

Chapter 17 Vegetation

Words in **bold** and acronyms are defined in Chapter 32, Glossary and Acronyms.

This chapter describes existing vegetation resources in the project area, and how the project alternatives could affect these vegetation resources. Related vegetation information can be found in Chapter 16, Wetlands; Chapter 18, Wildlife; and Chapter 19, Fish.

17.1 Affected Environment

Most of the project area is in the Western Hemlock Forest Vegetation Zone, which was historically dominated by western hemlock, Douglas fir, and western red cedar (Franklin and Dyrness 1988). The southwest portion of the project area transitions into the Interior (Willamette) Valley Vegetation Zone. Within these zones, other plant community types occur, including remnant patches of wet and dry prairie, Oregon white oak (*Quercus garryana*) woodlands, and riparian woodlands dominated by black cottonwood and willow. **Wetland plant communities** are common, especially near rivers and streams and where **hydric soils** occur in lowland and floodplain areas, including the Cowlitz River valley lowlands and the Columbia River floodplain (see Chapter 16, Wetlands).

In general, vegetation within the project area is determined by a combination of factors, including climate, topography, soils, hydrology, and land use practices. Much of the vegetation has been disturbed and altered by urbanization, forestry, and agriculture. Major urban and suburban influences on vegetation occur near larger rivers and include the cities of Kelso, Longview, Castle Rock, Vancouver, and Camas in Washington, and Troutdale and Fairview in Oregon. Agriculture and production forests are common in rural areas east of the Longview-Kelso area and north of Vancouver.

The effects of extensive development on natural vegetation include **habitat fragmentation**, the conversion and loss of native habitats, and the introduction and spread of weedy species. In the project area, many native species and plant communities have become scarce, such as Bradshaw's lomatium (*Lomatium bradshawii*) and Oregon ash/common snowberry forested wetlands (see Section 17.1.2, Special-Status Plant Habitats, and Section 17.1.3, Special-Status Species). Despite the large extent of human development in the project area, however, some high-quality native plant communities persist, including stands of old-growth and mature forest, Oregon white-oak woodlands, an extensive network of streams and riparian areas, wetlands, and small areas of native prairie. This is particularly the case in the northern and eastern portions of the project area.

17.1.1 General Vegetation Types

Land cover and vegetative cover were used to categorize the land within the project area into seven general vegetation types: mature forest, forest, production forest, shrubland, herbaceous (non-woody), rural landscaped, and urban/suburban landscaped (see Maps 17-1A through 17-1D).

Although these maps show the vegetation types throughout the project area, for this analysis, a study area for vegetation types was identified to include a 3,000-foot corridor, 1,500 feet either side of the transmission line centerline. This area includes the transmission line right-of-way,

new and improved access roads, substation areas, and removed, rebuilt, and new towers on existing right-of-way.

Wetlands may occur in all general vegetation types and include forested wetlands, scrub-shrub wetlands, emergent wetlands, aquatic bed wetlands, and open water. The vegetation characteristic of each of these wetland types is described under the general vegetation types in this section, but information on existing wetland locations and acreages in the project area is in Chapter 16, Wetlands.

17.1.1.1 Mature Forest

Mature forest includes older forested areas typically dominated by coniferous trees over 80-years old with a diameter at breast height (dbh) over 21 inches. This vegetation type also includes old-growth forest, which is forest with at least eight trees per acre that either have a dbh greater than 32 inches, or are more than 200-years old, and form a multi-layered canopy with occasional small openings.

The most common tree species in mature forest is Douglas fir, but mature forest may also include Sitka spruce, noble fir (*Abies procera*), western hemlock, western red cedar, and Pacific silver fir (*Abies amabilis*). Understory species vary, but may include vine maple (*Acer circinatum*), salal (*Gaultheria shallon*), bunchberry dogwood (*Cornus Canadensis*), beaked hazelnut (*Corylus cornuta*), red huckleberry (*Vaccinium parvifolium*), oval-leaf blueberry (*V. ovalifolium*), thinleaf huckleberry (*V. membranaceum*), and sword fern (*Polystichum munitum*).

Some mature forests include areas dominated by Oregon white oak, particularly in areas with well-drained sandy and gravelly soils. Oregon white oak woodlands are a priority for conservation and management by the state of Washington (see Section 17.1.2, Special-Status Plant Habitats).

Mature forest also includes some areas with mature forested wetlands, which have at least 30 percent areal cover by mature tree species (over 80-years old) (see Chapter 16, Wetlands). Tree species commonly found in mature forested wetlands include red alder, black cottonwood, western red cedar, Sitka spruce, and Oregon ash. Shrub and herbaceous layers in mature forested wetlands include black hawthorn, red-osier dogwood, stinging nettle, western skunk cabbage, slough sedge, and various fern species.

Mature forest is uncommon in the study area, but can be found in riparian areas where timber harvest has been limited, and near Yale Lake and Lake Merwin (see Maps 17-1A, 17-1C, and 17-1D). Mature forest only covers about 3 percent of the study area along the Crossover Alternative, 2 percent along the West Alternative, and 1 percent along the Central and East alternatives.

Mature forests are considered high-quality native plant habitats.

17.1.1.2 Forest

The forest vegetation type includes forests with at least 30 percent areal cover by trees younger than 80-years old, or with a dbh less than 21 inches. Forest has a greater diversity of shrubby and herbaceous species in the understory than in the mature forest and production forest

vegetation types. Forests in the project area may be dominated by conifers or by a combination of conifers and hardwoods. They include small stands in some urban and suburban settings and expansive stands in more remote areas. The forest vegetation type likely includes some small tracts of privately owned forests managed for production.

Common coniferous tree species in the forest vegetation type include Douglas fir, grand fir (*Abies grandis*), noble fir, and western hemlock in uplands, and western red cedar in wetlands. Common hardwood tree species include big leaf maple (*Acer macrophyllum*) in uplands, and Oregon ash, black cottonwood, and red alder in forested wetlands. Common shrub understory species include Oregon grape (*Mahonia nervosa*), beaked hazelnut, salmonberry (*Rubus spectabilis*), oceanspray (*Holodiscus discolor*), vine maple, Indian plum (*Oemleria cerasiformis*), and salal.

The forest vegetation type also includes some forested wetlands (see Chapter 16, Wetlands). These forested wetlands are similar to mature forested wetlands, but with trees generally less than 80-years old. Because of more recent or frequent disturbances and more open canopy, less mature forested wetlands may have more non-native species in the understory, including various shrubs and dense areas of reed canarygrass.

The forest vegetation type can be found throughout the study area, although it is more prevalent on either side of the Cowlitz River in the northern portion of the study area and southwest of Lake Merwin in the central portion (see Maps 17-1A through 17-1D). This vegetation type covers about 31 percent of the study area along the West Alternative, 24 percent along the Central Alternative, 27 percent along the Crossover Alternative, and 16 percent along the East Alternative.

Forest is considered a native plant habitat of moderate quality, and forested wetlands a high-quality native plant habitat.

17.1.1.3 Production Forest

Cowlitz and Clark counties are dominated by the production forest vegetation type, which are forests routinely harvested to produce wood products, although some production forest is also managed for habitat. Production forest was identified by the locations of large timber company landholdings in the project area. It is likely that some smaller areas of privately-owned production forest also occur in the project area, but information about these smaller areas is not readily available, so these areas have been categorized as forest for the purposes of this analysis. In 2009, private timberland owners harvested about 114 million board feet of timber from about 4,500 acres in Cowlitz, Clark, and Multnomah counties (WDNR 2009b, Oregon Department of Forestry 2009). About 86 percent of this timber was harvested in Cowlitz County.

The production forest vegetation type is dominated by Douglas fir and western hemlock (WDNR 2009c). Although plant species in production forest areas are similar to species found in the other two forest vegetation types, tree species diversity is lower. A recurring cycle of tree growth and harvest strongly influence the structural characteristics, age, and composition of these forests. Frequent disturbance from tree harvests can also create opportunities for weedy species to invade the understory.

Production forest is most concentrated in the central portion of the study area, both north and southeast of Lake Merwin and Yale Dam (see Map 17-1B and Map 17-1C). It is the most common vegetation type along three of the action alternatives. In the study area, it covers 73 percent of the East Alternative, 63 percent of the Central Alternative, and 50 percent of the Crossover Alternative (Herrera 2010). It covers only 10 percent of the West Alternative. The Casey Road and Baxter Road substation sites and about one third of the Monahan Creek substation site occur in production forest.

Production forest is considered a low-quality native plant habitat.

17.1.1.4 Shrubland

Shrubland includes areas with at least 30 percent areal cover by shrubs and tree saplings. In the project area, shrubland occurs in existing transmission line rights-of-way where vegetation management requires the regular removal of tall-growing vegetation, in recently harvested production forest, and in fallow fields. Because shrublands develop following a disturbance, they are susceptible to invasion by non-native plants from infested areas. Because of this, and given the prevalence of non-native plants in the region, shrublands are likely to have low native plant diversity in the project area.

Common native shrub species within upland shrubland include vine maple, oceanspray, and snowberry (*Symphoricarpos albus*), and common non-native species include Himalayan blackberry (*Rubus armeniacus*) and Scotch broom (*Cytisus scoparius*). Non-native pasture grasses and **forbs** commonly occur in the understory within upland shrubland.

Wetlands within shrubland are known as scrub-shrub wetlands (see Chapter 16, Wetlands). Scrub-shrub wetlands are dominated by shrubs adapted to areas that are partially inundated during the growing season. Scrub-shrub wetlands occur in depressions; along streams, rivers, and ditches; and in forested wetlands that have been cleared. Common native shrub species include a variety of willows, salmonberry, red-osier dogwood, Douglas' spiraea, Pacific ninebark, and rose species. Non-native shrub species may include butterfly bush. Common herbaceous species include native sedges, rushes, and ferns, and native and non-native grasses and forbs.

Shrublands are scattered throughout the production forest and forest habitats in the study area and are often connected to herbaceous habitat. They are more common along the West and Crossover alternatives than the Central and East alternatives (see Maps 17-1A through 17-1D). Shrubland covers about 7 percent of the study area along the West Alternative and 4 percent along the Crossover Alternative. The Central and East alternatives only have about 2 percent of the study area in shrublands.

Shrubland is considered a low-quality native plant habitat; scrub-shrub wetlands are considered a high-quality native plant habitat.

17.1.1.5 Herbaceous

The herbaceous vegetation type includes pasture and cropland, and native upland and wetland prairie. Although more than 99 percent of the prairies of southwestern Washington have been converted to pasture, cropland, or other uses, areas of remnant native prairie and wetland vegetation remain (Caplow and Miller 2004). In 1988, the USFWS estimated that between

20 and 39 percent of Washington's wetlands had been lost, with estimates of continuing wetland removal ranging from 700 to 2,000 acres per year (Lane and Taylor 1997).

The herbaceous vegetation type, like shrublands, frequently occurs scattered throughout forest and production forest. It is more concentrated along the Cowlitz River and mixed with forest in the area southwest of Lake Merwin. This vegetation type is more common along the West Alternative, providing about 21 percent cover of the study area (see Maps 17-1A through 17-1D). The remaining action alternatives have little herbaceous vegetation within the study area: about 5 percent in the Crossover Alternative, 4 percent cover in the Central Alternative, and 3 percent in the East Alternative.

The herbaceous vegetation type is generally considered a low-quality native plant habitat, with the exception of native prairie and herbaceous wetlands.

Pasture and Cropland

The pasture and cropland vegetation types include large tracts of pastures, hayfields, and row crops interspersed with orchards, Christmas tree farms, and vineyards. Common pasture species include orchard grass (*Dactylis glomerata*), sweet vernal grass (*Anthoxanthum odoratum*), timothy (*Phleum pratense*), and non-native forbs such as clovers (*Trifolium spp.*), oxeye daisy (*Leucanthemum vulgare*), and hairy cat's ear (*Hypochaeris radicata*). A variety of crops are grown including vegetables, mints, grapes, nursery stock, sod, berries (e.g., strawberries, blueberries, and caneberries), tree fruits, and nuts.

Areas within pasture and cropland often include drainage ditches and depressions, which may support emergent and scrub-shrub wetland communities. Pasture and cropland can also include natural or human-made open water areas and streams, which often support riparian habitat.

Native Upland and Wet Prairie

Native prairie is a rare vegetation type. Native prairie predominantly consists of native herbaceous species and is classified as either wetland (wet) or upland prairie. For this analysis, native prairie is considered a high-quality native plant habitat. Wet prairie has wetland hydrology, hydric soils, and plant species adapted to grow in wet conditions. Although the project area historically contained many native prairies, most have been converted for agriculture or developed for other uses. Only small remnant patches remain along fencerows and field margins (WDNR 2008, 2009c; Caplow and Miller 2004).

The Lacamas Prairie Natural Area is in the project area and contains the only remaining intact wet prairie in Washington (see Section 17.1.2.1, WDNR Protected Areas). The Lacamas Prairie Natural Area also includes extensive Oregon white oak woodland habitats. Plant species include native grasses such as tufted hairgrass (*Deschampsia cespitosa*) and California oatgrass (*Danthonia californica*), native sedges and rushes, and a variety of native forbs, including blue camas (*Camassia quamash*). Special-status plant species include the federally endangered Bradshaw's lomatium, state-endangered hairy-stemmed checker-mallow (*Sidalcea hirtipes*), and state-threatened Oregon coyote-thistle (*Eryngium petiolatum*) (see Section 17.1.3, Special-Status Plant Species). Most remnant wetland native prairies in the project area have been extensively altered and invaded by non-native species such as common velvetgrass (*Holcus*

lanatus), and various native trees and shrubs, including Oregon ash, red alder, black hawthorn, and various rose species.

Plant species found in intact upland native prairies include native bunchgrasses such as Roemer's bunchgrass (*Festuca idahoensis* ssp. *roemeri*), California oatgrass, blue wildrye (*Elymus glaucus*), Lemmon's needlegrass (*Achnatherum lemmonii*), and junegrass (*Koeleria macrantha*) (Chappell and Kagan 2001). The spaces between the bunchgrasses are typically covered by mosses, fruticose lichens, or native forbs (Altman et al. 2001). Showy, slow-growing, perennial forbs include common woolly sunflower (*Eriophyllum lanatum*), slender cinquefoil (*Potentilla gracilis*), wild strawberry (*Fragaria virginiana*), rose checker-mallow (*Sidalcea malviflora* ssp. *virgata*), Hall's aster (*Symphotrichum hallii*), and Tolmie's mariposa lily (*Calochortus tolmiei*). Most remnant upland native prairies in the project area have been extensively altered and invaded by non-native species such as Kentucky bluegrass (*Poa pratensis*), sweet vernal grass, and scotch broom, and by various native shrubs and trees.

Wetlands

Herbaceous wetlands include palustrine emergent wetlands, aquatic bed wetlands, and open water. Vegetation consists of erect, rooted, herbaceous **hydrophytes** with at least 30 percent areal coverage (Cowardin et al. 1979). Emergent wetlands are common along the margins of aquatic beds and open water areas and in cleared forested wetlands. Common native herbaceous plant species in emergent wetlands include sedges, rushes, bulrushes, and cattail. They can also contain a wide range of non-native species such as reed canarygrass. Emergent wetlands may also provide habitat for special-status native plant species, including those that historically occurred in wet prairies.

Aquatic bed wetland vegetation is dominated by plants that grow on or below the surface of the water for most of the growing season (Cowardin et al. 1979). The areal coverage of submerged or floating aquatic vegetation is at least 30 percent. Aquatic beds represent a diverse group of plant communities that require surface water for optimum growth; they are best developed in permanent water or under conditions of repeated flooding. The plants attach to the substrate or float freely in the water above or below the surface. Plant species include milfoils, pondweeds, water lilies, and lesser duckweed. Aquatic bed habitats within the project area are scarce, widely scattered, and least common in foothills areas (such as those crossed by the East Alternative). They occur in open water and next to emergent habitats. Depending on water depth and turbidity, open water may contain non-emergent hydrophytic plant species.

17.1.1.6 Rural Landscaped

The rural landscaped vegetation type includes the vegetation in farmyards, small pastures or cultivated areas a few acres in size, and low-density residential development.

The landscape is highly fragmented and may include vegetation from the other general vegetation types. Examples are small pastures or cultivated fields surrounding farmyards, and forested areas intermixed with single-family homes. The quality and amount of natural plant habitats are highly variable.

The rural landscaped vegetation type is located primarily along the Cowlitz River, mixed with forest in the area southwest of Lake Merwin, and in and around Castle Rock, Longview-Kelso, and Vancouver (see Maps 17-1A, 17-1C, and 17-1D). This vegetation type covers about

12 percent of the study area along the West Alternative, 7 percent along the Crossover Alternative, 4 percent along the Central Alternative, and 3 percent along the East Alternative.

Rural landscaped vegetation is considered a low-quality native plant habitat due to high levels of disturbance and a small distribution of native plant communities.

17.1.1.7 Urban/Suburban Landscaped

The urban/suburban landscaped vegetation type includes the vegetation in mid-to-high-density development, including commercial, residential, and industrial areas. Vegetation primarily occurs in highly fragmented patches of non-native street trees, lawns, and ornamental landscaping, although some native plant communities may occur in parks or other public spaces.

Urban and suburban landscaped vegetation occurs primarily in the north and south portions of the study area. They include Castle Rock and the Longview-Kelso metro area in the north, and Vancouver in the south (see Maps 17-1A and 17-1D). This vegetation type covers about 18 percent of the study area along the West Alternative, 4 percent along the Crossover Alternative, and 3 percent along the Central and East alternatives.

The rural landscaped vegetation type is considered a low-quality native plant habitat due to high levels of disturbance and a small distribution of native plant communities.

17.1.2 Special-Status Plant Habitats

Special-status plant habitats are native plant communities that are rare or have very limited distribution. In Washington, they are recognized as high quality or rare plant communities (priority ecosystems) that contain a unique, mature, or high-diversity assemblage of native plant species (WNHP 2011b). They are a priority for preservation and the lands on which they occur may be purchased by WDNR and designated as **Natural Area Preserves (NAPs)** or **Natural Resource Conservation Areas (NRCAs)**. In addition, WDNR owns forest riparian conservation easements, research plots, and genetic reserves important for conservation and research. **Priority habitats** are similar to priority ecosystems, but are identified by the Washington Department of Fish and Wildlife (WDFW) as having unique vegetation types, dominant plant species, successional stages, or specific habitat features that are important to wildlife and considered a priority for conservation and management by the state (WDFW 2008) (see Chapter 18, Wildlife).

The Oregon Biodiversity Information Center (ORBIC) identifies high-quality native plant communities that represent the full range of Oregon's natural heritage resources, and are priorities for preservation (Oregon Natural Heritage Advisory Council 2010). Natural heritage (vegetation) resources are identified as ecosystem elements, which can be high-quality plant communities, ecosystems, or special-status species.

For this analysis, the study area for special status plant habitats and species was a 2-mile corridor (1 mile either side of the transmission line centerline). This area includes the transmission line right-of-way, new and improved access roads, substation areas, and removed, rebuilt, and new towers on existing right-of-way. This study area is larger than the study area for general vegetation types. A broader area allows a more accurate assessment of their likelihood to occur in the affected environment, and a better description of the extent of impacts to these important resources.

A number of special-status plant habitats have been identified within the study area in Washington, although none have been found within this area in Oregon.

17.1.2.1 WDNR Protected Areas

WDNR protected areas include a proposed combined NAP and NRCA, and forest riparian conservation easements, research plots, and genetic reserves.

Natural Area Preserves are important natural areas owned and managed by WDNR. They protect some of the best remaining examples of natural ecosystems that occur in the state. They include rare plant and animal habitat, and often have features unique to the region. The overarching purpose of the NAP program is to protect these areas as a legacy for future generations.

The project area in Washington includes the Lacamas Prairie Natural Area, as designated by the Washington State Commissioner of Public Lands (see Figure 17-1). The Lacamas Prairie Natural Area is east of Vancouver and northwest of Washougal. It contains federally and state-listed plant species, WNHP priority ecosystems (see Section 17.1.2.2, WNHP Priority Ecosystems) and other high quality plant communities, including wet prairie and mature forest. WDNR has proposed that the entire Natural Area be purchased by WDNR for a NAP and NRCA, and WDNR is currently pursuing the purchase of a portion of the proposed NAP.

The following alternatives and options have the Lacamas Prairie Natural Area within their study areas: West Alternative (1,603 acres), West Option 1 (46 additional acres), West Option 2 (259 fewer acres), West Option 3 (524 fewer acres), and Crossover Option 1 (371 acres). Specific segments crossing Lacamas Prairie include 36, 36A, 36B, 40, 41, 45, 46 and 50 (see Figure 17-1).

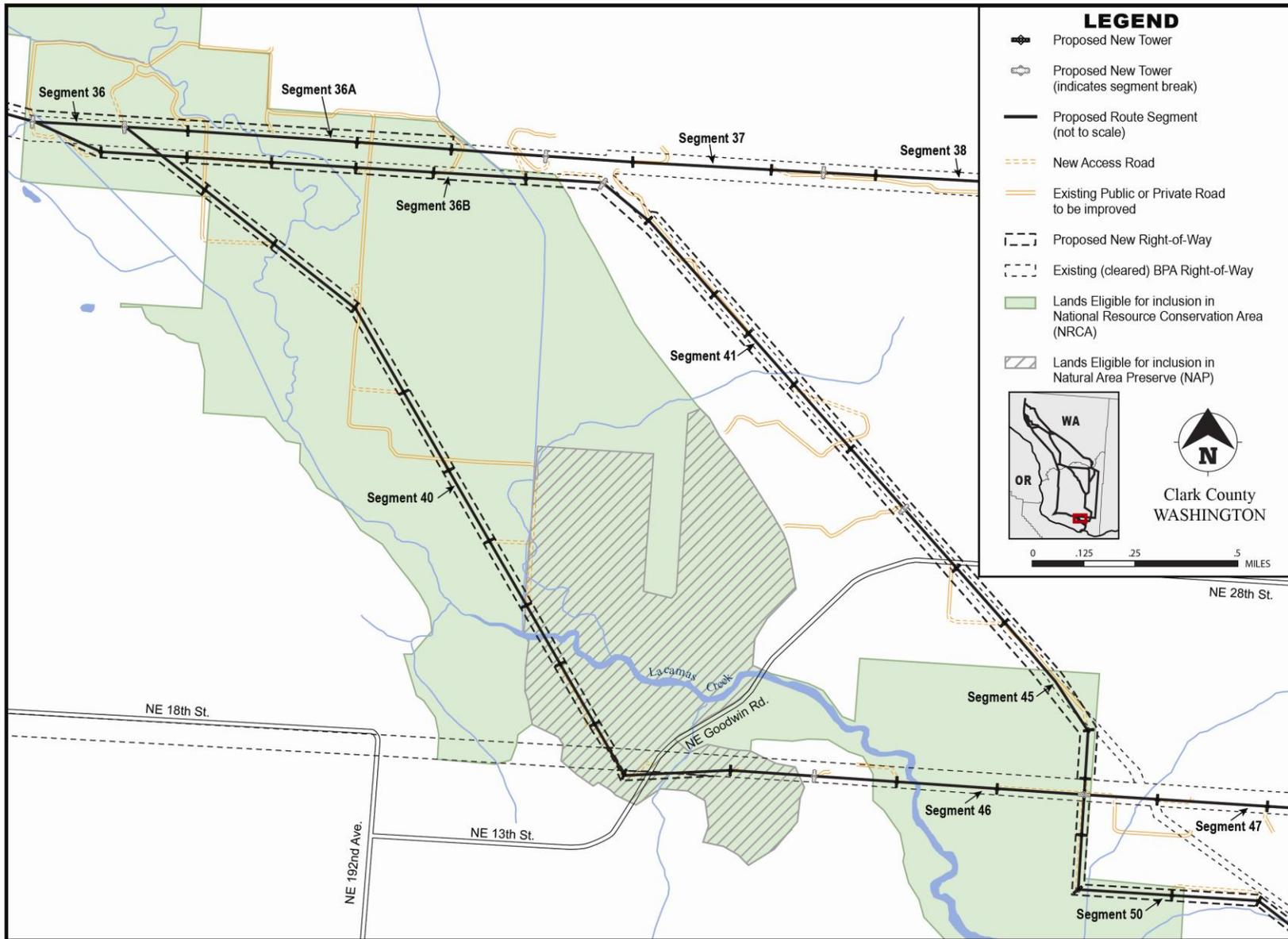
WDNR holds a forest riparian conservation easement through its Riparian Open Space Program within the right-of-way along Segment 9 of the West and Crossover alternatives. WDNR also maintains permanent research plots for varying purposes and has reserves for research on tree species genetics. One of these areas is partially within new right-of-way and the proposed routes for new and improved access roads along Segment 30 of Central Option 3.

17.1.2.2 WNHP Priority Ecosystems

The Washington Natural Heritage Program establishes native plant and ecological conservation priorities for Washington by identifying priority ecosystems. Prioritization is based on ecosystem rarity; the degree of threat to the persistence of an ecosystem; whether an ecosystem is habitat for endangered, threatened, and sensitive plants and animals; and whether the ecosystem is an important scenic landscape (WNHP 2007). Prioritization of these ecosystems is meant to guide the selection of areas to be designated officially as NAPs and NRCAs by WDNR, and to help guide other entities in land use planning and environmental decision-making (WNHP 2011b).

WNHP maintains a database of high-quality or rare ecological communities known to occur in each county of Washington (WNHP 2010). These priority ecosystems are areas designated by WNHP that contain unique mature or highly diverse native plant communities. Priority ecosystems are identified by indicator plant species, such as Oregon white oak/*Pacific* poison-oak (*Toxicodendron diversilobum*)/blue wildrye.

Figure 17-1 Proposed and Existing Rights-of-Way through the Lacamas Prairie Natural Area



The action alternatives have documented occurrences of the following priority ecosystems in the study area (WDNR 2008, 2010c):

- Oregon white oak woodlands
 - Oregon ash/common snowberry (in forested wetlands)
 - Oregon white oak/Pacific poison-oak/blue wildrye (in forest)
- Tufted hairgrass–California oatgrass (in emergent and scrub-shrub wetlands)
- North Pacific **herbaceous bald** and bluff (in forest openings)

Oregon white oak woodland priority ecosystems have been documented along parts of the southern portion of the study areas for all action alternatives, primarily in or near the Lamasas Prairie Natural Area. However, they are only found in the study areas of the West Alternative (including the West Options) and Crossover Option 1, which is where they are also most abundant.

One tufted hairgrass-California oatgrass priority ecosystem occurs in the study areas of the West Alternative (including the West Options) and Crossover Option 1 in the Lamasas Prairie Natural Area, though it is not crossed by the alternatives.

There is one documented North Pacific herbaceous bald and bluff WNHP priority ecosystem within the study area of the West Alternative, West Option 1, and Crossover Option 1, but it is not crossed by the proposed right-of-way or access roads. Six other herbaceous balds that have not been documented as WNHP priority ecosystems have been identified by WDFW: Larch Mountain (East and Crossover alternatives and East Option 2), Bald Mountain (Central Alternative), Davis Peak (Central Alternative), Lamasas Lake (Central, Crossover, East, and West alternatives, all West Options, and Crossover Option 1), Little Baldy Mountain (West Option 3), and Wilkinson Saddle (East Alternative) (see Chapter 18, Wildlife). Only the herbaceous bald on Larch Mountain is crossed by the project, although the herbaceous bald on Bald Mountain is within a few feet of an access road.

Several other priority ecosystems considered by WNHP as high quality or rare have not been documented in the study area, but have the potential to occur because they are known to occur in Cowlitz or Clark counties:

- Oregon ash/slough sedge forest (in forested wetlands)
- Douglas-fir–Oregon white oak/snowberry woodland (in forest and production forest areas)
- A variety of remnant native prairie associations, such as the Roemer’s fescue (*Festuca idahoensis*, var. *roemerii*)–great camas (*Camassia leichtlinii*) association (in herbaceous areas)
- Douglas fir/beaked hazelnut/sword fern forest (in forest, production forest, and mature forest)
- Noble fir forest (in forest and production forest areas)
- Douglas fir–western hemlock/sword fern forest (in forest and production forest)
- Sitka willow (*Salix sitchensis*) shrubland (in scrub-shrub wetlands)
- Western hemlock/sword fern forest (in forest and production forest)

The ORBIC database maintains Oregon's database of natural vegetation, with descriptions and information on occurrences of rare, threatened, or endangered species; however, it does not map native plant communities, ecosystems, or associations (ORBIC 2010).

17.1.3 Special-Status Species

17.1.3.1 Definitions

Special-status species include those native species identified by federal and/or state authorities as having low or declining populations that could put the species at risk at state, national, and/or global levels.

Federally listed threatened and endangered plant species are protected under the federal Endangered Species Act (ESA) and regulated by the USFWS. Federal special-status species also include those categorized by USFWS as proposed for listing, candidates for listing, or as species of concern. Fourteen federal special-status plant species potentially occur in the project area; two species have current documented occurrences in the study area (see Table 17-1 and Section 17.1.2, Special-Status Plant Habitats for a definition of the study area) (USFWS 2010a, 2010b, 2010c, 2011; WNHP 2010).

State special-status species are those identified by the states of Washington (WDNR) and/or Oregon (Oregon Department of Agriculture [ODA]) as having populations at risk within the state (see Table 17-1). In Washington, special-status species in the project area include those identified as endangered, threatened, sensitive, or candidates for listing (WDNR 2010e). In Oregon, they include those identified as endangered, threatened, sensitive vulnerable, sensitive critical, or as candidates for listing (ORBIC 2010). Twenty-eight state special-status plant species have the potential to occur in the project area; 13 are also federal special-status species. Eleven species have current documented occurrences in the study area.

Table 17-1 Special-Status Plant Species with the Potential to Occur in the Study Area¹

Species	Status	Potential Habitat in Project Area	Documented Occurrences by Action Alternative		
			In Access Roads or at Tower Sites ²	In the Right-of-Way	Outside of the Right-of-Way
Barrett's penstemon (<i>Penstemon barrettiae</i>)	Federal (SOC) WA (T)	Herbaceous (herbaceous bald and bluff)	-	-	-
Bolandra (<i>Bolandra oregano</i>)	WA (S)	Mature Forest, Forest, Production Forest (riparian, moist rocky outcrops)	-	-	West, Central, and East alternatives and options (h); Crossover Alternative and Options (c)
Bradshaw's lomatium (<i>Lomatium bradshawii</i>)	Federal (E) WA (E) OR (E)	Herbaceous (wet prairies)	West Alternative and Options (c)	West Option 1 (c)	West Alternative and Options (c) Crossover Option 1 (c)
Branching montia (<i>Montia diffusa</i>)	WA (S)	Forest, Production Forest	-	-	West Alternative and Options (h)
Clackamas corydalis (<i>Corydalis aquae-gelidae</i>)	Federal (SOC) WA (S)	Forest, Production Forest (elev. 2,500 to 3,800 feet, forested wetland, forested riparian)	-	-	-
Dense sedge (<i>Carex densa</i>)	WA (T)	Herbaceous (wet prairie, riparian areas)	-	-	West Alternative West Option 1 Crossover Option 1 (c)
Golden paintbrush (<i>Castilleja levisecta</i>)	Federal (T) WA (E) OR (E)	Herbaceous (wet and upland prairie)	-	-	All Action Alternatives (h)
Great polemonium (<i>Polemonium carneum</i>)	WA (T)	Forest, Production Forest, Herbaceous, Rural Landscaped	-	-	West Alternative and Options (h)
Hairy-stemmed checkermallow (<i>Sidalcea hirtipes</i>)	WA (E)	Herbaceous (prairie, herbaceous balds)	-	-	West (h), Central (c/h) (Central Option 3 = h), and Crossover alternative and options (h)
Hall's aster (<i>Symphotrichum hallii</i>)	WA (T)	Herbaceous (prairie)	West Option 1 (c)	West Option 1 (c)	West Alternative, West Option 1, Crossover Option 1 (c)

Species	Status	Potential Habitat in Project Area	Documented Occurrences by Action Alternative		
			In Access Roads or at Tower Sites ²	In the Right-of-Way	Outside of the Right-of-Way
Howell's bentgrass (<i>Agrostis howellii</i>)	Federal (SOC)	Forest, Production Forest (shady woodlands, cliff bases) ^f	–	–	–
Howell's daisy (<i>Erigeron howellii</i>)	Federal (SOC) WA (T)	Herbaceous (1,600–3,400', herbaceous balds) ^e	–	–	–
Idaho gooseberry (<i>Ribes oxycanthoides</i> ssp. <i>Irriguum</i>)	WA (T)	Forest and Production Forest (3,000 to 5,000 feet, stream-sides, canyon slopes)	–	–	West Alternative and Options (h)
Kincaid's lupine (<i>Lupinus sulphureus</i> ssp. <i>kincaidii</i>)	Federal (T) WA (E) OR (T)	Herbaceous and Forest (upland prairie and open oak woodlands)	–	–	–
Narrowleaf wyethia (<i>Wyethia angustifolia</i>)	WA (S)	Herbaceous (upland prairie)	–	–	Central Alternative and Options (h)
Nelson's checker-mallow (<i>Sidalcea nelsoniana</i>)	Federal (T) WA (E) OR (T)	Herbaceous (wet prairie, open riparian)	–	–	–
Nuttall's quillwort (<i>Isoetes nuttallii</i>)	WA (S)	Herbaceous (wet prairie)	West Alternative and Options (c)	West Option 1 (c)	West Alternative and Options Crossover Option 1 (c)
Oregon coyote-thistle (<i>Eryngium petiolatum</i>)	WA (T)	Herbaceous (wet prairie)	West Option 1 (c)	West Option 1 (c)	West Alternative and Options Crossover Option 1 (c)
Pale (white rock) larkspur (<i>Delphinium leucophaeum</i>)	Federal (SOC) WA (E) OR (E)	Herbaceous (herbaceous bald and bluff, upland prairie, wet prairie)	–	–	–
Small-flowered trillium (<i>Trillium parviflorum</i>)	WA (S)	Mature forest, Forest (including Oregon white oak woodlands and riparian areas), Production Forest, Shrubland	All Action Alternatives (c)	All Action Alternatives (c)	All Action Alternatives (c)
Smooth goldfields (<i>Lasthenia glaberrima</i>)	WA (E)	Herbaceous (emergent wetlands, riparian areas)	–	–	All Action Alternatives (h)

Species	Status	Potential Habitat in Project Area	Documented Occurrences by Action Alternative		
			In Access Roads or at Tower Sites ²	In the Right-of-Way	Outside of the Right-of-Way
Soft-leaved willow (<i>Salix sessilifolia</i>)	WA (S)	Mature Forest, Forest, Production Forest (forested riparian)	–	–	Central Alternative, Central Options 1 and 3, East Alternative, East Options 2 and 3 (c)
Tall bugbane (<i>Cimicifuga elata</i>)	Federal (SOC) WA (S) OR (C)	Mature Forest, Forest, Production Forest (forested riparian)	–	–	West Alternative and Options (c/h); Central, East, and Crossover alternatives and options (c)
Torrey's peavine (<i>Lathyrus torreyi</i>)	Federal (SOC) WA (T)	Forest, Production Forest	–	–	West Alternative and Options (h)
Water howellia (<i>Howellia aquatilis</i>)	Federal (T) WA (T)	Herbaceous (emergent wetlands)	–	–	–
Western wahoo (<i>Euonymus occidentalis</i> var. <i>occidentalis</i>)	WA (T)	Mature Forest, Forest, Production Forest	–	–	West Alternative and Options (c/h), Central Alternative and Options 1 and 2 (h), Central Option 3 (c/h), and East Alternatives and Options (h)
Western yellow oxalis (<i>Oxalis suksdorfii</i>)	WA (T)	Herbaceous, Forest, Production Forest	–	–	West Alternative and Options (h)
Whitetop aster (<i>Sericocarpus rigidus</i>)	Federal (SOC) OR (S)	Herbaceous (upland prairie)	–	–	–
Willamette Valley daisy (<i>Erigeron decumbens</i> var. <i>decumbens</i>)	Federal (E) OR (E)	Herbaceous (upland prairie, Oregon white oak savanna)	–	–	–
<p>Notes:</p> <p>C – candidate, T – threatened, E – endangered, S – sensitive, SOC – species of concern, c = current documented occurrences (recently verified as still existing), h = historic documented occurrences (not recently verified)</p> <p>1. Documented occurrences are within a 2-mile-wide corridor (1 mile on each side of the action alternatives).</p> <p>2. Documented occurrences of species that occur in access roads or at tower sites are not repeated in the two right-of-way columns.</p> <p>Sources: Center for Plant Conservation 2011, eFloras.org 2011, ORBIC 2010, OSU 2010, USFWS 2010b, USFWS 2011a, WDNR 2010d, WDNR 2010e, WNHP 2010</p>					

17.1.3.2 Documented Occurrences of Special-Status Species

In Washington, federally listed species and federal species of concern with historic or current documented occurrences in the study area include Bradshaw's lomatium (federally endangered, Oregon and Washington state endangered); golden paintbrush (*Castilleja levisecta*; federally endangered); tall bugbane (*Cimicifuga elata*; federal species of concern, Washington sensitive, Oregon candidate), and Torrey's peavine (federal species of concern, Washington threatened) (see Table 17-1). Of these, only Bradshaw's lomatium and tall bugbane have been recently verified (current occurrences). Fifteen additional state special-status species have been documented within the study area; nine of these have been verified recently along at least one action alternative (see Table 17-1).

In Oregon, no special-status species are documented in the study area (OSU 2010). However, there are documented occurrences of special-status species in the larger project area in Oregon, and suitable habitat for these species may be present in the study area in Oregon (Herrera 2010).

Federally listed species may have **critical habitats**—areas that are determined to be “essential for the conservation of the species” (USFWS 2011c). These areas are determined and designated by USFWS. No critical habitat is currently designated in the study area for any federally listed plant species (USFWS 2011b).

17.1.4 Weeds

“Noxious weeds” are specifically defined in the Federal Plant Protection Act as those plant species that can damage cultivated or natural vegetation, livestock, and other resources. The Federal Noxious Weed Act directs federal agencies to manage noxious weeds—as identified by state or federal law—on federal land where county or private management plans are in place. Weeds can reduce crop yields and forage production, injure livestock, alter habitats, and displace native plant species. State and county noxious weed lists classify weeds according to the threats they pose, their distribution, and their potential for eradication or control. Generally, those species posing a higher risk and having a lower distribution are rated higher, meaning more intensive control is required or recommended.

In Washington, noxious weeds are regulated at the state level by the Washington State Noxious Weed Control Board (WSNWCB), which identifies three classes of noxious weeds (WSNWCB 2010). **Class A** weeds require eradication according to state law; **Class B** weeds require control in areas of the state where they are not yet widespread; and for **Class C** weeds, local jurisdictions can dictate whether control is required.

In Oregon, noxious weeds are regulated at the state level by the ODA, which also identifies three classes of noxious weeds (ODA 2011a). **List A** weeds are recommended for eradication or intensive control when and where found; **List B** weeds are recommended for intensive control on a site-specific, case-by-case basis at the state, county, or regional levels; and **List T** weeds are recognized as priority species for prevention and control that ODA targets for developing and implementing statewide management plans (ODA 2011a).

Cowlitz County's Noxious Weed Control Board and Clark County's Department of Environmental Services Vegetation Management track weed distribution and manage control operations. Each county keeps a complete noxious weed species list (see Appendix M).

In Cowlitz County, Class A weeds with a high priority for control include false brome (*Brachypodium sylvaticum*), buffalobur (*Solanum rostratum*), bighead knapweed (*Centaurea macrocephala*), milk thistle (*Silybum marianum*), and slenderflower thistle (*Carduus tenuiflorus*). Scotch broom is a Class B weed, but is listed as a priority for control, with control being required along transportation rights-of-way, near residential communities where plants create a high fire danger for residents, and near areas where plants substantially degrade the quality of pastures and farmland (Cowlitz County 2010c).

In Clark County, Class A weeds with a high priority for control include garlic mustard (*Alliaria petiolata*), giant hogweed (*Heracleum mantegazzianum*), buffalobur, bighead knapweed, Vochin knapweed (*Centaurea nigrescens*), European hawkweed (*Hieracium sabaudum*), yellow devil hawkweed (*Hieracium floribundum*), and shiny geranium (*Geranium lucidum*) (Lebsack September 2010).

In Multnomah County, ODA and the Multnomah County Weed Control Program track weed distribution and manage control operations. Weeds with a high priority for control include yellow starthistle (*Centaurea solstitialis*), rush skeletonweed (*Chondrilla juncea*), giant hogweed, orange hawkweed (*Hieracium aurantiacum*), pepperweed (*Lepidium latifolium*), Dalmatian toadflax (*Linaria dalmatica* ssp. *almatica*), kudzu (*Pueraria Montana* var. *lobata*), and tansy ragwort (*Senecio jacobaea*).

Noxious weed species are most common along roadsides, within existing utility corridors, and in other disturbed areas. Reed canarygrass and knotweeds are particularly abundant in disturbed areas in emergent wetland habitats and along ditches and streams. Himalayan blackberry is common along the fringes of wetlands and non-forested upland habitats along existing utility corridors and other disturbed areas. Thistles and scotch broom are common in disturbed, drier areas, such as along roadsides, abandoned pastures, and unmanaged agricultural areas. Butterfly bush is common in drier areas along roadsides and on vacant lots. Giant hogweed can occur along roadsides, other rights-of-way, vacant lots, and disturbed streambanks and wetland habitats.

17.2 Environmental Consequences

General impacts that would occur for the action alternatives are discussed below, followed by impacts unique to each alternative.

17.2.1 Impact Levels

Impacts would be **high** where project activities would cause the following:

- Disturbance to a federally listed plant species that adversely affects population recovery
- Permanent removal or alteration of special-status plant habitats or other high quality native plant habitats (e.g., mature forest) such that most or all of the relevant attributes of the original habitat are lost
- Disturbance to a special-status plant species that contributes to the need for federal listing of the species
- One or more Washington Class A or Oregon “T-list” noxious weeds to become established, more abundant, or more widespread

Impacts would be **moderate** where project activities would cause the following:

- Disturbance to a federally listed plant species does not adversely affect population recovery
- Disturbance of special-status plant habitats or other high quality native plant habitats (e.g., mature forest) such that all or most of the relevant attributes of the original habitat are altered but will be restored
- Disturbance to a special-status plant species that does not contribute to the need for federal listing of the species
- Permanent removal or alteration of native plant habitats of moderate quality (e.g., non-production forest) such that all or most of the relevant attributes of the original habitat are lost
- One or more Class B noxious weeds to become established, more abundant, or more widespread

Impacts would be **low** where project activities would cause the following:

- Minimal disturbance to special-status plant habitats or other high quality native plant habitats such that all or most of the relevant attributes of the original habitat are maintained
- Permanent removal or alteration of low quality native plant habitats with low native species diversity (e.g., production forest)
- One or more Class C noxious weeds to become established, more abundant, or more widespread

There would be **no** impact when vegetation would remain undisturbed, and no weeds would be spread or introduced.

17.2.2 Impacts Common to Action Alternatives

17.2.2.1 Construction

Vegetation Removal

Vegetation with a mature height greater than 4 feet would be cleared from the right-of-way to ensure safe operation of the transmission line. Vegetation within at least a 6-foot buffer around the perimeter of a substation yard would also be removed (see Section 3.11, Vegetation Clearing), and danger trees next to the right-of-way would be removed if they could fall on any part of the transmission line or grow close enough to the conductors to cause a flashover.

Removal of tall-growing vegetation in forested areas would permanently alter the remaining understory plant communities because shade-tolerant species would either not persist with exposure to full sun or would likely be outcompeted by species with a higher light requirement. The right-of-way would be converted to vegetation types dominated by low-growing species. Right-of-way clearing would permanently remove all forest vegetation types (including Oregon white oak woodlands and forested wetlands) from within and immediately adjacent to the

right-of-way. Riparian areas would lose trees and tall-growing shrubs and would be extensively altered.

The loss of trees and tall shrubs would also create habitat fragmentation in forested and riparian areas. Habitat fragmentation can occur when a habitat is divided into smaller areas, hindering the spread or movement of plants and animals from one area to another. Plant populations that become fragmented have greater edge exposure and reduced genetic diversity. These conditions can negatively affect the ability of plant communities to recover from disturbance and increase their vulnerability to weed invasion, disease, and other external threats.

Removal or alteration of special-status plant habitats and high-quality native plant habitats (mature forest, riparian areas, and forested wetlands) would be a **high** impact; clearing in forested areas with documented occurrences of special-status species a **moderate-to-high** impact; removal of forest a **moderate** impact; and removal of production forest a **low** impact. Shrublands containing species with a mature height greater than 4 feet would be altered by right-of-way clearing, but would persist as shrublands, which would cause a **low** impact. The herbaceous, rural landscaped, and urban/suburban landscaped vegetation types would generally experience **no-to-low** impacts from right-of-way clearing since low-growing vegetation would not need to be removed, and removing isolated trees, woodlands, tall shrubs, or orchard and landscape trees would not alter the surrounding vegetation type.

Some trees within and next to the transmission line right-of-way might not need to be removed if the trees pose no danger to the safe operation of the transmission line. BPA foresters would conduct a survey to determine if mature trees would be far enough below the conductors, such as in low-lying stream or river channels, to avoid removal.

All proposed locations for towers, new access roads, and substations would be permanently cleared of existing vegetation. New access roads would also create habitat fragmentation in all vegetation types since no vegetation would exist within the roadbed. Permanent vegetation removal would also occur on existing access roads that have become overgrown with vegetation or where roads would be widened.

Impacts from vegetation removal for towers, access roads, and substations would be **high** for special-status habitats and high quality native habitats (i.e., mature forest, riparian areas, wet prairie, and forested wetlands); **moderate-to-high** in areas with documented occurrences of special-status species; **moderate** for forest, and **low** for all other habitats. Towers, access roads, and substations would be sited to avoid important vegetation resources, including special-status species, as much as possible.

Construction Activities

Construction activities would cause temporary impacts along the right-of-way and at tower sites, substations, counterpoise sites, pulling and tensioning sites, and staging areas. These impacts would include damage to vegetation from clearing, cutting, or crushing; loss of soil structure from digging and other activities; and soil compaction from vehicles and construction equipment (see Chapter 14, Geology and Soils). Exposed soil at a construction site could be eroded by stormwater runoff, causing sedimentation and changes in the hydrology of the site. However, standard mitigation measures would prevent or minimize erosion; **no-to-low** impacts would occur.

Construction areas are also vulnerable to weed invasion—particularly in areas close to existing weed populations—from inadvertent transportation of weed seeds or plant parts on vehicles and equipment that could regenerate on exposed, bare soil. Where weeds become established, plant diversity is reduced and native species may be replaced. Mitigation measures such as wash stations for vehicles and equipment, eradication of noxious weeds before construction begins, and reseeding disturbed areas would reduce this potential. Pre-construction and post-construction weed surveys would be done to identify and map noxious weeds and identify newly established noxious weeds in or near construction areas. BPA would address control or eradication of these weeds during construction or afterwards during maintenance of the project. Because vegetation management occurs more frequently around substations (annual herbicide applications, etc.), noxious weeds are more likely to be detected and eradicated in these areas. However, non-native, invasive plants not on the county or state noxious weed lists would not be actively managed along the right-of-way, access roads, or substations, and could still present a threat to native ecosystems.

In areas disturbed by construction, where soils and hydrology could be adequately restored and low-growing disturbed vegetation reestablished, temporary, **low** impacts would occur. With mitigation measures, including reseeding with appropriate seed mixes and possible soil cultivation to reduce soil compaction, vegetation in the construction area would be expected to reestablish within a few growing seasons, particularly if weed spread can be prevented or suppressed. If weeds become established in spite of control efforts, or if the soil structure and hydrology are too damaged, preconstruction plant communities could become permanently altered. In these cases, the vegetation community would be degraded and experience **low-to-high** impacts, depending on the quality and protected status of the preconstruction community, and extent of the alteration. WNHP priority ecosystems and WDNR Protected Areas, for instance, would experience **moderate-to-high** impacts. Tall-growing vegetation would not be allowed to remain, causing these communities to be permanently altered. Spread of noxious weeds would cause **low-to-high** impacts, depending on the status of the weed species.

Indirect effects from construction could include damage to vegetation next to construction areas from the effects of soil erosion and the potential spread of weeds to the wider landscape, which would cause **low-to-high** impacts depending on the quality of the surrounding plant communities and the status of the weed species. Again, standard mitigation measures would help prevent or minimize soil erosion and the spread of noxious weeds.

Material staging areas could cause some soil compaction, erosion, and vegetation removal, but these areas would most likely be located on currently developed areas or highly disturbed paved or cleared and graded areas. Staging areas would be between 5 and 15 acres and locations would be identified before construction. Vegetation would likely be weedy, non-native species, and impacts would be limited to mowing or trampling. Preconstruction vegetation would be allowed to reestablish or be reseeded following construction. **No-to-low** impacts would occur.

17.2.2.2 Operation and Maintenance

Vegetation Management

BPA conducts ongoing vegetation management under its Vegetation Management Program (BPA 2000a). Manual, mechanical (including brushing, cutting, and trimming), chemical, and biological methods of vegetation management are used to control noxious weeds and foster

low-growing plant communities to keep tall shrubs and trees from interfering with transmission lines. Along the right-of-way, woody vegetation would be cut every 2 to 8 years, and herbicides applied for noxious weed control every 3 to 10 years, where appropriate. Vegetation management activities prevent forest development within the right-of-way and sometimes outside of the right-of-way (danger trees), and create a corridor with native and non-native herbaceous plants and shrubs. Crops, pasture, and residential and urban landscaping can generally occur, although tall-growing vegetation may need to be removed or trimmed. All vegetation is removed in substation yards and 6 feet beyond the substation fence. Brushing and cutting are used to maintain the edges of access roads.

Typical vegetation management in transmission line rights-of-way and along access roads would generally have **low** impacts on vegetation because there would be little to no ground disturbance or soil exposed. Trampled vegetation and soil compaction from vehicles and crews during vegetation maintenance would be temporary, infrequent, and, minor; and, although forest vegetation types would not be allowed to reestablish, other vegetation types would persist (except within a substation yard). Impacts would be greater if vegetation maintenance such as brushing or mowing inadvertently harmed special-status species (causing **moderate-to-high** impacts, depending on the extent of the damage), spread weeds (**low-to-high** impacts depending on weed status), or introduced weeds to or otherwise damaged special-status plant habitats (**high impacts**). Any herbicide use would increase the risk of herbicide drift or leaching that could damage non-target plants, including special-status species, both within and outside the right-of-way. However, BPA would reduce this risk by hiring qualified contractors and requiring them to properly handle and apply herbicides. With appropriate methods, some vegetation management activities would help maintain herbaceous vegetation communities such as emergent wetlands and native prairies.

Maintenance

Transmission line maintenance could crush vegetation and compact soils in work areas around towers, but these disturbances would be infrequent and minor with no permanent damage, causing **low** impacts. During some maintenance activities such as emergency repair work, heavy equipment and vehicles could travel off designated access roads, which could damage vegetation and compact soils. Impacts would likely be greater than typical maintenance work, creating **low-to-high** impacts depending on the quality of the surrounding plant community. Site restoration may be attempted if the degree of damage is high, if special-status species or WNHP priority ecosystems are affected, or if noxious weed species are present.

Access road maintenance could include grading and culvert replacement. These activities are similar to construction activities and could cause soil disturbance, vegetation removal or damage, erosion, and changes in hydrology that could damage plants and alter plant communities. Soil disturbed by these activities could also provide a place for weeds to become established. These disturbances would create **low-to-high** impacts, depending on the quality of the surrounding plant community. Standard mitigation measures would help minimize the area disturbed, prevent or minimize erosion, re-establish vegetation, and prevent or minimize the spread of noxious weeds.

Maintenance vehicles driven over grassy areas during the dry season could start fires. However, because fire prevention and control measures would be used, the project would cause **no-to-low** impacts from fire (see Chapter 10, Public Health and Safety).

17.2.2.3 Sundial Substation

The Sundial site is covered with herbaceous vegetation. Construction would permanently remove 40 acres of herbaceous vegetation. This includes about 11 acres of moderately functioning herbaceous emergent wetlands (see Section 16.1.5, Sundial Substation). Although low-quality wetlands sometimes support special-status species, there are no documented occurrences in the area. Because the wetlands are already disturbed, impacts to vegetation would be **low-to-moderate** (see Chapter 16, Wetlands).

17.2.3 Castle Rock Substation Sites

17.2.3.1 Casey Road

The Casey Road site is in production forest and shrubland vegetation types that include recently harvested areas and young forest. No special-status species or habitats are documented to occur in this area. Weedy species could occur at this site due to frequent disturbance from timber production.

Impacts common to action alternatives are in Section 17.2.2. The remaining sections discuss impacts unique to each alternative, and recommended mitigation measures.

Construction would permanently remove about 63 acres of vegetation. This would include about 38 acres of production forest, 24 acres of shrubland, and 1 acre of rural landscaped. Because the vegetation has little native diversity, impacts from plant removal and crushed vegetation would be **low**.

17.2.3.2 Baxter Road

The Baxter Road site is in the production forest vegetation type and supports young to middle-aged trees. Some forest and wetland areas are within the riparian zone of Baxter Creek. Because this is a disturbed production forest area, WNHP priority ecosystems would not likely occur. The wetland and riparian areas could provide suitable habitat for special-status species (see Table 17-1), although no special-status species or habitats are documented to occur in the area. Noxious weeds that grow in wetlands or aquatic environments could occur at this site due to frequent disturbance from timber production.

Construction would permanently remove about 47 acres of production forest vegetation. This includes a small area of forested (less than 0.6 acre of forested wetland; see Chapter 16, Wetlands) that could be high-quality native plant habitat. Since most impacts would be to previously harvested production forest, impacts to vegetation would be **low**.

17.2.3.3 Monahan Creek

The Monahan Creek site includes the rural landscaped vegetation type composed primarily of pasture, with some mature forest, forest vegetation, and shrubland. The northern portion of the site supports a stand of mixed coniferous and deciduous forest, particularly in areas near Monahan Creek. Western wahoo (*Euonymus occidentalis* var. *occidentalis*) (a state-listed species) is within 1 mile of the site, making it the only substation site with a documented special-status plant occurrence in the vicinity. There are no documented occurrences of this species on-site, but suitable habitat could be present in the forested areas. Also, the potential

for noxious weeds at this site is great due to the high level of previous disturbance to vegetation from agricultural activities.

Construction would permanently remove about 67 acres of vegetation. The vegetation types include about 2 acres of mature forest, 18 acres of forest, 1 acre of shrubland, and 46 acres of rural landscaped vegetation. Losses of rural landscaped vegetation, production forest, and shrubland would be **low** impacts. The removal of mature forest would be a **high** impact. The proximity of western wahoo increases the possibility that it could be present at the Monahan Creek site and could experience **moderate-to-high** impacts depending on whether impacts would contribute to the need for federal listing. It is considered secure globally, but critically imperiled at the state level (with five or fewer known occurrences) (WNHP 2011a).

17.2.4 West Alternative

17.2.4.1 General Vegetation Types

The general vegetation types with the most acreage affected by the West Alternative would be shrubland and forest, although all general vegetation types would be affected (see Tables 17-2 and 17-3). Of the total 366 acres of shrubland affected by this alternative, right-of-way clearing would affect 307 acres, and towers, access roads, and substations would permanently remove 59 acres, all **low** impacts. The West Alternative would also clear 372 acres of the forest vegetation type for right-of-way, towers, access roads, and substations, a **moderate** impact. About 27 acres of mature forest would be cleared under this alternative, a **high** impact (see Tables 17-2 and 17-3). About 13 acres of production forest would be cleared for access roads, a **low** impact.



Towers, access roads, and substations would permanently remove 106 acres of the herbaceous vegetation type, which would generally be a **low** impact except where special-status plant habitats or species would be affected in the Lacamas Prairie Natural Area (see Section 17.2.4.2, Special-Status Plant Habitats), or wherever prairie or wetlands could occur. Right-of-way would cross an additional 342 acres of herbaceous vegetation, which would have **no** impact since vegetation is low-growing and clearing would not be required for safe operation of the line.

About 241 acres of rural landscaped and urban/suburban landscaped vegetation types together would experience **no-to-low** impacts from right-of-way clearing, towers, access roads, and substations.

17.2.4.2 Special-Status Plant Habitats

High impacts would result from removal and alteration of special-status plant habitats and high-quality plant communities, including those within the Lacamas Prairie Natural Area and the WDNR Forest Riparian Conservation Easement. Through the Lacamas Prairie Natural Area, portions of the new line and access roads could be in new right-of-way, existing cleared right-of-way, and/or expanded existing right-of-way. Thirty-three acres of the Lacamas Prairie Natural Area (within the proposed WDNR Natural Resource Conservation Area) would be crossed by the right-of-way. This would create a **high** impact on less than 1 acre of Oregon white oak woodlands, and **no** impact where the right-of-way would cross wet prairie (where no clearing

would be needed). In addition, 11 acres of the Lacamas Prairie Natural Area would be lost to towers (1 acre), new access roads (6 acres), and improved access roads (4 acres), a **high** impact.

A portion of the WDNR Forest Riparian Conservation Easement would also be within the right-of-way; vegetation removal in this easement would be a **high** impact since tree removal would be necessary (impacted acreage is unknown at this time) (see Section 5.2.4.2, Land Use, Open Space).

A tufted hairgrass-California oatgrass priority ecosystem is located in the proposed Natural Area Preserve; however, it would not likely be affected unless project activities spread weeds.

17.2.4.3 Special-Status Species

Based on the location of current documented occurrences in the impacted area and habitat requirements, habitat and plant losses could occur for four special-status species: Bradshaw's lomatium (0.08 acre), small-flowered trillium (4.3 acres), dense sedge (1 acre), and Nuttall's quillwort (0.5 acre). Small-flowered trillium would primarily be affected by right-of-way clearing (4 acres) (it needs forest canopy and shade cover to survive), but also new and improved access roads and a tower (0.3 acre). Bradshaw's lomatium, Nuttall's quillwort, and dense sedge would be affected by an improved access road. The impact to Bradshaw's lomatium would be **high**. Losses could affect species recovery since it is critically imperiled at the state level and imperiled at the global level, according to conservation rankings by the state of Washington and the conservation organization NatureServe, which provide an additional measure of population status for special-status species (WNHP 2011a). Impacts to small-flowered trillium, dense sedge, and Nuttall's quillwort would be **moderate-to-high** depending on whether impacts would contribute to the need for federal listing. Small-flowered trillium is imperiled/rare at both the state and global levels; dense sedge and Nuttall's quillwort are critically imperiled within the state of Washington, but globally secure (WNHP 2011a).

Special-Status Species State and Global Conservation Rankings

- **Critically Imperiled:** 5 or fewer known occurrences
- **Imperiled:** 6–20 known occurrences
- **Rare:** 21–100 known occurrences

Source: WNHP 2011a

In addition, four other special-status species have current documented occurrences in the study area, indicating an increased likelihood that they could be present and affected by project activities, although they are not crossed by the project. They include Hall's aster, Oregon coyote-thistle, tall bugbane, and western wahoo (see Table 17-1). If affected, impacts to Oregon coyote-thistle would be **high**; impacts to the other three species would be **moderate-to-high**. All are secure globally with the exception of tall bugbane, which is considered rare (WNHP 2011a). At the state level, the only known population of Oregon coyote-thistle in Washington is the one identified in this analysis, with Oregon being the only other state where it is known to occur. Western wahoo and Hall's aster are critically impaired at the state level.

17.2.4.4 West Option 1, 2, and 3

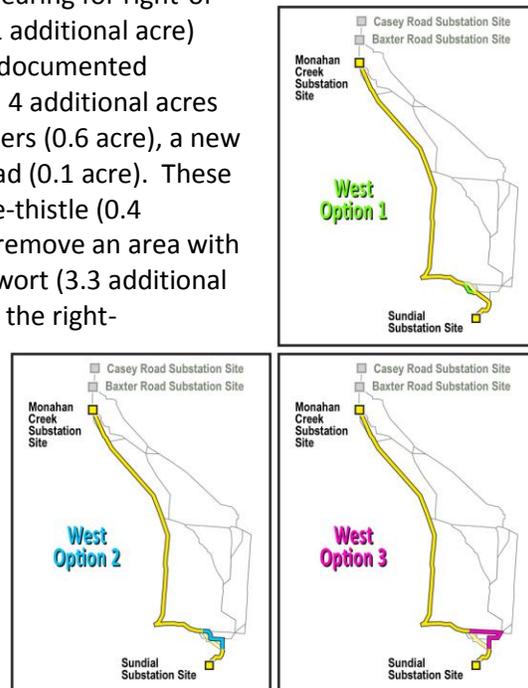
West Option 1 would clear 15 fewer acres of forest. The proposed right-of-way would cross an additional 28 acres of the Lacamas Prairie Natural Area. New access roads would remove an additional 4 acres, and towers and improved access roads would remove an additional 2 acres of this special-status plant habitat. These impacts affect the proposed WDNR NAP and an additional acre of a WNHP Oregon white oak woodland priority ecosystem. Clearing for right-of-way (19 additional acres), and a new access road (1 additional acre) would remove or degrade 20 acres of habitat with documented occurrences of small-flowered trillium. In addition, 4 additional acres of Bradshaw's lomatium would be removed by towers (0.6 acre), a new access road (3.3 acres), and an improved access road (0.1 acre). These project activities would also remove Oregon coyote-thistle (0.4 additional acre), and a tower and new road would remove an area with Hall's aster (0.2 additional acre), and Nuttall's quillwort (3.3 additional acres). (Although the latter four species are also in the right-of-way [see Table 17-1], they require herbaceous habitat, which would not be affected by right-of-way clearing).

West Options 2 and 3 would have 14 fewer acres of right-of-way and 4 fewer acres of towers and new and improved access roads (4 fewer acres) through the Lacamas Prairie Natural Area than the West Alternative. They would also avoid the WDNR Forest Riparian Conservation Easement and WNHP Oregon white oak woodland priority ecosystems, and the documented populations of dense sedge. West Options 2 and 3 would, however, clear more mature forest vegetation for new right-of-way (West Option 2, 5 acres; West Option 3, 3 acres). West Option 2 would remove 9 fewer acres of forest (see Tables 17-2 and 17-3). West Option 3 would remove 31 more acres of forest (see Tables 17-2 and 17-3).

Impact levels on vegetation would be the same as the West Alternative.

Impact Option Discussion

Impacts to higher quality vegetation types, special-status plant habitats, and special-status species are discussed for each option. See Maps 17-1A through 17-1D and Tables 17-2 and 17-3 for all impacts.



**Table 17-2 General Vegetation Types Impacted by Right-of-Way Clearing
(Acres)^{1,2,3,4}**

Alternatives and Options	Mature Forest	Forest	Production Forest	Shrubland	Rural Landscaped ⁵	Urban/Suburban Landscaped ⁵
West Alternative	23	285	0	307	79	87
West Option 1	N/C	-14	N/C	+3	-2	N/C
West Option 2	+5	-10	+9	+2	+7	N/C
West Option 3	+3	+27	+21	+22	+31	N/C
Central Alternative	12	228	910	42	26	20
Central Option 1	N/C	+1	+39	+2	N/C	N/C
Central Option 2	+5	+35	-76	+4	-1	-6
Central Option 3	+3	+53	-175	-3	+10	-1
East Alternative	10	163	961	34	28	19
East Option 1	+5	+13	-56	+3	+8	-8
East Option 2	-6	+21	N/C	+1	N/C	N/C
East Option 3	N/C	-6	+22	+3	N/C	N/C
Crossover Alternative	37	239	588	208	59	21
Crossover Option 1	-1	+16	N/C	+16	-6	+1
Crossover Option 2	+1	+2	N/C	+54	+14	N/C
Crossover Option 3	+1	+28	+16	+6	+14	N/C

Notes:

N/C – No net change from the action alternative.

1. To avoid double counting impacts, the acreages for substations, and access roads and towers that occur within the right of way, were subtracted from right-of-way acreages. These acreages are in Table 17-3.
2. 150-foot wide right-of-way
3. The value for each option represents the net change from the action alternative. It was calculated as the acres added by the option minus the acres in the segments the option replaces.
4. Clearing for danger trees outside the right-of-way is unknown at this time and not included in these calculations.
5. Right-of-way clearing would only affect portions of the acreages given for these general vegetation types; i.e., where trees and tall shrubs are present. Herbaceous vegetation is below clearing requirements and not included in this table.

Sources: Herrera 2010, USGS 2011

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Table 17-3 General Vegetation Types Converted to Towers, Access Roads, and Substations (Acres)¹

Alternatives and Options	Mature Forest					Forest					Production Forest					Shrubland					Herbaceous					Rural Landscaped					Urban/Suburban				
	Towers	New Access Roads	Improved Access Roads ²	Substations	Totals	Towers	New Access Roads	Improved Access Roads	Substations	Totals	Towers	New Access Roads	Improved Access Roads	Substations	Totals	Towers	New Access Roads	Improved Access Roads	Substations	Totals	Towers	New Access Roads	Improved Access Roads	Substations	Totals	Towers	New Access Roads	Improved Access Roads	Substations	Totals					
West Alternative	<1	0	1	2	4	6	20	16	18	60	0	5	8	0	13	7	29	22	1	59	11	37	18	40	106	2	5	12	46	65	3	4	3	0	10
West Option 1	N/C	N/C	N/C	N/C	N/C	N/C	N/C	-1	N/C	-1	N/C	N/C	N/C	N/C	N/C	N/C	N/C	N/C	N/C	N/C	N/C	+2	N/C	N/C	+2	N/C	N/C	N/C	N/C	N/C	N/C	N/C	N/C	N/C	N/C
West Option 2	N/C	N/C	N/C	N/C	N/C	N/C	N/C	+1	N/C	+1	N/C	+1	+<1	N/C	+2	N/C	+2	<-1	N/C	+1	N/C	+3	-5	N/C	-2	N/C	N/C	N/C	N/C	N/C	N/C	N/C	N/C	N/C	N/C
West Option 3	N/C	N/C	N/C	N/C	N/C	+1	+1	+2	N/C	+4	+<1	+7	+4	N/C	+12	N/C	+4	+2	N/C	+6	N/C	-2	-4	N/C	-6	+<1	N/C	N/C	N/C	+1	N/C	N/C	N/C	N/C	N/C
Central Alternative	0	<1	0	0	<1	5	25	45	0	75	19	100	185	47	351	2	7	23	0	32	3	10	7	40	60	<1	2	19	0	22	0	<1	2	0	3
Central Option 1	N/C	N/C	N/C	N/C	N/C	N/C	N/C	-1	N/C	-1	+<1	+2	+9	-9	+3	<-1	+<1	+2	+24	+26	N/C	N/C	N/C	N/C	N/C	N/C	N/C	+8	+1	+9	N/C	N/C	N/C	N/C	N/C
Central Option 2	N/C	N/C	N/C	+2	+2	+1	+11	-5	+18	+25	-2	+1	-12	-47	-60	<-1	N/C	-3	+1	-3	N/C	<-1	-2	N/C	-3	N/C	N/C	+<1	+46	+47	N/C	N/C	N/C	N/C	N/C
Central Option 3	N/C	N/C	N/C	N/C	N/C	+2	+6	-4	N/C	+4	-4	-11	-18	N/C	-33	N/C	-1	-2	N/C	-3	N/C	+1	N/C	N/C	+1	N/C	+2	+4	N/C	+6	N/C	N/C	N/C	N/C	N/C
East Alternative	0	<1	2	0	3	3	16	32	0	51	19	84	275	47	425	2	5	48	0	55	3	10	12	40	65	1	3	45	0	49	0	<1	2	0	3
East Option 1	N/C	N/C	N/C	+2	+2	N/C	+6	-3	+18	+21	-1	+<1	-11	-47	-58	N/C	+<1	-7	+1	-5	N/C	N/C	-2	N/C	-2	+<1	+1	<-1	+46	+47	N/C	N/C	<-1	N/C	-1
East Option 2	N/C	N/C	-2	N/C	-2	+<1	+<1	<-1	N/C	+1	N/C	-5	-45	N/C	-50	N/C	N/C	-15	N/C	-15	N/C	N/C	-2	N/C	-2	N/C	N/C	N/C	N/C	N/C	N/C	N/C	N/C	N/C	N/C
East Option 3	N/C	N/C	N/C	N/C	N/C	N/C	-3	N/C	N/C	-3	+<1	N/C	N/C	N/C	+1	N/C	N/C	N/C	N/C	N/C	N/C	N/C	N/C	N/C	N/C	N/C	N/C	N/C	N/C	N/C	N/C	N/C	N/C	N/C	N/C
Crossover Alternative	<1	2	3	2	8	5	21	32	18	76	12	65	122	0	199	5	16	44	1	66	3	11	9	40	63	2	3	12	46	63	<1	1	2	0	4
Crossover Option 1	N/C	N/C	N/C	N/C	N/C	N/C	+2	<-1	N/C	+1	N/C	N/C	N/C	N/C	N/C	+<1	+2	N/C	N/C	+3	+2	+7	+3	N/C	+12	N/C	N/C	+<1	N/C	+1	N/C	N/C	N/C	N/C	N/C
Crossover Option 2	N/C	N/C	N/C	-2	-2	N/C	N/C	+3	-18	-15	N/C	N/C	+5	+47	+52	+3	+2	+9	-1	+13	N/C	N/C	N/C	N/C	N/C	N/C	+1	+4	-46	-41	N/C	N/C	N/C	N/C	N/C
Crossover Option 3	N/C	N/C	N/C	-2	-2	N/C	+<1	+3	-18	-14	+<1	+<1	+4	+47	+53	+<1	+2	+10	-1	+12	N/C	N/C	N/C	N/C	N/C	N/C	+1	+4	-46	-41	N/C	N/C	N/C	N/C	N/C

Notes:
 N/C – No net change from the action alternative.
 1. The value for each option represents the net change from the action alternative. It was calculated as the acres added by the option minus the acres in the segments the option replaces.
 2. Many improved access roads could be overgrown or would need to be widened; vegetation would need to be removed.
 Sources: Herrera 2010, USGS 2011

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17.2.5 Central Alternative

17.2.5.1 General Vegetation Types

The general vegetation type with the most acreage affected by the Central Alternative would be production forest. About 1,261 acres of this vegetation type would be cleared for right-of-way, towers, access roads, and substations, which would be a **low** impact (see Tables 17-2 and 17-3). The same disturbances would affect the other forested vegetation types; 303 acres of forest would be cleared under this alternative, a **moderate** impact, and 13 acres of mature forest would be cleared under this alternative, a **high** impact.



About 74 acres of shrubland would be affected by this alternative. Right-of-way clearing could affect 42 acres of shrubland, while towers and access roads would permanently remove 32 acres of shrubland, both **low** impacts (see Tables 17-2 and 17-3). A similar amount of herbaceous vegetation would be affected; 60 acres would be removed by towers, access roads, and substations, a **low** impact. The right-of-way would cross an additional 55 acres of herbaceous vegetation, which would have **no** impact since clearing would not be required. Rural landscaped and urban/suburban vegetation types together would have **no-to-low** impacts on 71 acres from right-of-way clearing, towers, and access roads.

17.2.5.2 Special-Status Plant Habitats

No known special-status plant habitats identified by the WNHP, ORBIC, or WDNR (see Section 17.1.2, Special-Status Plant Habitats) would be affected by the Central Alternative.

17.2.5.3 Special-Status Species

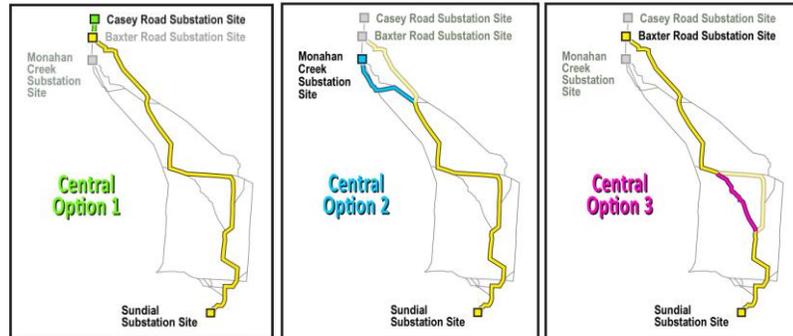
Two special-status species could be affected by the Central Alternative. Based on the location of current documented occurrences in the impacted area and habitat requirements, right-of-way clearing, towers, and access roads would remove plants and habitat of small-flowered trillium (4.3 acres) (it needs forest canopy and shade cover to survive), while a tower and a new access road would remove plants and habitat for hairy-stemmed checker-mallow (0.8 acre). Impacts to hairy-stemmed checker-mallow would be **high** since it is critically imperiled at the state level and imperiled at the global level, and impacts could contribute to the need for federal listing. (While hairy-stemmed checker-mallow does occur within the right-of-way of the Central Alternative, it occurs in herbaceous habitat [see Table 17-1] and would not be affected by right-of-way clearing). Impacts to small-flowered trillium would be **moderate-to-high**, since it is imperiled/rare at both the state and global levels (WNHP 2011a). (The same small-flowered trillium population would experience the same impacts by all action alternatives because it is on Segment 52).

Two additional special-status species—soft-leaved willow and tall bugbane—have current documented occurrences in the study area, indicating an increased likelihood that they could be present and affected by project activities, although they are not crossed by the project. If affected, impacts would be **moderate**. Both are globally secure, with soft-leaved willow imperiled at the state level and tall bugbane rare (WNHP 2011a).

17.2.5.4 Central Options 1, 2, and 3

Central Option 1 crosses similar types of vegetation as the Central Alternative and would create similar impacts (see Tables 17-2 and 17-3).

Central Option 2 would remove 7 more acres of mature forest, and 60 more acres of forest (see Tables 17-2 and 17-3).



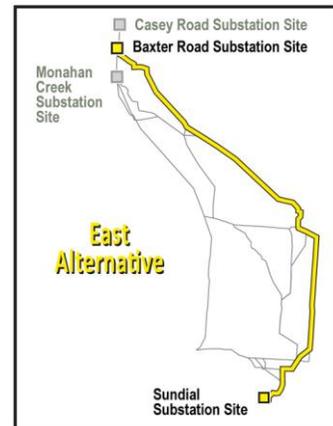
Central Option 3 would remove 3 more acres of mature forest, and 57 more acres of forest. Central Option 3 could also impact a WDNR Permanent Research Plot and Genetic Reserve, a special-status plant habitat (exact acreages are unknown at this time, but impacts would be **moderate-to-high** depending on whether the site could continue to be used for research). Conversely, it would avoid the population of hairy-stemmed checker-mallow.

Impact levels on vegetation would be the same as the Central Alternative.

17.2.6 East Alternative

17.2.6.1 General Vegetation Types

The most common vegetation type affected by the East Alternative would be production forest. About 1,386 acres of this vegetation type would be cleared for right-of-way, towers, access roads, and substations, which would be a **low** impact (see Tables 17-2 and 17-3). Of the other forested vegetation types, 214 acres of forest would be cleared, a **moderate** impact; and 13 acres of mature forest would be cleared, a **high** impact.



The remaining vegetation types would experience fewer or lower-level impacts (see Tables 17-2 and 17-3). About 89 acres of shrubland would be affected. Right-of-way clearing could affect 34 acres of shrubland, and towers and access roads would remove 55 acres of shrubland, both **low** impacts. About 65 acres of herbaceous vegetation type would be cleared for towers, access roads, and substations, a **low** impact except where special-status plant habitats would be affected (see Section 17.2.6.2 Special-Status Plant Habitats). The right-of-way would cross 54 acres of herbaceous vegetation, which would have **no** impact since clearing would not be required. About 99 acres of rural landscaped and urban/suburban landscaped vegetation types together would have **no-to-low** impacts from right-of-way clearing and **low** impacts from towers and access roads.

17.2.6.2 Special-Status Plant Habitats

One special-status plant habitat could be affected by the East Alternative. About 0.5 acre of an existing access road to be improved crosses the southern edge of the herbaceous bald along

Segment O. Although species composition is unknown at this time, it could qualify as a WNHP North Pacific herbaceous bald and bluff priority ecosystem (it is not currently documented as such by WNHP), or as a high quality plant community. If so, disturbance to this plant community and the possible spread of weedy species would cause **moderate-to-high** impacts. Since disturbance would likely be located along the edge of the potential priority ecosystem, disturbance or damage could be minimized, decreasing impacts to **low**.

17.2.6.3 Special-Status Species

Based on the location of current documented occurrences in the impacted area and habitat requirements, right-of-way clearing and towers and access roads would remove or alter habitat of only one special-status species: small-flowered trillium (4.3 acres [it needs forest canopy and shade cover to survive]). These losses would be **moderate-to-high** depending on whether the impacts would contribute to the need for federal listing, given that it is imperiled/rare at the state and global levels (WNHP 2011a). (The same small-flowered trillium population would experience the same impacts by all action alternatives).

Two additional special-status species—soft-leaved willow and tall bugbane—have current documented occurrences in the study area, indicating an increased likelihood that they could be present and affected by project activities, although they are not crossed by the project. If affected, impacts would be **moderate**. Both are globally secure, with soft-leaved willow imperiled at the state level and tall bugbane rare (WNHP 2011a).

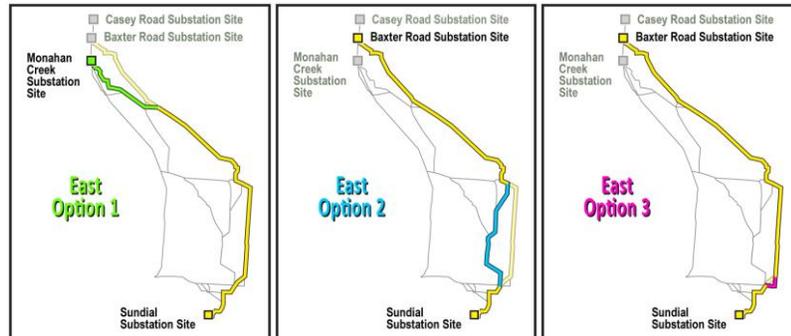
17.2.6.4 East Options 1, 2, and 3

East Option 1 would remove 7 additional acres of mature forest, and 34 additional acres of forest (see Table 17-2 with Table 17-3).

East Option 2 would remove less mature forest (8 fewer acres), but more forest (22 additional acres).

East Option 3 would remove 9 fewer acres of forest.

Impact levels on vegetation would be the same as the East Alternative.



17.2.7 Crossover Alternative

17.2.7.1 General Vegetation Types

The most common vegetation type that would be affected by the Crossover Alternative would be production forest. About 787 acres of this vegetation type would be cleared for right-of-way, towers, and access roads, which would be a **low** impact (see Tables 17-2 and 17-3). Of the other forested vegetation types, about 315 acres of forest would be cleared, a **moderate** impact, and about 44 acres of mature forest would be cleared, a **high** impact.



The remaining general vegetation types would have either fewer or lower impacts (see Tables 17-2 and 17-3). About 274 acres of shrubland would be affected. Right-of-way clearing could alter 208 acres of shrubland, and towers, access roads, and substations would remove an additional 66 acres of shrubland, both **low** impacts. About 63 acres of herbaceous vegetation type would be cleared for towers, access roads, and substations, a **low** impact except where special-status plant habitats could be affected (see Section 17.2.6.2 Special-Status Plant Habitats). Right-of-way would cross over an additional 88 acres of herbaceous vegetation, which would have **no** impact since clearing would not be required. Depending on the need for tree removal, about 147 acres of rural landscaped and urban/suburban landscaped vegetation types together would experience **no-to-low** impacts from right-of-way clearing, towers, access roads, and substations.

17.2.7.2 Special-Status Plant Habitats

Two special-status plant habitats or high quality plant communities could be affected. Similar to the East Alternative, about 0.5 acre of an existing access road to be improved crosses the southern edge of an herbaceous bald along Segment O. Although species composition is unknown at this time, it could qualify as a WNHP North Pacific herbaceous bald and bluff priority ecosystem (it is not currently documented as such by WNHP), or as a high quality plant community. If so, disturbance to this plant community and the possible spread of weedy species would cause **moderate-to-high** impacts. Since disturbance would likely be located along the edge of the potential priority ecosystem, disturbance or damage could be minimized, decreasing impacts to **low**. The second habitat is the WDNR Forest Riparian Conservation Easement. Vegetation removal in this easement would be a **high** impact since a portion would be within the right-of-way, and tree removal would be necessary (impacted acreage is unknown at this time) (see 5.2.4.2, Land Use, Open Space).

17.2.7.3 Special-Status Species

Based on the location of current documented occurrences in the impacted area, right-of-way clearing and towers and access roads could remove or alter habitat of only one special-status species: small-flowered trillium (4.3 acres) (it needs forest canopy and shade cover to survive). These losses would be **moderate-to-high** depending on whether the impacts could contribute to the need for federal listing, given that it is imperiled/rare at the state and global levels (WNHP 2011a). (The same small-flowered trillium population would experience the same impacts by all action alternatives).

Two additional special-status species— bolandra (*Bolandra oregano*) and tall bugbane—have current documented occurrences in the study area, indicating an increased likelihood that they could be present and affected by project activities, although they are not crossed by the project. If affected, impacts would be **moderate** for tall bugbane, which is globally secure and rare at the state level, and **moderate-to-high** for bolandra, which is globally rare and imperiled at the state level (WNHP 2011a).

17.2.7.4 Crossover Options 1, 2, and 3

Crossover Option 1 would pass through the Lacamas Prairie Natural Area and potentially disturb 8 acres of this special-status plant habitat from new right-of-way (8 acres) and a tower and new access road (less than

1 acre). These disturbances would increase impacts, depending on the need for tree removal, but would not affect any known WNHP priority ecosystems in the Lacamas Prairie Natural Area. Crossover

Option 1 would also remove an additional 16 acres of forest (see Tables 17-2 and 17-3).



Crossover Option 2 would reduce impacts by removing 14 fewer acres of forest.

Crossover Option 3 would increase impacts by removing 13 more acres of forest.

Impact levels on vegetation would be the same as the Crossover Alternative.

17.2.8 Recommended Mitigation Measures

Mitigation measures included as part of the project are identified in Table 3-2 of Chapter 3, Project Components. The following additional mitigation measures have been identified to avoid, minimize, or eliminate adverse vegetation impacts (especially special-status species and habitats) by the action alternatives. Chapter 16, Wetlands, and Chapter 19, Fish, recommend mitigation measures for vegetation clearing in wetlands and riparian areas. All mitigation measures would be completed before, during, or immediately after project construction unless otherwise noted.

- Prior to construction, perform surveys to confirm the presence or absence of special-status species and habitats where they have the potential to occur in areas potentially affected by the proposed project.
- Identify known special-status plant populations and habitats, including an appropriate buffer, as sensitive areas in construction documents and maps used by construction contractors, maintenance contractors, and BPA personnel.
- Mark and sign (as sensitive areas) the boundaries of special-status plant populations and habitats located near or adjacent to construction sites where work is prohibited, and install protective fencing as needed, including an appropriate buffer, to ensure they are not disturbed during construction.

- Explain all vegetation-related mitigation measures and permit conditions to construction contractors and BPA personnel during a preconstruction meeting detailing environmental requirements.
- Restrict construction activities, including vehicle access and equipment storage, to the smallest area necessary to work effectively and safely while limiting removal and disturbance to vegetation, special-status species and habitats, and other sensitive plant communities; and to help prevent weed introduction or spread.
- Where possible, in areas not already infested with high concentrations of weeds and particularly where ground disturbance affects special-status species or habitats, stockpile excavated topsoil during construction and use it to restore excavated areas to former grades to help retain the native seed bank present in the soils.
- Reseed disturbed areas after construction and regrading are complete, as soon as possible and at the appropriate time for germination, with a seed mix identified in the Stormwater Management Manual for Western Washington (Ecology 2005a), with an appropriate native seed mix in sensitive vegetation areas, with one most appropriate for establishment in a weed-infested area, or with a seed mix agreed upon with landowners for use on their property.
- Monitor seed germination of seeded areas with at least three field visits per year until site stabilization (defined as at least 70 percent cover by native or acceptable non-native species) is achieved; if vegetative cover is inadequate, implement contingency measures and reseed to ensure adequate revegetation of disturbed soils.
- Clean construction vehicles and other equipment at established wash stations before entering construction work areas.
- Conduct the following: (1) a preconstruction weed survey of areas that would be disturbed by construction activities to document weed distribution present at that time; and (2) a post-construction weed survey of all areas disturbed by construction activities to determine if noxious weeds were introduced or spread.
- Implement appropriate control measures of weed infestations caused by construction activities.
- Use noxious weed control practices that minimize harm to special-status species and their habitats.
- Obtain rock and other fill materials from weed-free quarries.
- Use certified weed-free straw for use in erosion control, if available in the project area.
- Use the procedures outlined in BPA's Transmission System Vegetation Management Program (BPA 2000a) to address and minimize noxious weed problems during construction and subsequent management activities.

17.2.9 Unavoidable Impacts

Unavoidable impacts on vegetation common to all action alternatives include temporary removal or disturbance of vegetation during construction, and permanent vegetation loss to tower footings, access roads, and substation facilities. Permanent loss of forest and conversion of forest to low-growing vegetation types within the 150-foot-wide right-of-way and outside of the right-of-way for removal of danger trees also would occur. Noxious weed introduction likely

would occur to some degree, even with implementation of identified weed control measures. This unavoidable weed introduction or spread could impact native plant communities depending on their status and ability to recover.

17.2.10 No Action Alternative

The No Action Alternative would avoid impacts on vegetation from the project because no new transmission lines, access roads, or substations would be constructed. Current and future actions in the project area by others, besides BPA, could affect plant communities, reduce species diversity, and affect special-status plant habitats or special-status species and their habitat, through removal or degradation of existing plant communities, and conversion to non-native plant communities. Actions that would affect vegetation include ongoing commercial practices, maintenance of existing rights-of-way, road maintenance and development, residential and commercial development ongoing commercial timber harvest, and effects from climate change.

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