

## 5.6 Vegetation

Vegetation is the foundation of most aquatic and terrestrial ecosystems. Among other functions, plants release oxygen and sequester carbon, provide wildlife habitat and food, affect soil development, and can increase slope stability. Plants are involved in the regulation of biogeochemical cycles such as the movement and filtration of water, carbon, and nitrogen. Plants can also have cultural, spiritual, and psychological benefits for humans.

This section describes vegetation in the study areas and the impacts on vegetation potentially resulting from construction and operation of the proposed export terminal.

### 5.6.1 Regulatory Setting

Laws and regulations relevant to vegetation are summarized in Table 5.6-1.

**Table 5.6-1. Regulations, Statutes, and Guidelines for Vegetation**

Regulation, Statute, Guideline	Description
<b>Federal</b>	
Clean Water Act (33 USC 1251, <i>et seq.</i> )	Authorizes EPA to establish the basic structure for regulating discharges of pollutants into the waters of the United States and regulating quality standards for surface waters. Regulates many activities in streams, wetlands, and other aquatic resources, including integral vegetated components.
Endangered Species Act (16 USC 1531-1544)	The federal Endangered Species Act of 1973, as amended, provides for the conservation of species listed as threatened or endangered and the habitat upon which they depend. Section 7 of the federal Endangered Species Act requires federal agencies to consult with the USFWS and/or NMFS to ensure a federal action is not likely to jeopardize the continued existence of any threatened or endangered species or result in the destruction or adverse modification of designated critical habitat.
<b>State</b>	
Washington State Growth Management Act (RCW 36.70A)	Defines a variety of critical areas, which are designated and regulated at the local level under city and county critical areas ordinances.
Washington State Shoreline Management Act (RCW 90.58)	Requires cities and counties (through their Shoreline Master Programs) to protect shoreline natural resources against adverse impacts.
Washington Natural Resource Damage Assessment (RCW 90.56.370)	Holds parties responsible for spilling oil into state waters liable for damages resulting from injuries to public resources.

<b>Regulation, Statute, Guideline</b>	<b>Description</b>
Washington State Noxious Weed Control Act (RCW 17.10, WAC 16-750)	Establishes noxious weed control boards, which designate certain plant species as Class A, B, or C noxious weeds. Authorizes the management, control, and/or elimination of noxious weed populations in the state.
Washington State Hydraulic Code (WAC 220-110)	WDFW issues a hydraulic project approval for certain construction projects or activities in or near state waters. Considers effects on riparian and shoreline or bank vegetation in issuance and conditions of the permit.
<b>Local</b>	
Cowlitz County Critical Areas Protection Ordinance (CCC 19.15)	Requires the County to designate critical areas, including vegetation in wetlands and their buffers.
City of Longview Critical Areas Ordinance (LMC 17.10.140) (Off-Site Alternative only)	Regulates activities within and adjacent to critical areas including vegetation occurring in wetlands and their buffers, fish and wildlife habitat conservation areas (including streams and their buffers), frequently flooded areas, and geological hazard areas.
Notes: USC = United States Code; EPA = U.S. Environmental Protection Agency; USFWS = U.S. Fish and Wildlife Service; NMFS = National Marine Fisheries Service; RCW = Revised Code of Washington; WAC = Washington Administrative Code; WDFW = Washington Department of Fish and Wildlife; CCC = Cowlitz County Code; LMC = Longview Municipal Code	

## 5.6.2 Study Area

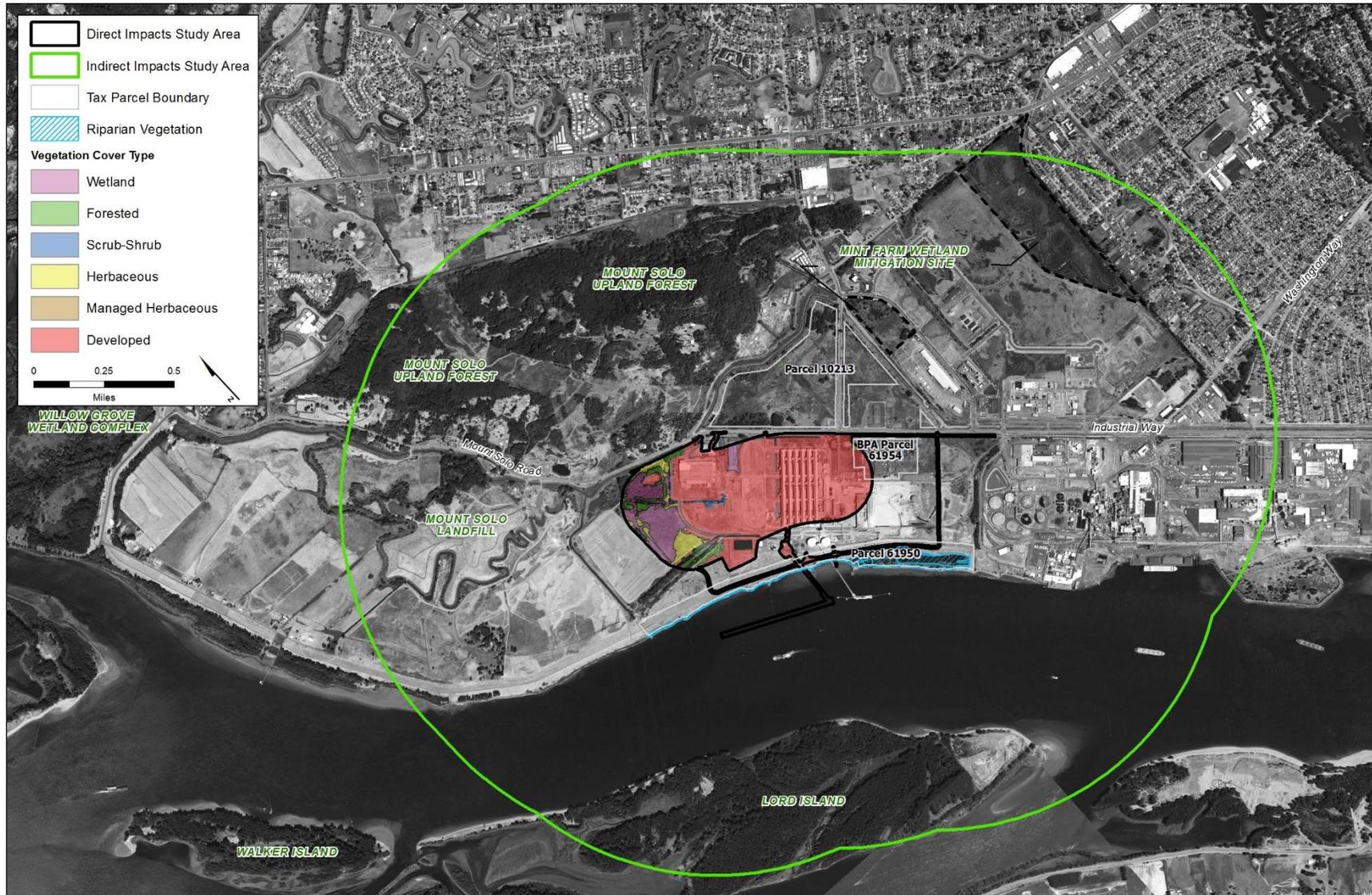
The study areas for the proposed export terminal at the On-Site Alternative and Off-Site Alternative locations are described below. These study areas are based on the Corps' *NEPA Scope of Analysis Memorandum for Record* (MFR) (2014) and adjusted to reflect vegetation characteristics in and near the project areas.

### 5.6.2.1 On-Site Alternative

The study area for direct impacts on vegetation is defined as the 212-acre project area.<sup>1</sup> The study area for indirect impacts on vegetation is defined as the project area, surrounding areas up to 1 mile from the project area, and the lower Columbia River from the project area to the mouth of the river. The broader 1-mile study area considers the extent to which potential coal dust deposition (Chapter 6, Section 6.7, *Coal Dust*) could affect vegetation during operations (Figure 5.6-1). The lower Columbia River study area was established to evaluate the potential impacts on shoreline vegetation resulting from project-related vessels transiting the Columbia River; this same study area is shown in Section 5.7, *Fish*, Figure 5.7-2. Wetland vegetation is further discussed in Section 5.3, *Wetlands*.

<sup>1</sup> The On-Site Alternative project area for vegetation is approximately 212 acres, which includes the 190-acre project area identified for the proposed export terminal, plus additional elements (e.g., access roads, docks, and rail line).

**Figure 5.6-1. Vegetation Study Area—On-Site Alternative**



### 5.6.2.2 Off-Site Alternative

The study area for direct impacts on vegetation is defined as the 225-acre project area. The study area for indirect impacts is defined as the project area, surrounding areas up to 1 mile from the project area, and the lower Columbia River from the project area to the mouth of the river (Figure 5.6-2). The broader 1-mile study area considers the extent to which potential coal dust deposition (Chapter 6, Section 6.7, *Coal Dust*) could affect vegetation during operations. The lower Columbia River study area was also established to evaluate the potential impacts on shoreline vegetation as resulting from project-related vessels transiting the Columbia River; this same study area is shown in Section 5.7, *Fish*, Figure 5.7-2. Wetland vegetation is further discussed in Section 5.3, *Wetlands*.

## 5.6.3 Methods

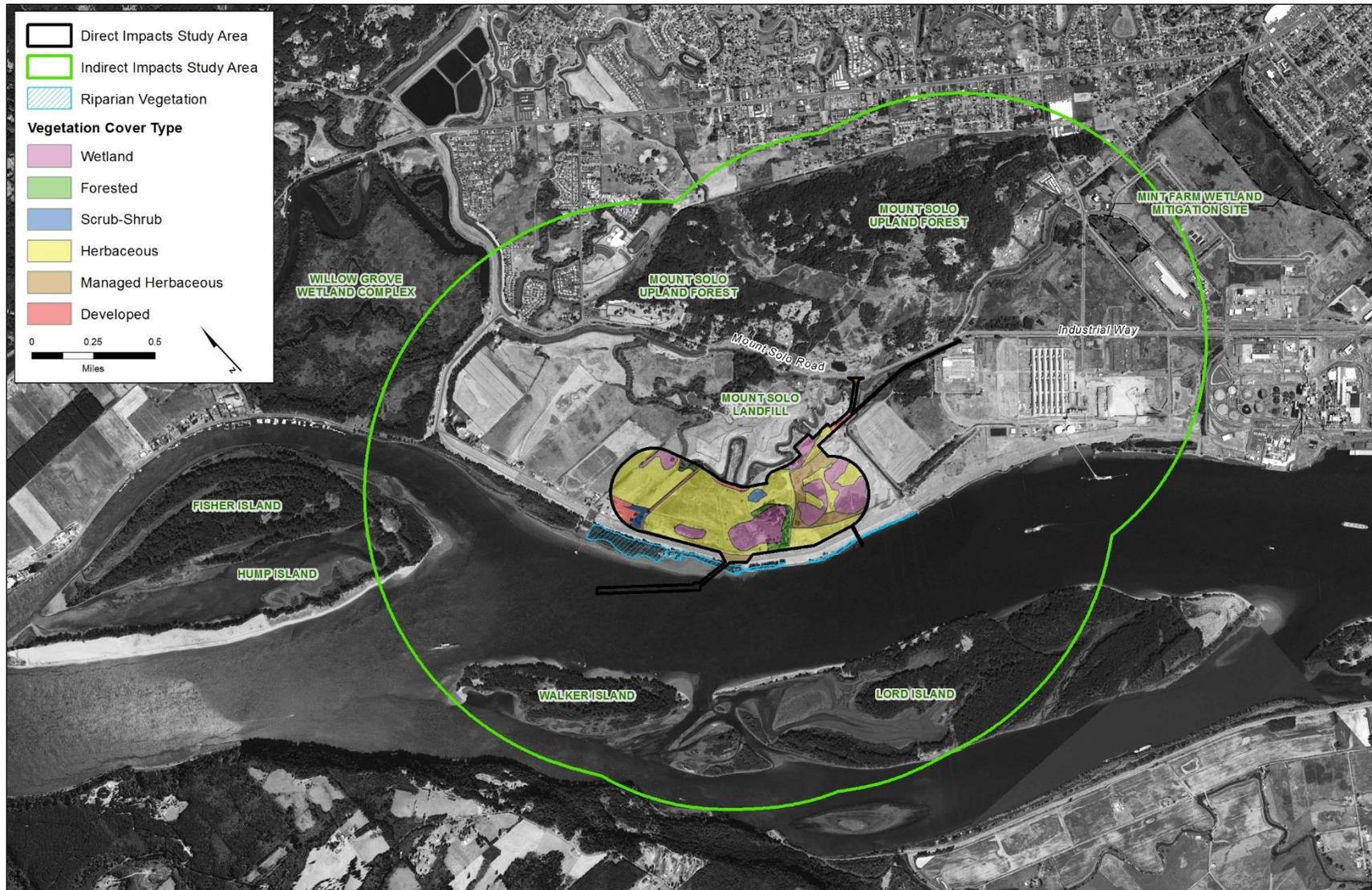
This section describes the sources of information and methods used to evaluate the potential impacts on vegetation associated with construction and operation of the proposed export terminal.

### 5.6.3.1 Information Sources

The following sources of information were used to identify the potential impacts of the proposed export terminal on vegetation in the study areas.

- Two site visits conducted by ICF International biologists on April 8, 2014, and December 11, 2014.
- Historical aerial photos from between 1994 and 2014 accessed through Google Earth Professional, a 2010 aerial photo provided by ESRI, and a 2012 aerial photo from the North Agriculture Imagery Program.
- Reports prepared by Grette Associates for the Applicant as part of the permit application materials (Grette 2014a through 2014i).
- U.S. Fish and Wildlife Service (USFWS) (2015) Information for Planning and Conservation (IPaC) online database.
- 2011 National Land Cover Database (Homer et al. 2015) to describe land cover classes in the indirect impacts study area.
- Washington Department of Fish and Wildlife (WDFW) Priority Habitat and Species (PHS) spatial data provided by WDFW on May 5, 2014, for the study area (Washington Department of Fish and Wildlife 2014).
- The Washington Department of Natural Resources (WDNR) Natural Heritage Program Information System (Washington Department of Natural Resources 2015) list of known occurrences of rare plants in Cowlitz County, Washington, and details regarding their occurrence, habitat, and range.

Figure 5.6-2. Vegetation Study Area—Off-Site Alternative



### 5.6.3.2 Impact Analysis

The following methods were used to identify the potential impacts of the On-Site Alternative, Off-Site Alternative, and No-Action Alternative on vegetation in the study areas. The *NEPA Vegetation Technical Report* (ICF International 2016) provides a full description of the analysis methods.

- Five land cover types (developed lands, uplands, wetlands, riparian lands, and open water) were mapped to describe vegetation for the direct impacts study area based on site visits, aerial photographs, federal databases, and information provided by the Applicant. Vegetation cover within these land cover types was then characterized (e.g., forested, scrub-shrub, herbaceous, and managed herbaceous). Land cover type mapping was adjusted based on field observations.
- Land cover types in the indirect impacts study area are described based on the 2011 National Land Cover Database GIS data (Homer et al 2015); land cover classifications described in this data consist of open water, developed, forest, shrub, herbaceous, barren land, agriculture (planted/cultivated and hay/pasture), and wetlands.
- Direct impacts on vegetation from construction of the proposed project would result when portions of the study area are cleared to construct the proposed export terminal and associated infrastructure. These impacts were quantified by overlaying the study areas on the land cover map. The approximate acreage of each affected cover type was calculated and expressed as a percentage of all cover types in the study area.
- Indirect impacts on vegetation from construction could occur outside of the On-Site Alternative's and Off-Site Alternative's direct impacts study areas. These impacts are qualitatively described by identifying the impact mechanism (i.e., how the impact would occur), describing the potential impacts, and assessing the likelihood of impacts after implementation of mitigation measures.
- Direct and indirect impacts from operations are qualitatively described, including the impact mechanism, potential impacts, duration (i.e., temporary or permanent), and likelihood of occurrence.

For the purposes of this analysis, construction impacts are based on peak construction period and operations impacts are based on maximum throughput capacity (up to 44 million metric tons per year).

## 5.6.4 Affected Environment

This section describes the environment in the study areas related to vegetation potentially affected by construction and operation of the proposed export terminal.

### 5.6.4.1 On-Site Alternative

#### Direct Impacts Study Area

The following land cover types are found in the direct impacts study area for the On-Site Alternative.

## Developed Lands

Developed lands account for 151.14 acres (71%) of the direct impacts study area. Developed lands are those areas where the majority of the vegetation has been removed and replaced with pavement, buildings, or other types of infrastructure. Developed lands also include disturbed areas of land comprised of widely scattered patches of invasive shrubs such as Himalayan blackberry (*Rubus armeniacus*) and Scotch broom (*Cytisus scoparius*); these areas are typically found on higher mounds and around derelict structures and equipment. Developed lands include all of the areas previously developed by the former Reynolds Metals Company facility (Reynolds facility) and the Bonneville Power Administration (BPA) and Cowlitz County Public Utility District substations. Named features and facilities described below are shown in Section 5.2, *Surface Water*, Figure 5.2-5. Wetlands discussed below are shown in Section 5.3, *Wetlands*, Figures 5.3-1 through 5.3-4.

## Uplands

Uplands are undeveloped vegetated areas that do not exhibit wetland characteristics. Uplands account for 26.26 acres (12%) of the direct impacts study area and consist of the following vegetation types.

- **Forested upland.** Forested uplands are areas where trees more than 16 feet in height provide more than 20% canopy cover (Multi-Resolution Land Characteristic Consortium 2011). Approximately 8.90 acres (4%) of the direct impacts study area were identified as forested upland. On the former Reynolds facility, forested upland occurs around Wetlands A, C, and Y between the closed Black Mud Pond (BMP) facility and the former Cable Plant and along the U-Ditch and Interceptor Ditch. Dominant trees in the uplands adjacent to Wetlands A, C, and Y include black cottonwood (*Populus trichocarpa*), some Pacific willow (*Salix lucida*), and Oregon ash (*Fraxinus latifolia*). Common shrubs include Himalayan blackberry, red elderberry (*Sambucus racemose*), and sweetbriar rose (*Rosa rubiginosa*), with black cottonwood and Oregon ash sapling also present. Dominant trees in the forested corridor along the U-Ditch and Interceptor Ditch include black cottonwood, red alder (*Alnus rubra*), and some Oregon ash along the ditch banks. Himalayan blackberry is the most common plant in the shrub layer, but has been recently cleared from some areas on the western end of the U-Ditch. Red osier-dogwood (*Cornus sericea*) is also common. Several types and sizes of fallen trees are present in this forested corridor, as are various snags. Reed canarygrass is common in the herbaceous layer in all of these forested upland areas.

Forested upland in the direct impacts study area also includes a small area (0.05 acre) of forest in the riparian zone along the Columbia River between the ordinary high water mark (OHWM) and the top of the Consolidated Diking Improvement District (CDID) #1 levee.

- **Scrub-shrub upland.** Scrub-shrub uplands are areas with more than 20% canopy cover of shrubs or small trees less than 16 feet high (Multi-Resolution Land Characteristic Consortium 2011). Approximately 2.11 acres (1%) of the direct impacts study area were identified as scrub-shrub upland. Scrub-shrub uplands on the former Reynolds facility occur around the former Cable Plant and north of the closed BMP facility around Wetland Y. Common species in these areas include young black cottonwood, willows, and Himalayan blackberry. Reed canarygrass is also common in the herbaceous layer.
- **Unmanaged herbaceous upland.** Unmanaged herbaceous uplands are areas dominated by native and nonnative grasses and forbs and not maintained or managed (e.g., mowed) on a regular basis. Approximately 10.88 acres (5%) of the direct impacts study area were identified

as unmanaged herbaceous uplands. These areas occur on the former Reynolds facility and BPA Parcel 61954. Unmanaged herbaceous uplands on the direct impacts study area occur along the CDID #1 Ditch 10 to the northwest of the former Cable Plant; in the former borrow area to the east of the closed BMP facility; and in the southeastern portion of the direct impacts study area along the Reynolds Lead spur. These areas are primarily dominated by reed canarygrass. Unmanaged herbaceous uplands on BPA parcel 61954 are located in a transmission line easement to the northwest of the Longview Substation. This area is dominated by species similar to those listed above for the direct impacts study area, as well as Himalayan blackberry.

- **Managed herbaceous upland.** Managed herbaceous uplands are areas regularly managed by mowing, grazing, or other activities. Approximately 4.37 acres (2%) of this cover type occur at the former Reynolds facility, CDID #1 levee, lawns around the administrative and maintenance buildings, and caps of the closed BMP facility. All of these areas are dominated by grasses and forbs mown regularly. Species present include reed canarygrass (*Phalaris arundinacea*), haired bentgrass (*Agrotis scabra*), colonial bentgrass (*Agrostis capillaris*), broadleaf plantain (*Plantago major*), orchard grass (*Dactylis* spp.), short-awn foxtail (*Alopecurus aequalis*), western bittercress (*Cardamine oligosperma*), blue wildrye (*Elymus glaucus*), common horsetail (*Equisetum arvense*), Queen Anne's lace (*Daucus carota*), scouring rush (*Equisetum hyemale affinis*), bedstraw (*Calium aparine*), velvetgrass (*Holcus lanatus*), perennial ryegrass (*Lolium perenne*), Kentucky bluegrass (*Poa pratensis*), and American vetch (*Vicia americana*).

## Wetlands

Wetlands are areas that exhibit the wetland vegetation, soil, and hydrology characteristics defined in the federal wetland delineation manual. Wetlands account for 24.10 acres (11%) of the direct impacts study area. The most prevalent wetland type is herbaceous wetlands, followed by forested wetlands and scrub-shrub wetlands. Section 5.3, *Wetlands*, discusses wetlands and wetland vegetation in detail.

## Open Water

Open water accounts for 10.78 acres (5%) of the direct impacts study area and consist of the Columbia River and various ditches and ponds. This land cover is described in more detail Section 5.2, *Surface Water and Floodplains*. These areas support vegetation along their outer perimeters, typically including native plants as well as noxious weeds. Curly pondweed (*Potamogeton crispus*) was observed at approximately -1 foot Columbia River Datum downstream of Dock 1 during a period of high visibility. The gently sloping portion of the shallow water habitat area between the east and west pile dikes near the project area may support a narrow band of sparse aquatic vegetation in the uppermost elevations.

## Indirect Impacts Study Area

Table 5.6-2 summarizes the areas and percent cover of land cover classes in the indirect impacts study area for the Off-Site Alternative within 1 mile of the project area. Approximately 70% of the indirect impacts study area is occupied by developed lands, open water (primarily the Columbia River), and agricultural lands; the remaining 30% consists of forest, shrub, herbaceous, wetlands, and barren lands.

**Table 5.6-2. Land Cover in the Indirect Impacts Study Area – On-Site Alternative**

<b>Land Cover Classification</b>	<b>Area in Indirect Impacts Study Area (acres)</b>	<b>Percent Cover in Indirect Impacts Study Area</b>
Developed	1631	37
Forest	347	8
Shrub	106	2
Herbaceous	62	2
Agriculture	573	13
Wetlands	719	16
Open Water	880	20
Barren land	83	2
<b>TOTAL</b>	<b>4401</b>	<b>100</b>

Source: National Land Cover Data Base 2011 (Homer et al 2015)

Land cover surrounding the project area is similar to the project area, consisting primarily of developed areas, managed/unmanaged herbaceous areas, wetlands, and open water (the Columbia River). Riparian lands are found predominantly along the Columbia River between the OHWM and the top of the CDID #1 levee, and include vegetation adjacent to the active channel margin in riparian zones identified in the previous upland and shoreline habitat inventories (Grette Associates 2014e, 2014g, 2014h). These riparian lands consist of three vegetation types: forest, scrub-shrub, and herbaceous.

- Riparian forest.** Riparian forest extends in a band of varying width along most of the shoreline, with the widest areas found on the southern portion of the shoreline near the previous Dredged Material Storage Area. Dominant vegetation in this cover type includes black cottonwood and various willow trees, underlain by a mixture of native shrubs such, as red osier dogwood, and invasive shrubs, such as Himalayan blackberry and Scotch broom. Scattered accumulations of large woody material are present in these areas.
- Riparian scrub-shrub.** Riparian scrub-shrub contains similar species to riparian forest. Two scrub-shrub riparian areas are found on Parcel 61950 between the Columbia River and the levee. These areas are dominated by black cottonwood saplings, various willow, and nonnative vegetation including Himalayan blackberry and Scotch broom. Native and nonnative herbaceous species are also present.
- Riparian herbaceous.** Riparian herbaceous areas are generally dominated by grasses and weeds including reed canarygrass, velvet grass, common horsetail, and English plantain (*Plantago lanceolata*). These sparse patches of emergent vegetation occur under the existing Dock 1 conveyor and trestle, and on sandy flats between OHWM and the approximate elevation of mean high water.

The following areas in the indirect impacts study area contain higher quality vegetation communities and generally represent contiguous forest and other intact vegetation communities (Figure 5.6-1).

- Mount Solo upland forest.** Mount Solo is a forested ridge north of the project area. It supports a large area (approximately 505 acres) of native forest intermixed with rural residential areas and some light industrial uses. This area is the largest inland forested area in the indirect impacts study area. Vegetation includes Douglas fir (*Pseudotsuga menziesii*), big leaf maple (*Acer*

*macrophyllum*), red alder (*Alnus rubra*), and western hemlock (*Tsuga heterophylla*). It supports a diversity of native plant communities and provides habitat for a variety of wildlife species.

- **Mint Farm wetland mitigation sites.** Two compensatory wetland mitigation sites for the Mint Farm Industrial Park are located east of the project area. The Phase I mitigation site is 4.28 acres and is a complex of forested, scrub-shrub and emergent wetlands; the Phase II mitigation site is 67 acres and is a mixture of forested, scrub-shrub and emergent wetlands intermixed with forested uplands.
- **Lord Island.** Lord Island is located in the Columbia River near the project area. The 234-acre island was previously used for dredge material disposal. It is densely forested and bisected by various high-flow channels supporting tidal marshes and shallow habitat areas. Vegetation on the island is largely native.

### Special-Status Plant Species

As shown in Table 5.6-3, there are 15 plant species with some type of federal or state status in Cowlitz County (Washington Department of Natural Resources 2015). None of these species has been recorded in the direct or indirect impacts study areas. The nearest record of occurrence of a special-status plant species is a documented siting of the obligate wetland species Columbia water-meal approximately 1.5 miles northwest of the project area and study areas (Washington Department of Natural Resources 2015).

The special-status plant species, and the preferred elevation, habitat and geographic range for each are provided in Table 5.6-4. As indicated in Table 5.6-4, of the 15 special-status plant species known to occur in Cowlitz County, six were identified as potentially occurring in the direct impacts study area, based on the presence of potentially suitable habitat. These species are Nelson's checker-mallow (*Sidalcea nelsoniana*), western wahoo (*Euonymus occidentalis*), western false dragonhead (*Physostegia parviflora*), loose-flowered bluegrass (*Poa laxiflora*), soft-leaved willow (*Salix sessilifolia*), and Columbia water-meal (*Wolffia columiana*).

**Table 5.6-3. Known Occurrences of Threatened, Endangered, Sensitive, and Rare Plants in Cowlitz County**

<b>Scientific Name</b>	<b>Common Name</b>	<b>Federal Status<sup>a</sup></b>	<b>State Status<sup>b</sup></b>	<b>Historical Record<sup>c</sup></b>
<i>Agoseris elata</i>	Tall agoseris	--	S	C
<i>Buxbaumia viridis</i>	Buxbaumia moss	--	R1	C
<i>Cimicifuga elata</i>	Tall bugbane	SC	S	H
<i>Corydalis aquae-gelidae</i>	Clackamas corydalis	SC	S	C
<i>Erythronium revolutum</i>	Pink fawn-lily	--	S	C
<i>Euonymus occidentalis</i> var. <i>occidentalis</i>	Western wahoo	--	S	C
<i>Isoetes nuttallii</i>	Nuttall's quillwort	--	S	C
<i>Physostegia parviflora</i>	Western false dragonhead	--	R1	H
<i>Poa laxiflora</i>	Loose-flowered bluegrass	--	S	C
<i>Poa nervosa</i>	Wheeler's bluegrass	--	S	C
<i>Salix sessilifolia</i>	Soft-leaved willow	--	S	C
<i>Sidalcea nelsoniana</i>	Nelson's checker-mallow	LT	E	C
<i>Tetraphis geniculata</i>	Tetraphis moss	--	R1	C
<i>Utricularia gibba</i>	Humped bladderwort	--	R1	C
<i>Wolffia columbiana</i>	Columbia water-meal	--	R1	C

## Notes:

- <sup>a</sup> Federal Status under the Endangered Species Act: LT = Listed Threatened (likely to become endangered) SC = Species of Concern. An unofficial status, the species appears to be in jeopardy, but insufficient information to support listing.
- <sup>b</sup> State Status of plant species is determined by the Washington Natural Heritage Program. Factors considered include abundance, occurrence patterns, vulnerability, threats, existing protection, and taxonomic distinctness. Values include:  
E = Endangered. In danger of becoming extinct or extirpated from Washington. S = Sensitive. Vulnerable or declining and could become Endangered or Threatened in the state.  
R1 = Review group 1. Of potential concern but needs more fieldwork to assign another rank.
- <sup>c</sup> Historical Record refers to when the occurrence was documented:  
C = Most recent sightings after 1977.  
H = Most recent sighting before 1977.

Source: Washington Department of Natural Resources 2014.

**Table 5.6-4. Elevation, Habitat, and Geographic Range of Listed Threatened, Endangered, Sensitive, and Rare Plants in Cowlitz County**

<b>Common Name</b>	<b>Scientific Name</b>	<b>Elevation Range</b>	<b>Habitat</b>	<b>Geographic Range</b>	<b>Occurrence Relative to Project Area</b>
Tall agoseris	<i>Agoseris elata</i>	500 to 7,800 feet	Found in meadows, prairies, open woods, and exposed rocky ridges. Occurs in areas with little to no canopy cover and assumed to be shade intolerant.	Throughout California, Oregon, and Washington.	Documented in northeastern Cowlitz County. Not likely to occur on the project area due to elevation.
Buxbaumia moss	<i>Buxbaumia viridis</i>	Low to subalpine elevations	Found in coniferous forests on well-rotted logs and peaty soil and humus.	Western North America including the western portion of Washington.	Documented in east-central Cowlitz County. Not likely to occur on the project area due to lack of suitable coniferous habitat.
Tall bugbane	<i>Cimicifuga elata</i>	100 to 2,800 feet, with majority below 700 feet	Occurs in or along margins of mixed mature or old growth forests, including mesic coniferous or mixed coniferous-deciduous stands. Frequently found on north or east-facing slopes.	Southwestern British Columbia to southern Oregon, west of Cascade range.	Documented in western Cowlitz County in areas along the Columbia River. Not likely to occur on the project area due to lack of appropriate forest habitat.
Clackamas corydalis	<i>Corydalis aquae-gelidae</i>	1,250 to 4,200 feet	Occurs in or near cold flowing water, including seeps and small streams; often occurring in stream channels. Moist shady woods in western hemlock ( <i>Tsuga heterophylla</i> ) and silver fir ( <i>Abies amabilis</i> ) zones. Prefers intermediate levels of overstory canopy closure.	Regionally endemic of Washington; Clackamas and Multnomah Counties in Oregon.	Documented in eastern Cowlitz County. Not likely to occur on the project area due to elevation and lack of suitable habitat.

Common Name	Scientific Name	Elevation Range	Habitat	Geographic Range	Occurrence Relative to Project Area
Pink fawn-lily	<i>Erythronium revolutum</i>	100 to 600 feet	Occurs in high-precipitation areas within 100 km of the coast, in moist soil in open or moderately shaded forests that provide full light at ground level. Habitats in Washington include swampy western red cedar ( <i>Thuja plicata</i> )-lodgepole pine ( <i>Pinus contorta</i> ) forests, Sitka spruce ( <i>Picea sitchensis</i> ) woods on consolidated sand dunes, Sitka spruce-western hemlock forests, and shaded river bottoms.	Pacific coast region from southern British Columbia to northwestern California.	Documented in northwestern Cowlitz County. Not likely to occur on the project area due to lack of suitable coniferous forest habitat.
Western wahoo	<i>Euonymus occidentalis</i> var. <i>occidentalis</i>	20 to 600 feet	Occurs in moist woods and forested areas on west side of Cascades. Often found in shaded draws, riparian areas, and ravines. Sometimes found in grassy areas with scattered trees. In Washington, it typically occurs on fine sandy loam, silty loam, and silty clay loams.	British Columbia, western Washington and Oregon, south to central California	Documented in west-central Cowlitz County, potentially near the project area. Appropriate habitat may occur on and near the project area.
Nuttall's quillwort	<i>Isoetes nuttallii</i>	200 to 345 feet	Terrestrial species found in seasonally wet ground, seepages, temporary streams, and mud near vernal pools.	Southeast Vancouver Island, British Columbia to southern California	Documented in west-central Cowlitz County, potentially near the project area. Not likely to occur on the project area due to elevation.
Western false dragonhead	<i>Physostegia parviflora</i>	None provided.	Occurs along shores of streams and lakes, marshes, and other low, wet places in the valleys and foothills. <sup>a</sup>	East of the Cascade summits, British Columbia south through Washington to the Columbia Gorge, then west to Portland, Oregon; east to Idaho and North Dakota. <sup>a</sup>	Most recent documentation in Cowlitz County is prior to 1977. Appropriate habitat may occur on and near the project area.

<b>Common Name</b>	<b>Scientific Name</b>	<b>Elevation Range</b>	<b>Habitat</b>	<b>Geographic Range</b>	<b>Occurrence Relative to Project Area</b>
Loose-flowered bluegrass	<i>Poa laxiflora</i>	50 to 3,700 feet	Found on moss-covered rocks and logs, along streams and rivers, and on edges of wet meadows in moist shady woods.	Coastal Alaska, British Columbia, western Washington, and western Oregon	Documented in northwestern Cowlitz County. Appropriate habitat may occur on and near the project area.
Wheeler's bluegrass	<i>Poa nervosa</i>	10 to 800 feet	Found in low-elevation wet habitats west of the Cascade crest in forest openings with minimal canopy cover, mossy rock outcrops, cliff crevices, and occasionally talus. Sites are often sparsely vegetated with little soil development.	Endemic from Vancouver Island, British Columbia, to northwest Oregon	Documented in west-central Cowlitz County, potentially near project area. Unlikely to occur on the project area due to lack of preferred habitat elements.
Soft-leaved willow	<i>Salix sessilifolia</i>	None provided	Found in wet lowland habitats, including silty or sandy riverbanks, riparian forests, dredge spoils, sandy beaches, and at the upper edge of an intertidal zone.	Southern British Columbia to northern California	Documented in northern Cowlitz County. Appropriate habitat may occur on or near the project area.
Nelson's checker-mallow	<i>Sidalcea nelsoniana</i>	None provided	Found in low-elevation meadows, prairie or grassland, along fencerows, streams, and roadsides, drainage swales, and edges of plowed fields adjacent to wooded areas.	Regionally endemic of Benton County, Oregon, north to Lewis County, Washington, and from central Linn County, Oregon to just west of the crest of the Coast Range.	Documented in northwestern Cowlitz County. Appropriate habitat may occur on and near the project area.
Tetraphis moss	<i>Tetraphis geniculata</i>	Sea level to subalpine elevations.	Occurs on the cut or broken ends or lower half of large decay class rotten logs or stumps, and occasionally on peaty banks in moist coniferous forests.	From Alaska and British Columbia through western Washington and select sites in Oregon.	Not documented in Cowlitz County. Not likely to occur on project area due to lack of suitable coniferous habitat with logs and stumps.

<b>Common Name</b>	<b>Scientific Name</b>	<b>Elevation Range</b>	<b>Habitat</b>	<b>Geographic Range</b>	<b>Occurrence Relative to Project Area</b>
Humped bladderwort	<i>Utricularia gibba</i>	160 to 490 feet	Occurs in lakes, lake edges, and muddy disturbed sites in the lowland zone.	Southern British Columbia south to California.	Documented in northern Cowlitz County. Not likely to occur on project area due to elevation.
Columbia water-meal	<i>Wolffia columbiana</i>	10 to 250 feet	Found in freshwater lakes, ponds, and slow streams.	From California to British Columbia, east to Quebec, and south to Florida, excluding the interior southwestern states.	Occurs within 1.5 miles of the project area; could occur in ponded habitats on or near the project area.

Notes:

<sup>a</sup> Herbarium, Burke Museum of Natural History and Culture 2014.

Source: Unless noted otherwise, this information came from the Washington Department of Natural Resources, Washington Natural Heritage Program plant species fact sheets; available at: <http://www1.dnr.wa.gov/nhp/refdesk/lists/plantsxco/cowlitz.html>

## Noxious Weeds

The project area supports plant species regulated as noxious weeds. Fourteen noxious weed species have been documented in the project area (Table 5.6-5) (Cowlitz County Noxious Weed Control Board 2015; Washington State Noxious Weed Control Board 2015). No species designated for Cowlitz County as Class A noxious weeds has been observed in the project area (Table 5.6-6 provides definitions for the noxious weed classifications). Six of the species identified in the project area (indigobush [*morpha fruticosa*], scotch broom, policeman’s helmet [*Impatiens glandulifera*], Eurasian water milfoil [*Myriophyllum spicatum*], parrotfeather [*Myriophyllum aquaticum*], and water primrose [*Ludwigia peploides glabrescens*]) are considered Class B weeds, and identified as priorities for control, either by Washington State or Cowlitz County. The remaining eight species in the study area are listed Class C noxious weeds, a classification assigned to weeds not typically considered a priority for weed control because they are already widespread throughout the state. These species are Canada thistle (*Cirsium arvense*), bull thistle (*Cirsium vulgare*), English ivy (*Hedera helix*), yellow-flag iris (*Iris pseudacorus*), reed canarygrass, Himalayan blackberry, common tansy (*Tanacetum vulgare*), and nonnative cattail.

**Table 5.6-5. Noxious Weeds Identified in the Project Area—On-Site Alternative**

Noxious Weed Species		Classification			State/County Priority Weed for Control <sup>e</sup>
Common Name	Scientific Name	Location Observed <sup>a,b,c</sup>	State <sup>d</sup>	Cowlitz County <sup>e</sup>	
Indigobush	<i>Amorpha fruticosa</i>	Riparian <sup>b</sup>	B	B	Yes/No
Scotch broom	<i>Cytisus scoparius</i>	W/U <sup>a,b</sup>	B	B	No/Yes
Policeman’s helmet	<i>Impatiens glandulifera</i>	W/U <sup>a</sup>	B	B	Yes/Yes
Eurasian water milfoil	<i>Myriophyllum spicatum</i>	W/OW <sup>a</sup>	B	B	Yes/No
Parrotfeather	<i>Myriophyllum aquaticum</i>	W/OW <sup>a</sup>	B	B	No/No
Water primrose	<i>Ludwigia hexapetala</i>	D <sup>c</sup>	B	B	No/No
Canada thistle	<i>Cirsium arvense</i>	W/U <sup>a,b</sup>	C	C	No/Yes
Bull thistle	<i>Cirsium vulgare</i>	W/U <sup>a,b</sup>	C	C	No/No
English ivy	<i>Hedera helix</i>	W/U <sup>a,b</sup>	C	C	No/No
Yellowflag iris	<i>Iris pseudacorus</i>	W/D <sup>b</sup>	C	C	No/No
Reed canarygrass	<i>Phalaris arundinacea</i>	W/U <sup>a,b</sup>	C	Not listed	No/No
Himalayan blackberry	<i>Rubus armeniacus</i>	U <sup>a,b</sup>	C	C	No/No
Common tansy	<i>Tanacetum vulgare</i>	U <sup>a</sup>	C	C	No/Yes
Nonnative cattail	<i>Typha</i> spp.	W <sup>a,b</sup>	C	C	No/No

Notes:

- <sup>a</sup> Appendix F: Noxious Weeds and Sensitive Plants in Grette Associates 2014a. Location values: W = wetland; U = upland; D = Ditches; OW = open water
- <sup>b</sup> Observations made by ICF International during site investigations in April and December 2014.
- <sup>c</sup> Observations by Washington State Noxious Weed Control Board (1999).
- <sup>d</sup> State classification based on Washington State Noxious Weed Control Board 2015 Noxious Weed List.
- <sup>e</sup> County classification and priority for weed control (state and county level) based on Proposed 2015 Cowlitz County Noxious Weed List (Cowlitz County Noxious Weed Control Board 2015).

**Table 5.6-6. Washington State Noxious Weed Classification**

<b>Class</b>	<b>Definition</b>
A	Nonnative species whose distribution in Washington is still limited. Preventing new infestations and eradicating existing infestations are the highest priority. Eradication of Class A plants is required by law.
B	Nonnative species presently limited to portions of the State. Species are designated for control in regions where they are not yet widespread. Preventing new infestations in these areas is a high priority. In regions where a Class B species is already abundant, control is decided at the local level, with containment as the primary goal.
C	Noxious weeds typically widespread in Washington or are of special interest to the state's agricultural industry. The Class C status allows counties to require control if locally desired. Other counties may choose to provide education or technical consultation.

Notes:

Source: Washington State Noxious Weed Control Board 2015.

### 5.6.4.2 Off-Site Alternative

#### Direct Impacts Study Area

The following land cover types are found in the Off-Site Alternative direct impacts study area.

#### Developed Lands

The Off-Site Alternative site is mostly undeveloped, with developed lands accounting for 9.62 acres of the direct impacts study area (4%). Developed land with disturbed vegetation occurs in association with an existing residence and a few outbuildings in the northwest corner of the direct impacts study area; fill stockpile areas, gravel lots, and equipment storage areas around the site entrance; and several areas within the meanders of Mount Solo Slough where recent land clearing and woody debris placement has occurred. These sparsely vegetated areas are dominated by nonnative species including Himalayan blackberry, Scotch broom, reed canarygrass, other common grasses, and weedy forbs. This area also includes several brush piles placed along Mount Solo Slough. Section 5.3, *Wetlands*, Figure 5.3-5, shows the wetlands discussed later in this section.

#### Uplands

Uplands account for 155.46 acres (69%) of the direct impacts study area and include the following vegetation types.

- **Forested upland.** Approximately 6.74 acres (3%) of the direct impacts study area were identified as forested upland. This cover type occurs in the south-central portion of the area, contiguous with a forested wetland area (Figure 5.6-2). Dominant species include black cottonwood and red alder, with some willow species.
- **Scrub-shrub upland.** Approximately 4.42 acres (2%) of the direct impacts study area were identified as scrub-shrub upland, similar in proportion to scrub-shrub upland occurring in the On-Site Alternative direct impacts study area. These areas occur near the center of the project area and near the existing agricultural complex in the northwestern portion (Figure 5.6-2). Dominant vegetation includes young cottonwood, red alder, and willows. Scrub-shrub upland in the direct impacts study area also includes a small area (0.01 acre) of scrub-shrub riparian land along the Columbia River shoreline.

- **Unmanaged herbaceous upland.** Approximately 126.57 acres (56%) of the direct impacts study area were identified as unmanaged herbaceous upland (Figure 5.6-2). Dominant vegetation is primarily reed canarygrass mixed with other common grasses and weedy forbs, including bentgrass, Canada thistle, soft rush (*Juncus effuses*), orchard grass, velvetgrass, hairy cat's ear (*Hypochaeris radicata*), perennial ryegrass, English plantain, broad-leaf plantain, fowl bluegrass (*Poa palustris*), Kentucky bluegrass, curly dock (*Rumex crispus*), red clover (*Trifolium pretense*), and American vetch.
- **Managed herbaceous upland.** Approximately 17.73 acres (8%) of the direct impacts study area were identified as managed herbaceous upland (Figure 5.6-2). This area includes the mown area in the southern portion of the project area and for the CDID #1 levee. Reed canarygrass is the dominant species present with the remaining vegetation similar to that found in the unmanaged herbaceous upland cover type.

### Wetlands

Wetlands account for 51.28 acres (23%) of the direct impacts study area (Figure 5.6-2). The most prevalent wetland type present is herbaceous wetlands followed by forested wetlands, and scrub-shrub wetland. The extent, configuration, and vegetation classification of wetlands was based on the reconnaissance-level surveys using aerial photographs, existing resource maps, and LIDAR data. Wetlands are described in more detail in Section 5.3, *Wetlands*.

### Open Water

Approximately 8.61 acres (4%) of the direct impacts study area were identified as open water. These areas include the sections of Mount Solo Slough and portions of CDID Ditches 14 and 16 (Figure 5.6-2). Aquatic vegetation was not specifically quantified in the direct impacts study area. However, a narrow band of aquatic vegetation likely exists along the Columbia River shoreline. This land cover is described in more detail in Section 5.2, *Surface Water and Floodplains*.

### Indirect Impacts Study Area

Table 5.6-7 summarizes the areas and percent cover of the different land cover classes in the indirect impacts study area within 1 mile of the project area. Approximately 60% of the indirect impacts study area is occupied by developed lands, open water (primarily the Columbia River) and agricultural lands; and 24% is occupied by wetlands. The remaining 16% consists of forest, shrub, herbaceous, and barren lands.

**Table 5.6-7. Land Cover in the Indirect Impacts Study Area—Off-Site Alternative**

<b>Land Cover Classification</b>	<b>Area in Indirect Impacts Study Area (acres)</b>	<b>Percent Cover in Indirect Impacts Study Area</b>
Developed	978	21
Forest	389	8
Shrub	110	2
Herbaceous	72	2
Agriculture	645	14
Wetlands	1145	24
Open Water	1164	25
Barren land	183	4
<b>TOTAL</b>	<b>4686</b>	<b>100</b>

Source: National Land Cover Data Base 2011 (Homer et al 2015)

Land cover in the indirect impacts study area surrounding the project area is similar to what is described for the direct impacts study area, mostly consisting of managed and unmanaged herbaceous areas, wetlands, and open water of the Columbia River. Riparian lands are found predominantly along the Columbia River shoreline and include vegetation growing adjacent to the active channel margin in the riparian zone. These riparian lands consist of two vegetation types—forest and scrub-shrub—with the forested riparian cover type the most prevalent.

- **Riparian forest.** Riparian forest vegetation is dominated by black cottonwood, Oregon ash, red osier dogwood, Columbia River willow (*Salix fluviatilis*), Sitka willow (*Salix sitchensis*), and Pacific willow. Other species present include big leaf maple, Nootka rose (*Rosa nutkana*), Himalayan blackberry, trailing blackberry (*Rubus ursinus*), Scouler's willow (*Salix scouleriana*), and various native and nonnative grasses and forbs.
- **Riparian scrub-shrub.** Riparian scrub-shrub vegetation consists of relatively sparse shrubs including noxious weeds (primarily indigobush and Himalayan blackberry), as well as native shrubs such as Pacific crabapple (*Malus fusca*) and big leaf maple. Occasional black cottonwood trees are also present. Scattered patches of spikerush (*Eleocharis palustris*) occur in the herbaceous layer along with other native and nonnative grasses and forbs. Standing snags also occur in this area.

Higher-quality vegetation communities in the indirect impacts study area include the plant communities described for the On-Site Alternative (i.e., Mount Solo upland forest, Mint Farm Wetland Mitigation Sites, and Lord Island), as well as three additional areas in the Off-Site Alternative indirect impacts study area.

- **Walker Island.** Walker Island is a 190-acre island in the Columbia River downstream from Lord Island and connected to the island by a narrow sand spit. Like Lord Island, it was previously used for dredged material disposal but is now heavily forested. It includes tidal marshes on its southern shoreline that provide high-quality habitat for a variety of waterfowl and other wildlife species (Oregon Wetlands Joint Venture 1994:20).
- **Willow Grove Wetland Complex.** The Willow Grove Wetland Complex consists of 388 acres of Category I tidal fringe wetlands indirectly connected to the Columbia River by Coal Creek Slough (Ecological Land Services 2014:6). Vegetation includes a mix of native and nonnative emergent plants, with native shrubs and trees dominant along tidal channels and shoreline areas. It is a

relatively intact and functional intertidal wetland area that provides habitat for a variety of species including bald eagle, peregrine falcon, and a variety of waterfowl, as well as ESA-listed salmonids. The Willow Grove Wetland Complex is owned by Columbia Land Trust (312 acres) and Port of Longview (76 acres) and is used for wetland preservation and mitigation purposes (Ecological Land Services 2014:6).

- **Hump-Fisher Islands.** Hump-Fisher Islands are a 400-acre island complex located in the Columbia River downstream from the project area and from Lord and Walker Islands. Similar to Lord and Walker Islands, Hump-Fisher Islands support native forested vegetation, as well as tidal marshes and provide important wildlife habitat.

### Special-Status Plant Species

The same six special-status plant species identified as potentially occurring in the On-Site Alternative direct impacts study area also could occur in the direct impacts study area for the Off-Site Alternative (special-status plant species are listed in Table 5.6-3). The history of land manipulation, agricultural use, and ongoing maintenance of the Off-Site Alternative direct impacts study area decreases the likelihood of these rare plant species actually being present in the area.

The nearest record of a special-status plant occurrence is the obligate wetland species Columbia water-meal (*Wolffia columbiana*) approximately 0.5 mile northwest of the Off-Site Alternative direct impacts study area (Washington State Department of Natural Resources 2015). Based on documented habitat and known proximity to the direct impacts study area, it could occur within the Mount Solo Slough and CDID #1 ditches along the northern edge of the direct impacts study area.

### Noxious Weeds

Seven noxious weed species have been documented in the Off-Site Alternative direct impacts study area, including indigobush, Scotch broom, Eurasian water milfoil, Canada thistle, reed canarygrass, Himalayan blackberry, and nonnative cattail. Three of these species (indigobush, scotch broom, and Eurasian water milfoil) are Class B species and considered priorities for control, either by Washington State or Cowlitz County (Cowlitz County Noxious Weed Control Board 2015).

Additional detail regarding the occurrence of these noxious weed species in the specific habitats present on the Off-Site Alternative project area is presented in the *NEPA Vegetation Technical Report*.

## 5.6.5 Impacts

This section describes the direct and indirect impacts on vegetation potentially resulting from construction and operation of the proposed export terminal.

### 5.6.5.1 On-Site Alternative

Direct impacts could result from activities that directly disturb or damage vegetation including such actions as removing vegetation during clearing and grading activities and the physical and chemical management of vegetation and noxious weeds as part of routine maintenance of the proposed export terminal. Indirect impacts include the future spread of noxious weeds into areas adjacent to the construction site and the associated changes in plant communities that could result.

Potential impacts on vegetation were also considered in terms of duration. Permanent impacts would modify vegetation cover types to such a degree that they would not return to their preconstruction state for the life of the project. Temporary vegetation impacts would result in the disturbance of vegetation cover types but implementation of best management practices, project design components, regulatory requirements, or an on-site vegetation management plan would facilitate reestablishment of vegetation cover types similar to preproject conditions after construction is completed.

### Construction—Direct Impacts

Construction-related activities associated with the On-Site Alternative could result in direct impacts as described below. As explained in Chapter 3, *Alternatives*, construction-related activities include demolishing existing structures and preparing the site, constructing the rail loop and docks, and constructing supporting infrastructure (e.g., conveyors and transfer towers).

#### Removed Vegetation

Clearing and grading would permanently alter or remove approximately 212 acres of land cover types from the direct impacts study area (Table 5.6-8). Most of the clearing would affect disturbed vegetation and weedy areas that generally do not support native plant species or provide suitable wildlife habitat (Figure 5.6-3).

**Table 5.6-8. Permanent Direct Impacts by Land Cover and Vegetation Cover Type—On-Site Alternative**

Land Cover Category	Vegetation Cover Type	Direct Impacts (Acres) <sup>b</sup>	Percentage of Cover Type <sup>c,d</sup>
Developed land			
	<b>Developed land total</b>	<b>151.14</b>	<b>71</b>
Upland	<i>Forested</i>	<i>8.90</i>	<i>4</i>
	<i>Scrub-shrub</i>	<i>2.11</i>	<i>1</i>
	<i>Herbaceous</i>	<i>10.88</i>	<i>5</i>
	<i>Managed herbaceous</i>	<i>4.37</i>	<i>2</i>
	<b>Upland total</b>	<b>26.26</b>	<b>12</b>
Wetlands	<b>Wetlands total<sup>a</sup></b>	<b>24.10</b>	<b>12</b>
Open water	<b>Open water total</b>	<b>10.78</b>	<b>5</b>
<b>Total</b>		<b>212.28</b>	<b>100</b>

Notes:

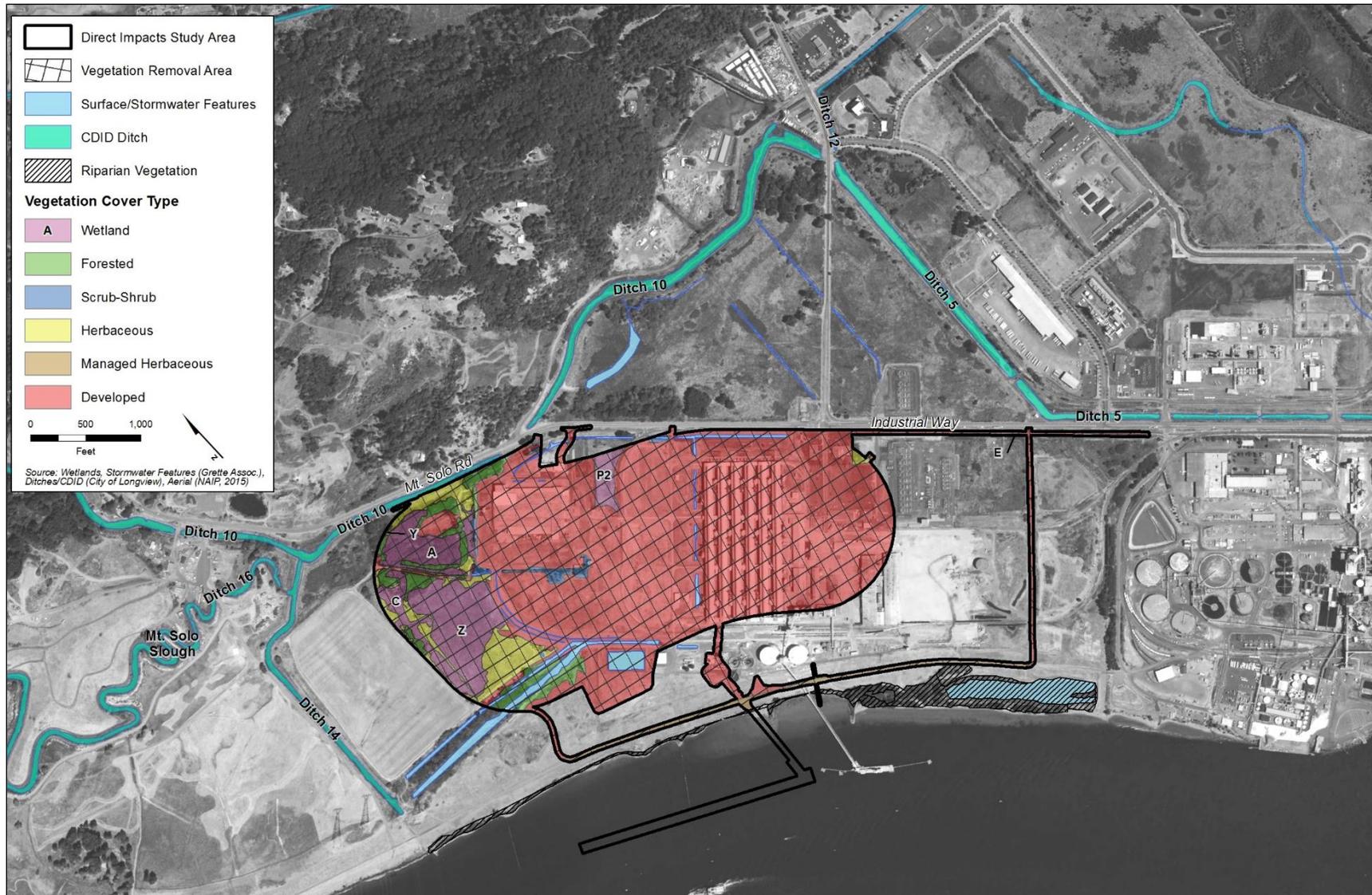
<sup>a</sup> For a detailed discussion of wetland impacts refer to Section 5.3, *Wetlands*.

<sup>b</sup> These are direct impacts on vegetation in the 212-acre project area, which includes the 190-acre project area for the proposed export terminal plus additional elements (e.g., access roads, docks, and rail line).

<sup>c</sup> This column represents the percent of cover type in the direct impacts study area affected by construction.

<sup>d</sup> Total does not equal sum of values due to rounding.

**Figure 5.6-3. Impacts on Existing Land Cover Classes and Vegetation Cover Types—On-Site Alternative**



The majority of the total impact (71%) would occur in areas occupied by developed lands, typically consisting of scattered grasses and weeds in and around the developed portions of the project area or areas of existing infrastructure. Approximately 26.26 acres of upland vegetation would be removed, or 12% of the direct impact study area. Herbaceous upland vegetation surrounding Wetlands A, C, and Z make up the majority of this acreage. These herbaceous upland areas are generally dominated by reed canarygrass. Approximately 8.90 acres of upland forest would be removed, with most impacts occurring around Wetland A and the areas surrounding the interception ditch and stormwater conveyance. These areas are dominated by native trees, primarily black cottonwood, red alder, Oregon ash, and Pacific willow trees, with an understory of mixed native and invasive shrubs dominated by red elderberry, sweetbriar rose, and Himalayan blackberry. The impacts would occur as a result of construction of the rail loop, stockpile pads, and a series of stacking and reclaim conveyors.

Approximately 0.05 acre of upland forest impact consists of riparian forest. This impact would occur as a result of construction of the trestle conveyor connecting the surge bin to Docks 2 and 3, and would include the removal and trimming of black cottonwood and willow trees, and understory shrubs such as red-osier dogwood and Himalayan blackberry.

Construction would result in the permanent loss of 24.10 acres of wetlands from placement of permanent fill in all of Wetlands A, C, Z, and P2, and a portion of Wetland Y. For a detailed discussion of wetland impacts refer to Section 5.3, *Wetlands*.

Although no special-status plant species have been recorded in the project area, potentially suitable habitat is present. Should any special-status plant species occur in the project area, they would likely be destroyed as a result of project construction. To minimize any losses, a special-status plant survey would be conducted as a mitigation measure. These surveys would occur during the appropriate time of year, prior to any project related construction activities beginning. If special-status plants are identified by the survey, the impact would be mitigated through Cowlitz County's Critical Areas Ordinance mitigation requirements for special-status plants (19.15.170).

### **Adjacent Vegetation**

Construction and staging activities along the edges of the project area could crush and bury adjacent vegetation and compact soil in the direct impacts study area through vehicle use, material storage and stockpiling, and ground disturbance. Ground disturbance related to these activities could also increase the opportunity for stormwater runoff to carry sediments, spilled vehicle fluids, or other construction materials into areas outside of the project area, potentially affecting the health and vigor of adjacent vegetation. Depending on the extent, duration, and content of this runoff, vegetation could be affected through interference with photosynthesis, respiration, growth, and/or reproduction.

Dust from construction activities could also affect vegetation by collecting on leaves and other plant surfaces, potentially inhibiting photosynthesis and other plant functions.

The 35-foot-high preload material piles could provide an area for invasive plant species, including noxious weeds, to colonize. Such conditions would provide a seed source that could be readily dispersed into adjacent areas by wind and runoff, increasing the potential for invasive species and noxious weeds to spread and displace native vegetation.

Special-status plants adjacent to the project area could be temporarily affected by construction. The extent of any such impact cannot be quantified until a special-status plant survey is conducted.

### **Construction—Indirect Impacts**

Construction of the proposed export terminal would not result in indirect impacts on vegetation because the impacts of construction would be limited to the project area, and would not occur later in time or be further removed in terms of distance than the direct impacts.

### **Operations—Direct Impacts**

Direct impacts on vegetation from operation of the proposed export terminal at the On-Site Alternative location would likely be limited to the continued existence or possible colonization by noxious weeds around the periphery of the project area, impacts from vessel loading and transport along railroad tracks, and maintenance of vegetation under the conveyor and along the railroad tracks and rail loop.

#### **Noxious Weeds**

The disturbed nature of the project area during operations would favor colonization by noxious weeds, which are generally adapted to highly disturbed areas such as the periphery and other portions of the project area. Areas along rail tracks, along stacking conveyors, and between tracks of the rail loop would be most likely to support noxious weed species in scattered patches. Reed canarygrass, Himalayan blackberry, Canadian and/or bull thistle, and Scotch broom, which are already present on the project area, would likely persist during operations.

#### **Disturbed Vegetation during Rail and Vessel Loading**

Operation of the terminal could disturb vegetation along the railroad tracks entering the project area, along the shoreline of the Columbia River, and in the shallow waters of the Columbia River near the project area. Such impacts could occur as the result of spills of coal or other materials associated with operation of the rail cars, the conveyor and stockpiling systems, the mobile maintenance equipment, and the shiploaders.

Direct impacts on aquatic vegetation along the shoreline of the Columbia River cannot be quantified until an aquatic vegetation survey is conducted. The Applicant would conduct an aquatic vegetation survey (see Chapter 8, *Minimization and Mitigation*) to reduce potential impacts on aquatic vegetation prior to initiating in-water work. Impacts on water quality associated with the routine movement of coal near water bodies could also affect vegetation along or in receiving waters. However, stormwater runoff would be collected and treated prior to discharge to the Columbia River.

#### **Altered Vegetation**

Trees and tall shrubs around the trestle and conveyor to Docks 2 and 3 would likely be regularly trimmed or removed, slightly reducing organic material delivered to the river, shading for the upper beach and shoreline, and native foraging, resting, and perching opportunities for birds. The 45- to 50-foot-wide area affected would be very small relative to the approximately 5,000 linear feet of vegetated shoreline in the project area.

Routine vegetation maintenance along the perimeter road, rail tracks, and rail loop would involve trimming trees and tall shrubs within approximately 25 feet of either side of the perimeter road. This maintenance would artificially stunt individual trees and shrubs in these areas but would not measurably reduce the functions of native plant communities because it would be confined to the outermost edges of such communities. Any vegetation colonizing the disturbed interior of the project area along the rail loop would likely also be removed, controlled, or trimmed to eliminate any interference with the movement of the rail cars, equipment, or personnel.

Any special-status plants occurring along the periphery of the project area, along the rail tracks and rail loop, or under the conveyor would be affected by operations as described above. The spatial extent of any such impact cannot be quantified until a special status plant survey is conducted.

### **Coal Dust**

The movement of coal into and around the project area, creation of large stockpiles of coal, and use of 29,100 linear feet of open conveyors to move coal onto vessels could generate coal particles and fugitive coal dust. Windborne coal dust can deposit on vegetation, soils, and sediments. The potential extent and deposition rate of coal dust particles less than 75 microns diameter was modeled as part of the air quality analysis. Based on this modeling, the highest rate of coal dust deposition would be expected in the area adjacent to the project area, but smaller particles could also deposit in a zone extending around and downwind of the project area. Deposition rates could range from 1.45 grams per square meter per year ( $\text{g}/\text{m}^2/\text{year}$ ) closest to the project area, gradually declining to less than  $0.01 \text{ g}/\text{m}^2/\text{year}$  approximately 2.41 miles from the project area.

The potential zone of deposition includes the coniferous forest vegetation on the hills adjacent to the northern extent of the project area, as well as the riparian vegetation along the shoreline of the river. Deposition rates of less than  $0.1 \text{ g}/\text{m}^2/\text{year}$  are projected to occur over the forested communities on Lord Island within the Columbia River just east of the project area, with declining concentrations across the island and to the south and west toward Walker Island.

The impacts of dust on vegetation, including special status plants, would vary depending on dust load, climatic conditions, and the physical characteristics of the vegetation. Impacts could be physical, such as blocked stomata that alters gas diffusion into and out of the leaves, causing reduced respiration or increased transpiration; altered leaf surface reflectance and light absorption potential; and increased leaf temperature due to optical properties of the dust (Chaston and Doley 2006; Doley 2006:38; Farmer 1993). The *NEPA Vegetation Technical Report* summarizes studies of the impacts of dust deposition on vegetation in other regions. Coal dust deposition is also discussed in Chapter 6, Sections 6.6, *Air Quality*, and 6.7, *Coal Dust*.

Although coal transport could release contaminants such as arsenic and polycyclic hydrocarbons into the soil, concentrations would vary greatly and impacts on vegetation communities in the study area are not known. Given the number and variety of environmental, climatic and plant factors affecting the deposition of coal dust (Doley 2006), information regarding foliage density, leaf dimensions and characteristics, as well as particle size distribution, dust color, and climatic conditions would likely be needed to determine the level of dust deposition that could affect vegetation or plant functions.

To reduce the potential impacts of coal dust on vegetation, the Applicant would use enclosed conveyors and transfer points (except for stockyard and shiploader conveyors). Transfer chutes would be enclosed in transfer towers with soft flow transfer chutes and inlet and outlet curtains and side skirts. The conveyor system would include a washdown water collection and containment system as discussed in Section 5.5, *Water Quality*. During shiploading, the shiploader boom would be enclosed and coal would be discharged below deck, in the vessel's cargo hold.

### **Coal Spills**

Direct impacts resulting from a coal spill during coal handling at the terminal would likely be minor because the amount of coal that could be spilled would be expected to be relatively small. Also, impacts would be negligible because of the absence of vegetation in the project area and the contained nature and features of the terminal (e.g., fully enclosed belt conveyors, transfer towers, and shiploaders).

Coal spilled into terrestrial environments could impact vegetation. Herbaceous vegetation would be more susceptible to damage and smothering from a coal spill compared to more rigid, woody vegetation like shrubs and trees, which may be better able to withstand the weight and force of a coal spill, depending on the magnitude of the spill. The physical impact of coal spilled on vegetation would range from minor plant damage to complete loss of vegetation. Coal dust associated with a coal spill could also cover vegetation, resulting in reduced light penetration and photosynthesis, which could lead to reduced vegetation density and plant diversity. Cleanup of coal spilled during operations could further impact vegetation by either removing or further damaging vegetation as a result of ground disturbance related to cleanup activities. Any coal remaining on the ground after a cleanup effort could leach chemicals from exposure to rain, which could damage or kill vegetation. However, if this were to occur, the impact area would generally be highly localized and limited to the extent of the spill, and unlikely to disrupt the overall plant community in the project area.

## **Operations—Indirect Impacts**

Operation of the proposed export terminal at the On-Site Alternative Location would result in the following indirect impacts.

### **Coal Dust**

The movement of coal by rail along the BNSF spur and Reynolds Lead could generate coal particles and fugitive coal dust, which could be deposited on vegetation, soil, and sediments in the study area. Coal transported by vessel would be in enclosed cargo holds and is not likely to result in deposition of coal on vegetation along the vessel route in the Columbia River. Coal dust deposition from rail cars is discussed in Chapter 6, Sections 6.6, *Air Quality*, and 6.7, *Coal Dust*. Potential impacts from coal dust deposition on vegetation is described the *Operations—Direct Impacts* section.

### **Eroded Vegetation due to Vessel Wakes**

Increased vessel traffic from the terminal and associated wakes could contribute to erosion of vegetation along the shoreline of the Columbia River. Operation of the terminal at maximum throughput would result in 1,680 vessel transits (i.e., one-way trips either to or from the

termina) per year (Chapter 6, Section 6.4, *Vessel Transportation*). The location and extent of these impacts would depend on vessel design, hull shape, vessel weight and speed, angle of travel relative to the shoreline, proximity to the shoreline, currents and waves, tidal stage, and water depth (Jonason 1993:29–30; MARCOM 2003). The potential for shoreline erosion could also be influenced by the slope and physical character of the shoreline (i.e., soil erodibility), as well as the amount and type of vegetation occurring along the shoreline.

Shoreline erosion is a natural process that removes sediment from the shoreline. It is caused by a number of factors including storms, wave action, and wind. Erosion of shoreline sediment can remove the substrate in which vegetation grows, eventually leading to loss of plants. Although erosion is not intrinsically harmful, it can be increased by vessel wakes, which can intensify the impacts and/or rate of the erosion process. In riverine environments the wave periods of vessels are longer compared to waves generated by wind. Riverbank vegetation is naturally adapted to the shorter period of wind waves, but not to the longer periods of vessel wakes. Long-period waves are an erosion mechanism to which the riverbank vegetation may be susceptible (Macfarlane and Cox 2004 in Gourlay 2011). While shoreline erosion along the Columbia River currently occurs due to existing vessel traffic, operation of the terminal would increase vessel traffic and probably increase or intensify the extent and/or rate of shoreline erosion and subsequent loss of shoreline vegetation.

The potential for vessel wake impacts on vegetation along the project area shoreline would be limited due to the slope of the shoreline and the general lack of aquatic vegetation near the docks. Additionally, vessels maneuvering near the docks would be moving very slowly and likely would not generate a wake sufficient to cause shoreline erosion. However, there is potential for erosion along the thin strip of shoreline vegetation along the northern end of Lord Island from large wakes or wakes oriented perpendicular to the main navigation channel and docks, such as those occurring when tugs push vessels into position at docks. There is higher potential for vessel wake impacts on vegetation along the shoreline of the lower Columbia River. Measures that could be implemented to reduce shoreline erosion and impacts on vegetation could include actions outside the control of the Applicant and permitting agencies. These actions include, but are not limited to, soft beach armoring, planting of native vegetation, and bank armoring. Vessel operations in the lower Columbia River are federally regulated, including size, speed, and navigation. Additionally, large vessels must be operated in the lower Columbia River by pilots licensed by the United States Coast Guard to perform this function. The navigation channel and its ongoing maintenance are also managed and regulated at the federal level.

### 5.6.5.2 Off-Site Alternative

Constructing the proposed export terminal at the Off-Site Alternative location would involve a project design very similar to the On-Site Alternative, although the Off-Site Alternative would involve constructing a new access road and extending the Reynolds Lead. Therefore, the types of impacts and impact mechanisms would be similar for the two alternatives, although the extent of potential impacts would differ somewhat due to differences in vegetation communities.

#### Construction—Direct Impacts

Construction of the proposed export terminal at the Off-Site Alternative location would result in the following direct impacts.

### Removed Vegetation

Vegetation would be removed from the Off-Site Alternative project area as depicted in Figure 5.6-4. Clearing and grading would result in the permanent removal of approximately 225 acres of various land cover types from the project area, as shown in Table 5.6-9.

The majority of vegetation loss (56%) under the Off-Site Alternative would occur in herbaceous uplands, i.e., large areas of unmaintained grasses supporting a mixture of native and invasive plant species providing some wildlife habitat. Under the On-Site Alternative, the majority of vegetation loss (71%) would be to developed lands characterized by disturbed vegetation.

Construction would permanently fill 51.28 acres of wetlands, including all of Wetlands 1, 2, 4, and 5, and portions of Wetlands 3, 6, and Y. The proposed trestle would pass above approximately 140 feet of Wetland B. While there is no anticipated placement of fill or trestle structure in this wetland, construction would remove about 0.08 acre of trees in Wetland B. For a detailed discussion of wetland impacts refer to Section 5.3, *Wetlands*.

The Off-Site Alternative would remove approximately six times more upland vegetation than the On-Site Alternative (155.46 acres compared to 26.26 acres) because the project area for the Off-Site Alternative is currently undeveloped and largely vegetated. Most of the upland vegetation to be removed would consist of managed (17.73 acres) and unmanaged (126.57 acres) herbaceous vegetation. The remaining upland vegetation to be removed would consist of smaller areas of forest (6.74 acres) and scrub-shrub (4.42 acres) vegetation. These areas are dominated by a similar mixture of plant species as the upland forest and upland scrub-shrub vegetation for the On-Site Alternative.

Approximately 0.01 acre of riparian scrub-shrub vegetation would be removed to install a new stormwater outfall, including a sparse cover of noxious weed species (i.e., indigobush and Himalayan blackberry) and native species such as Pacific crabapple and big-leaf maple. The affected area would be similar and proportionate to the riparian vegetation impact under the On-Site Alternative, although forested riparian vegetation would be affected under the On-Site Alternative.

### Disturbed Adjacent Vegetation

Construction activities could temporarily affect vegetation adjacent to the Off-Site Alternative project area by the same mechanisms described for the On-Site Alternative. Impacts could include temporary disturbance to riparian vegetation along the shoreline of the Columbia River, which is closer to the outer extent of the rail loop configuration under the Off-Site Alternative than for the On-Site Alternative.

**Figure 5.6-4. Impacts on Existing Land Cover Classes and Vegetation Cover Types—Off-Site Alternative**



**Table 5.6-9. Permanent Direct Impacts by Land Cover and Vegetation Cover Type in the Project Area—Off-Site Alternative**

Land Cover Category	Vegetation Cover Type	Direct Impacts (Acres) <sup>b</sup>	Percentage of Cover Type <sup>c</sup>
Developed Land	<b>Developed Land Total</b>	<b>9.62</b>	<b>4</b>
Upland	Forested	6.74	3
	Scrub-Shrub	4.42	2
	Herbaceous	126.57	56
	Managed Herbaceous	17.73	8
	<b>Upland Total</b>	<b>155.46</b>	<b>69</b>
Wetlands	<b>Wetlands Total<sup>a</sup></b>	<b>51.28</b>	<b>23</b>
Open Water	<b>Open Water Total</b>	<b>8.61</b>	<b>4</b>
<b>Total</b>		<b>224.97</b>	<b>100</b>

Notes:

<sup>a</sup> For a detailed discussion of wetland impacts refer to Section 5.3, *Wetlands*.<sup>b</sup> These are direct impacts on vegetation in the 225-acre direct impacts study area, which includes the 220-acre terminal plus additional elements (e.g., access roads, docks, and rail line).<sup>c</sup> This column represents the percent of cover type in the direct impacts study area affected by construction.

### Construction—Indirect Impacts

Construction of the proposed export terminal at the Off-Site Alternative location would not result in indirect impacts on vegetation because construction would be limited to the project area, and would not occur later in time or be further removed in terms of distance than the direct impacts.

### Operations—Direct Impacts

Operation of the proposed export terminal at the Off-Site Alternative location would result in the following direct impacts, similar to the On-Site Alternative.

#### Promote Colonization by Noxious Weeds

The potential for the Off-Site Alternative to result in colonization by noxious weeds would be the same as described for the On-Site Alternative and would occur through the same mechanisms. The magnitude of the impacts would be greater under the Off-Site Alternative because of the extent of the existing vegetation, relatively lower occurrence of noxious weeds, and larger extent of ground disturbance occurring at the Off-Site Alternative project area. Colonization by noxious weeds could increase the prevalence of such weedy species in closer proximity to intact native vegetation (e.g., Willow Grove Wetland Complex) than under the On-Site Alternative.

#### Disturb Vegetation during Rail and Vessel Loading

The Off-Site Alternative could affect riparian forested and scrub-shrub vegetation along the shoreline of the Columbia River, as well as scattered areas of aquatic vegetation possibly present in the shallow waters of the Columbia River in the vicinity of the Off-Site Alternative project area. The mechanisms and likelihood of these impacts would be the same as described for the On-Site Alternative.

### **Alter Vegetation during Maintenance Activities**

The potential for the Off-Site Alternative to affect vegetation during maintenance vegetation under the proposed docks would be the same as described for the On-Site Alternative. The approximate extent, mechanisms, and likelihood of these impacts would also be the same. The Off-Site Alternative would affect a more well-developed riparian forest community, but one more dominated by the noxious weed indigobush than the more sparsely vegetated riparian area under the On-Site Alternative.

The Off-Site Alternative would affect vegetation along the railroad tracks entering the project area and along the rail loop used to stage coal trains at the terminal. Trees and tall shrubs within approximately 25 feet of either side of the perimeter road surrounding the tracks would likely be trimmed to ensure branches and leaves do not interfere with the movement of the rail cars. Areas along the railroad tracks entering the site and along the perimeter road surrounding the tracks have fewer trees and shrubs compared to the On-Site Alternative.

### **Deposit Coal Dust on Vegetation**

Moving coal into and around the project area, managing large stockpiles of coal in the project area, and operating 17,900 linear feet of open conveyors within the project area would generate coal dust, which could become wind-borne and deposit on vegetation.

The highest rate of coal dust deposition would be expected adjacent to the project area, but smaller particles would also be expected to deposit in a zone extending downwind of the terminal. Deposition rates could range from 1.83 g/m<sup>2</sup>/year closest to the terminal, gradually declining to less than 0.01 g/m<sup>2</sup>/year at approximately 2.98 miles from the terminal.

The potential impact of coal dust on vegetation would be similar to that expected from the On-Site Alternative but would extend further downriver. The zone of deposition would include coniferous forest vegetation on the hills adjacent to the north end of the Off-Site Alternative project area, as well as riparian vegetation along the shoreline of the river. Coal dust would be expected to temporarily settle on some areas of higher quality native vegetation in the study area at a rate of approximately less than 0.1 g/m<sup>2</sup>/year, including the native wetland vegetation communities of the Willow Grove Wetland Complex, as well as native forest communities on Walker Island, Fisher Island, and Hump Island within the Columbia River. However, given the number and variety of environmental and plant-specific factors affecting the deposition of dust (Doley 2006:36), information regarding foliage density, leaf dimensions and characteristics, and particle size distribution and dust color would likely be needed to determine the level of dust deposition that might affect sensitive plant species or functions.

### **Spill Coal during Operations**

The potential impact of coal spills on vegetation during operations would be same as described for the On-Site Alternative, but would occur in the vegetation context described for the Off-Site Alternative.

## Operations—Indirect Impacts

Operation of the proposed export terminal at the Off-Site Alternative location would result in the following indirect impacts.

### Coal Dust

The potential impact of deposition of coal dust on vegetation in the study area during operations would be same as described for the On-Site Alternative.

### Erode Vegetation due to Vessel Wakes

The Off-Site Alternative could result in indirect impacts on vegetation along the shoreline of the Columbia River related to increased vessel traffic and associated vessel wakes and bank erosion.

Increased vessel traffic in the Columbia River has the potential to increase the impact of vessel wakes, which could increase shoreline erosion and affect vegetation in low-lying areas along the river through the same mechanisms and to the same extent as under the On-Site Alternative.

However, the actual extent, location, and magnitude of shoreline erosion would be influenced by a complex interaction of multiple factors, including vessel design, hull shape, vessel weight and speed, angle of travel relative to the shoreline, proximity to the shoreline, currents and waves, and water depth (Jonason 1993:29–30; MARCOM 2003). The potential for shoreline erosion is also influenced by the physical character of the shoreline and amount and type of vegetation.

There is a potential for shoreline vegetation along the northeastern end of Walker Island to be eroded by large wakes or wakes oriented perpendicular to the main navigation channel and docks, such as those occurring when tugs push vessels into position at docks.

### 5.6.5.3 No-Action Alternative

Under the No-Action Alternative, the Corps would not issue a Department of the Army permit authorizing construction and operation of the proposed export terminal. As a result, impacts resulting from constructing and operating the export terminal would not occur. In addition, not constructing the export terminal would likely lead to expansion of the adjacent bulk product business onto the export terminal project area. Potential impacts on vegetation could occur under the No-Action Alternative similar to what is described for the On-Site Alternative, but the magnitude of the impact would depend on the nature and extent of future expansion.

## 5.6.6 Required Permits

No permits related to vegetation would be required for the proposed export terminal.