

Chapter 16 Wetlands

This chapter describes wetlands in the project area, and how the project alternatives could affect these wetlands. Related information can be found in Chapter 14, Geology and Soils; Chapter 15, Water; Chapter 17, Vegetation, Chapter 27, Consultation, Review, and Permit Requirements, and Appendix L, Wetland Modeling and Analysis.

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

16.1 Affected Environment

Wetlands are areas of transition between aquatic and terrestrial systems where water is the dominant factor that determines soil characteristics and biological communities. Wetlands can support diverse plants and animals, and help maintain or improve water quality, contribute to flood control, provide wildlife habitat, and have recreational or aesthetic value.

Several laws provide protection for wetlands and their functions. For regulatory purposes, wetlands are formally defined by local, state, and federal statutes, including the Clean Water Act. The Clean Water Act regulates discharges into waters of the United States, including wetlands. The State of Oregon regulates removal and fill of material into waters of the state through Oregon's Removal-Fill Law (see Section 27.10, Clean Water Act). The Shoreline Management Act, Section 401 of the Clean Water Act, and the Water Pollution Control Act give the State of Washington the authority to regulate wetlands including non-federal, isolated wetlands (see Section 27.26.1.2, Washington State Shoreline Management Act, Section 27.10.2, Section 401, and Section 28.4.1, Shorelines and Wetlands). Cities and counties in Washington have adopted critical areas regulations as defined by the Growth Management Act to protect critical areas including wetlands (see Section 27.26.2.1, Critical Area Ordinances). Cities and counties in Oregon do not have critical areas ordinances that would protect wetlands.

In the project area, wetlands are typical of types found in the Puget lowland and western Cascade Mountain foothills. Sources for wetland **hydrology** include precipitation, overland runoff, groundwater discharge, flows from adjacent streams, and perched water tables. Some wetland soils have formed in glacial materials developing characteristics influenced by coniferous forest vegetation. Wetlands have also been created by the network of roads in agriculture and timber harvest areas.

Wetlands are found in floodplains and along rivers, streams or creeks, in depressional swales, on slopes and terraces, as part of larger complexes, or in areas of open pasture and agricultural fields. Wetlands are within rural areas, on lands managed for timber harvest and agriculture, and land within suburban and urban development primarily on the north and south sides of the Columbia River, including the cities of Longview, Vancouver, and Camas in Washington, and Fairview and Troutdale in Oregon.

For the Draft EIS, wetlands were remotely mapped within a study area that includes a 1,000-foot corridor (500 feet either side of the transmission line centerline) for each action alternative. Substation areas and portions of access roads outside of the 1,000-foot corridor were also mapped. The study area was extended beyond project facilities to understand and consider potential connectivity of existing wetlands to larger wetland complexes in adjacent areas; however, acreages of direct impacts to wetlands were calculated within each action alternative (the transmission line right-of-way, new and improved access roads within and outside the right-

of-way, and removed, rebuilt, and new towers on existing right-of-way, and substations). The study area was mapped using a combination of wetland field delineations at the Sundial, Casey Road, and Baxter Road substation sites (DEA 2009, Herrera 2011a and 2011b), aerial imagery interpretation, and other available databases (Herrera 2010 and 2012) including National Agriculture Imaging Program (NAIP) imagery (NAIP 2009), LIDAR imagery (BPA 2011), U.S. Fish and Wildlife Service (USFWS) National Wetland Inventory (USFWS 2010a), Natural Resources Conservation Service (NRCS) **hydric soils** (NRCS 2009b), U.S. Geological Survey (USGS) topography (USGS 1995), WDNR hydrography (WDNR 2006). Wetland classification was based on the vegetation class, hydrology, position of the wetland within the landscape, and water source (Cowardin et al. 1979).

Following identification of the Preferred Alternative (Central Alternative using Central Option 1), a detailed on-the-ground survey of wetlands and streams was conducted in the field for this alternative. The study site for field investigations on the Preferred Alternative included the entire 150-foot-wide transmission line right-of-way, select areas outside of the right-of-way (e.g., danger trees, pulling/tensioning areas, and utility relocation areas), existing right-of-way where towers would be moved, replaced, rebuilt, the Baxter Road and Casey Road substation sites and the preferred Sundial substation site (Lot 11), and all areas within 50 feet of new and improved access roads. In addition, more detailed mapping was conducted using LiDAR imagery (BPA 2014) within an area extending 200 feet outside of the field surveyed area. This LiDAR analysis was also used to estimate wetlands and streams on parcels where access was not granted by the property owner.

Wetland boundaries were delineated in accordance with the 1987 Corps Wetlands Delineation Manual, including the Corps' Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region, Version 2.0 (May 2010). The wetland boundaries were flagged and mapped using the global positioning system (GPS). Wetlands in Washington were rated using the Revised Washington State Wetland Rating System for Western Washington (Hruby 2004, Revised 2006) (rated as Category I through IV). In Oregon, wetlands were rated using the Oregon Rapid Wetland Assessment Protocol (ORWAP) (rated as low to high). Functional assessments for wetlands at Casey Road and Baxter Road substation sites and along the Preferred Alternative were classified using the Revised Washington State Wetland Rating System and at the Sundial substation site, ORWAP was used.

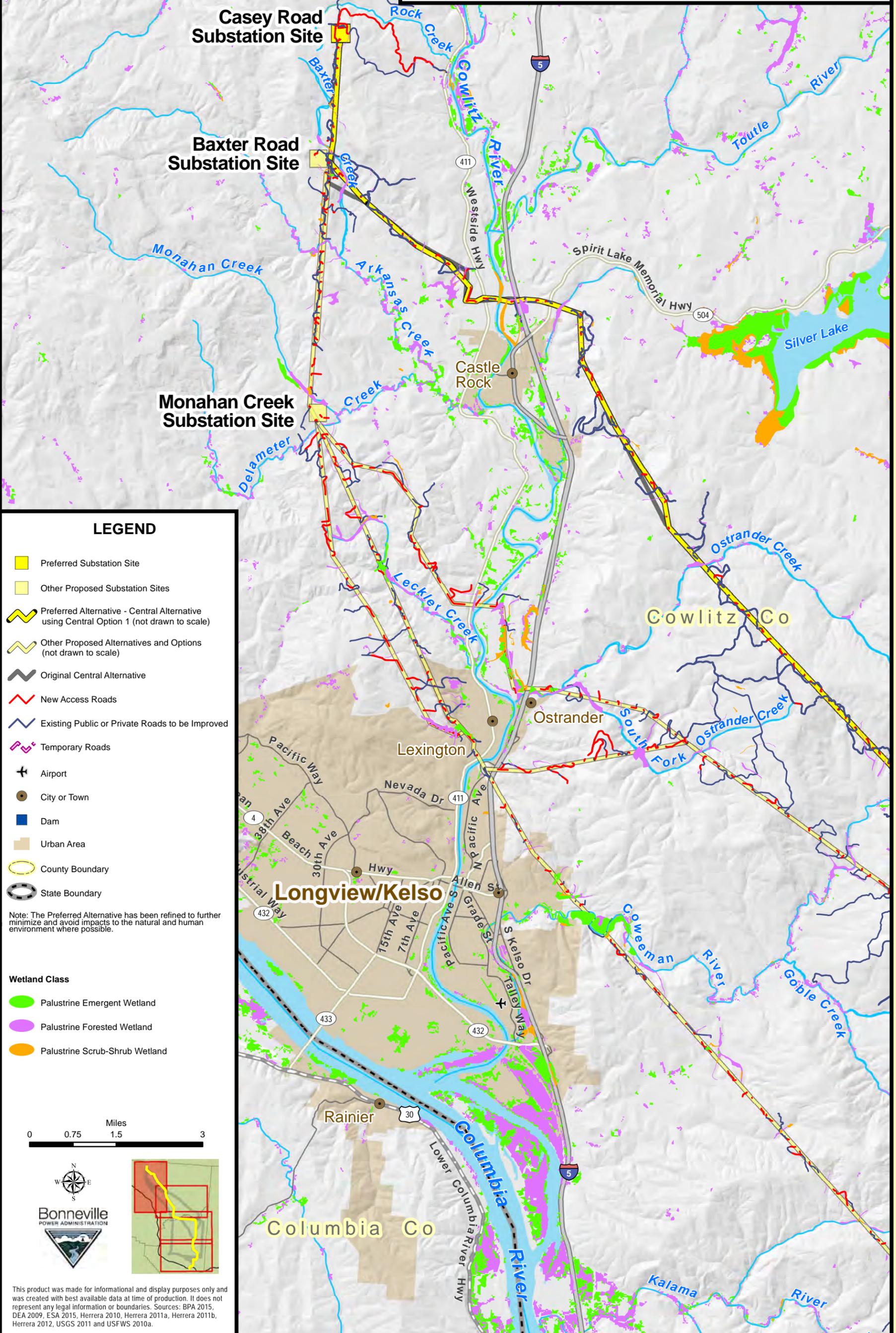
Both forested and non-forested wetland classes occur in the study area (see Maps 16-1A through 16-1D). Wetland classes are determined by the type of vegetation that constitutes the uppermost layer of vegetation with an areal coverage of 30 percent or greater (Cowardin, et al. 1979). Forested wetlands include **palustrine** (freshwater) forested wetlands dominated by at least 30 percent tree cover greater than 20 feet tall. Non-forested wetlands include palustrine scrub-shrub having at least 30 percent cover of woody

Wetland Categories I through IV

Category I wetlands (high-quality wetlands) are those that represent a unique or rare wetland type or are more sensitive to disturbance than most wetlands. They are also relatively undisturbed. Category II wetlands (also high-quality wetlands) provide important functions including the potential to reduce flooding and erosion, improve water quality, and provide wildlife habitat. Category III wetlands (medium-quality wetlands) are those with a moderate level of functions and values because they have been disturbed. They are often smaller, less diverse, or more isolated than Category I and II wetlands. Category IV wetlands (low-quality wetlands) have the lowest levels of functions and are often heavily disturbed wetlands.

I-5 Corridor Reinforcement Project

Map 16-1A: Wetlands



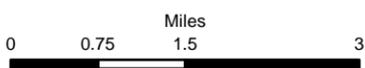
LEGEND

- Preferred Substation Site
- Other Proposed Substation Sites
- Preferred Alternative - Central Alternative using Central Option 1 (not drawn to scale)
- Other Proposed Alternatives and Options (not drawn to scale)
- Original Central Alternative
- New Access Roads
- Existing Public or Private Roads to be Improved
- Temporary Roads
- Airport
- City or Town
- Dam
- Urban Area
- County Boundary
- State Boundary

Note: The Preferred Alternative has been refined to further minimize and avoid impacts to the natural and human environment where possible.

Wetland Class

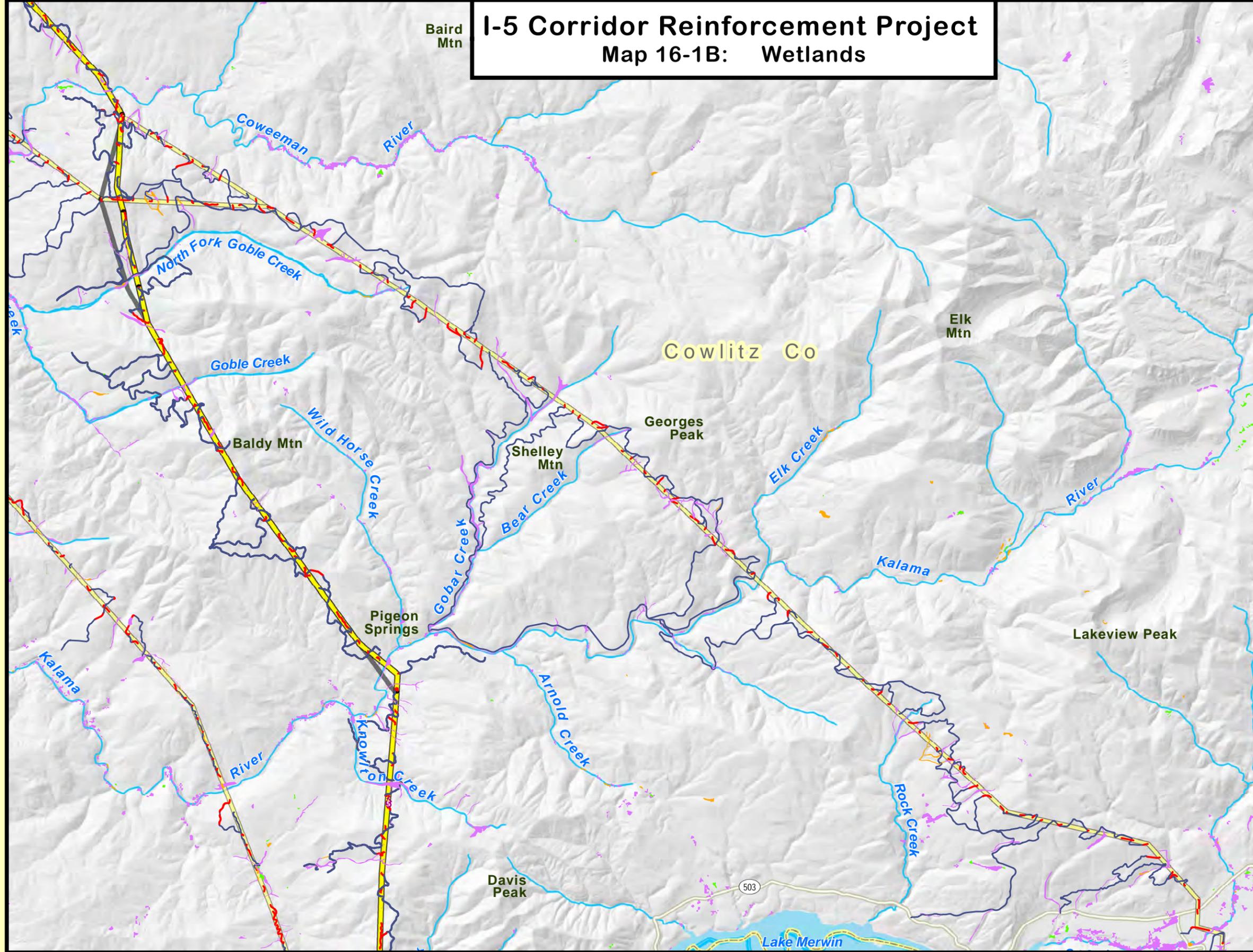
- Palustrine Emergent Wetland
- Palustrine Forested Wetland
- Palustrine Scrub-Shrub Wetland



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Map 16-1B: Wetlands

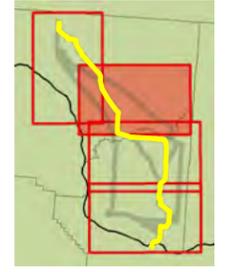
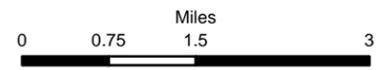


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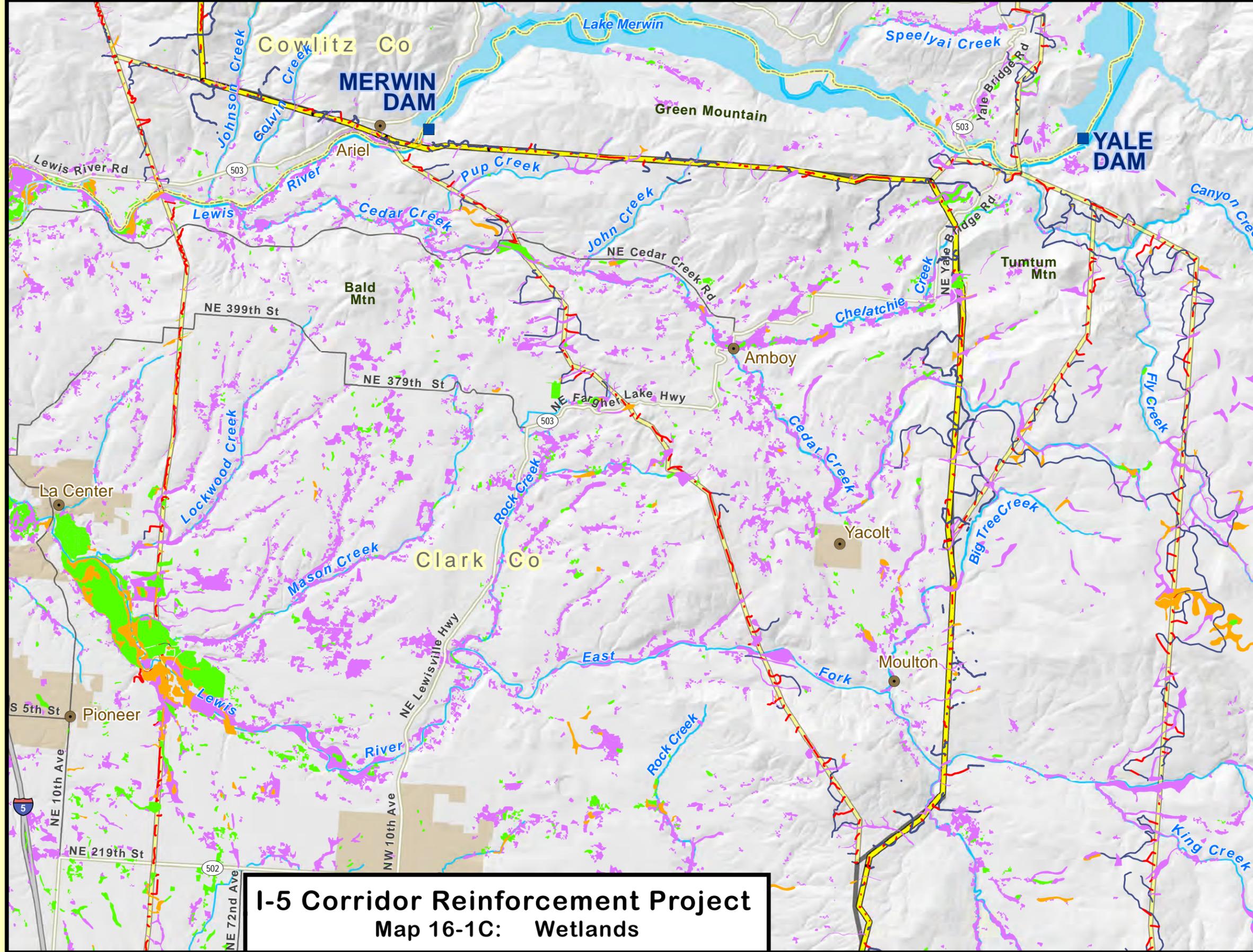
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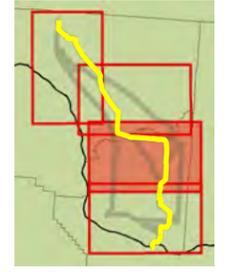
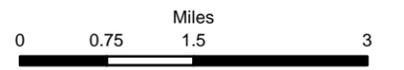


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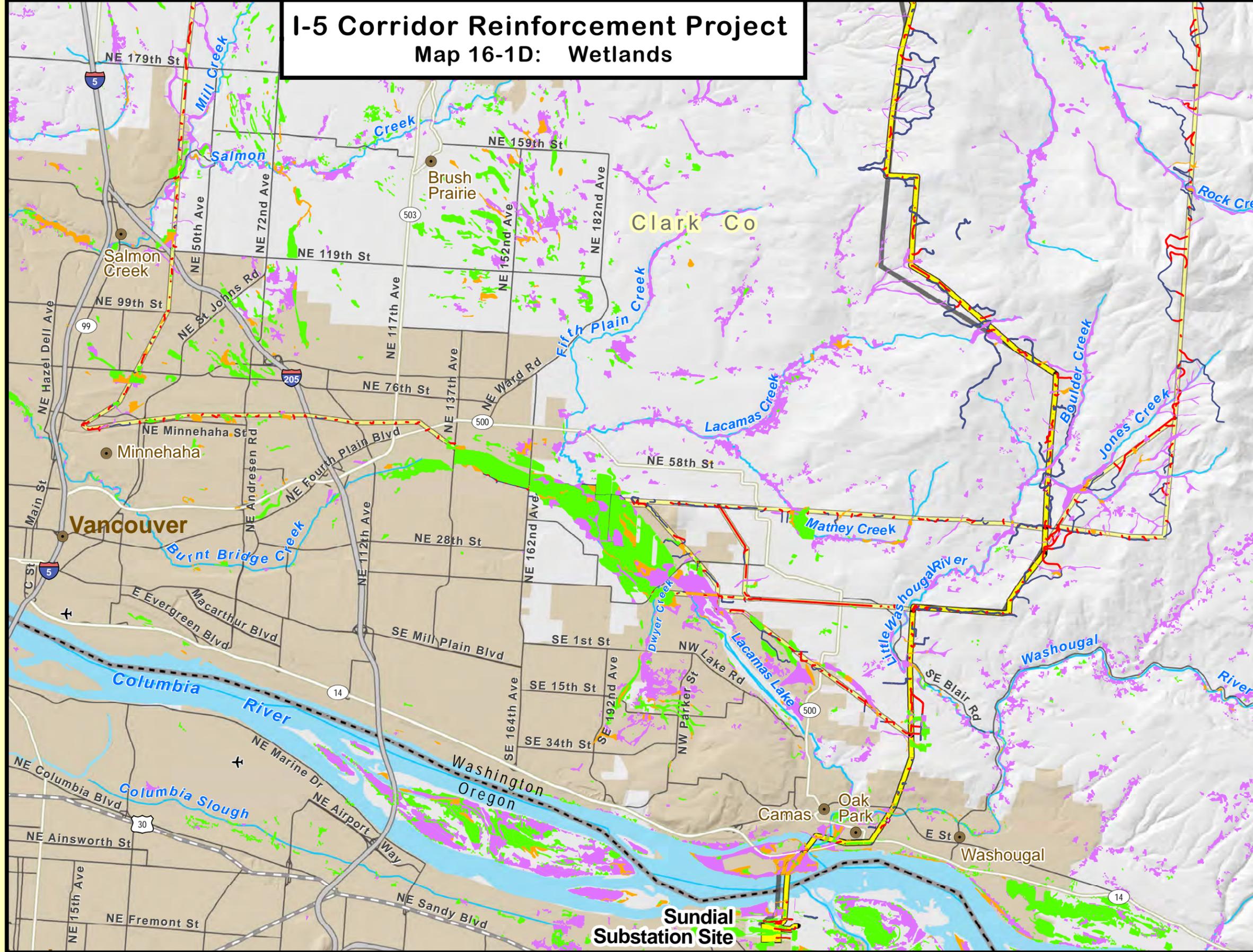


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Map 16-1C: Wetlands

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Map 16-1D: Wetlands



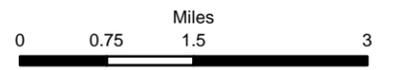
LEGEND

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vegetation less than 20 feet tall; and palustrine **emergent** having at least 30 percent cover of emergent herbaceous vegetation.

Forested wetlands within the study area are dominated by a mixture of deciduous and coniferous trees, including red alder (*Alnus rubra*), black cottonwood (*Populus balsamifera* ssp. *trichocarpa*), western red cedar (*Thuja plicata*), Oregon ash (*Fraxinus latifolia*), and Sitka spruce (*Picea sitchensis*) along with western skunk cabbage (*Lysichiton americanum*) and slough sedge (*Carex obnupta*). Scrub-shrub wetland vegetation consists of small trees, shrubs, and multi-stemmed plants, such as willow (*Salix* spp.), red osier dogwood (*Cornus sericea*), Douglas spirea (*Spiraea douglasii*), wild rose (*Rosa* spp.), black hawthorn (*Crataegus douglasii*), stinging nettle (*Urtica dioica*), Pacific ninebark (*Physocarpus capitatus*), rose species (*Rosa* spp.), butterfly bush (*Buddleia davidii*), and gooseberry (*Ribes* spp.). Emergent wetlands have cattail (*Typha latifolia*), reed canarygrass (*Phalaris arundinacea*), rushes (*Juncus* spp.), bulrush (*Scirpus* spp. and *Schoenoplectus* spp.), and sedges (*Carex* spp.) as the primary vegetation. Vegetation within aquatic bed wetlands, a transition between emergent wetlands and open water, includes yellow pondlily (*Nuphar variegata*), white waterlily (*Nymphaea odorata*), milfoils (*Myriophyllum* spp.), pondweeds (*Potamogeton* spp.), and lesser duckweed (*Lemna minor*).

Wetland functions are those processes that occur within a wetland, such as water storage, nutrient cycling, and maintenance of diverse plant communities and habitat that benefits wildlife. Wetland functions can be grouped into three broad categories: habitat functions, hydrologic functions, and water quality functions. Habitat functions include providing food, water, and shelter for fish, shellfish, birds, amphibians, and mammals. Wetlands also serve as a breeding ground and nursery for many species. Hydrologic functions include reducing stormwater velocity, recharging and discharging groundwater, and providing flood storage. Water quality functions include the potential for removing sediment, nutrients, heavy metals, and toxic organic compounds.

Assessing Wetland Function

As noted, wetland delineations including functional assessments were done for all areas crossed by the Preferred Alternative, as well as for Baxter Road and Casey Road substations sites and the preferred Sundial substation site. For other project components such as other route alternatives, where delineations were not conducted, wetland functions were assessed using a modified version of the Washington State Department of Ecology's rating system as a foundation (see Appendix L). Each state's rating system assesses wetland functions using a series of questions related to water quality, hydrology, and habitat functions, and generates a score for each function category based on the wetland's potential and opportunity for providing the function. Each question on the rating form was evaluated to determine the feasibility of answering the question using available information without conducting site visits. Several questions could not be answered without sites visits and were not included on the modified rating form developed for this project. Low, medium and high qualitative ratings were assigned to wetlands based on the wetland function score from the modified assessment (see Maps 16-2A through 16-2D). These qualitative ratings along with ratings determined through the Washington State Wetland Rating System and ORWAP were used to help provide the basis for assigning impact levels in Section 16.2.1 below.

Wetlands vary in quality throughout the study area (see Maps 16-2A through 16-2D). For example, high-quality wetlands are relatively undisturbed wetlands that contain a high diversity of native plants, thereby providing greater habitat opportunities and erosion and flood control. Medium-quality wetlands are more disturbed but still provide a moderate to high level of some functions. Low-quality wetlands have the lowest level of functions because they are heavily

disturbed. In some cases, high-quality wetlands may have rare or special characteristics protected by federal, state, or local jurisdictions, or may support species protected by federal, state, and local jurisdictions (see Chapters 17, Vegetation and 18, Wildlife). In the study area, mature forested wetlands, bogs, bog-like wetlands, aspen-dominated wetlands, and camas prairie wetlands are aquatic resources that require special protection under the Seattle District Corps Clean Water Act regulatory program.

All wetlands in the study area are considered priority habitats by WDFW (WDFW 2010a) (see Chapter 17, Vegetation, and Chapter 18, Wildlife). Priority habitat wetlands have been identified as having unique and valuable attributes. For example, they may have comparatively high fish and wildlife density, species diversity, important breeding habitat, important fish and wildlife seasonal ranges or movement corridors, limited availability, high vulnerability to habitat alteration, or unique or dependent species (WDFW 2008). They are often part of large riparian areas along or otherwise connected to nearby rivers. Additional wetlands that could be considered priority habitats by WDFW may be present in the study area although they have not yet been documented.

Smaller, disturbed wetlands are often found in active agricultural fields and interspersed among or next to developed areas. These wetlands are frequently of lesser quality because their primary functions or values may be limited.

Wetlands have buffer areas surrounding them that provide protection of wetland functions, including providing habitat for a variety of wetland-dependent or upland wildlife and plant species. The Cowlitz County Critical Areas Ordinance and the Clark County Critical Areas Ordinance each classify wetlands based on their functions and values and specify a minimum buffer width for each classification. This width is then adjusted based on wetland function level and proposed wetland impact. Similar buffer width determinations occur in Multnomah County, Oregon. Ecology's Wetlands in Washington State Volume 2: Guidance for Protecting and Managing Wetlands, also includes recommended buffer widths to protect wetlands functions, depending on the intensity of the surrounding land uses.

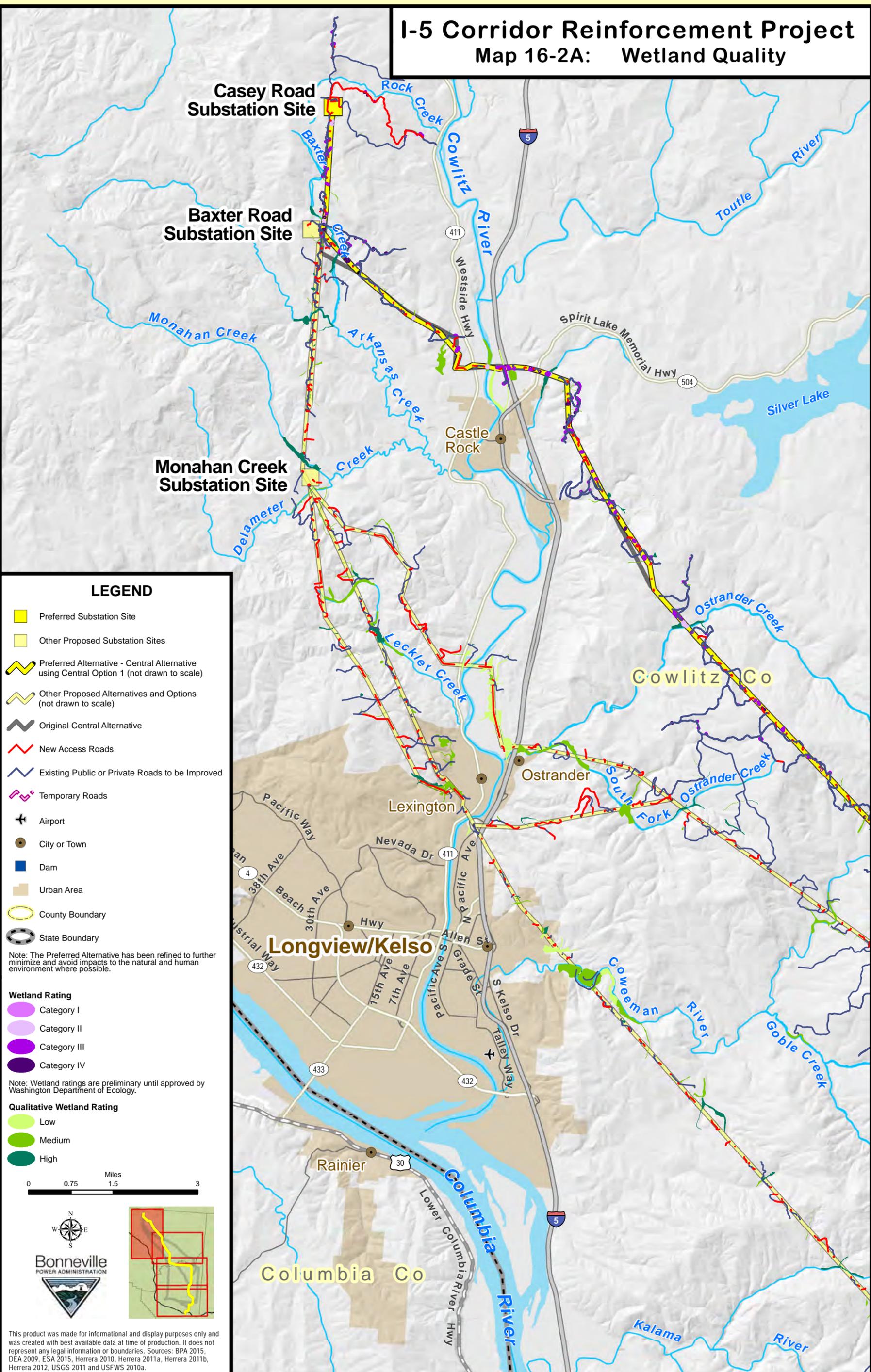
16.1.1 West Alternative and Options

Wetlands along the West Alternative are primarily emergent wetlands (56 percent) with scrub--shrub (23 percent) and forested (20 percent) wetlands the remaining wetland classes (see Maps 16-1A through 16-1D). Within the West Alternative there are three to six times as many wetlands compared to the other alternatives (307 acres compared to 51 acres for the Central Alternative; 126 acres for the East Alternative; and 158 acres for the Crossover Alternative).

Low-to-medium quality wetlands were found along the Coweeman River in the northern portion of the West Alternative near the city of Longview (see Map 16-2A). Wetlands with a medium-to-high function rating or quality were mapped along Leckler Creek and near Lexington west of a residential area. Medium-to-high quality wetlands were mapped along the Lewis and East Fork Lewis rivers south to Salmon Creek (low-to-medium quality) in the middle portion of the alternative (see Maps 16-2C and 16-2D). Along Burnt Bridge Creek and Lacamas Creek, wetland functions were rated as high. Also found along the West Alternative in the Lacamas Creek area are wet prairie wetlands and special-status plants that require special protection (see Section 17.1.1.5, Herbaceous, Native Upland and Wet Prairie). Wetlands along the Columbia River, including where Lacamas Creek and the Washougal River merge and flow into the Columbia River in the southern portion of the alternative were rated as Category II and III

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Map 16-2A: Wetland Quality



LEGEND

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- Existing Public or Private Roads to be Improved
- Temporary Roads
- Airport
- City or Town
- Dam
- Urban Area
- County Boundary
- State Boundary

Note: The Preferred Alternative has been refined to further minimize and avoid impacts to the natural and human environment where possible.

- #### Wetland Rating
- Category I
 - Category II
 - Category III
 - Category IV

Note: Wetland ratings are preliminary until approved by Washington Department of Ecology.

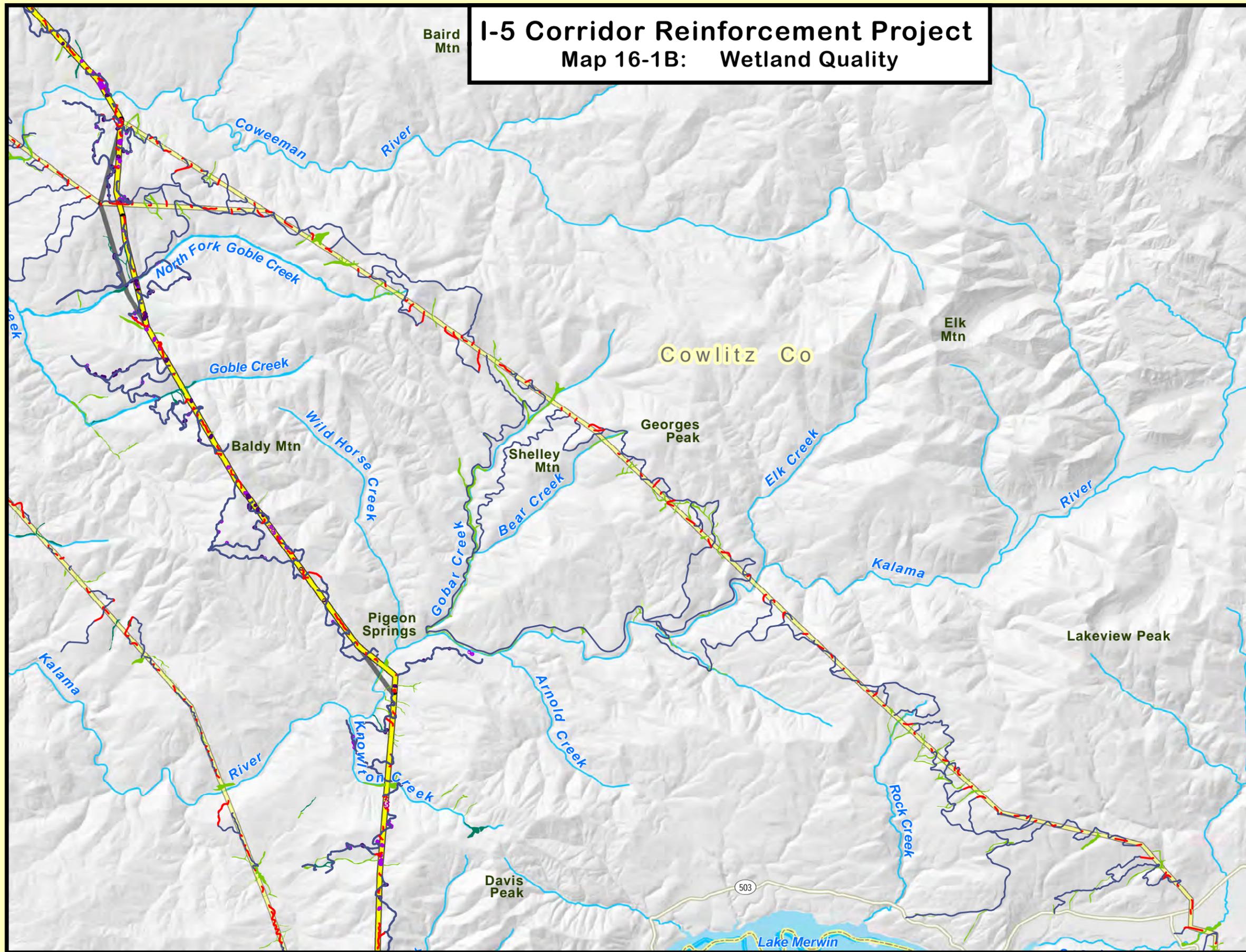
- #### Qualitative Wetland Rating
- Low
 - Medium
 - High



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I-5 Corridor Reinforcement Project

Map 16-1B: Wetland Quality



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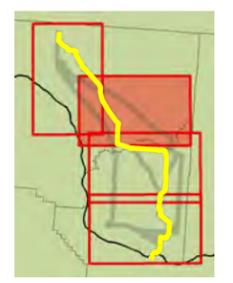
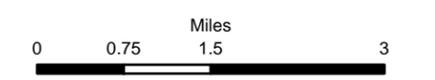
Wetland Rating

- Category I
- Category II
- Category III
- Category IV

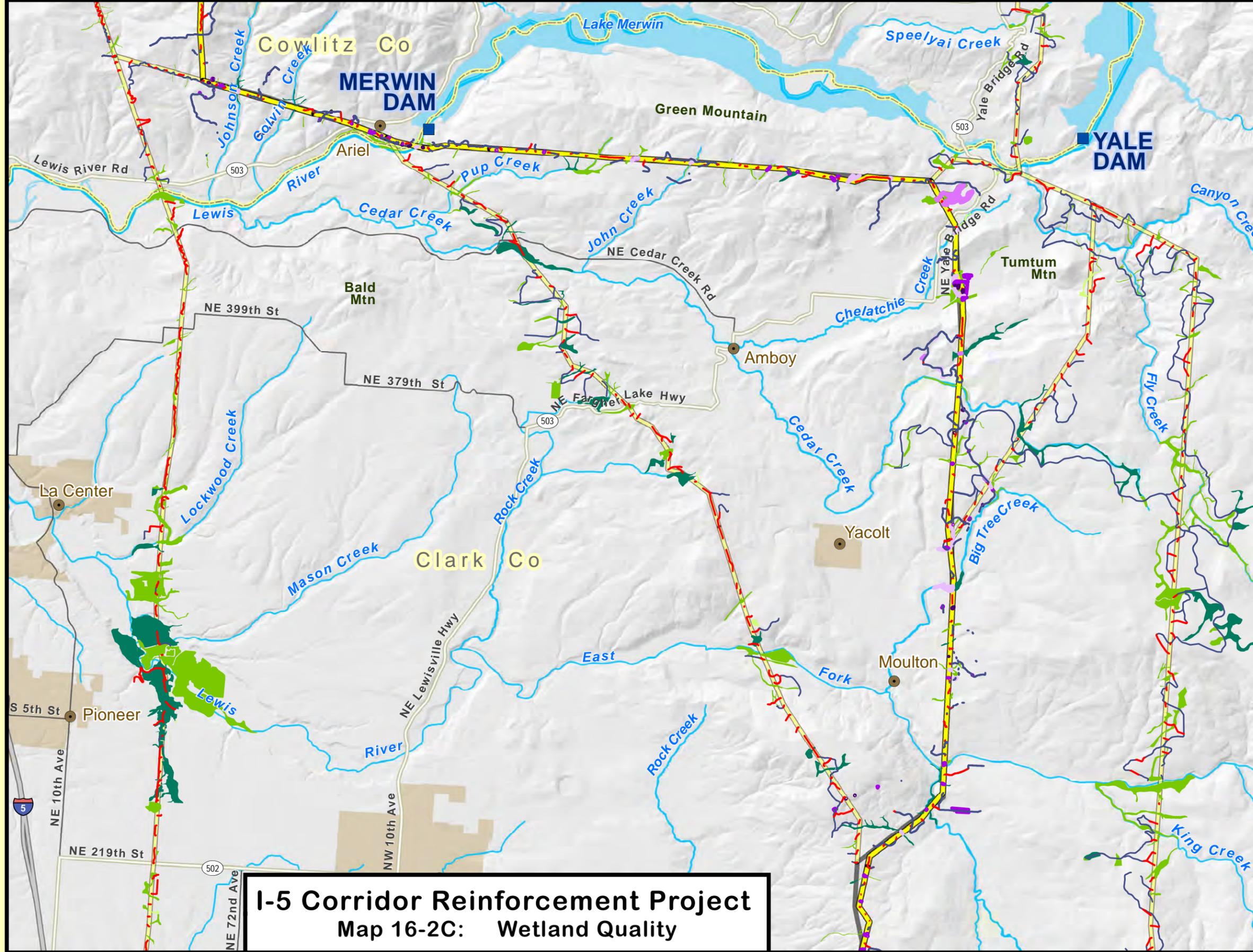
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Qualitative Wetland Rating

- Low
- Medium
- High



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Qualitative Wetland Rating

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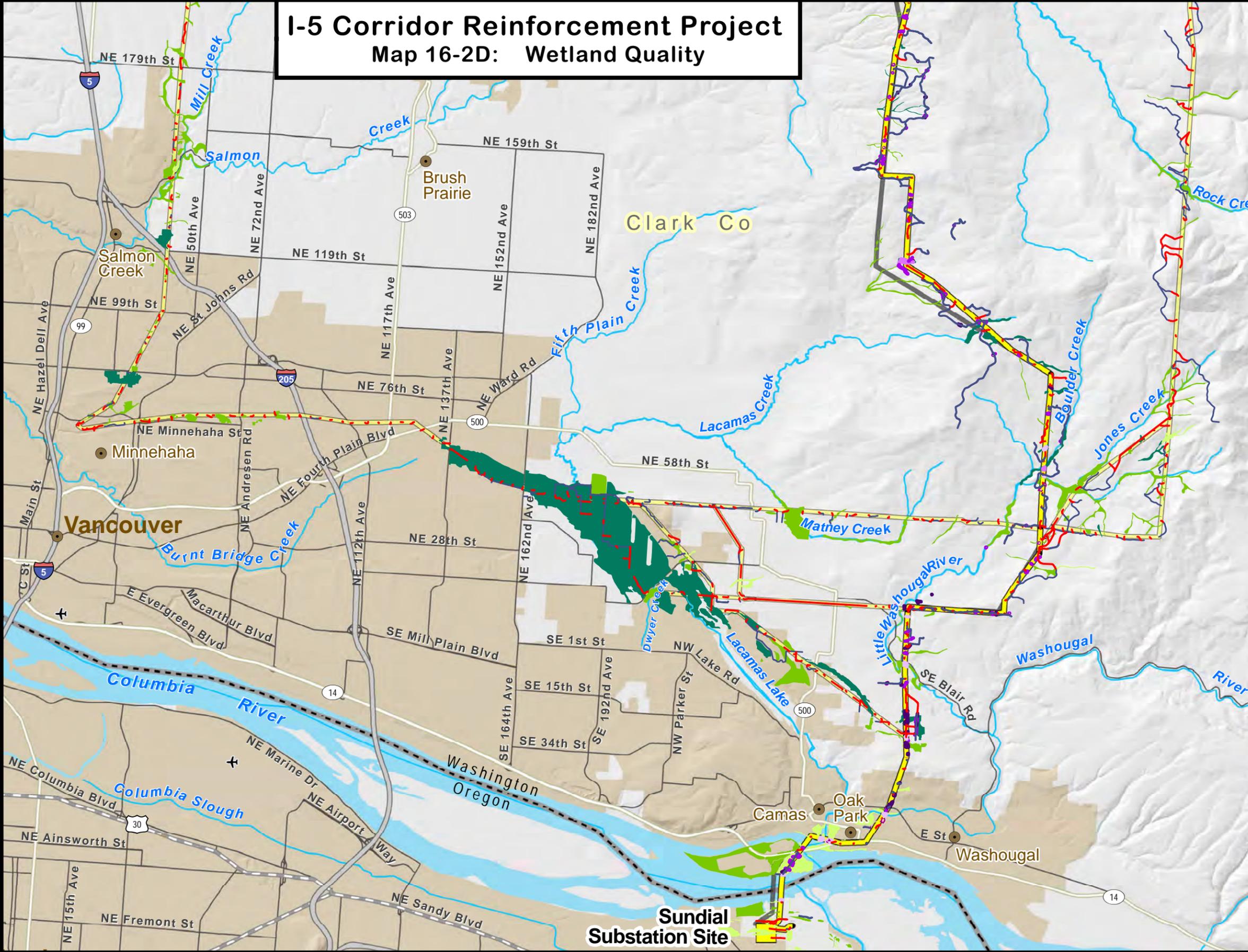


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Map 16-2C: Wetland Quality

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Map 16-2D: Wetland Quality



LEGEND

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Wetland Rating

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Qualitative Wetland Rating

- Low
- Medium
- High

Miles

0 0.75 1.5 3

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wetlands (see Map 16-2D). Several unnamed streams and drainages crossed by the West Alternative also have low-to-high functioning wetlands. In Oregon, emergent wetlands with a medium functional rating have been delineated at the Sundial substation site on Lots 11 and 12 (see Section 16.1.5, Sundial Substation Site).

Many low-to-medium quality wetlands were also mapped along the West Alternative in the more developed areas of Kelso, Vancouver, Camas, Washougal, and Troutdale and along major road systems that have previously been disturbed by road construction and commercial and residential development. Wetlands have been filled and roads have created impervious surfaces and blocked water flow to wetland areas. Emergent wetlands with medium quality are found in agricultural land between the East Fork Lewis River and the city of Vancouver.

West Option 1 crosses emergent and scrub-shrub wetlands, with some forested wetlands, for almost its entire length through the Lacamas Creek floodplain northwest of Lacamas Lake where wetland functions were rated as high (see Map 16-2D). A portion of the area along West Option 1 crosses the Lacamas Prairie Natural Area Preserve and Natural Resource Conservation Area that includes wet prairie wetland areas and special status plants and habitat (see Section 17.1.2, Special-Status Plant Habitats). (Although not presently delineated, these wetlands would be considered by Ecology to be Category I wetlands due to the presence of rare plants and a rare wetland ecosystem type in the area.)

West Options 2 and 3 both cross the Lacamas Creek floodplain and wetlands with a high function rating at their western end (see Map 16-2D). West Option 2 crosses wetlands along the middle reaches of the Little Washougal River (medium-to-high quality). West Option 3 crosses small areas of forested, emergent, and scrub-shrub wetlands along Matney Creek (medium-to-high quality) and northeast of Camas along the lower and middle reaches of the Little Washougal River.

16.1.2 Central Alternative and Options

Wetlands along the Central Alternative are primarily forested and scrub-shrub wetlands (37 percent and 34 percent respectively) with some emergent wetlands (23 percent) (see Maps 16-1A through 16-1D). Within the Central Alternative, there are less wetlands than the other alternatives (about 76 acres less than the East Alternative, about 107 acres less than the Crossover Alternative, and about a sixth of those mapped on the West Alternative). Emergent and forested wetlands with a Category II function rating were mapped along Ostrander Creek, with Category III and IV rated wetlands along the North Fork Goble Creek and Goble Creek in the northern portion of the Central Alternative east of Longview (see Map 16-2A). Wetlands rated as Category I, II, III, and IV were mapped along the Lewis, and East Fork Lewis rivers and near Chelatchie and Big Tree creeks east of Amboy in the middle portion (see Maps 16-2B and 16-2C). Wetlands near the Little Washougal River and where Lacamas Creek and the Washougal River flow into the Columbia River in the southern portion of the alternative were rated as Category II and III wetlands (see Section 16.1.1, West Alternative and Options, and Map 16-2D). Several unnamed streams and drainages crossed by the Central Alternative also have wetlands rated as Category II to IV wetlands. Similar to the West Alternative, emergent wetlands with a medium functional rating have been delineated at the Sundial substation site on both Lots 11 and 12 (see Section 16.1.5, Sundial Substation Site).

Disturbance to low or medium functioning wetlands from previous development and roads has occurred near Camas, Washougal, and Troutdale (see Section 16.1.1, West Alternative and

Options). Near Camas, Troutdale, and the Columbia River, wetlands crossed are the same as those identified for the West Alternative, since all action alternatives follow a common route to Troutdale.

Central Option 1 begins at the Casey Road substation site; there are Category I and III wetlands to the south and east of the site (see Section 16.1.6.1, Casey Road, and Map 16-2A). Category II, III, and IV wetlands were also delineated at the south end of the option just north of the Baxter Road substation site. Central Option 2 crosses low-to-high functioning forested wetlands near Lexington west of a residential area, along the Cowlitz River in the middle portion of the option, and along the Coweeman River in the southern portion of the option (see Map 16-2A). Central Option 3 crosses medium-to-high quality forested, emergent and scrub-shrub wetlands along and near Cedar Creek, Rock Creek, the East Fork Lewis River, and other streams southwest of Amboy (see Map 16-2C).

16.1.3 East Alternative and Options

Wetlands along the East Alternative are primarily forested (43 percent) and emergent (41 percent) wetlands with some scrub-shrub wetlands (17 percent) (see Maps 16-1A through 16-1D). Within the East Alternative there are more wetlands than the Central Alternative, less than the Crossover Alternative, and about a third of those mapped on the West Alternative.

Low-to-medium quality emergent and forested wetlands were mapped along the Cowlitz, with low-to-high quality wetlands along and near the Coweeman River in the northern portion of the East Alternative (see Maps 16-2A and 16-2B). Medium functioning forested wetlands along the North Fork Goble Creek, tributaries to Rock Creek, Speelyai Creek, and the Kalama and East Fork Lewis rivers were mapped on the middle portion of the East Alternative, including a concentration of forested and scrub-shrub wetlands (medium-to-high function rating) along smaller creeks west and northwest of Yale Dam (see Maps 16-2B and 16-2C). Wetlands near the Little Washougal River and where Lacamas Creek and the Washougal River flow into the Columbia River in the southern portion of the alternative were rated as Category II and III wetlands (see Sections 16.1.1, West Alternative and Options, and 16.1.2, Central Alternative and Options, and Map 16-2D). Several unnamed streams and drainages crossed by the East Alternative also have low-to-high functioning wetlands. Similar to the West and Central alternatives, emergent wetlands with a medium functional rating have been delineated at the Sundial substation site on Lots 11 and 12 (see Section 16.1.5, Sundial Substation Site).

Low-to-medium functioning wetlands near Camas, Washougal, and Troutdale have been previously disturbed from development and roads construction (see Section 16.1.1, West Alternative and Options).

Forested, emergent, and scrub-shrub wetlands with low-to-medium function ratings were mapped along the Cowlitz River, Ostrander Creek, and the South Fork Ostrander Creek north of Longview for East Option 1 (see Map 16-2A). Medium functioning wetlands crossed by this option were also mapped along the Coweeman River. East Option 2 crosses forested and scrub-shrub wetlands along Cedar Creek (Category II rating), Big Tree Creek (Category II rating), Rock Creek (Category III rating), East Fork Lewis River (estimated to be Category III), East (Category III rating) and North Fork Lacamas creeks (medium-to-high function rating), and the Little Washougal River (Category II and III rating) (see Map 16-2D). East Option 3 crosses low-to-medium functioning forested and scrub-shrub wetlands along the East Fork Little Washougal River and its tributaries.

16.1.4 Crossover Alternative and Options

Wetlands along the Crossover Alternative are a combination of emergent (41 percent), scrub-shrub (30 percent) and forested (29 percent) wetlands (see Maps 16-1A through 16-1D). Within the Crossover Alternative, there are more wetlands than the Central and East alternatives, but about half of those mapped on the West Alternative.

Low-to-high functioning wetlands along this alternative are the same as those mapped along the northern portion of the West Alternative north of the Lewis River and southern portion of the East Alternative south of Yale Dam to the Columbia River (see Maps 16-2A to 16-2D). Where the Crossover Alternative runs west to east, Category II, III, and IV rated wetlands are the same as those found along the middle portion of the Central Alternative along the Lewis River between Merwin and Yale dams (see Maps 16-2B and 16-2C).

Low-to-medium functioning wetlands near Camas, Washougal, and Troutdale have been previously disturbed from development and roads construction (see Section 16.1.1, West Alternative and Options).

Forested, emergent, and scrub-shrub wetlands with medium-to-high function ratings were mapped along the Crossover Option 1 north of Lacamas Lake (see Map 16-2D). Crossover Options 2 and 3 cross scrub-shrub and forested wetland near Baxter Creek with low-to-high function ratings (see Map 16-2A).

16.1.5 Sundial Substation Site

Twenty-six wetlands, about 90 acres overall including depressional forested, scrub-shrub, and emergent and riverine wetlands, were delineated at the Troutdale Reynolds Industrial Park by the Port of Portland as part of their light industrial complex Phase II development (DEA 2009). Lot 12 includes about 11 acres of primarily emergent wetland with a medium function rating. Lot 11 has no wetlands because they were filled by the Port of Portland under a Section 404 permit authorized by the Corps and a Removal-Fill permit issued by DSL.

Construction and operation of the Reynolds Aluminum plant, levee construction and drainage improvements, the presence of existing transmission lines and substations, and agricultural activities have extensively disturbed portions of the industrial park (DEA 2009). These activities are no longer occurring, except for utility use, agricultural uses at the far northwest corner of the property and some new industrial development, including a Federal Express shipping facility (DEA 2009). The Port plans to continue this type of light industrial development.

16.1.6 Castle Rock Substation Sites

16.1.6.1 Casey Road

Eight wetlands, about 3 acres overall, were delineated at the Casey Road site; none are directly within the boundary of the proposed substation facility itself (Herrera 2011a, ESA 2015). The wetlands are along Rock Creek to the north of the proposed facility and along tributaries to Rock Creek north, south and east of the site. The substation site has recently been cleared of trees. Wetlands include Category I, II, III, and IV forested, scrub-shrub, and emergent wetlands.

16.1.6.2 Baxter Road

Twelve wetlands, about 5 acres overall, were delineated at the Baxter Road site including emergent and scrub-shrub wetlands (Herrera 2011b). Less than 1 acre of wetland, mostly forested, is within the boundary of the proposed substation facility. Wetlands at the site include three Category II wetlands. The other wetlands are seven Category III wetlands and two Category IV wetlands. Category IV wetlands have the lowest levels of functions and are often heavily disturbed. Eight drainages are also present south of the substation site (see Chapter 15, Water and Chapter 19, Fish).

16.1.6.3 Monahan Creek

There are no wetlands at the proposed substation site. Wetlands are found nearby in the ditch abutting Delameter Road and within the riparian zone of Monahan Creek.

16.2 Environmental Consequences

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

16.2.1 Impact Levels

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

- Permanent alteration of wetland hydrology, vegetation, and/or soils by excavation or fill of a medium- or high-quality wetland (Category I, II, or III in Washington and medium-to-high rating in Oregon) that causes destruction of water quality, hydrologic, and habitat functions.
- Permanent clearing of wetland vegetation converts high or medium-quality wetland (Category I, II, or III in Washington and medium-to-high rating in Oregon) to medium- or low-quality wetland (Category III or IV in Washington and -low-to-medium rating in Oregon) with no opportunity for regrowth of trees or other tall-growing vegetation.
- Permanent clearing of high-quality wetland (Category I or II in Washington and high rating in Oregon) buffer areas with introduction of invasive non-native or noxious weed species or there is no opportunity for regrowth of trees or other tall-growing vegetation.
- Temporary disturbance or alteration of wetland hydrology, vegetation, and/or soils by temporary fill in wetlands requiring special protection (see Section 16.1, Affected Environment) that causes temporary alteration of water quality, hydrologic, and habitat functions.

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

- Permanent alteration of wetland hydrology, vegetation, and/or soils by excavation or fill of a low-quality wetland (Category IV in Washington and low rating in Oregon) that causes destruction of water quality, hydrologic, and habitat functions.
- Temporary disturbance or alteration of wetland hydrology, vegetation, and/or soils by temporary fill of a medium- or high-quality wetland (Category I, II, or III in Washington

and medium-to-high rating in Oregon) that causes temporary alteration of water quality, hydrologic, and habitat functions.

- Permanent clearing of medium-quality wetland (Category III in Washington and medium rating in Oregon) buffers with introduction of invasive non-native or noxious weed species or there is no opportunity for regrowth of trees or other tall-growing vegetation.

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

- Temporary disturbance or alteration of wetland hydrology, vegetation, and/or soils by temporary fill of a low-quality wetland (Category IV in Washington and low rating in Oregon) that causes temporary alteration or disruption of water quality, hydrologic, and habitat functions.

No impact would occur where project activities would not disturb or alter wetlands.

16.2.2 Impacts Common to Action Alternatives

16.2.2.1 Construction

Transmission line and access road construction would directly affect wetlands from placement of fill, vegetation removal (for the right-of-way and towers, access roads, substations, pulling and tensioning sites, and danger trees outside of the right-of-way), soil compaction, and contamination from accidental spills or oil from construction vehicles and equipment. Long-term, indirect impacts would include habitat fragmentation and the introduction of invasive non-native or noxious weed species. Towers and roads would be located to avoid wetlands as much as possible. Where unavoidable, filling of medium- or high-quality wetlands for tower footings and access roads would be a **high** impact where all wetland functions such as habitat and water storage would be destroyed. Fill placed in low-quality wetlands for tower footings or access roads would be a **moderate** impact where limited wetland functions would be destroyed.

Clearing trees and shrubs from medium- or high-quality forested and scrub/shrub wetlands and wetland buffers along rights-of-way and new access roads also would be a long-term, **high** impact. Conversion of medium- or high-quality wetlands and buffers to low- or medium-quality would remove habitat, alter hydrology through a decrease in **evapotranspiration** or increase in direct precipitation onto soils, increase soil and water temperatures from lack of shading, and possibly introduce weed species. Dense vegetation common in scrub-shrub wetlands, offering cover, breeding habitat, and foraging opportunities would be lost or modified. Vegetation removal would also cause impacts to species diversity and richness and continuity with adjacent habitat.

Temporary soil disturbance and compaction from construction activities including the use of temporary roads could modify hydrology, and disturb vegetation or change species richness and diversity in emergent wetlands, especially if noxious weeds are introduced. Impacts to medium- or high-quality wetlands would be **moderate-to-high** depending on landscape position and opportunity for the wetland to provide flood storage, water quality improvement, habitat, or if they are wetlands requiring special protection. Similarly, temporary impacts to low-quality wetlands would be **low** depending on the same factors. Short-term habitat fragmentation would occur to all wetland classes found within and next to the transmission line and access roads during project construction.

Up to 2,000 or more danger trees that pose a potential hazard to the transmission line also would be removed from areas next to rights-of-way, creating a **low-to-moderate** impact depending on the number removed at a specific wetland site and the quality of the wetland.

Pulling and tensioning sites totaling almost 40 acres adjacent to and outside of the right-of-way, would be cleared during construction. While the intent would be to avoid wetland, some clearing may occur in wetlands at these sites. Temporary wetland fill also would occur from grading and placement of crushed rock causing a **low-to-high** impact depending on the quality of the wetland and if trees are allowed to regrow (for sites located outside the right-of-way).

Staging areas (5-15 acres each) and helicopter fly yards (10 acres each) would be located by the contractor in previously developed areas on or outside of the right-of-way, or would be permitted individually if a developed site is not available. Although the locations and numbers are unknown, staging areas and helicopter fly yards would not be placed in wetlands so **no** impact would occur.

16.2.2.2 Operation and Maintenance

Operation and maintenance of the transmission line and access roads would create direct and indirect impacts to wetlands. Direct impacts would occur from vegetation maintenance activities such as vegetation clearing or herbicide application for noxious weed control. If herbicide application is required, appropriate buffers would be used to keep herbicides out of wetlands (BPA 2000a, Table III-I). Use of access roads during wet periods for structure maintenance would indirectly affect wetlands by introducing sediment into wetlands through vehicular traffic mud splash, potentially affecting water quality in the short-term. Best management practices would be used to reduce the potential for sediment to enter wetlands; impacts from maintenance activities would be **low-to-moderate**.

Wetlands or wetland buffers adjacent to or near substations could receive dust or sediment and contaminants in surface runoff from substation yard and roads. Exposure to these contaminants would be infrequent, temporary, and a **low** impact.

16.2.2.3 Sundial Substation Site

There would be **no** impacts to wetlands on Lot 11 as none exist on the site.

About 11 acres of primarily emergent wetlands would be filled on Lot 12. Although wetlands on Lot 12 are within an industrial setting and are of medium-quality, functions such as water quality improvement, decreasing overland runoff from precipitation, and bird, amphibian, reptile, and aquatic invertebrate habitat would be lost; impacts would be **high**.

16.2.3 Castle Rock Substation Sites

16.2.3.1 Casey Road

No-to-low impacts to wetlands would occur at the Casey Road site because wetlands are outside the substation disturbance area. The stockpile area and stormwater detention pond constructed north of the substation site would be about 300 and 1400 feet respectively, south of a wetland along Rock Creek. The stockpile and stormwater

Impacts common to action alternatives are in Section 16.2.2. The remaining sections discuss impacts unique to each alternative, and recommended mitigation measures.

detention pond areas also would avoid a wetland located within the existing transmission line right-of-way. However, there is the potential for operation and maintenance activities to encroach into wetland buffers. If dust, sediment, or contaminants reach adjacent buffers, this would be a short-term, **low** impact.

16.2.3.2 Baxter Road

About 0.6 acre of medium-quality wetland, mostly forested, could be filled at the Baxter Road site causing a **high** impact. The functions provided by the wetlands and their buffers that could be filled, such as reducing overland flows and delivery of storm runoff to streams, would be lost. A stormwater detention pond constructed southeast of the substation site would be about 300 feet northeast of these wetlands.

16.2.3.3 Monahan Creek

No impacts to wetlands would occur at this site because the substation would avoid wetlands including the ditch along Delameter Road and the riparian zone along Monahan Creek.

16.2.4 West Alternative

All forested wetlands within new and existing transmission line right-of-way and where crossed by access roads would be cleared. About 54 acres of forested wetland would be cleared within new and existing right-of-way (see Table 16-1). Most cleared forested wetland would be converted to low-growing scrub-shrub wetland. While these medium-to-high quality wetlands would continue to function as wetlands, a **high** impact would occur because habitat would be removed and hydrology could be altered similar to impacts described in impacts common to action alternatives.

Vegetation removal in scrub-shrub wetlands (about 62 acres) also would occur causing a **high** impact. Likely, some low-growing scrub-shrub habitat would remain, causing some functions such as water quality improvement to continue, but overall, habitat would be degraded.



Fill for tower footings and access roads also would be placed in 31 acres of forested and non-forested wetlands from tower footings and access roads, including along the Coweeman, Lewis, and East Fork Lewis rivers, and Salmon and Lacamas creeks. Two towers with access roads would be constructed in non-forested wetlands along the Coweeman River. About 20 towers would be constructed in the area starting just north of the East Fork Lewis River south to the Salmon Creek area. Fill in these wetlands would cause a **high** impact because they are primarily medium-to-high quality wetlands. As discussed in impacts common to action alternatives, compaction and fill would destroy wetland functions, fragment habitat, and possibly alter hydrology. About 26 towers with access roads would be constructed in medium-to-high quality scrub-shrub, forested, and emergent wetlands along Lacamas Creek and north of Lacamas Lake; this would be a **high** impact because there is no opportunity for regrowth, even of low-growing species, and continuity may be disturbed with adjacent wetland habitat. In these wetlands, the potential for construction activities to introduce noxious weeds or non-native plants would cause a **moderate** impact because weed species could displace native wetland species. Almost twice as much fill would be required for the West Alternative as the other action alternatives (see Table 16-1).

About 14 towers with access roads would be constructed near Camas where the line would cross the Columbia River and south of the Columbia River. The impact on wetlands in this area would be **low-to-high** where temporary or permanent fill would be placed at towers and roads constructed in disturbed wetlands with low-to-medium function ratings. Wetland impacts at Sundial Substation would be high (see Section 16.2.2.3, Sundial Substation Site).

16.2.4.1 West Option 1

West Option 1 would replace a portion of the alternative that follows existing right-of-way just east of Vancouver with an option that is farther west and closer to Vancouver. This portion of the alternative includes replacing one of the existing 230-kV lines with a new double-circuit 500-kV line. The existing 230-kV line and the new line would be placed on new 500-kV towers.

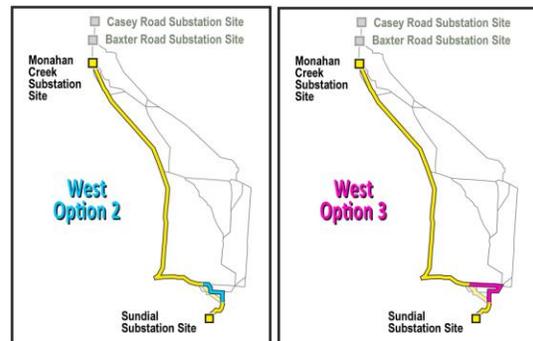


Clearing in scrub-shrub and forested wetlands and fill of emergent and scrub-shrub wetlands along West Option 1 would occur within the Lacamas Creek floodplain northwest of Lacamas Lake (see Table 16-1).

About 14 towers with access roads would be constructed in this area. Most of this option would be located in wetlands. Because this area has wetlands with a high function rating (the southern portion has been designated by WDNR as a Natural Area Preserve), impacts from clearing and fill would be **high**. Additionally, West Option 1 would impact more wetlands (12 acres) than the portion of line this option would replace on the West Alternative.

16.2.4.2 West Options 2 and 3

West Option 2 would replace a portion of the alternative in the rural residential areas north of Camas with an option farther to the east in the same area. West Option 3 would replace a portion of the West Alternative in the rural residential areas north of Camas with a route crossing rural residential and rural areas farther east.



Clearing in scrub-shrub wetlands and fill of emergent and scrub-shrub wetlands also would occur within the Lacamas Creek floodplain for both West Options 2 and 3 causing a **high** impact (the first five towers of both options would be constructed in the same high functioning emergent and scrub-shrub wetlands as West Option 1). While the wetlands are part of the larger wetland complex along Lacamas Creek, this northern portion has more agriculturally disturbed wetlands where functions are rated as low-to-medium. Farther to the east, clearing of forested and scrub-shrub wetlands with no opportunity for regrowth northeast of Camas and along the Little Washougal River for both options and Matney Creek for West Option 3 would create a **moderate-to-high** impact. Similar to the West Alternative, wetland functions would continue, but habitat would be removed and hydrology could be altered. However, West Options 2 and 3 would require between 11 and 7 fewer acres to be cleared in forested and scrub-shrub wetlands within the right-of-way than the portions of line these options would replace on the West Alternative.

Table 16-1 Potential Impacts to Wetlands^{1,2}

Alternatives and Options	Clearing (acres)			Fill (acres)								
	Right-of-Way ³		Total Approximate Wetland Clearing	Towers ⁴		New Access Roads ⁵		Improved Access Roads ⁵		Substations		Total Approximate Wetland Fill
	Forested	Scrub-Shrub		Forested	Non-Forested ⁶	Forested	Non-Forested ⁶	Forested	Non-Forested ⁶	Forested	Non-Forested ⁶	
West Alternative	54	62	116	0.6	3	2	17⁷	1	7	2	11	44⁷
West Option 1	+5	+2	+7	+0.1	+0.3	+0.3	+3	+0.6	+0.4	N/C	N/C	+5
West Option 2	-8	-3	-11	-0.1	-0.3	-0.5	-1	-0.2	-2	N/C	N/C	-4
West Option 3	-5	-2	-7	<0.1	-0.3	-0.4	-1	-0.1	-2	N/C	N/C	-4
Central Alternative⁸	17(69)	17(16)	34(85)	<0.1(0.4)	0.4(1)	0.4(2)	0.6(3)	0.2(1)	0.6(0.5)	0.6(0.6)	<0.1(11)	3(20)
Central Option 1	+0.4(+1)	+0.8(+0.5)	+1.2(+1.5)	N/C(N/C)	N/C(<0.1)	+0.2(N/C)	+0.1(+<0.1)	N/C(+<0.1)	+0.1(+0.2)	-0.6(-0.5)	<0.1(<0.1)	-0.2(-0.3)
Central Option 2	+5	-0.7	+4.3	<0.1	<0.1	+1	+0.4	-0.1	<0.1	+2	<0.1	+3
Central Option 3	-2	-0.5	-2.5	-0.1	+0.1	+0.9	+0.5	<0.1	<0.1	N/C	N/C	+1
East Alternative	61	23	84	0.7	1	3	3	2	1	0.6	11	22
East Option 1	+2	+8	+10	+0.1	+0.5	+0.3	+2	<0.1	<0.1	+1	<0.1	+4
East Option 2	+4	-7	-3	-0.3	-0.1	-0.9	-0.5	-0.7	-0.5	N/C	N/C	-3
East Option 3	+1	-1	N/C	<0.1	<0.1	-0.3	-0.4	-0.2	N/C	N/C	N/C	-1

Alternatives and Options	Clearing (acres)			Fill (acres)								
	Right-of-Way ³		Total Approximate Wetland Clearing	Towers ⁴		New Access Roads ⁵		Improved Access Roads ⁵		Substations		Total Approximate Wetland Fill
	Forested	Scrub-Shrub		Forested	Non-Forested ⁶	Forested	Non-Forested ⁶	Forested	Non-Forested ⁶	Forested	Non-Forested ⁶	
Crossover Alternative	53	35	88	0.7	1	3	4	2	3	2	11	26
Crossover Option 1	+8	+1	+9	+0.1	+0.2	+0.5	-0.3	N/C	+1	N/C	N/C	+2
Crossover Option 2	+1	+3	+4	N/C	+<0.1	N/C	+<0.1	+<0.1	+<0.1	-1	+<0.1	-1
Crossover Option 3	+3	+2	+5	N/C	+<0.1	N/C	N/C	+<0.1	N/C	-1	+<0.1	-1

Notes:

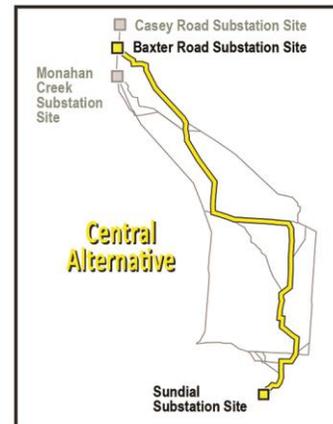
N/C – No net change from the action alternative.

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. Acreages for all action alternatives except the Preferred Alternative are based on wetlands mapped from available data; acreages for the Preferred Alternative are based on wetland delineations.
3. Cleared wetland within the right-of-way (does not include clearing for towers/roads because those acreages are included in the fill numbers).
4. Tower fill includes new, rebuilt, and removal based on 0.065 acre per tower.
5. Includes all road impacts inside and outside the transmission line right-of-way and assumes a 30-foot disturbance area for new roads and 20-foot disturbance area for improved roads. Casey Road site access road has 75- and 65-foot disturbance areas for new and improved roads, respectively.
6. Non-forested wetland includes emergent, scrub-shrub, and aquatic bed.
7. Values for the West Alternative's non-forested fill for new access roads and total approximate wetland fill have been revised; about 6 acres were inadvertently left out of the Draft EIS values.
8. Impact numbers not shown in parentheses reflect updated data, assumptions, and design refinements; impact numbers shown in parentheses are from the Draft EIS.

Sources: BPA 2015; DEA 2009, ESA 2015, Herrera 2011a, 2011b, 2012

16.2.5 Central Alternative

Similar to the West Alternative, all forested wetlands within new and existing transmission line right-of-way and where crossed by access roads would be cleared for the Central Alternative, a **high** impact. Together, about 34 acres of forested and scrub-shrub wetland would be cleared within the right-of-way, with most of these Category II to III wetlands converted to lower quality and low-growing scrub-shrub or other types of wetland (see Table 16-1). Similar to the West Alternative, while these wetlands would likely continue to offer some wetland functions, impacts would occur from habitat removal and possible changes to wetland hydrology and water quality improvement.



Fill would be placed in 1.8 acres of forested and non-forested wetlands primarily for construction and improvement of access roads near the Cowlitz River (two towers would be constructed in the floodplain) and east of Amboy along Chelatchie Creek (two towers with roads), near Big Tree Creek (two towers with roads) and northeast of Camas. Fill placed in these wetlands would destroy wetland functions, fragment habitat, and possibly alter hydrology causing a **high** impact.

Where the transmission line would cross the Columbia River and south of the river approximately nine towers with access roads would be constructed. Wetland impacts in this area would be **low-to-high** where temporary or permanent fill for towers and roads would be placed in disturbed wetlands with Category II and III ratings. About 0.07 mile of temporary access roads needed in two areas near Camas and Washougal would require temporary fill be placed in wetlands. Impacts to these areas would be **low-to-moderate** because the wetlands are Category III and IV and the access road would be removed.

Danger tree removal within wetlands adjacent to rights-of-way would create temporary **low-to-moderate** impacts, depending on the number of trees removed and the wetland quality.

Four pulling sites along the Preferred Alternative would cross wetlands. Temporary fill for the pulling sites would occur in the following areas: about 0.05 acre in a Category IV wetland at the Columbia River crossing; about 0.03 acre in a Category III wetland north of Washougal; about 0.04 acre in a Category III wetland north of the Kalama River; and about 0.002 acre in a Category III wetlands northwest of Castle Rock. Impacts to these wetlands would be temporary and **moderate**; temporary fill would be removed and trees would be allowed to regrow.

16.2.5.1 Central Option 1

Central Option 1 would begin at the Casey Road substation site and the transmission line would cross unpopulated forest production and open space land. Central Option 1 would require a small amount (about 1.2 acres) of clearing within Category II, III, and IV scrub-shrub and forested wetlands near the southern end of the option, a **moderate-to-high** impact. No fill would be placed at tower sites or for roads and existing scrub-shrub or emergent wetland functions would continue even if some degradation occurs.



16.2.5.2 Central Option 2

Central Option 2 would begin at the Monahan Creek substation site and would remove the portion of the Central Alternative crossing the Cowlitz River north of Castle Rock and running farther to the southeast. Clearing of forested wetland would occur as Central Option 2 crosses into Lexington near the Cowlitz River (about 5 acres). Fill and disturbance for construction of four towers in this wetland also would occur. Similar to impacts described in impacts common to action alternatives, a **high** impact would occur because habitat would be removed and hydrology could be altered. Compaction and fill at towers sites would also destroy wetlands functions and values.



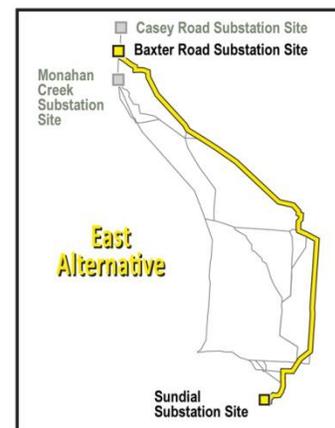
16.2.5.3 Central Option 3

Central Option 3 would replace the Lewis River crossing near Ariel and a portion of the Central Alternative between Ariel and Venersborg, with a downstream river crossing and a new route running directly southeast from Ariel through rural residential areas toward Venersborg. Impacts would be similar to those from Central Option 2 (**high**), although this option would require about 3 acres less clearing than the portion of line this option would replace on the Central Alternative. Clearing of forested wetland and construction of two towers would occur along Cedar Creek within high-quality forested and emergent wetlands. Fill for access roads and towers would be placed in smaller scrub-shrub wetlands along drainages west and south of Amboy. Wetlands along the East Fork Lewis River would most likely be avoided by placing towers outside the wetland and buffer although clearing would occur. Clearing and tower placement with access road construction also would occur in a forested wetland along the south end of Central Option 3.



16.2.6 East Alternative

Similar to the West and Central alternatives, all forested wetlands within new and existing transmission line right-of-way and where crossed by access roads would be cleared for the East Alternative, a **high** impact. Together, about 84 acres of forested and scrub-shrub wetland would be cleared within the transmission right-of-way, with most of the medium-to-high quality wetlands converted to low-growing scrub-shrub or other types of wetland for the East Alternative (see Table 16-1). Similar to other action alternatives, though wetlands would most likely continue to offer some wetland functions, a **high** impact would occur from habitat removal and possible changes to wetland hydrology and water quality improvement.



Fill for towers and roads also would be placed in about 10 acres of forested and non-forested wetlands (**high** impact) near the Cowlitz River (two towers and roads in forested wetlands), east of Amboy (seven towers and roads in forested and scrub-shrub wetlands), and northeast of Camas along and north of the Little Washougal River (five towers and roads in mostly scrub-

shrub and emergent wetlands). Similar to the West and Central alternatives, temporary or permanent fill placed in agricultural fields or more developed areas where functions and quality are lower would cause **low-to-high** impacts depending on wetland quality. Fill placed in wetlands that provide benefits in the less developed areas along much of the East Alternative would affect water quality improvement and habitat, causing a **high** impact. The East Alternative would take the same route near Camas as the other action alternatives; about 14 towers with access roads would be constructed where the line would cross the Columbia River and south of the river. These are generally low-to-medium quality wetlands; impacts would be **low-to-high** (see Section 16.2.4, West Alternative).

16.2.6.1 East Option 1

East Option 1 begins at the Monahan Creek substation site and would remove the portion of the East Alternative crossing the Cowlitz River north of Castle Rock. The option would use segments southeast of the Monahan Creek substation site that run through sparsely populated land, cross the Cowlitz River and I-5 and run through largely unpopulated land toward the east. About eight towers with roads would be constructed within emergent, scrub-shrub, and forested wetlands in the Cowlitz River floodplain for East Option 1. Similar to impacts described in impacts common to action alternatives, a **high** impact would occur where forested wetlands are cleared and fill is placed because habitat would be removed and hydrology could be altered. Compaction and fill at towers sites would also destroy wetlands functions and values. Additionally, East Option 1 would clear more wetlands (10 acres) than the portion of line this option would replace on the East Alternative.



16.2.6.2 East Options 2 and 3

East Option 2 would replace a portion of the East Alternative between Yale and the rural residential areas north of Camas with a route farther to the west. While many small wetlands are present along East Option 2, most would be spanned or avoided. About two towers with roads would be constructed near Cedar Creek in forested and scrub-shrub wetlands. Clearing and fill in these primarily medium-to-high quality scrub-shrub and forested wetlands would be a

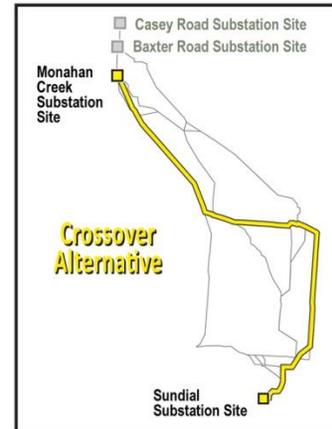
high impact. Similar to the other options and action alternatives, though wetland functions would continue, habitat would be removed and hydrology could be altered. About three towers with roads would be constructed near the Little Washougal River. Similar to impacts for West Option 3, impacts to wetlands cleared and filled along the Little Washougal River would be **high**.



East Option 3 would replace a short portion of the alternative in unpopulated land with a new route through unpopulated land. One forested wetland is present along East Option 3 south of the East Fork Little Washougal River. About two towers with roads would be constructed within this wetland. Clearing and fill in the forested wetland would be a **high** impact.

16.2.7 Crossover Alternative

Similar to the other action alternatives, all forested wetlands within new and existing transmission line right-of-way and where crossed by access roads would be cleared for the Crossover Alternative, a **high** impact. Together, about 88 acres of forested and scrub-shrub wetland would be cleared within the transmission right-of-way, with most of the wetlands converted to low-growing scrub-shrub or other types of wetland (see Table 16-1). Similar to other action alternatives, though wetlands would most likely continue to offer some wetland functions, a **high** impact would occur from habitat removal and possible changes to wetland hydrology and water quality improvement.



Fill for towers and access roads would be placed in 13 acres of forested and non-forested wetlands from towers and access roads along the Coweeman and Cowlitz rivers, east of Amboy (seven towers and roads in forested and scrub-shrub wetlands), and northeast of Camas along and north of the Little Washougal River (five towers and roads in mostly scrub-shrub and emergent wetlands). Fill in these wetlands would cause a **high** impact. As discussed in impacts common to action alternatives, compaction and fill would destroy wetland functions, fragment habitat, and possibly alter hydrology. Similar to the other action alternatives, temporary or permanent fill placed in disturbed areas where functions and quality are lower along the northern portion of the Crossover Alternative, would create **low-to-high** impacts depending on wetland quality. Fill placed in wetlands that provide benefits in the less developed areas along the southern portion of the Crossover Alternative would affect water quality improvement and habitat, causing a **high** impact.

The Crossover Alternative would take the same route as the East and Central alternatives near Camas; about 14 towers with access roads would be constructed where the line would cross the Columbia River and south of the river. Impacts would be **low-to-high** (see Section 16.2.4, West Alternative).

16.2.7.1 Crossover Options 1, 2, and 3

Crossover Option 1 would require clearing and construction in the same forested, emergent, and scrub-shrub wetlands as described for West Option 3; impacts would be **high**. This option would clear more forested wetlands (8 acres) than the portion of line this option would replace on the Crossover Alternative.



About two to three towers with roads would be constructed in or near wetlands along Crossover Options 2 and 3 between the Baxter Road and Monahan Creek substation sites. Fill and clearing would occur in areas of scrub-shrub and forested wetland near Baxter Creek; this would be a **high** impact.

16.2.8 Recommended Mitigation Measures

Mitigation measures included as part of the project are identified in Table 3-2 and will be used to avoid and minimize impacts to wetlands to the maximum extent possible. BPA is considering the following additional mitigation measures to further reduce or eliminate adverse wetland impacts by the action alternatives. If implemented, these measures would be completed before, during, or immediately after project construction unless otherwise noted.

- Obtain all required permits with approved wetland delineations and compensatory mitigation plans prior to construction, and implement required wetland compensation in accordance with these plans and permits.
- Stockpile wetland topsoil when excavating in wetlands and redeposit soil in place for restoration following construction.
- Avoid placing new access roads through wetlands and around surface waters to minimize the potential for altering surface water patterns and isolating connected wetlands.

16.2.9 Unavoidable Impacts

Unavoidable impacts to wetlands from all action alternatives include permanent fill of wetlands. As described above, depending on the action alternative, unavoidable impacts from fill would range from 2.8 to 49 acres of direct wetland loss. Unavoidable impacts also would occur from permanent removal of trees, shrubs, and other vegetation in wetlands within the transmission line right-of-way; and where tower footings, access roads, and substations would be sited. Depending on the action alternative, about 32 to 123 acres would be cleared. Within certain wetlands outside of the transmission line right-of-way, select trees that would present a current or future hazard to the transmission line (i.e., danger trees) also would be removed. This removal would result in unavoidable destruction or degradation of wetland functions. In all areas where trees are removed from forested wetlands and wetland fill is not required, wetlands would be converted to scrub-shrub or emergent wetlands. Maintenance of vegetation height within the right-of-way would prevent these converted wetlands from redeveloping the functions and values previously provided as forested wetland (e.g., forested wildlife habitat, stream shading, species diversity, overland flow and flood storage moderation, water quality functions). Tower footings, access roads, and substations can fragment wetlands, altering hydrology and drainage patterns, plant species and vegetation structure, and wildlife use and distribution.

16.2.10 No Action Alternative

The No Action Alternative would have no project-related impact on wetlands because no new transmission lines, towers, or substations would be constructed. Impacts from ongoing commercial practices or other future development could impact wetlands, either directly or indirectly, through population growth, land management, climate change, or development affecting water quality. Potential future impacts to wetlands include those from ongoing commercial timber harvest on lands managed for timber production in both Cowlitz and Clark counties and from urban development in the greater Portland-Vancouver metro area.

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