliance with appropriate construction BMPs would minimize the potential to affect aquatic species.	Less-than-Significant
Invasive plant control	Discriminating use of growth regulators and herbicides for vegetation management will be used in accordance with existing permits and associated BMPs.	Less-than-Significant
Redmond Segment		
Noise disturbance from ground-clearing activities	See Section 4.4.2.1, <i>Short-term Impacts Common to All Components</i> .	Less-than-Significant
Habitat loss (temporary)	An estimated 35 poles (12 less than existing) would be installed, potentially including up to 11 in wetlands and wetland buffers. Impacts to available habitat from installing new poles would be less-than-significant because the segment is in the existing corridor and timber mats would be used to access the pole locations to minimize ground disturbance.	Less-than-Significant

Location/Segment	Short-term Effect	Impact
Impacts to aquatic species	With the potential exception of lamprey, no protected aquatic species are expected to occur in the small streams in this segment. Direct impacts to aquatic habitat would be avoided, and compliance with appropriate construction BMPs would minimize the potential to affect aquatic habitat.	Less-than-Significant
Invasive plant control	As with the Richards Creek substation site, this would include discriminating use of growth regulators and herbicides in accordance with existing management plans and permits.	Less-than-Significant
Bellevue North Segment		
Noise disturbance from ground-clearing activities	See Section 4.4.2.1, <i>Short-term Impacts Common to All Components</i> .	Less-than-Significant
Loss of habitat (temporary)	An estimated 21 poles (17 less than existing) would be installed, but no poles would be located in wetlands. Impacts from installing new poles on available habitat would be less-than-significant because the segment is in the existing corridor with available access to minimize ground disturbance.	Less-than-Significant
Impacts to aquatic species	Several protected fish species could occur in Valley Creek in this segment. However, no poles would be located in the stream or buffers, and available access to the pole sites would minimize or eliminate potential short-term impacts to aquatic habitat or species.	Less-than-Significant
Invasive plant control	Impacts would be similar to the Redmond Segment.	Less-than-Significant
Bellevue Central Segment, Existing Corridor Option		
Noise disturbance from ground-clearing activities	See Section 4.4.2.1, <i>Short-term Impacts Common to All Components</i> .	Less-than-Significant
Habitat loss (temporary)	An estimated 11 transmission poles (14 less than existing) would be installed. Available access to these and other pole sites would minimize potential ground disturbance impacts to available habitats.	Less-than-Significant

Location/Segment	Short-term Effect	Impact
Impacts to aquatic species	Several protected fish species occur in the streams in this option. However, no poles would be located in streams or buffers, and available access to the pole sites would minimize or eliminate potential short-term impacts to aquatic habitat or species.	Less-than-Significant
Invasive plant control	Impacts would be similar to the Redmond Segment.	Less-than-Significant
Bellevue Central Segment, Bypass Option 1		
Noise disturbance from ground-clearing activities	See Section 4.4.2.1, <i>Short-term Impacts Common to All Components</i> .	Less-than-Significant
Habitat loss (temporary)	An estimated 52 new poles would be installed for this option, potentially including some in wetland buffer habitats, but access to most poles along corridor would be from existing roadways. Although critical area buffer impacts are currently unknown, because delineation surveys have not been completed, installing new poles would be less-than-significant because mitigation would minimize short-term impacts to available habitats.	Less-than-Significant
Impacts to aquatic species	This option crosses nine streams, including several that support protected fish species. However, impacts to aquatic species would be less-than-significant with the implementation of construction BMPs, and access to most pole locations would be from existing roadways.	Less-than-Significant
Invasive plant control	Impacts would be similar to the Redmond Segment.	Less-than-Significant
Bellevue Central Segment, Bypass Option 2		
Noise disturbance from ground-clearing activities	See Section 4.4.2.1, <i>Short-term Impacts Common to All Components</i> .	Less-than-Significant
Habitat loss (temporary)	An estimated 64 new poles would be installed for this option, potentially including some in wetland or buffer habitat; however, access to these sites would be from existing roadways, thereby minimizing potential short-term effects to available habitat.	Less-than-Significant

Location/Segment	Short-term Effect	Impact
Impacts to aquatic species	Six streams are located in this option area, including several that support protected species, and new poles would likely be installed adjacent to these streams. As a result, new stream crossings and buffer clearing could be required. However, access to these sites would be from existing roadways, thereby minimizing potential short-term effects to available habitat.	Less-than-Significant
Invasive plant control	Impacts would be similar to the Redmond Segment.	Less-than-Significant
Bellevue South Segment, Oak 1 Option		
Noise disturbance from ground-clearing activities	See Section 4.4.2.1, <i>Short-term Impacts Common to All Components</i> .	Less-than-Significant
Habitat loss (temporary)	An estimated 86 poles would be installed for this option (20 more than existing), potentially including up to 4 additional poles in wetland habitat, adjacent to a small stream, or within wetland and/or stream buffers. Access to these sites would be from existing roadways, thereby minimizing potential short-term effects to available habitat.	Less-than-Significant
Impacts to aquatic species	Twelve streams occur along this segment. The segment parallels Coal Creek and may require stream crossings and buffer clearing. Impacts would be less-than-significant because access to construction sites would be from existing roadways, and mitigation measures would minimize impacts.	Less-than-Significant
Invasive plant control	Impacts would be similar to the Redmond Segment.	Less-than-Significant
Bellevue South Segment, Oak 2 Option		
Noise disturbance from ground-clearing activities	See Section 4.4.2.1, <i>Short-term Impacts Common to All Components</i> .	Less-than-Significant
Habitat loss (temporary)	Impacts would be the same as the Oak 1 Option.	Less-than-Significant
Impacts to aquatic species	Impacts would be the same as the Oak 1 Option.	Less-than-Significant

Location/Segment	Short-term Effect	Impact
Invasive plant control	Impacts would be similar to the Redmond Segment.	Less-than-Significant
Bellevue South Segment, Willow 1 Option		
Noise disturbance from ground-clearing activities	See Section 4.4.2.1, <i>Short-term Impacts Common to All Components</i> .	Less-than-Significant
Habitat loss (temporary)	An estimated 40 poles (26 less than existing) would be installed for this option, potentially including up to 6 poles in wetlands or wetland and stream buffers. Impacts from installing new poles would be less-than-significant because the option is in the existing corridor, and mitigation would minimize short-term impacts to available habitat.	Less-than-Significant
Impacts to aquatic species	Seven streams are located in this option, including Coal Creek, which supports several protected fish species. However, no new impacts would occur near these streams.	Less-than-Significant
Invasive plant control	Impacts would be similar to the Redmond Segment.	Less-than-Significant
Bellevue South Segment, Willow 2 Option		
Noise disturbance from ground-clearing activities	See Section 4.4.2.1, <i>Short-term Impacts Common to All Components</i> .	Less-than-Significant
Habitat loss (temporary)	An estimated 76 poles (55 less than existing) would be installed for this option, potentially including up to 6 poles in wetlands or wetland and stream buffers. Impacts from installing new poles would be less-than-significant because a portion of this option is in the existing corridor, and mitigation would minimize short-term impacts to available habitat.	Less-than-Significant
Impacts to aquatic species	Impacts would be similar to those for Oak 1 and Willow 1. No new impacts would occur near these streams.	Less-than-Significant
Invasive plant control	Impacts would be similar to the Redmond Segment.	Less-than-Significant

Location/Segment	Short-term Effect	Impact
Newcastle Segment		
Noise disturbance from ground-clearing activities	See Section 4.4.2.1, <i>Short-term Impacts Common to All Components</i> .	Less-than-Significant
Habitat loss (temporary)	An estimated 24 poles (same as existing) would be installed for this segment, and no poles are proposed in wetland habitat or buffers. Impacts from installing new poles would be less-than-significant because the segment is in the existing corridor and mitigation would minimize short-term impacts to available habitat.	Less-than-Significant
Impacts to aquatic species	May Creek occurs in this segment, and supports several protected fish species, the same as existing conditions. No new impacts would occur at these stream crossings.	Less-than-Significant
Invasive plant control	Impacts would be similar to the Redmond Segment.	Less-than-Significant
Renton Segment		
Noise disturbance from ground-clearing activities	See Section 4.4.2.1, <i>Short-term Impacts Common to All Components</i> .	Less-than-Significant
Habitat loss (temporary)	An estimated 45 poles (24 less than existing) would be installed in this segment. Potentially one pole is proposed in a wetland buffer. Impacts from installing new poles would be less-than-significant because the segment is in the existing corridor, and mitigation would minimize short-term impacts to available habitat.	Less-than-Significant
Impacts to aquatic species	Five streams occur in this segment, including Honey Creek and the Cedar River, which support several protected fish species. No new impacts would occur at these stream crossings. No poles would be placed in the shoreline jurisdiction of the Cedar River.	Less-than-Significant
Invasive plant control	Impacts would be similar to the Redmond Segment.	Less-than-Significant

4.4.3 Mitigation Measures

As described above for long-term impacts (Section 3.4.6), PSE would provide mitigation for potential long-term impacts to fish, wildlife, and plant resources caused by construction, using on- and off-site habitat enhancements, which would be developed in coordination with local, state, and federal agencies. In addition, to mitigate for short-term impacts discussed in this chapter, the following mitigation measures would be used during construction to reduce construction-related impacts:

4.4.3.1 Regulatory Requirements

The following measures are required to comply with regulations and are not appealable.

During Construction

- Minimize impacts to critical areas and buffers, including Fish and Wildlife Conservation Areas, to the extent practicable.
- Mitigate impacts to critical areas to the levels established by the appropriate jurisdictions and environmental permit requirements.
- Replant and stabilize disturbed construction and staging areas with native trees, shrubs, and grasses.
- Implementation of temporary erosion control measures.
- Utilize a Spill Prevention and Control Plan.

4.4.3.2 Potential Mitigation

During Construction

- PSE would continue to implement an ecologically based, integrated weed management program to control the spread of invasive and noxious weeds at these disturbed areas by planting native plants.
- Flag the limits of construction, trees to be retained, and critical habitat areas and associated buffers to be avoided.



4.5 GREENHOUSE GASES

4.5.1 Short-term (Construction) Impacts Considered

The following specifically defines project-level short-term (construction) impacts to GHGs:

Less-than-Significant – The project would result in construction-related GHG emissions over a limited period not exceeding 2 years.

Significant – The project would result in construction-related GHG emissions over an extensive construction period exceeding 2 years and not implementing BMPs.

Methods for Analyzing Short-term Impacts

Short-term construction emissions of GHGs were qualitatively assessed with a construction phase duration of 2 years as the criteria for requiring BMPs as mitigation.

4.5.2 Short-term (Construction) Impacts: Alternative 1 (New Substation and 230 kV Transmission Lines)

Construction truck trips, off-road equipment, and worker trips would generate GHG emissions. Construction equipment would include specialized oversize trucks and trailers, backhoes or excavators, concrete trucks, and cranes or other specialty equipment to place transformers. Most of this equipment would operate on diesel fuel, which has an emission factor of 10.15 kilograms of CO₂ per gallon.

As described in the Phase 1 Draft EIS, Alternative 1 would have a relatively short construction period (approximately 12 to 18 months). Installing transformers would be performed concurrently with the transmission line and poles. Consequently, although Alternative 1 would involve a relatively large amount of construction equipment, its relatively short duration would result in temporary construction GHG emissions.

The Phase 1 Draft EIS addressed the potential for lifecycle emissions from manufacturing and transport of material resources required for Alternative 1. The primary material resources would be concrete for pier and transformer foundations, steel or laminated wood poles for towers, and conductors. Of these materials, concrete is likely the most GHG-intensive to produce. Production of 1 cubic meter of concrete generates approximately 101 kilograms (222 pounds) of CO₂ (Kjellsen et al., 2005), which accounts for cement production, aggregate production, water, and transport. The exact number of foundations is not known at this time because PSE is still evaluating which poles can be directly embedded, avoiding the need for concrete foundations. A conservative estimate assuming of approximately 18 miles of transmission lines and a typical spacing between poles of 600 feet, suggests that approximately 180 pole foundations would need to be installed. Assuming caisson foundations 35 feet deep and 6 feet in diameter, each foundation would require approximately 6 cubic meters of concrete, yielding a minimum GHG estimate for all towers of 109 metric tons of CO₂.

Project-related GHG emissions from construction would be temporary, would not represent a continuing burden on the statewide inventory, and would likely be below state reporting thresholds; in addition, in practice, the reporting threshold applies to emissions from a facility and not to temporary construction activities. Consequently, construction-related GHG emissions would be less-than-significant.

4.5.3 Mitigation Measures

Short-term (construction) GHG impacts would be less-than-significant, and no mitigation measures are required. However, the following BMPs could be implemented to reduce construction-related GHG contributions.

4.5.3.1 Potential Mitigation Measures

During Construction

- Use renewable diesel for diesel-powered construction equipment. The fuel can achieve a 40–80 percent reduction in GHG emissions compared to fossil diesel and is a recommended component of GHG reduction efforts in other jurisdictions such as the Drive Clean Seattle program (Seattle OSE, 2012).
- Use non-petroleum lubricants for construction equipment.
- Replant disturbed construction and staging areas with native trees, shrubs, and grasses.



4.6 RECREATION

4.6.1 Short-term (Construction) Impacts Considered

Potential short-term impacts to recreation include the loss of use of a recreation site during construction activities. The following specifically defines short-term impacts to recreation.

Less-than-Significant – Impacts would be less-than-significant if a recreation site were not usable for a short duration or if construction activities are noticeable (e.g., decreased visual enjoyment) and cause irritation to users but do not preclude recreation use (e.g., if a trail is closed for 3 to 7 days over a 2-month period while a pole is replaced and the lines are restrung). Impacts would also be less-than-significant if a recreation site were unusable or access completely blocked outside of peak use or in a recreation site or area of a recreation site that is not frequently used (e.g., if construction site access blocks a trail that is located in a park for a 2-month period while all poles in that park are replaced and the lines are restrung). Construction on school property would be less-than-significant if it occurred when school is not in session (e.g., weekends, summertime).

Significant – Impacts are considered significant if a recreation site were unusable or access is completely blocked during peak use for an extended period of time (e.g., a park is inaccessible during the summer months and many users are affected). Construction through easements on school property during the school year would be significant if sports and play fields are not available to the students (e.g., a soccer field is inaccessible during a tournament).

Methods for Studying Short-term Impacts

The EIS Consultant Team used the same mapping methods used for long-term (operation) impacts to determine the short-term (construction) impacts. They then considered the type and scale of construction activities, the time of year of construction (e.g., during peak summer use), duration of construction, number of users affected, and type and number of recreation sites affected.

4.6.2 Alternative 1: New Substation and 230 kV Transmission Lines

4.6.2.1 New Richards Creek Substation

Short-term impacts to recreation from the construction of the substation would be less-than-significant. Students at the Chestnut Hill Academy may hear construction noise in outside play areas or sports fields, but this is not expected to disrupt their activities.

4.6.2.2 Impacts Common to All Segments and Options

Activities within a recreation site in the vicinity of construction may be limited for the duration of active construction (see Section 2.1.3, *Construction*, for details). For example, where a pole site is located within a park, the portion of the park nearby could be inaccessible for 3 to 7 days while work is being done. If poles and access routes are not located in areas used by recreationists, recreation would not likely be affected. Where a trail is located along PSE's existing corridor and access to a number of poles would be along the corridor, the trail could be temporarily closed or rerouted during active work (i.e., while workers are on-site) until all poles are replaced. For example, if a trail is used to access four pole sites, that trail could be affected for up to 20 days within a 2-month period. The trail could remain open provided it was safe, but users would see construction activities and vehicles on the trail, which may affect user enjoyment. Bicycle and pedestrian use of roads or sidewalks may be restricted while poles are replaced or constructed along roads. In between active work (i.e.,

between work stages, including evenings and weekends), areas may have indications of construction (e.g., disturbed soil or a small area cordoned off), but access would be maintained. PSE would work to maintain access to recreation sites while providing a safe working area for crews and the public. Recreation users may relocate to nearby parks during construction, making those parks busier than usual.

Trees and vegetation may be removed within the clear zones within or adjacent to recreation sites to facilitate project construction and access. Grasses, shrubs, and saplings would be disturbed or cleared in areas subject to ground-disturbing activities. Temporary vegetation cleared to facilitate construction will be restored, but areas may be fenced off to allow vegetation to reestablish. Impacts to recreation from permanent changes to vegetation are described in Section 3.6, *Recreation*.

Construction vehicles may utilize parking spaces or adjacent street parking during active construction. In addition, it is possible that recreation sites or facilities may be used for temporary construction staging. PSE would work with the appropriate cities to identify suitable locations for staging that would result in minimal impacts to recreation. Such suitable locations may include overflow parking areas or parts of the site that are underutilized.

After poles are replaced, the site (including any staging areas) would be restored and available for recreation. Recreation users would be inconvenienced by construction activities; however, impacts would be short in duration at each recreation site and less-than-significant.

Short-term (construction) impacts at specific recreation sites are summarized by segment in Table 4.6-1. As shown, there would be no impacts or less-than-significant impacts at all recreation sites in the study area.

Table 4.6-1. Impacts to Recreation Sites in the Study Area by Segment

Recreation Sites	Short-term Effect	Impact
Richards Creek Substation		
Chestnut Hill Academy	Students may hear some construction noise from outside play areas or sports fields; however, there would be no change to recreation during construction.	Less-than-Significant
Redmond Segment		
Willows Crest Park	The parcel adjacent to Willows Crest Park would be used to access 11 pole sites on the easement. There would no construction in the park, but users would be disturbed by vehicles driving past the park intermittently for up to 2 months.	Less-than-Significant
Willows Creek Neighborhood Park	Construction would not be visible from the park, and there would be no disturbance to the park itself.	No Impact

Recreation Sites	Short-term Effect	Impact
Trails (unnamed on corridor, between the Sammamish substation and where the corridor turns south)	The trail would be temporarily closed while adjacent poles are replaced. Vegetation may be temporarily cleared to facilitate construction. Five new poles are proposed in the vicinity of the trail. This trail may be closed until all poles are replaced, or users may avoid the area. Given the number of poles, work in this area would likely be continuous for approximately 1 month. As this is not a high use area, impacts would be limited.	Less-than-Significant
Unnamed Trails (on the north-south portion of the corridor)	Trails along the north-south portion of the Redmond Segment may be temporarily closed while adjacent poles are replaced. How long a trail would be affected would depend on proximity to roads and if the trail is needed to access other poles. Vegetation may also be cleared to facilitate construction.	Less-than-Significant
Rose Hill Middle School	Access to playfields would be restricted during active construction while poles and wires are replaced. Two H-frames (four poles) would be removed and replaced with one pole on the school property. Work would take 6 to 14 days. Vegetation clearing during construction would be limited because the area is already cleared. The existing 115 kV lines and monopoles on the east side of the property would remain.	Less-than-Significant
Bellevue North Segment		
Bridle Crest Trail	No poles are located on this trail. The trail would be intermittently closed (less than 1 week at a time) while poles on the adjacent parcel are replaced. Work would take 3 to 7 days.	Less-than-Significant
Unnamed Trail along NE 52 nd Ln right-of-way and SR 520 Trail	No poles are located on either of these trails. These trails may be temporarily closed for 1 day during restringing of lines across the trails. Restringing of lines across SR 520 would likely take place at night.	Less-than-Significant
Viewpoint Park	The portion of the park within the existing corridor, including the trail, may be closed while the poles (one set of poles within the park) and wires are replaced. Vegetation clearing during construction would be limited because the area is already cleared. Work would take 3 to 7 days.	Less-than-Significant

Recreation Sites	Short-term Effect	Impact
Bellevue Central Segment		
Existing Corridor Option		
Unnamed Trail (on corridor at Bel-Red Rd and NE Spring Blvd)	There would be no changes to this section of trail and therefore no associated construction.	No Impact
Highland-Glendale Property	No poles are in this park, and it would not be used to access other poles. Wires would be restrung over the park, but ground disturbance is unlikely and the area is already cleared. The park may be closed for up to 1 day during restrung of lines.	Less-than-Significant
Glendale Country Club (private)	There are seven pairs of poles along the east edge of the golf course that would need to be replaced, which would result in disturbance at each pole site. Access for construction is not limited; thus, work in one area would not likely restrict access somewhere else. Users of the clubhouse and golf course would see construction activities, including temporary vegetation clearing, and holes or trails under the lines may be closed during active construction. Construction on the club property would be completed in less than 2 months.	Less-than-Significant
Unnamed Trails along the Existing Corridor (between SE 10 th St and SE 20 th St) and SE 3 rd Trail	Portions of trails would be closed during active construction while the poles and wires are replaced, and vegetation cleared. PSE would drive along the easement to access poles farther from the road, and trail users would need to be aware of construction traffic on the trail and possible restrictions. Between SE 10 th St and SE 20 th St, there are six pole sites, five of which PSE would access from the south, and the trail could be affected for up to 25 days within 2 months in addition to site preparation.	Less-than-Significant
Kelsey Creek Park	In Kelsey Creek Park, trails in PSE's easement would be closed during active construction while the poles and wires are replaced, and vegetation cleared. PSE would need to drive along the easement to access poles farther from the road, and trail users would need to be aware of construction traffic on the trail and possible restrictions. Between SE 1 th St and the Lake Hills Connector, there are four pole sites, which PSE would access from the north, and the trail could be affected for up to 20 days within 2 months in addition to site preparation.	Less-than-Significant

Recreation Sites	Short-term Effect	Impact
Skyridge Park	One pole site is located on the east edge of the park. Park users would see construction activities, such as vegetation clearing. As the pole is near the entrance to the park, access to the park may be closed for 3 to 7 days within 2 months.	Less-than-Significant
Richards Valley Greenway	This portion of the greenway may be temporarily closed for 1 day during restringing of lines across the greenway.	Less-than-Significant
Bel-Red Mini Park, McDowell House, Wilburton Hill Park and Bellevue Botanical Gardens, ERC, West Kelsey Open Space, Woodridge Open Space, Richards Creek Open Space, Bannerwood Ballfield Park, and Richards Valley Open Space	The Existing Corridor Option is not near these parks.	No Impact
Bypass Option 1		
Bel-Red Mini Park	There would be no construction work in or immediately adjacent to Bel-Red Mini Park.	No Impact
McDowell House	There would be no construction work in or immediately adjacent to the McDowell House.	No Impact
Eastside Rail Corridor (ERC)	The ERC is not yet developed for recreation; however, some individuals may use the ERC informally. Access would be limited until all seven poles are installed between SE 1 st and the Lake Hills Connector. Temporary vegetation clearing to facilitate construction may also occur. Construction on the ERC would be completed in less than 2 months.	Less-than-Significant
Wilburton Hill Park and Bellevue Botanical Gardens	There would be two new poles on the north side of the Lake Hills Connector adjacent to Wilburton Hill Park. Access to the trailhead at the intersection of SE 7 th PI and the Lake Hills Connector would be affected during construction activities (including temporary vegetation clearing), which could take up to 14 days.	Less-than-Significant
West Kelsey Open Space	There would be no construction work in or adjacent to West Kelsey Open Space.	No Impact

Recreation Sites	Short-term Effect	Impact
Kelsey Creek Park	There would be six new poles on the north side of the Lake Hills Connector adjacent to Kelsey Creek Park. There are no trail access points, and park users would not be able to see construction from within the park. Access for pedestrians and bicyclists adjacent to the park would likely be limited during construction.	Less-than-Significant
Woodridge Open Space	There would be no construction work in or adjacent to Woodridge Open Space.	No Impact
Richards Creek Open Space	There would be one new pole on the south side of the Lake Hills Connector adjacent to Richards Creek Open Space. There are no trail access points, and park users would not be able to see construction from within the park. Access for pedestrians and bicyclists adjacent to the park would likely be limited during construction.	Less-than-Significant
Bannerwood Ballfield Park	There would be one new pole on the south side of the Lake Hills Connector adjacent to Bannerwood Ballfield Park. There are no trail access points, and park users would not be able to see construction from within the park. Access for pedestrians and bicyclists adjacent to the park would likely be limited during construction.	Less-than-Significant
Unnamed Trails along the Existing Corridor between SE 10 th St and SE 20 th St	Impacts would be the same as for the Existing Corridor Option, except there would be five pole sites, all of which PSE would access from the south; the trail could be affected for up to 25 non-consecutive days within 2 months in addition to site preparation.	Less-than-Significant
Richards Valley Greenway	Temporary lane and sidewalk closures during construction along Lake Hills Connector are likely and would inconvenience users of the proposed greenway. Work along this section of road could take up to 2 months. Additionally, the greenway may be temporarily closed for 1 day during restringing of lines along the existing corridor.	Less-than-Significant
Skyridge Park	Same impacts as the Existing Corridor Option.	Less-than-Significant

Recreation Sites	Short-term Effect	Impact
Unnamed Trail (on Corridor at Bel-Red Rd and NE Spring Blvd), SE 3 rd Trail, Highland-Glendale Property, Glendale Country Club (private), and Richards Valley Open Space	Bypass Option 1 would not be near these sites.	No Impact
Bypass Option 2		
Unnamed Trail (on Corridor at Bel-Red Rd and NE Spring Blvd)	There are no pole sites located near the trail; however, access to the trail may be restricted for up to 1 day while the wires are restrung.	Less-than-Significant
Bel-Red Mini Park	Same impact as Bypass Option 1.	No Impact
Eastside Rail Corridor (ERC)	Same impact as Bypass Option 1.	Less-than-Significant
McDowell House	Same impact as Bypass Option 1.	No Impact
Wilburton Hill Park and Bellevue Botanical Gardens	Same impact as Bypass Option 1.	Less-than-Significant
West Kelsey Open Space	There would be no construction work in or adjacent to West Kelsey Open Space. Same impact as Bypass Option 1.	No Impact
Kelsey Creek Park	There would be four new poles on the north side of the Lake Hills Connector adjacent to Kelsey Creek Park. There are no trail access points, and park users would not be able to see construction from within the park. Access for pedestrians and bicyclists adjacent to the park would likely be limited during construction.	Less-than-Significant
Woodridge Open Space	There would be three new poles on the west side of Richards Rd adjacent to the Woodridge Open Space. One pole would be located at the trailhead for the Woodridge Trail. Vegetation may also be cleared to facilitate construction. Trail access would be blocked while the pole is installed and wires are strung. Access for pedestrians and bicyclists adjacent to the park would likely be limited during construction.	Less-than-Significant
Richards Creek Open Space	There would be no construction work in or adjacent to Richards Creek Open Space.	No Impact

Recreation Sites	Short-term Effect	Impact
Richards Valley Open Space	Bypass Option 2 would pass the south end of Richards Valley Open Space; however, there would be no construction in the park and there are no access points near the proposed route. Users of the open space would not be affected.	No Impact
Richards Valley Greenway	Temporary lane and sidewalk closures during construction along Lake Hills Connector and Richards Rd are likely and would inconvenience users of the proposed greenway. Road work along Lake Hills Connector could take up to 2 months plus, and work along the greenway portion of Richards Rd could take an additional 5 weeks.	Less-than-Significant
Highland-Glendale Property, Glendale Country Club (private), SE 3 rd Trail, Unnamed Trails along the Corridor (between SE 10 th St and SE 20 th St), Bannerwood Ballfield Park, and Skyridge Park	Bypass Option 2 would not be near these sites.	No Impact
Bellevue South Segment		
Oak 1 Option		
Mountains to Sound Greenway I-90 Trail	No poles are located on the trail. Although unlikely, it is possible that trails may be temporarily closed for up to 1 day during restringing of lines across the trail.	Less-than-Significant
Newport High School	One pole site would be located at the intersection of Factoria Blvd SE and Coal Creek Parkway SE on the same side of the road as the ballfield. Construction would not disturb recreation activities but may be visible from the field.	Less-than-Significant
Forest Drive Open Space	The open space is adjacent to the corridor but would not be affected during construction.	No Impact

Recreation Sites	Short-term Effect	Impact
Coal Creek Natural Area	North of Coal Creek, park users would not be affected because the new corridor is on the opposite side of the road from the natural area. Temporary lane closures during active construction along Coal Creek Parkway are likely and may inconvenience people driving to Coal Creek Natural Area. The Lower Coal Creek Trailhead near Forest Dr SE, the trailheads near the parking lot north of Coal Creek, and the parking lot itself should not be affected by construction. Where the corridor crosses through the natural area, access would be limited while the poles at three sites are replaced, as access for construction vehicles would be along the corridor and trail. Vegetation may also be temporarily cleared to facilitate construction. Construction through the natural area could take up to 3 weeks. <i>(Impacts would be the same for the Oak 1, Oak 2, and Willow 2 Options.)</i>	Less-than-significant
Newport Hills Mini Park	Access to the park would be limited during active construction, which would take 3 to 7 days. Vegetation disturbance would be minimal as existing vegetation is primarily lawn grass. <i>(Impacts would be the same for the Oak 1, Oak 2, Willow 1, and Willow 2 Options.)</i>	Less-than-Significant
Waterline Trail (between SE 60 th St and Newcastle Way)	Access to the trail would be limited during active construction. Vegetation disturbance would be minimal as existing vegetation is primarily lawn grass. There are 2 pole sites north of SE 63 rd St and 3 to the south, access may be limited to segments of trail up to 2 and 3 weeks, respectively. <i>(Impacts would be the same for the Oak 1, Oak 2, Willow 1, and Willow 2 Options.)</i>	Less-than-Significant
Tye Middle School, Somerset North Slope Open Space, Forest Hill Neighborhood Park Open Space, and Somerset Recreation Club	The Oak 1 Option is not near these sites.	No Impact
Oak 2 and Willow 2 Options		
Mountains to Sound Greenway I-90 Trail	No poles are located on the trail. Although unlikely, it is possible that the trail may be temporarily closed for up to 1 day during restringing of lines across the trail.	Less-than-Significant

Recreation Sites	Short-term Effect	Impact
Tyee Middle School	Access to playfields would be restricted during active construction while poles are replaced. Vegetation disturbance would be minimal as existing vegetation is primarily lawn grass. Construction on school property would take 6 to 14 days. <i>(Impacts would be the same for the Oak 2, Willow 1, and Willow 2 Options.)</i>	Less-than-Significant
Somerset North Slope Open Space	This open space is not open to the public.	No Impact
Newport High School	In addition to impacts described for the Oak 1 Option, Oak 2 would also have five poles along the east side of 124 th Ave SE. Construction would be visible from the sports fields but would not affect recreation opportunities and uses. For the Willow 2 Option, impacts would be the same as the Oak 1 Option.	Less-than-Significant
Somerset Recreation Club	PSE would access the poles from Somerset PI SE. Construction would be visible and access to the area near the poles may be limited. Vegetation may also be temporarily cleared to facilitate construction. Although unlikely, it is possible that the club may be temporarily closed for up to 1 day during restringing of lines. PSE would work with the club to avoid disturbance to recreation activities. <i>(Impacts would be the same for the Oak 2, Willow 1, and Willow 2 Options.)</i>	Less-than-Significant
Forest Hill Neighborhood Park & Open Space	The portion of the park within the existing corridor would have limited access during active construction. Users of the greenspace to the east of the corridor would see construction activities, but access would not be limited. <i>(Impacts would be the same for the Oak 2, Willow 1, and Willow 2 Options.)</i>	Less-than-Significant
Forest Drive Open Space	The north end of the open space would be used to access the pole site on the easement, and vegetation may be temporarily cleared. Use of the access road as a trail would be limited during active construction, approximately 3 to 7 days. <i>(Impacts would be the same for the Oak 2, Willow 1, and Willow 2 Options.)</i>	Less-than-Significant
Coal Creek Natural Area	See the Oak 1 Option description. <i>(Impacts would be the same for the Oak 1, Oak 2, and Willow 2 Options.)</i>	Less-than-Significant

Recreation Sites	Short-term Effect	Impact
Newport Hills Mini Park	Access to the park would be limited during active construction, which would take 3 to 7 days. Vegetation disturbance would be minimal; existing vegetation is primarily lawn grass. <i>(Impacts would be the same for the Oak 1, Oak 2, Willow 1, and Willow 2 Options.)</i>	Less-than-Significant
Waterline Trail (SE 60 th St to Newcastle Way)	Access to the trail would be limited during active construction. Vegetation disturbance would be minimal as existing vegetation is primarily lawn grass. There are two pole sites north of SE 63 rd St and three to the south; access may be limited to portions of the trail for up to 2 and 3 weeks, respectively. <i>(Impacts would be the same for the Oak 1, Oak 2, Willow 1, and Willow 2 Options.)</i>	Less-than-Significant
Willow 1 Option		
Mountains to Sound Greenway I-90 Trail	No poles are located on the trail. Although unlikely, it is possible that the trail may be temporarily closed for up to 1 day during restringing of wires across the trail.	Less-than-Significant
Tye Middle School	Access to the playfields would be restricted during active construction while poles are replaced. Vegetation disturbance would be minimal as existing vegetation is primarily lawn grass. Construction on school property would take 6 to 14 days. <i>(Impacts would be the same for the Oak 2, Willow 1, and Willow 2 Options.)</i>	Less-than-Significant
Somerset North Slope Open Space	This open space is not open to the public.	No Impact
Somerset Recreation Club	PSE would access the poles from Somerset PI SE. Construction would be visible, and access to the area near the poles may be limited. Although unlikely, it is possible that the club may be temporarily closed for up to 1 day during restringing of wires. PSE would work with the club to avoid disturbance to recreation activities. <i>(Impacts would be the same for the Oak 2, Willow 1, and Willow 2 Options.)</i>	Less-than-Significant

Recreation Sites	Short-term Effect	Impact
Forest Hill Neighborhood Park & Open Space	The portion of the park within the existing corridor would have limited access during active construction. Users of the greenspace to the east of the corridor would see construction activities, but access would not be limited. <i>(Impacts would be the same for the Oak 2, Willow 1, and Willow 2 Options.)</i>	Less-than-Significant
Forest Drive Open Space	The north end of the open space would be used to access the pole site on the easement. Use of the access road as a trail would be limited during active construction, approximately 3 to 7 days. <i>(Impacts would be the same for the Oak 2, Willow 1, and Willow 2 Options.)</i>	Less-than-Significant
Coal Creek Natural Area	The Willow 1 Option does not follow Coal Creek Parkway but follows the existing easement south of Forest Dr SE, as do the other options. The Lower Coal Creek Trailhead near Forest Dr SE, the trailheads near the parking lot north of Coal Creek, and the parking lot itself are not expected to be affected by construction. Where the corridor crosses through the natural area, access would be limited while the poles at three poles sites are replaced, as access for construction vehicles would be along the corridor and trail. Construction through the natural area could take up to 3 weeks.	Less-than-Significant
Newport Hills Mini Park	Access to the park would be limited during active construction, which would take 3 to 7 days. Vegetation disturbance would be minimal; existing vegetation is primarily lawn grass. <i>(Impacts would be the same for the Oak 1, Oak 2, Willow 1, and Willow 2 Options.)</i>	Less-than-Significant
Waterline Trail (SE 60 th St to Newcastle Way)	Access to the trail would be limited during active construction. Vegetation disturbance would be minimal as existing vegetation is primarily lawn grass. There are two pole sites north of SE 63 rd St and three to the south; access may be limited to portions of the trail up to 2 and 3 weeks, respectively. <i>(Impacts would be the same for the Oak 1, Oak 2, Willow 1, and Willow 2 Options.)</i>	Less-than-Significant
Newport High School and ERC	The Willow 1 Option is not near these sites.	No Impact

Recreation Sites	Short-term Effect	Impact
Newcastle Segment		
Waterline Trail, China Creek (proposed) Cross Town Trail, and Olympus Trail	Trail access would be limited in the vicinity of each pole site. Because there are many road crossings, work at one pole site would unlikely affect access to an adjacent pole site. Vegetation may be temporarily cleared to facilitate construction. There are six pairs of poles along the corridor between the Cross Town Trail and SE May Creek Park Dr where the Olympus Trail is located. Each set of poles would take 3 to 7 days to be replaced within a 2-month period.	Less-than-Significant
May Creek Natural Area	There are two pole sites within the natural area; however, they are not near areas used for recreation, and recreation would not be affected. Access to the May Creek Trail where it crosses the corridor may be restricted while the wires are strung. Vegetation may be temporarily cleared to facilitate construction.	Less-than-Significant
Lake Boren Park	There would be no construction work in or adjacent to Lake Boren Park.	No Impact
Renton Segment		
Sierra Heights Park	Access to the portion of the park along the existing corridor would be restricted during active construction. The trail is not located on the corridor, and access to the trail would not be affected.	Less-than-Significant
Sierra Heights Elementary School	The easement crosses the northwest corner of the school. The school sports fields are separated from the easement by a forested area. Construction activities are unlikely to be visible from the sports fields and would not affect recreation opportunities and uses.	No Impact
May Creek Greenway	There would be no construction work in or adjacent to the May Creek Greenway.	No Impact
Honey Creek Open Space	There is one pole site within the park, on the south side of Honey Creek. Access to the Honey Creek Trail, which crosses the corridor, may be closed during active construction. Vegetation may be temporarily cleared to facilitate construction.	Less-than-Significant

Recreation Sites	Short-term Effect	Impact
Cedar River Greenway System: Riverview Park, Cedar River Natural Zone, Cedar River Trail	During active construction, access would be limited in the portion of the system within the existing corridor. The Cedar River Trail, south of the Cedar River, crosses the existing corridor near a pole site, and the trail may be closed while poles are replaced at that site. Vegetation may also be temporarily cleared to facilitate construction. Riverview Park and the Cedar River Trail are in the valley bottom would not be affected by construction activities.	Less-than-Significant

4.6.3 Mitigation Measures

Required and potential mitigation measures described in Section 3.6.5 have the potential to mitigate construction-related impacts. However, the following construction-specific mitigation measures would also be required or could be imposed to reduce construction impacts to recreational resources. Construction-specific mitigation measures were identified based on discussion with the Partner Cities. Mitigation measures specified during the permitting process, such as use of construction BMPs, would be required, whereas measures suggested by the City of Bellevue or based on comprehensive plan policies would be at the discretion of the applicant to adopt or the local jurisdictions to impose as a condition of project approval.

4.6.3.1 Regulatory Requirements

The following measure is required to comply with regulations and is not appealable.

During Construction

- Use BMPs to minimize noise, dust, and other disturbances to visitors to recreation sites during construction, as well as in areas used for informal recreation (e.g., along roads).

4.6.3.2 Potential Mitigation Measures

Prior to Construction

- Coordinate with potentially affected park districts/departments.
- Provide alternative access points to recreation sites and trail detours.
- Avoid construction during months in which recreation sites are busier when possible.
- Avoid vegetation clearing for construction activities where possible.
- Avoid replacing poles at Rose Hill Middle School and Tyee Middle School while school is in session.
- Notify local jurisdictions, schools, or private owners, 60 days in advance of work within recreation sites.
- Notify the public of any temporary closure of trails or recreations sites 2 weeks in advance.
- Provide signage along trails or park entrances at least 1 week prior to closures.

Post Construction

- Restore recreation sites or trails after construction.



4.7 HISTORIC AND CULTURAL RESOURCES

4.7.1 Alternative 1: New Substation and 230 kV Transmission Lines

4.7.1.1 *Archaeological Resources (belowground)*

Construction impacts to archaeological resources would be an irreversible and permanent impact as these resources are non-renewable, and any impact to the depositional integrity (i.e., context) of a protected archaeological resource would be significant. Therefore, analysis of impacts to protected archaeological resources is addressed as a permanent impact in Section 3.7.

4.7.1.2 *Historic Resources (aboveground)*

Construction impacts to historic resources would be temporary and could reduce a resource's historic register eligibility or reduce the ability of the resource to convey its historic significance. These impacts could be reversible or irreversible. Reversible impacts would be less-than-significant.

Irreversible impacts would be permanent. As such, these impacts are addressed in Section 3.7. Permanent impacts could occur during construction if increased vibration levels result in structural damage to a significant historic resource. The necessary level of vibration to result in structural damage would be above the standard threshold limits defined in the Federal Transit Administration's Noise and Vibration Impact Assessment (FTA, 2006). The project does not propose work that would result in this level of vibration. Permanent impacts could result from the placement of a new pole within the viewshed of a significant historic resource, demolition of a significant historic resource, or irreversible alterations to contributing resources within a historic district. It is probable that these impacts could be mitigated and therefore are not considered significant.

Less-than-Significant—Less-than-significant construction impacts are defined in this analysis as those that are temporary, reversible, and that do not impact the significant historic resource's historic register eligibility or ability to convey its historic significance. Less-than-significant impacts could temporarily alter a resource's integrity of setting, feeling, or place, but it is probable that these impacts could be mitigated through BMPs that would reduce levels of dust, vibration, and noise.

Significant—Significant construction impacts are defined in this analysis as those that are irreversible and permanent. Because these would result in permanent impacts, analysis is addressed in Section 3.7.



4.8 ENVIRONMENTAL HEALTH - ELECTRIC AND MAGNETIC FIELDS

Electric and magnetic fields (EMF) are described in more detail in Chapter 8 of the Phase 1 Draft EIS. As described in that document, although small motors in construction equipment generate some level of magnetic fields, these fields are very small and would be indistinguishable from background levels for the public outside of the construction site. Workers within the construction site would experience magnetic fields from this equipment as they would from working on any similar construction site (these fields would be at lower levels than those investigated as potentially causing health impacts). Therefore, any increase in magnetic fields during construction would be minor and are not described in further detail in this chapter.



4.9 ENVIRONMENTAL HEALTH – PIPELINE SAFETY

4.9.1 Risks During Construction

During construction, the Olympic Pipelines would be exposed to an increased risk of damage by construction activities (e.g., outside force/excavation), which includes both excavation activities and potential for pipelines to be overstressed by *surchARGE loading* from construction equipment. This section addresses the potential pipeline safety risks associated with construction within the project corridor. Risks during construction were assessed by EDM Services using the same risk assessment methodology described in Section 3.9.5.1 (and described further in Appendix I) to assess the temporary increase in potential risks of pipeline damage and pool or flash fires associated with project construction activities.

4.9.1.1 Significance Thresholds

As described in Chapter 3, thresholds for significance were established based on Partner Cities workshop discussions. For this analysis, project-related risks associated with construction are classified as being significant or less-than-significant as follows:

Less-than-Significant

- With implementation of mandatory safety standards, including Olympic general construction procedures, there would be no substantial increase in risk of pipeline release or fire during construction that could result in public safety impacts or damage to property and environmental resources.

Significant

- Even with the implementation of mandatory safety standards, including Olympic general construction procedures, there would be a substantial increase in risk of pipeline release or fire during construction that could result in public safety impacts or damage to property and environmental resources.

4.9.1.2 Risk Assessment Results

The results of the risk assessment developed by EDM Services (as described in Section 3.9.5.1, *Methodology*) are presented in this section beginning with the incident frequency for the main category of construction-related pipeline damage (i.e., outside force/excavation). This frequency was used to develop the final risk assessment results, which follow.

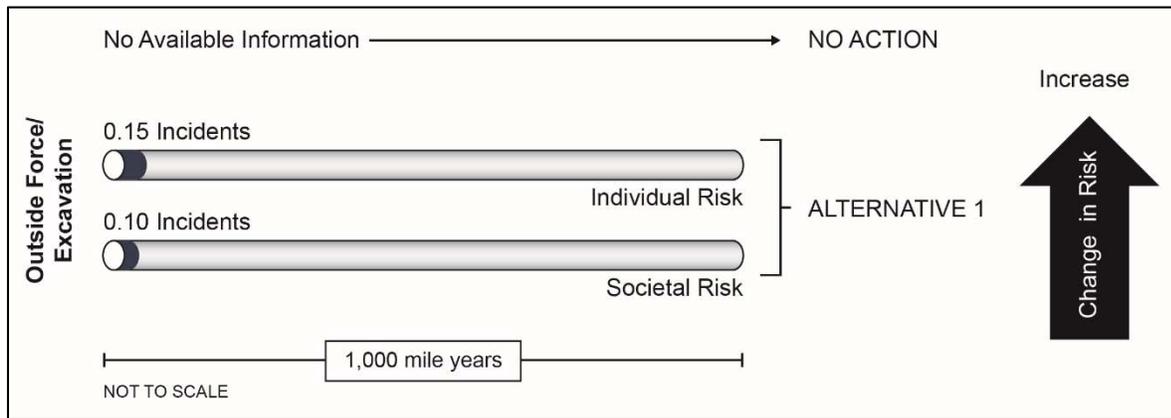
Methods for Assessing Risks During Construction

The *Pipeline Safety Technical Report* (EDM Services, 2017) estimated the increase in existing pipeline safety risk that would be present during construction. The analysis considers the following activities: excavation and surcharge loading. The report estimated the likelihood of unintentional pipeline releases or fires from these construction activities and identified actions that can mitigate the potential impacts and risks.

Figure 4.9-1 summarizes the results of the risk assessment for outside force/excavation pipeline caused releases during construction of Alternative 1. The potential frequency of incidents (or estimated number of incidents per 1,000 mile years) was developed for individuals (individual risk) and groups of people (societal risk) and compared to the national incident frequencies for this same category. The change in the anticipated frequency of incidents risk is presented on the right side of the figure. Because there would be no construction activity for the No Action Alternative, no incident frequency is presented.

Mile Years

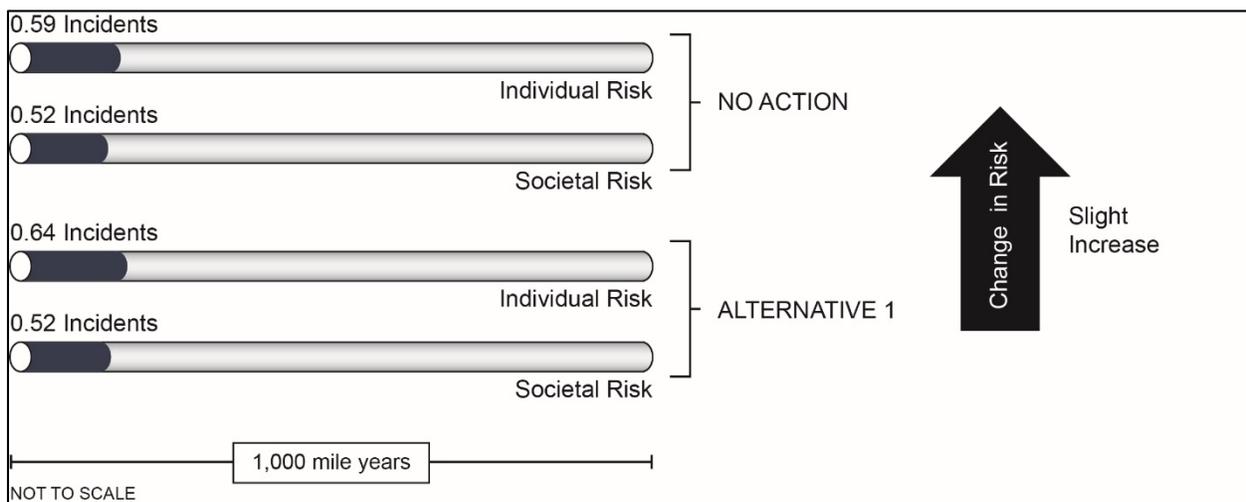
A means of predicting the number of incidents for a given length of line, over a given period of time. For example, if one considered an incident rate of 1.0 incident per 1,000 mile years, one would expect one incident per year on a 1,000-mile pipeline.



Source: EDM Services, 2017.

Figure 4.9-1. Change in Incident Frequency

In consideration of the separate individual risk and societal risk incident frequencies developed for outside force/excavation, Figure 4.9-2 presents the anticipated additional frequency of incidents that could be present during construction of Alternative 1. For this, Alternative 1 is compared to the existing operational baseline (No Action Alternative) results presented in Section 3.9.5.3 to identify the change in anticipated frequency that would be present during construction.



Source: EDM Services, 2017.

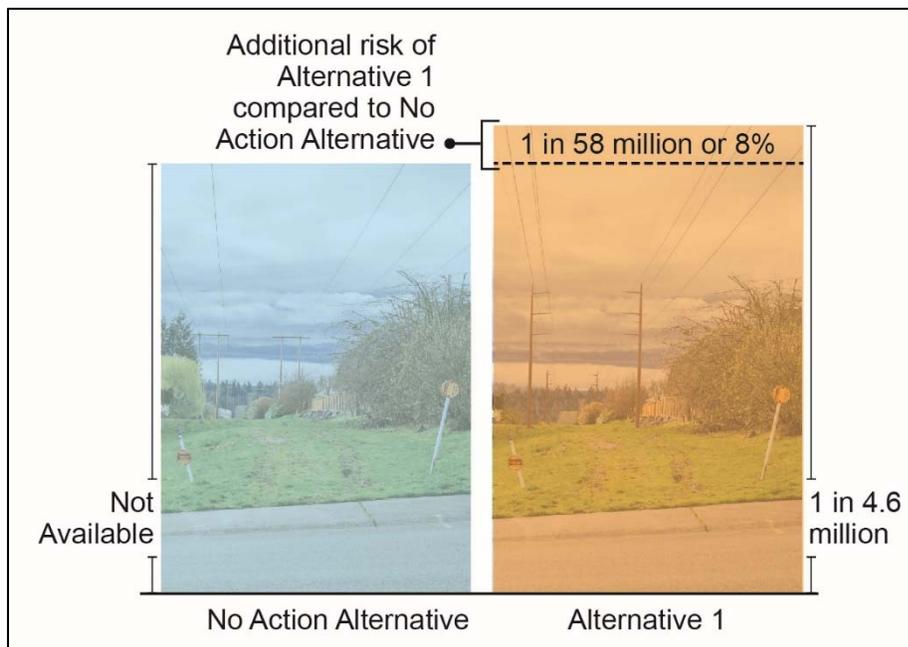
Figure 4.9-2. Change in Incident Frequency During Construction (Combined)

Using the additional construction incident frequency results above, the individual risk and societal risk results for Alternative 1 are presented below.

The annual individual risk of fatality during construction of the 230 kV lines within the corridor is 1 in 4.6 million (Figure 4.9-3). In other words, it is estimated that there could be a 1 in 4.6 million likelihood that an individual at a specific location would be fatally injured over a 1-year construction period. These results are below the common threshold of 1 in 1.0 million used by Santa Barbara County, the California Department of Education, and other jurisdictions in determining unacceptable and acceptable risk. Based on the results of the risk assessment, the individual risk (during construction) for the proposed 230 kV lines would incrementally increase over that posed by the existing 115 kV lines (No Action). This increase in risk is slight, approximately 1 in 58 million. In other words, the assessment estimates that there would be an approximately 8 percent increase in individual risk during operation of Alternative 1. Because the risk level is already very low, this 8 percent increase is not considered substantial.

What is meant by the “increase in risk”?

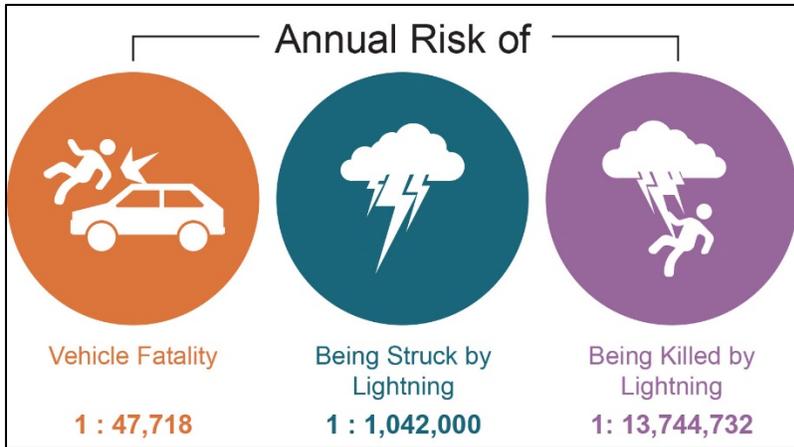
Risk is characterized as a 1 in x chance of a specified event occurring. The “increase in risk” is the chance that the specified event (e.g., an individual fatality from an unintentional release from the pipeline) would occur that would not have occurred if the project had not been built. In this case, there is an estimated 1 in 58 million chance that an individual fatality would occur during construction that would not have occurred if the project was not built.



Source: EDM Services, 2017.

Figure 4.9-3. Alternative 1 Individual Risk (of fatality) Results

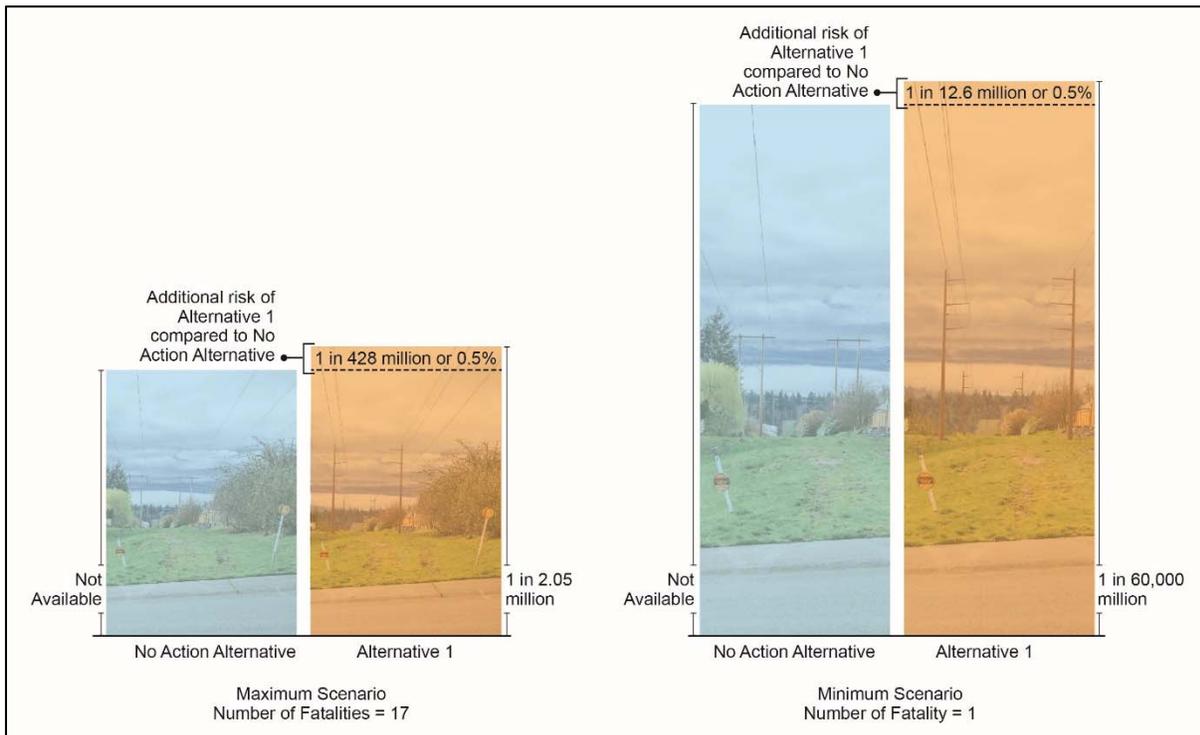
To put individual annual risk results in context, Figure 4.9-4 illustrates the annual risks for a relatively common type of incident (vehicle fatality) and a relatively uncommon type of incident (being struck or being killed by lightning).



Source: Insurance Information Institute, 2013; National Weather Service, 2017.

Figure 4.9-4. Annual Risk of Other Incidents, for Comparison

The assessment also considered the broader societal risk, or risk to groups of people, which takes into account the number of individuals who may be present near the project corridor at any given time and the duration of their presence. See Section 3.9.5.1 for additional information on societal risk. Societal risk takes into account multiple release scenarios. The societal risk results are presented below in Figure 4.9-5 for the maximum and minimum fatalities under the possible release scenarios, which are further described in *Pipeline Safety Technical Report* (Appendix I).



Source: EDM Services, 2017.

Figure 4.9-5. Alternative 1 Societal Risk Results

During construction, there is a one in 2 million probability of an event resulting in 17 fatalities occurring in any 1-year time period, and a one in 60,000 probability of a single-fatality event

occurring in any 1-year period. These results are above the thresholds for negligible impacts, and below the thresholds for intolerable impacts, that are used by Santa Barbara County and the California Department of Education for school siting purposes.

Based on the results of the assessment, the increased societal risk during construction of the proposed 230 kV lines over that posed by the existing 115 kV lines (No Action) is 1 in 428 million (for a scenario resulting in 17 fatalities), and 1 in 12.6 million (for a scenario resulting in one fatality). In other words, the assessment estimates that there would be a less than a 0.5 percent increase in societal risk during construction of Alternative 1.

4.9.2 Risks During Construction: No Action Alternative

No risk assessment was conducted for existing risks during construction since there would be no construction activity under the No Action Alternative. Any change in risks related to ongoing pole replacement activities (an operational activity) is expected to be minimal. Therefore, the construction risks for the No Action Alternative would be the same as the operational risks for the No Action Alternative. See Section 3.9.5.4.

4.9.3 Risks During Construction: Alternative 1 (New Substation and 230 kV Transmission Lines)

This section summarizes the potential pipeline safety risks during construction. During construction, the possibility of pipeline damage could occur from excavation activities and/or *surcharge loading* from construction equipment. The consequences of those impacts on resources, in the unlikely event an incident occurs, are provided in Section 3.9.6. The *Pipeline Safety Technical Report* was used as resource in this evaluation. See Appendix I for additional detailed information included in this analysis. In the EIS, the pipeline owner and operator are collectively referred to simply as Olympic.

Surcharge Loading

The presence of equipment and other loads on the soil surface (surcharge loads) can place stress on the underlying substructures, including pipelines. These stresses can over-stress the pipe, causing damage.

If a pipeline is encountered during excavation, the pipeline could be damaged and could result in an immediate or subsequent release that could place the public and/or workers at risk. PSE or the construction contractor would be required under state law to notify Olympic at least 48 hours prior to the start of any work to comply with the state's "one-call" locater service law. After Olympic is notified, PSE or the construction contractor would mark the ground where the facilities exist. As company practice, if a project is within 100 feet of the pipeline, Olympic's Damage Prevention Team will meet the construction crew on-site at the beginning of the project and weekly thereafter. If excavation has the potential to be within 10 feet of the pipeline, the Damage Prevention Team would be on-site at all times to monitor excavation. These procedures are designed to ensure that excavation would not damage any underground utilities and to decrease potential safety hazards (see Section 4.9.4, *Mitigation*). Therefore, unintentional damage to the pipelines from project-related construction would be unlikely.

Vibrations from operation of equipment to excavate for their poles could also be a potential construction impact. PSE would work with Olympic to confirm that potential vibration associated with proposed excavation methods for pole installation that include the use of vacuum trucks and auger drills would avoid damaging the pipelines.

The presence of equipment and other loads on the soil surface (surcharge loads) can place stress on the underlying substructures, including pipelines. These stresses can over-stress the pipe, causing damage. During construction, surcharge loads would be imposed over the existing Olympic Pipelines from heavy equipment, crane mats, and other loads that could be placed on the ground above the pipelines. PSE would coordinate with Olympic during project design to identify site-specific surcharge load requirements and needed mitigation measures to reduce or distribute the loads (see Section 4.9.4, *Mitigation*). Therefore, pipeline damage caused by surcharge loads would be unlikely.

As described in Section 3.9.3.3, “outside force/excavation” caused 20 percent of the refined petroleum product releases (nationally) from January 2010 through December 2015. In many cases, damage from outside/force excavation occurs because a contractor or other third party fails to notify the utility locator service, or the utility improperly locates the buried pipeline. With PSE’s awareness of the pipelines within the corridor, Washington State’s Damage Prevention Law and “one-call” locator service, and Olympic’s procedures to prevent third party damage described in Section 4.9.4, the increased risk posed to the pipelines during construction of the Energize Eastside project is relatively low.

Despite procedures in place to prevent third party damage, the estimates for individual and societal risk incident frequencies were developed using worst-case assumptions about the potential increase in risk during construction. The assessment assumed that the potential for third party damage during construction would increase by 50 percent (EDM Services, 2017), a conservatively high assumption. Because the probability of damage to the pipelines during construction is so low to begin with, even with these assumptions, the results indicate that there would still be a very small increase in total risk. With the implementation of measures to mitigate potential excavation and surcharge loading risks described in Section 4.9.4, these risks would likely be even lower.

Alternative 1 Impacts Conclusions

Based on the results of the risk assessment, there could be an increased risk of a pipeline release and fire during construction when compared with the No Action Alternative (see Section 4.9.1.2). Based on the results, and in consideration of project safeguards, the probability of a pipeline release and fire remains low under Alternative 1. However, the potential environmental health and safety impacts are significant if this unlikely event were to occur.

The individual and societal risks described above would be similar across all Alternative 1 segments and options. There would be reduced risk in segments and options where fewer miles of the transmission line are co-located with the Olympic Pipelines. These include Bypass Options 1 and 2, and the Willow 1 and Willow 2 Options. See Table 3.9-5 for the length of the Olympic Pipelines (both the 20-inch and 16-inch diameter pipelines) co-located with the PSE transmission lines in the segments and options.

With the implementation of additional measures to mitigate potential excavation and surcharge loading risks, the construction risks could be even lower (see Section 4.9.4, *Mitigation Measures*). Even with worst-case assumptions related to the increased risk during construction, the likelihood of a pipeline release and fire would remain low, and no substantial change in risk compared to the existing condition (No Action Alternative) has been identified. As a result, the potential risk is not considered significant.

For additional details about the analysis of construction risks under Alternative 1, see the *Pipeline Safety Technical Report* (Appendix I).

4.9.4 Mitigation Measures

The following construction-specific mitigation measures would be required or could be imposed to reduce the potential for environmental health and safety impacts related to pipeline safety. Construction-specific mitigation measures were identified based on a review of regulations, construction BMPs, and construction requirements for work in the corridor, all of which would be required. Additional mitigation measures are proposed to further reduce the potential for construction-related environmental health and safety impacts related to pipeline safety. Some of the required and potential mitigation measures listed in Section 3.9.7 (such as integrating the results and recommendations of the *AC Interference Study* [DNV GL, 2016] where applicable to the design of pole locations and layout) also have the potential to mitigate construction-related impacts.

As the pipeline operator, Olympic is responsible for operating and maintaining their pipelines in accordance with or to exceed PHMSA’s Minimum Federal Safety Standards in 49 CFR 195. The regulations are intended to ensure adequate protection for the public and to prevent pipeline accidents and failures. As a result of potential hazards and in compliance with these federal requirements, Olympic has a general list of requirements as part of *BP Pipelines (North America) General Construction Requirements* for all work proposed near the pipeline (see Appendix I). These requirements have been shared with PSE.

As part of ongoing coordination between PSE and Olympic, additional mitigation measures may be identified during final design. Appendix I includes a “frequently asked questions” sheet, summarizing steps that PSE and Olympic will take during construction for corridor safety.

4.9.4.1 Regulatory Requirements

PSE construction activities within all the segments and options would need to comply with applicable federal, state, and local damage prevention laws, regulations, and requirements, and Olympic’s general construction requirements for work near their pipelines, including the following measures:

- Develop construction and access plans in coordination with Olympic’s Damage Prevention Team and mutually agreed upon by both parties. These plans will outline the specific actions that PSE will take to protect the pipeline from vehicle and equipment surcharge loads, excavation, and other activities in consideration of Olympic’s general construction requirements and in consultation with Olympic on the Energize Eastside project design specifically. The following general measures, at a minimum, would be included in the construction and access plans:
 - Notify “one-call” 811 utility locator service at least 48 hours prior to PSE or PSE designated contractors conducting excavation work (Olympic’s line marking personnel would then mark the location of the pipeline near the construction areas. These procedures are designed to ensure that excavation would not damage any underground utilities and to decrease potential safety hazards.)

PSE/Olympic Coordination

PSE is responsible for the Energize Eastside project’s design, construction, and operational parameters within the shared corridor with Olympic. Olympic and PSE have worked together in the corridor for 40 years, and communicate regularly to coordinate activities related to standard pole replacement and other maintenance work. As part of the project development process for the Energize Eastside project, PSE has, and will continue to coordinate with Olympic on specific topics/actions, including construction.

- Field verify the distance between the pipeline and transmission line pole grounds.
- Add the pipeline location and depth to project plans and drawings and submit to Olympic for evaluation.
- Arrange for Olympic representatives to be on-site to monitor construction activities near the pipeline.
- Install temporary fencing or other markers around the pipeline area.
- Provide all necessary information for Olympic to perform pipe stress calculations for equipment crossings and surface loads (surcharge loads). Based on pipe stress calculations, and in coordination with Olympic, provide additional cover that may include installing timber mats, steel plating, or temporary air bridging; utilize a combination of these; or avoid crossing in certain identified areas in order to avoid impacts on Olympic pipelines. Ensure that mitigation to address potential surcharge load impacts is implemented in accordance with applicable requirements and recommended practices, including the following:
 - 49 CFR 195, Transportation of Hazardous Liquid by Pipeline.
 - American Petroleum Institute Recommended Practice 1102, Steel Pipelines Crossing Railroads and Highways.
 - American Lifelines Alliance, Guidelines for the Design of Buried Steel Pipe.
- Comply with additional measures related to minimizing surcharge loads included in Olympic’s general construction requirements (Appendix I).
- As part of Olympic’s general construction requirements for all work proposed near the pipeline (see Appendix I), comply with all other applicable requirements, including the following requirements:
 - No excavation or construction activity will be permitted in the vicinity of a pipeline until all appropriate communications have been made with Olympic’s field operations and their Right-of-Way Department. A formal engineering assessment (conducted by Olympic) may be required.
 - No excavation or backfilling within the pipeline right-of-way will be permitted for any reason without a representative of Olympic on-site giving permission.
 - In some instances, excavation and other construction activities around certain pipelines can be conducted safely only when the pipeline operating pressure has been reduced. PSE must inform their designated contractors that excavation that exposes or significantly reduces the cover over a pipeline may have to be delayed until the reduced operating pressures are achieved.

Pipeline Location

To identify appropriate measures to mitigate potential surcharge load impacts on the existing pipelines to safe limits, Olympic would locate the existing pipeline using a variety of methods, which may include electronic pipe locators, probing, and soft digging methods. Once the pipeline is located and identified, Olympic would perform pipe stress calculations for equipment crossings and surface loads, in coordination with PSE.

- For a project within 100 feet of the pipeline, Olympic's Damage Prevention Team will meet the construction crew on-site at the beginning of the project and weekly thereafter. If excavation has the potential to be within 10 feet of the pipeline, the Damage Prevention Team would be on-site at all times to monitor excavation.

4.9.4.2 Proposed Mitigation Measures

Potential mitigation measures are summarized below based on recommendations of EDM Services (2017) and measures the EIS Consultant Team has proposed to provide additional safety assurances.

- Continue to coordinate with Olympic and include safeguards in the project construction and access plans to protect nearby pipelines from excavation activities and surcharge loads.
- Coordinate with Olympic to ensure that line marking personnel mark the entire length of any pipeline within 50 feet of any excavation or ground disturbance below original grade, and not only the location of angle points (points of intersection).
- Utilize soft dig methods (e.g., hand excavation, vacuum excavation, etc.) whenever the pipeline(s) are within 25 feet of any proposed excavation or ground disturbance below original grade.
- Coordinate with Olympic to ensure that an Olympic employee, trained in the observation of excavations and pipeline locating, is on-site at all times during excavation and other ground-disturbing activities that occur within 100 feet of the pipelines where the pipelines are co-located with the proposed transmission lines.
- Arrange for a special monitor (third party monitor) on-site at all times during excavation and other ground-disturbing activities that occur within 100 feet of the pipelines where the pipelines are co-located with the proposed transmission lines.
- Develop an adjacent use protection plan near sensitive land uses to identify appropriately sized construction zones to protect the general public, construction timing limits, and other mitigation measures that would effectively limit the exposure of the general public to potential pipeline incidents.
- Prior to construction of the Energize Eastside project, file a mitigation and monitoring report with the Partner Cities documenting all consultations with Olympic and mitigation measures to address safety-related issues. The report should include a monitoring plan that identifies how mitigation measures will be monitored to ensure that mitigation related to construction activities is followed.



4.10 ECONOMICS

The economic aspects of the project that are evaluated in this Phase 2 Draft EIS do not relate to construction impacts; no further detail is provided in this chapter.