MILLENNIUM BULK TERMINALS—LONGVIEW NEPA ENVIRONMENTAL IMPACT STATEMENT

NEPA VEGETATION TECHNICAL REPORT

PREPARED FOR:

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Acronyms and Abbreviations

Applicant	Millennium Bulk Terminals—Longview, LLC
BMPs	best management practices
BNSF	BNSF Railway Company
BPA	Bonneville Power Administration
CDID	Consolidated Diking Improvement District
CFR	Code of Federal Regulations
Corps	U.S. Army Corps of Engineers
CRD	Columbia River Datum
Ecology	Washington State Department of Ecology
g/m^2/year	grams per square meter per year
HGM	hydrogeomorphic code
IPaC	Information, Planning, and Conservation
NEPA	National Environmental Policy Act
OHWM	ordinary high water mark
OW	open water
PEM	palustrine emergent
PFO	palustrine forested
PSS	palustrine scrub-shrub
RCW	Revised Code of Washington
Reynolds facility	Reynolds Metals Company facility
SEPA	Washington State Environmental Policy Act
U	upland
USC	United States Code
USFWS	U.S. Fish and Wildlife Service
W	wetland
WAC	Washington Administrative Code
WDFW	Washington Department of Fish and Wildlife
WDNR	Washington Department of Natural Resources

Chapter 1
Introduction

This technical report assesses the potential vegetation impacts of the proposed Millennium Bulk Terminals—Longview project (On-Site Alternative), Off-Site Alternative, and No-Action Alternative. For the purposes of this assessment, vegetation refers to vascular plants[1] growing in upland and wetland areas; it does not include mosses, liverworts, or algae or vegetation growing submerged in the water (aquatic vegetation). This report describes the regulatory setting, establishes the method for assessing potential vegetation impacts, presents the historical and current vegetation conditions in the study areas, and assesses the potential for impacts on vegetation.

Both upland and wetland vegetation are described in this technical report; however, wetlands as a specific resource are also discussed in the multiple wetland delineation reports prepared by Grette Associates.

1.1 Project Description

Millennium Bulk Terminals—Longview, LLC (Applicant) proposes to construct and operate an export terminal in Cowlitz County, Washington, along the Columbia River (Figure 1). The export terminal would receive coal from the Powder River Basin in Montana and Wyoming and the Uinta Basin in Utah and Colorado via rail shipment, then load and transport the coal by ocean-going ships via the Columbia River and Pacific Ocean to overseas markets in Asia. The export terminal would be capable of receiving, stockpiling, blending, and loading coal by conveyor onto ships for export. Construction of the export terminal would begin in 2018. For the purpose of this analysis, it is assumed the export terminal would operate at full capacity by 2028. The following subsections present a summary of the On-Site Alternative, Off-Site Alternative, and No-Action Alternative.

1.1.1 On-Site Alternative

Under the On-Site Alternative, the Applicant would develop an export terminal on 190 acres (project area). The project area is located within an existing 540-acre area currently leased by the Applicant at the former Reynolds Metals Company facility (Reynolds facility), and land currently owned by Bonneville Power Administration. The project area is adjacent to the Columbia River in unincorporated Cowlitz County, Washington near Longview city limits (Figure 2).

The Applicant currently and separately operates at the Reynolds facility, and would continue to separately operate a bulk product terminal on land leased by the Applicant. Industrial Way (State Route 432) provides vehicular access to the Applicant's leased land. The Reynolds Lead and the BNSF Spur rail lines, both operated by Longview Switching Company (LVSW),[2] provide rail access to the Applicant's leased area from the BNSF Railway Company (BNSF) main line (Longview Junction) located to the east in Kelso, Washington. Ships access the Applicant's leased area including the bulk product terminal via the Columbia River and berth at an existing dock (Dock 1) operated by the Applicant in the Columbia River.

[1] Vascular plants include those plants that have tissues for conducting or transferring water and minerals throughout the plant.

[2] LVSW is jointly owned by BNSF Railway Company (BNSF) and Union Pacific Railroad (UP).

Figure 1. Project Vicinity

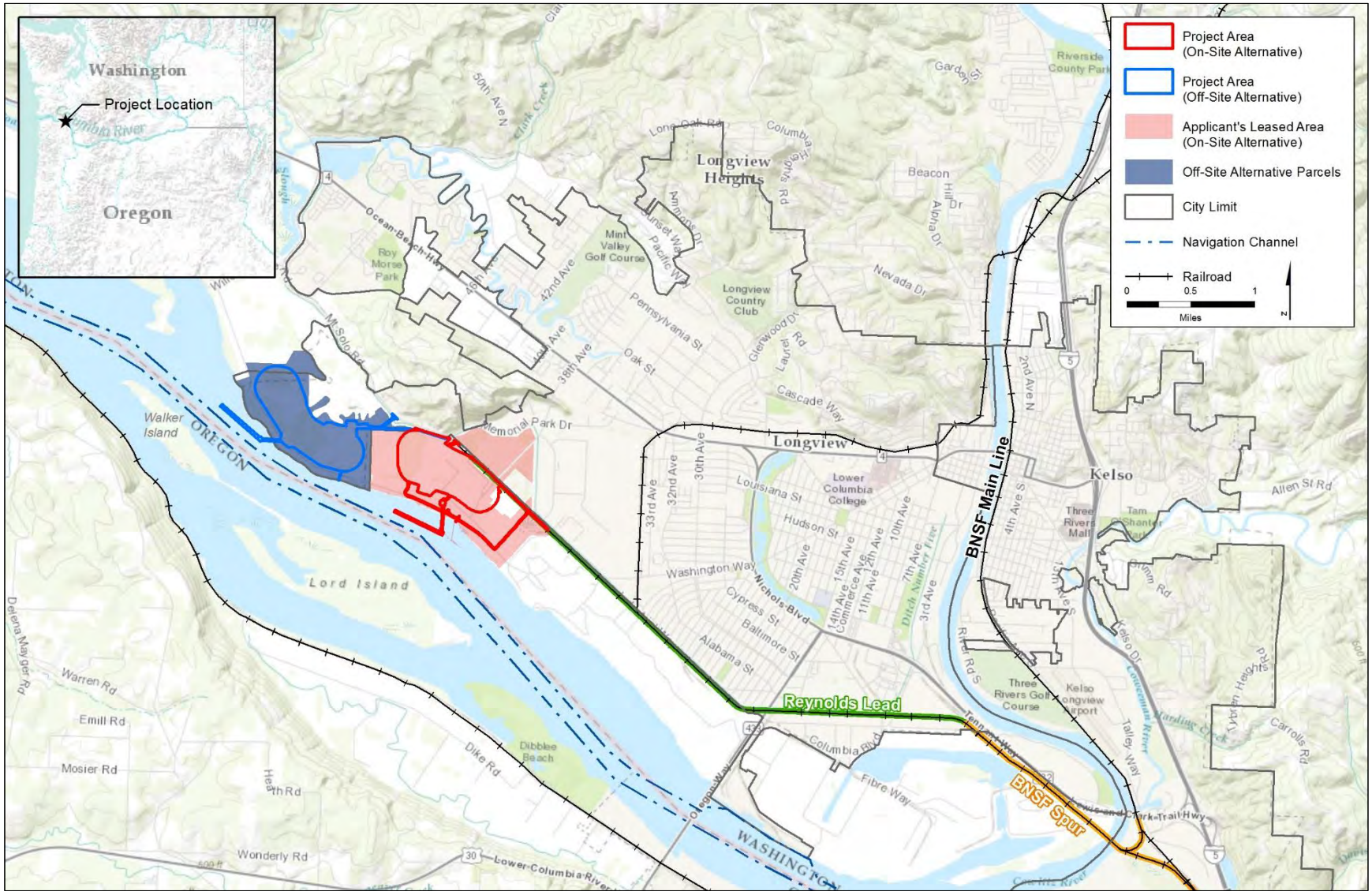
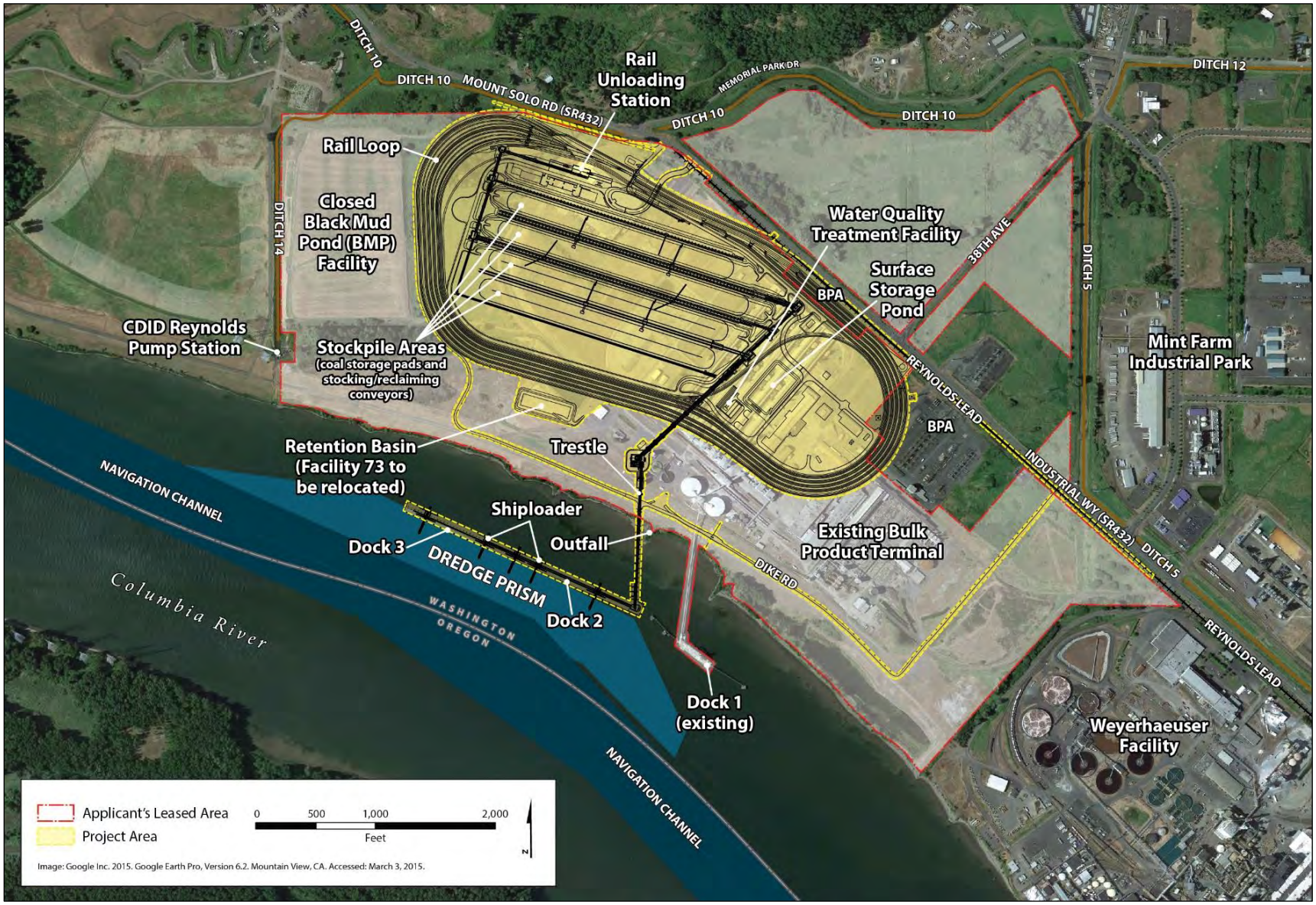


Figure 2. On-Site Alternative



Under the On-Site Alternative, BNSF or Union Pacific Railroad (UP) trains would transport coal in rail cars from the BNSF main line at Longview Junction to the project area via the BNSF Spur and Reynolds Lead. Coal would be unloaded from rail cars, stockpiled and blended, and loaded by conveyor onto ocean-going ships at two new docks (Docks 2 and 3) on the Columbia River for export to Asia.

Once construction is complete, the export terminal would have an annual throughput capacity of up to 44 million metric tons of coal.[3] The export terminal would consist of one operating rail track, eight rail tracks for the storage of rail cars, rail car unloading facilities, stockpile areas for coal storage, conveyor and reclaiming facilities, two new docks in the Columbia River (Docks 2 and 3), and ship-loading facilities on the two docks. Dredging of the Columbia River would be required to provide access to and from the Columbia River navigation channel and for berthing at the two new docks.

Vehicles would access the project area from Industrial Way (State Route 432). Ships would access the project area via the Columbia River and berth at one of the two new docks. Trains would access the export terminal via the BNSF Spur and the Reynolds Lead. Terminal operations would occur 24 hours per day, 7 days per week. The export terminal would be designed for a minimum 30-year period of operation.

1.1.2 Off-Site Alternative

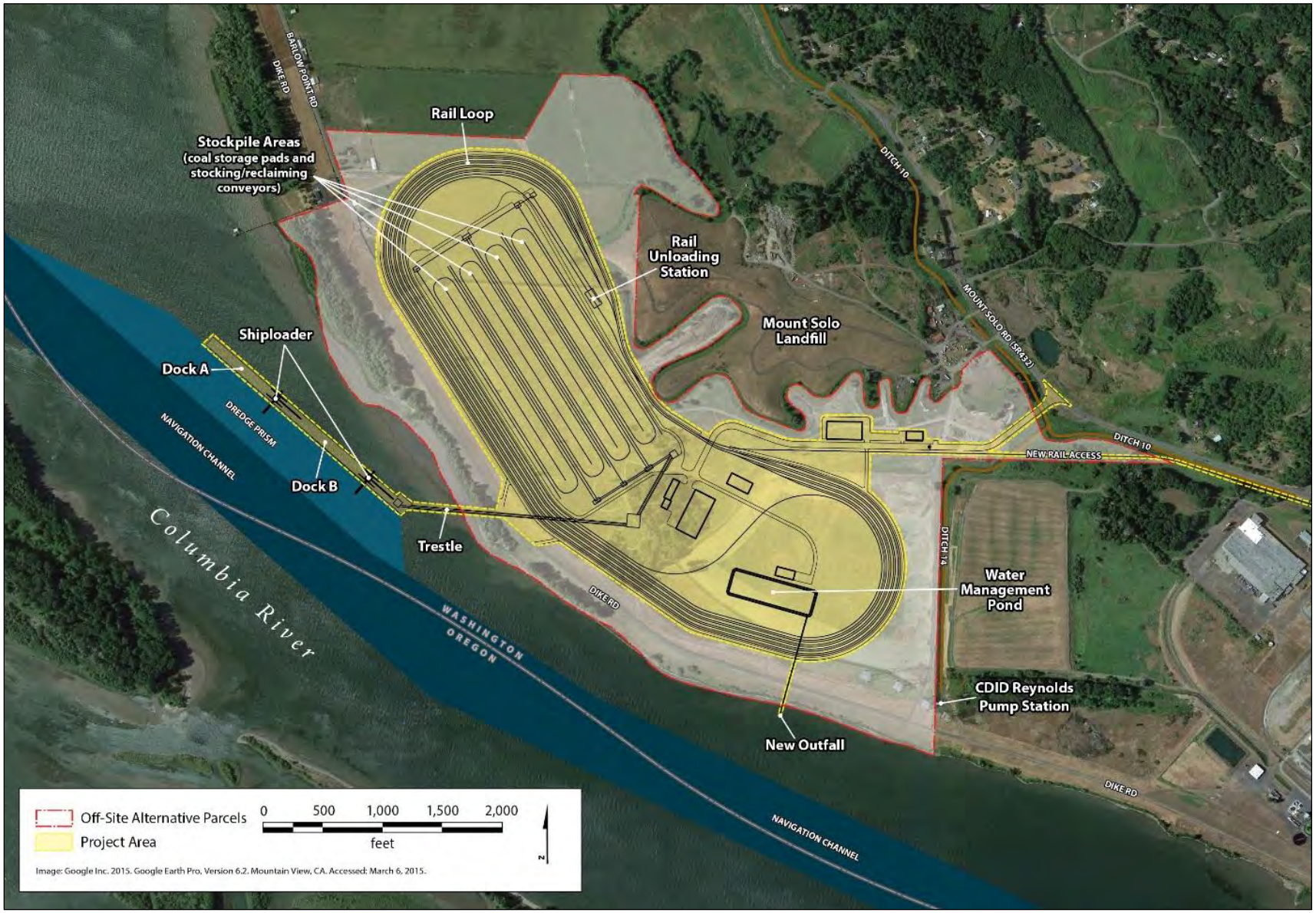
Under the Off-Site Alternative, the export terminal would be developed on an approximately 220-acre site adjacent to the Columbia River, located in both Longview, Washington, and unincorporated Cowlitz County, Washington, in an area commonly referred to as Barlow Point (Figure 3). The project area for the Off-Site Alternative is west and downstream of the project area for the On-Site Alternative. Most of the project area for the Off-Site Alternative is located within Longview city limits and owned by the Port of Longview. The remainder of the project area is within unincorporated Cowlitz County and privately owned.

Under the Off-Site Alternative, BNSF or UP trains would transport coal from the BNSF main line at Longview Junction over the BNSF Spur and the Reynolds Lead, which would be extended approximately 2,500 feet to the west. Coal would be unloaded from rail cars, stockpiled and blended, and loaded by conveyor onto ocean-going ships at two new docks (Docks A and B) on the Columbia River. The Off-Site Alternative would serve the same purpose as the On-Site Alternative.

Once construction is complete, the Off-Site Alternative would have an annual throughput capacity of up to 44 million metric tons of coal. The export terminal would consist of the same elements as the On-Site Alternative: one operating rail track, eight rail tracks for the storage of rail cars, rail car unloading facilities, stockpile areas for coal storage, conveyor and reclaiming facilities, two new docks in the Columbia River (Docks A and B), and ship-loading facilities on the two docks. Dredging of the Columbia River would be required to provide access to and from the Columbia River navigation channel and for berthing at the two new docks.

[3] A metric ton is the U.S. equivalent to a tonne per the International System of Units, or 1,000 kilograms or approximately 2,204.6 pounds.

Figure 3. Off-Site Alternative



Vehicles would access the project area via a new access road extending from Mount Solo Road (State Route 432) to the project area. Trains would access the terminal via the BNSF Spur and the extended Reynolds Lead. Ships would access the project area via the Columbia River and berth at one of the two new docks. Terminal operations would occur 24 hours per day, 7 days per week. The export terminal would be designed for a minimum 30-year period of operation.

1.1.3 No-Action Alternative

Under the No-Action Alternative, the U.S. Army Corps of Engineers would not issue the requested Department of the Army permit under the Clean Water Act Section 404 and the Rivers and Harbors Act Section 10. This permit is necessary to allow the Applicant to construct and operate the proposed export terminal.

The Applicant plans to continue operating its existing bulk product terminal located adjacent to the On-Site Alternative project area, as well as expand this business whether or not a Department of the Army permit is issued. Ongoing operations would include storing and transporting alumina and small quantities of coal, and continued use of Dock 1. Maintenance of the existing bulk product terminal would continue, including maintenance dredging at the existing dock every 2 to 3 years. Under the terms of an existing lease, expanded operations could include increased storage and upland transfer of bulk products utilizing new and existing buildings. The Applicant would likely undertake demolition, construction, and other related activities to develop expanded bulk product terminal facilities.

In addition to the current and planned activities, if the requested permit is not issued, the Applicant would intend to expand its bulk product terminal business onto areas that would have been subject to construction and operation of the proposed export terminal. In 2014, the Applicant described a future expansion scenario under No-Action Alternative that would involve handling bulk materials already permitted for off-loading at Dock 1. Additional bulk product transfer activities could involve products such as a calcine pet coke, coal tar pitch, cement, fly ash, and sand or gravel. While future expansion of the Applicant's bulk product terminal business might not be limited to this scenario, it was analyzed to help provide context to a No-Action Alternative evaluation and because it is a reasonably foreseeable consequence of a Department of the Army denial.

1.2 Regulatory Setting

Vegetation in general is not a regulated feature of the environment. However, impacts on certain vegetation types or communities are addressed as a component of other regulations, statutes, or guidance focused on a regulated feature (e.g., wetlands), a component of habitat for wildlife, or an environmental element of concern (e.g., noxious weeds). See the NEPA Wildlife Technical Report (ICF International 2016b) and reports prepared by the Applicant (Section 2.1.1, *Data Sources*) for further information. In addition, federally listed endangered or threatened species of plants are regulated under the Endangered Species Act, and some species or vegetation communities are protected at a local or state level. For example, the presence of certain types of wetland vegetation (e.g., old growth forest, estuarine wetlands, bogs) can change the regulatory classification of a wetland. Similarly, some jurisdictions have provisions in their critical areas or land development codes that regulate impacts on significant trees (e.g., native coniferous species over a particular size threshold) and on vegetation located within a stream or wetland buffer.

The jurisdictional authorities and corresponding regulations, statutes, and guidance for determining potential impacts on vegetation are summarized in Table 1.

Table 1. Regulations, Statutes, and Guidance for Vegetation

Regulation, Statute, Guidance	Description
Federal	
National Environmental Policy Act (42 USC 4321 *et seq*.)	Requires the consideration of potential environmental effects. NEPA implementation procedures are set forth in the President's Council on Environmental Quality's Regulations for Implementing NEPA (49 CFR 1105).
U.S. Army Corps of Engineers NEPA Environmental Regulations (33 CFR 230)	Provides guidance for implementing the procedural provisions of NEPA for the Corps. It supplements Council on Environmental Quality regulations (40 CFR 1500–1508).
Clean Water Act (33 USC 1251 *et seq*.)	Section 404 regulates discharges into waters of the United States and special aquatic sites, such as wetlands. Also regulates impacts on other vegetated areas such as shoreline vegetation at and below ordinary high water, and vegetated shallows waterward of the shoreline along the Columbia River.
Endangered Species Act	The federal Endangered Species Act of 1973, as amended provides for the conservation of species that are listed and threatened and endangered and the habitat upon which they depend. Section 7 of the federal Endangered Species Act requires that federal agencies initiate consultation with the USFWS and/or NMFS. This will ensure the federal action is not likely to jeopardize the continued existence of any listed threatened or endangered species or result in the destruction or adverse modification of designated critical habitat.
State	
Washington State Environmental Policy Act (WAC 197-11, RCW 43.21C)	Requires state and local agencies in Washington to identify potential environmental impacts that could result from governmental decisions.
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.
Water Quality Standard for Surface Waters of the State of Washington (WAC 173-201A)	Establishes water quality standards for surface waters of Washington State. Washington State Department of Ecology is the responsible agency.
Washington State Shoreline Management Act (90.58 RCW)	Requires cities and counties (through their Shoreline Master Programs) to protect shoreline natural resources against adverse impacts.
Washington Water Pollution Control Act (RCW90.48)	Sets the highest possible water quality standards to ensure purity of waters of the state consistent with public health and public enjoyment, propagation and protection of wildlife, and industrial development of the state.

Regulation, Statute, Guidance	Description
Washington Natural Resource Damage Assessment (RCW 90.56.370)	Establishes liability for damages related to injuries to public resources resulting from oil spills in state waters.
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 and authorizes the management, control, and/or elimination of noxious weed populations in the state.
Hydraulic Project Approval (RCW 77.55, WAC 220-110)	Issued by the Washington Department of Fish and Wildlife for projects with elements that could affect the bed, bank, or flow of a water of the state or productive capacity of fish habitat. Considers effects on riparian and shoreline/bank vegetation in issuance and conditions of the permit, including for the installation of piers, docks, pilings, and bank armoring and crossings of streams and rivers (including culverts).
Local	
Cowlitz County SEPA Regulations (CCC Code 19.11)	Provide for the implementation of SEPA in Cowlitz County.
Cowlitz County Critical Areas Protection Ordinance (CCC 19.15)	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.
City of Longview Critical Areas Ordinance (LMC 17.10.140)	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.

USC = United States Code; NEPA = National Environmental Policy Act; CFR = Code of Federal Regulations; Corps = U.S. Army Corps of Engineers; WAC = Washington Administrative Code; RCW = Revised Code of Washington; CCC = Cowlitz County Code; LNC = Longview Municipal Code

1.3 Study Areas

The study areas for the On-Site Alternative and Off-Site Alternative are described below.

1.3.1 On-Site Alternative

The study area for direct impacts on vegetation is defined as the 212-acre project area. 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 could affect vegetation during operations (Figure 4). The Lower Columbia River study area was established to evaluate the potential impacts that could occur to shoreline vegetation as a result of project related vessels transiting the Columbia River, from the project area downstream to the mouth of the Columbia River. Wetland vegetation is also covered in this tech report; however, wetlands as a specific resource are also discussed in more detail in the multiple wetland delineation reports prepared by Grette Associates.

The direct impact study area for wetlands is the same as described for overall vegetation, but the wetland indirect impact study area is limited to those wetlands that extend outside of the direct impact study area and are partially affected by the On-Site Alternative because of ongoing effects after construction.

1.3.2 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 miles from the project area, and the Lower Columbia River from the project area to the mouth of the river (Figure 5). The broader 1-mile study area considers the extent to which potential coal dust deposition could affect vegetation during operations. The Lower Columbia River study area was also established to evaluate the potential impacts that could occur to shoreline vegetation as a result of project related vessels transiting the Columbia River, from the project area downstream to the mouth of the Columbia River. Wetland vegetation is also covered in this tech report; however, wetlands as a specific resource are also discussed in more detail in the multiple wetland delineation reports prepared by Grette Associates.

The direct impact study area for wetlands is the same as described for overall vegetation, but the wetland indirect impact study area is limited to those wetlands that extend outside of the direct impact study area and are partially affected by the Off-Site Alternative because of ongoing effects after construction.

Figure 4. Vegetation Study Area for the On-Site Alternative

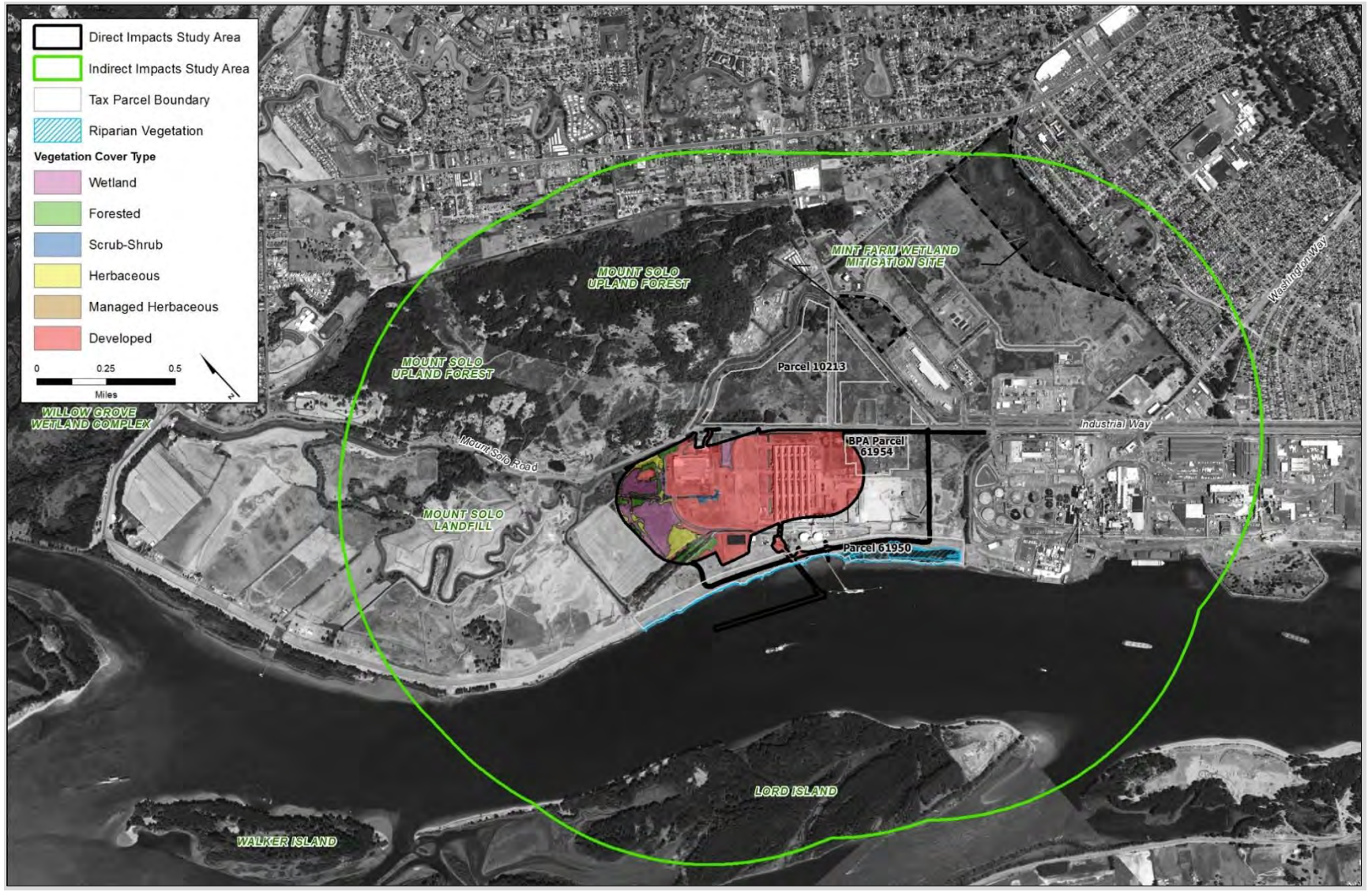
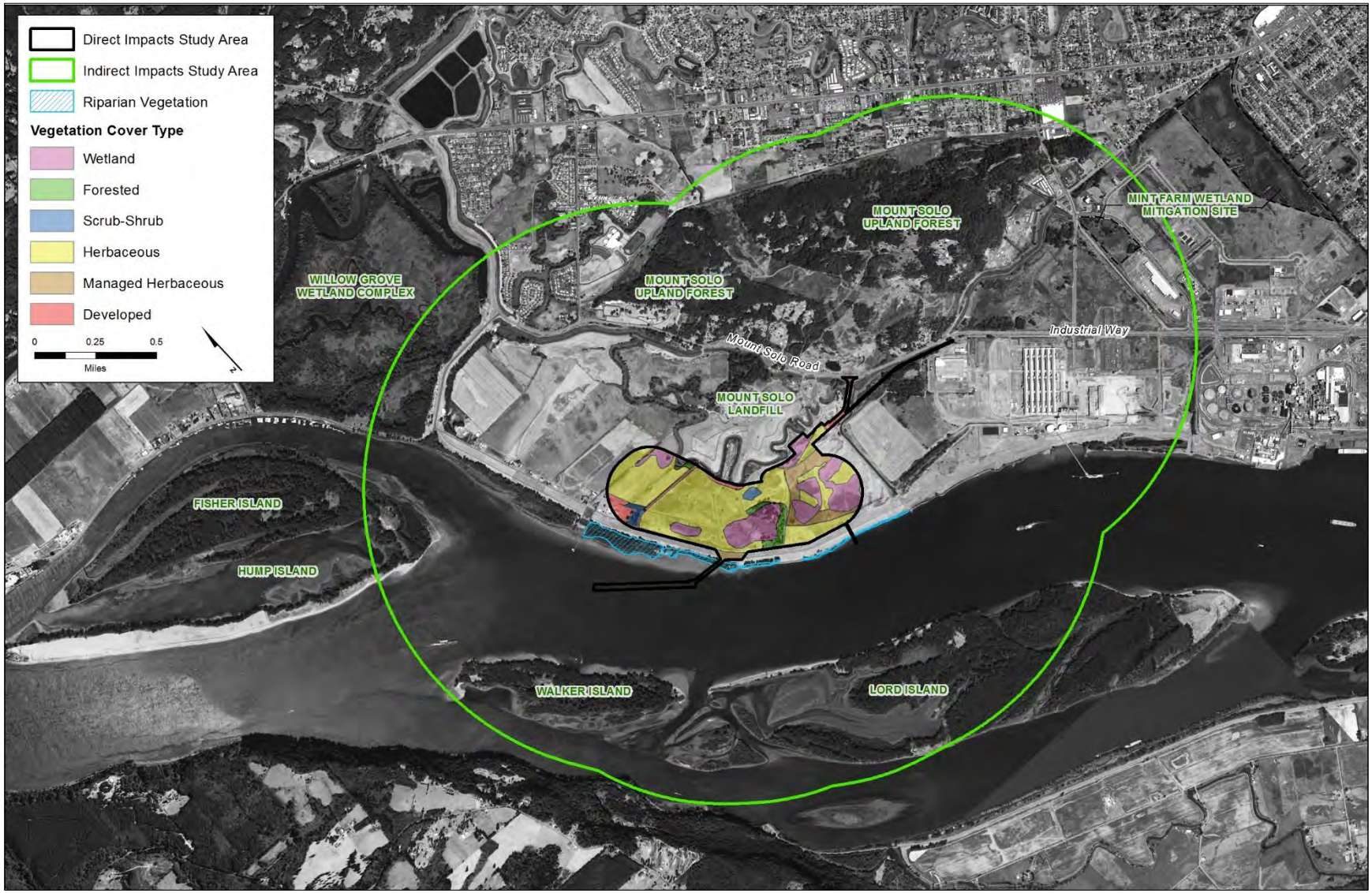


Figure 5. Vegetation Study Area for the Off-Site Alternative



Chapter 2
Affected Environment

This chapter explains the methods for assessing the affected environment and determining impacts, and describes the affected environment in the study areas as it pertains to vegetation.

2.1 Methods

This section describes the sources of information and methods used to characterize the affected environment and assess the potential impacts of the On-Site Alternative, Off-Site Alternative, and No-Action Alternative on vegetation.

2.1.1 Data Sources

The following sources of information were used to evaluate the study areas.

- Two reconnaissance level site visits conducted by ICF International biologists on April 8 and December 11, 2014.
- A series of historical aerial photos from various years and months between 1994 and 2014 accessed through Google Earth Pro, a 2010 aerial photo provided by ESRI, and 2012 aerial photo from the North Agriculture Imagery Program.
- Reports prepared by Grette Associates and provided by the Applicant as part of the permit application materials.
    - *Coal Export Terminal Wetland and Stormwater Ditch Delineation Report–Parcel 619530400 and associated appendices including Appendix F: Noxious Weeds and Sensitive Plants* (Grette Associates 2014a)
    - *Bulk Product Terminal Shoreline Wetland Delineation Report–Parcel 61950* (Grette Associates 2014b)
    - *Bulk Product Terminal, Wetland and Stormwater Ditch Reconnaissance Report–Parcel 10213* (Grette Associates 2014c)
    - *Bulk Product Terminal Wetland and Stormwater Ditch Delineation Report–Parcel 61953* (Grette Associates 2014d)
    - *Affected Environment Biological Resources, Addendum Upland Habitat Survey–MBTL Lease Areas* (Grette Associates 2014e)
    - *Affected Environment Biological Resources Report* (Grette Associates 2014f)
    - *Off-Site Alternative–Barlow Point Upland Habitat Survey* (Grette Associates 2014g)
    - *Off-Site Alternative–Barlow Point Shoreline Habitat Inventory* (Grette Associates 2014h)
    - *Off-Site Alternative–Barlow Point Wetland Reconnaissance Report* (Grette Associates 2014i)

- The results of a January 30, 2015, U.S. Fish and Wildlife Service (USFWS) Information, Planning, and Conservation (IPaC) system online database search to determine federally listed endangered or threatened plant species under the jurisdiction of USFWS.
- 2011 National Land Cover Database (Homer et al. 2015) to describe land cover classes in the indirect study area.
- Washington Department of Fish and Wildlife (WDFW) Priority Habitat and Species spatial data provided by WDFW on May 5, 2014, for the 5-mile radius surrounding the project area.
- 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.
- A limited literature search for information relative to threatened and endangered species.
- Comments received from interested parties during the scoping period relative to vegetation and wildlife, as summarized in the Scoping Reports (ICF International 2014a, 2014b).
- Other literature, as cited in the text.

2.1.2 Vegetation Cover Type Mapping

Vegetation cover type mapping in the direct impact study area was accomplished by initially identifying the major land classification categories present using recent and historical aerial photographs, and the information gathered from the references cited in Section 2.1.1, *Data Sources*. Five categories were identified: developed lands, uplands, wetlands,, and open water (Section 2.2.1.4, *Land Cover Classification and Vegetation Cover Types*). Each of these categories was further broken out into different cover types based on the dominant vegetation form (e.g., herbs, shrubs, trees) present. Preliminary boundaries of each cover type were sketched on a recent aerial photograph of the study areas using ArcGIS. Wetland cover types were mapped on the same aerial photo by overlaying the wetland boundaries previously identified (Grette Associates 2014a, b, c, d, i). Cover types in the direct impact study areas were organized and named using land cover classifications similar to those used in the National Land Cover Database (Multi-Resolution Land Characteristics Consortium 2011) and the USFWS *Classification of Wetlands and Deepwater Habitats of the United States* (Cowardin et al. 1979).

Mapped vegetation cover types across the majority of the direct impact study areas were ground-truthed by ICF biologists during reconnaissance-level site visits on April 8 and December 11, 2014. Visual observations of the vegetation present in adjacent areas and along Industrial Way, Mt. Solo Road, and Memorial Park Drive were made during the December 2014 site visit. Where necessary, cover type boundary mapping was adjusted based on field observations. The typical plant species observed in each cover type were recorded and compared with information on the historical vegetation of the Columbia River floodplain to gauge the level of disturbance present across the study areas and the potential to support native vegetation communities.

Land cover types in the indirect impact study area are described primarily 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. Definitions of these land cover classifications can be found at Homer et al. (2015).

2.1.3 Impact Analysis

The following methods were used to evaluate potential impacts of the On-Site Alternative, Off-Site Alternative, and No-Action Alternative on vegetation. Direct impacts on vegetation from the clearing of land to construct the export terminal and associated infrastructure were determined by overlaying the direct impact study area on the vegetation cover type map. All cover types that fell within the direct impact study area were considered permanent impacts, because they would be removed during construction and replaced with gravel pads, stockpiles, railroad tracks, buildings, pavement, and other project features. Approximate acreage of each cover type that would be affected by these activities was calculated and expressed as a percentage of the total cover types affected within the study areas. Potential impacts on vegetation in the indirect impact study areas were qualitatively discussed by identifying the potential impact mechanism (i.e., how the impact would occur), describing the potential effects, and by assessing the likelihood of its occurrence after implementation of the proposed construction mitigation measures.

Direct and indirect impacts from operations were qualitatively described, including the impact mechanism, potential effects, 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).

2.2 Affected Environment

The affected environment related to vegetation in the study areas is described below.

2.2.1 Regional Context

This section provides general information on the historical vegetation known to be present in the region of the state, the special-status species known to occur in Cowlitz County, and the noxious weeds typically found in this area, and descriptions of the land cover classifications and vegetation cover types present in the project area.

2.2.1.1 Historical Vegetation

The project areas are located in the Western Hemlock (*Tsuga heterophylla*) Forested Zone of the Coast Range physiographic province (Franklin and Dyrness 1988:6, 44–45). The portion of this zone that contains the project areas is characterized by a wet, mild, maritime climate, with a mean average temperature of 46 to 48°F. Annual precipitation averages between 59 and 118 inches per year, with most of it falling in the fall and winter. Most of this zone was historically covered by coniferous forests dominated by Douglas-fir (*Pseudotsuga menziesii*), western hemlock, and western redcedar (*Thuja plicata*). While forests composed of these species are still the primary land cover, most of these areas have been logged or burned (or both) during the last 150 to 175 years (Franklin and Dyrness 1988:71) and many now exist as managed timberlands. Deciduous trees are relatively uncommon in these forests and occur primarily in disturbed area, riparian zones, and floodplains. Dominant trees in such areas commonly include black cottonwood (*Populus trichocarpa*), Oregon ash (*Fraxinus latifolia*), big-leaf maple (*Acer macrophyllum*), and red alder (*Alnus rubra*).

Prior to historic development, the floodplain of the lower Columbia River near the project areas was characterized by deciduous riparian forest and riverine wetlands, emergent wet meadows, and complex mosaics of intertidal marshes and tidal forested wetlands. A 1993 natural area inventory for the Lower Columbia classified the areas around Longview as historically being a mixture of freshwater tidelands that transitioned to overflow plains as you moved further upstream (Christy and Putera 1993:12–13). The wettest tidelands were primarily occupied by freshwater marshes dominated by species such as three-square rush (*Schoenoplectus americanus* formerly *Scirpus americanus*) and Lyngby's sedge (*Carex lyngbyei*), while slightly higher sites were occupied by shrub swamps of red-osier dogwood (*Cornus sericea* formerly *C. stolonifera*), Pacific willow (*Salix lucida* var. *lasiandra*), and Sitka willow (*Salix sitchensis*). Stands of Oregon ash and black cottonwood were also common on natural levees along tidal streams. In nontidal areas, the wettest sites were dominated by creeping spikerush (*Eleocharis palustris*) in the shallows along the river, Columbia River willow (*Salix fluviatilis*) on sandy banks and sandbars, and Pacific willow along channels and around overflow lakes. Oregon ash frequently occurred in association with stinging nettle (*Urtica dioica*) on higher sites that were protected natural levees, and with black cottonwood, red-osier dogwood, snowberry (*Symphoricarpos albus*), and stinging nettle on higher banks and on the tops of natural levees. Plant communities that once occurred in this area that are now extremely rare or extirpated include Columbian sedge (*Carex aperta*) marsh, tufted hairgrass (*Deschampsis cespitosa*) prairie, and Oregon white oak (*Quercus garryana*) savanna. (Christy and Putera 1993)

European colonization and establishment of the City of Longview in 1923 modified the floodplain, particularly with the establishment of the Consolidated Diking Improvement District (CDID) #1 Columbia River flood control levee in the 1920s. This levee, which extends along the shoreline near the project areas, effectively disconnected the floodplain from the river and resulted in the loss of intertidal habitats along the shoreline. Floodplain vegetation was further modified by the hydroregulation (i.e., construction and management of hydroelectric dams) of the Columbia River system and the urbanization of the watershed (Johnson 2010). The construction of multiple stormwater drainage ditches by both CDID #1 and private entities also altered the hydrologic regime and vegetation of these areas, as did the development of the floodplain for industrial, agricultural, residential, and recreational uses.

2.2.1.2 Special-Status Plant Species

The WDNR National Heritage Program database was queried for records of rare plant occurrences in Cowlitz County. As shown in Table 2, 15 species with some type of federal or state status were returned from this query (Washington Department of Natural Resources 2015). None of these species has been recorded in the project areas. The nearest record of occurrence of one of these plants relative to the project areas is for a documented siting of the obligate wetland species Columbia water-meal (*Wolffia columbiana*) approximately 1.5 miles northwest of the project area for the On-Site Alternative (Washington Department of Natural Resources 2015) and outside of the study area. Table 3 provides a summary of the typical elevation, habitat, and geographic range for each of these species, as well as an assessment of their potential to occur on the project areas based on the presence or absence of suitable habitat.

Table 2. List of Known Occurrences of Threatened, Endangered, Sensitive, and Rare Plants in Cowlitz County, Washington

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

[a] Federal Status under the Endangered Species Act:
LE = Listed Endangered (in danger of extinction)
LT = Listed Threatened (likely to become endangered)
PE = Proposed Endangered
PT = Proposed Threatened
C = Candidate species. Sufficient information exists to support listing as Endangered or Threatened.
SC = Species of Concern. An unofficial status, the species appears to be in jeopardy, but insufficient information to support listing.

[b] 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.
T = Threatened. Likely to become Endangered in 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.

[c] 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 3. Elevation, Habitat, and Geographic Range of Listed Threatened, Endangered, Sensitive, and Rare Plants in Cowlitz County, Washington

Scientific Name	Common Name	Elevation Range	Habitat	Geographic Range	Occurrence Relative to Project Areas
Agoseris elata	Tall agoseris	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 within northeastern part of Cowlitz County. Not likely to occur in the project areas due to elevation.
Buxbaumia viridis	Buxbaumia moss	Low to subalpine elevations	Found in coniferous forests on very well-rotted logs and peaty soil and humus.	Western North America including the western portion of Washington.	Documented in east-central portion of Cowlitz County. Not likely to occur in the project areas due to lack of suitable coniferous habitat.
Cimicifuga elata	Tall bugbane	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 portion of Cowlitz County in areas along the Columbia River. Not likely to occur in the project areas due to lack of appropriate forest habitat.
Corydalis aquae-gelidae	Clackamas corydalis	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 (Tsuga heterophylla) and silver fir (Abies amabilis) zones. Prefers intermediate levels of overstory canopy closure.	Regionally endemic in Washington State and in Clackamas and Multnomah Counties in Oregon.	Documented in eastern portion of Cowlitz County. Not likely to occur in the project areas due to elevation and lack of suitable habitat.

Scientific Name	Common Name	Elevation Range	Habitat	Geographic Range	Occurrence Relative to Project Areas
Erythronium revolutum	Pink fawn-lily	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 (Thuja plicata)-lodgepole pine (*Pinus contorta*) forests, Sitka spruce (*Picea sitchensis*) 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 portion of Cowlitz County. Not likely to occur in the project areas due to lack of suitable coniferous forest habitat.
Euonymus occidentalis var. *occidentalis*	Western wahoo	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 portion of Cowlitz County, potentially near the project areas. Appropriate habitat could occur on and near both project areas.
Isoetes nuttallii	Nuttall's quillwort	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 portion of Cowlitz County, potentially near the project areas. Not likely to occur in the project areas due to elevation.

Scientific Name	Common Name	Elevation Range	Habitat	Geographic Range	Occurrence Relative to Project Areas
Physostegia parviflora	Western false dragonhead	None provided.	Occurs along shores of streams and lakes, marshes, and other low, wet places in the valleys and foothills (Herbarium, Burke Museum of Natural History and Culture 2014).	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. (Herbarium, Burke Museum of Natural History and Culture 2014)	Most recent documentation in Cowlitz County is prior to 1977. Appropriate habitat could occur on and near the project areas.
Poa laxiflora	Loose-flowered bluegrass	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 portion of Cowlitz County. Appropriate habitat could occur on or near the project areas.
Poa nervosa	Wheeler's bluegrass	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 portion of Cowlitz County, potentially near the project areas. Unlikely to occur in the project areas due to lack of preferred habitat elements.
Salix sessilifolia	Soft-leaved willow	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 portion of Cowlitz County. Appropriate habitat could occur on or near the project areas.

Scientific Name	Common Name	Elevation Range	Habitat	Geographic Range	Occurrence Relative to Project Areas
Sidalcea nelsoniana	Nelson's checker-mallow	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 within northwestern portion of Cowlitz County. Appropriate habitat could occur on or near the project areas.
Tetraphis geniculata	Tetraphis moss	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 in the project areas due to lack of suitable coniferous habitat with logs and stumps.
Utricularia gibba	Humped bladderwort	160 to 490 feet	Occurs in lakes and lake edges and in muddy disturbed sites in the lowland zone.	Southern British Columbia south to California.	Documented in the northern portion of Cowlitz County. Not likely to occur in the project areas due to elevation.
Wolffia columbiana	Columbia water-meal	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 areas; could occur in ponded habitats on or near the project areas.

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

As indicated in Table 3, of the 15 special-status species known to occur in Cowlitz County, six were identified by ICF as potentially occurring in the project areas, based on the presence of potentially suitable habitat in the species range. These include Nelson's checker-mallow, western wahoo, western false dragonhead, loose-flowered bluegrass, soft-leaved willow, and Columbia water-meal. Appendix A, *Descriptions of Special-Status Plant Species with Potential to Occur in the Project Areas,* provides descriptions of these species.

2.2.1.3 Noxious Weeds

Special-status plants can also include species designated as noxious weeds by the Washington State Weed Control Board under Washington State's noxious weed law (Revised Code of Washington 17.10). Noxious weeds are nonnative plants that have been designated as undesirable plants by federal and state laws. Noxious weeds can displace native species; decrease plant species diversity; degrade habitat for rare species and wildlife; decrease productivity of farms, rangelands, and forests; create unattractive areas dominated by a single species; and/or impair full use of the landscape by wildlife and humans. As weed infestations spread, private landowners and public land managers spend increasing amounts of money, time, and resources conducting weed control activities.

Washington Administrative Code (WAC) 16-750 establishes the list of noxious weeds and defines three classes of noxious weeds (A, B, and C), as defined below in Table 4. These classes indicate the level of concern based on the threat to natural systems and current degree of distribution in the area and specify mandatory control and prevention measures associated with each class. Local noxious weed control boards adopt lists specific to their areas, typically at a county level.

Table 4. Washington State Noxious Weed Classification

Class	Definition
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 that are 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 could choose to provide education or technical consultation.

Source: Washington State Noxious Weed Control Board 2015

The Washington State Noxious Weed Control Board maintains the state's official list of noxious weeds (Appendix B, *State Noxious Weed List*) that landowners could be required to control. Local noxious weed boards use the statewide list and classifications to identify noxious weed problems in their jurisdictions and to implement and prioritize control efforts. Cowlitz County's Noxious Weed Control Board maintains a county-specific noxious weed list (Appendix C, *Cowlitz County Noxious Weed List*) and assigns their own control priorities based on the distribution of these weeds in their jurisdiction.

The project areas support plant species regulated as noxious weeds under the law; management of developed areas can affect the spread of noxious weeds to adjacent undeveloped areas of natural plant communities. None of the species designated for Cowlitz County as Class A noxious weeds have been observed in the project areas. Five species documented in or within 1 mile of the project areas are listed as Class B noxious weeds, a classification assigned to plants considered a priority for weed control to prevent new infestations and to contain existing populations: indigobush (*Amorpha fruticosa*), Scotch broom (*Cytisus scouparius*), Policeman's helmet (*Impatiens glandulifera*), Eurasian watermilfoil (*Myriophyllum spicatum*), parrotfeather (*Myriophyllum aquaticum*), and water primrose (*Ludwigia hexapetala*). Eight species documented in the project areas or within 1 mile are listed as Class C noxious weeds, a classification assigned to widespread weeds: Canada thistle (*Cirsium arvense*), bull thistle (*Cirsium vulgare*), English ivy (*Hedera helix*), yellowflag iris (*Iris pseudacorus*), reed canarygrass (*Phalaris arundinacea*), Himalayan blackberry (*Rubus armeniacus*), common tansy (*Tanacetum vulgare*),and nonnative cattail (*Typha angustifolia*). Appendix D, *Descriptions of Noxious Weeds with Potential to Occur in the Project Areas*, provides descriptions of these species.

2.2.1.4 Land Cover Classifications and Vegetation Cover Types

Land cover classifications and vegetation cover types found in the project areas are briefly described in the following sections along with the typical plant species observed in them. A discussion of the location and distribution of these cover types is provided in Section 2.2.2, *On-Site Alternative Study Area* and Section 2.2.3, *Off-Site Alternative Study Area*.

Developed Land

Developed land includes those areas where the majority of the vegetation has been removed and replaced with pavement, buildings, or other types of infrastructure. One vegetation cover type (disturbed) was identified in the project areas.

Disturbed

Scattered vegetation is occasionally present in this community and typically consists of various nonnative grasses, forbs, and shrubs including colonial bentgrass (*Agrostis capillaris*), Kentucky bluegrass (*Poa palustris*), reed canarygrass, Canada thistle, bull thistle, common mullein (*Verbascum thapsus*), Scotch broom, and Himalayan blackberry.

Upland

The upland land cover category includes undeveloped vegetated areas that do not exhibit wetland characteristics. The following upland vegetation cover types are present in the project areas.

Forested Upland

The forested upland cover type includes areas where trees greater than 16 feet in height provide greater than 20% canopy cover (Multi-Resolution Land Characteristic Consortium 2011). Trees commonly found in this cover type include black cottonwood, red alder, Oregon ash, and Pacific willow in floodplain areas and Douglas-fir, big-leaf maple, and red alder in off-site areas. Planted rows of Sitka spruce (*Picea sitchensis*) along roadways and ditches are also present. Understory shrubs typically include Himalayan blackberry, trailing blackberry (*Rubus ursinus*), red elderberry (*Sambucus racemosa*), red-osier dogwood, and occasionally Pacific crabapple (*Malus fusca*) and cascara (*Rhamnus purshiana*). Reed canarygrass is typically the dominant plant in the understory,

with bedstraw (*Galium aparine*), stinging nettle, Canada thistle, and climbing nightshade (*Solanum dulcamara*) also common.

Scrub-Shrub Upland

The scrub-shrub upland cover type includes areas with greater than 20% canopy cover of shrubs or small trees that are less than 16 feet in height (Multi-Resolution Land Characteristic Consortium 2011). Like forested uplands, this cover type typically occurs in isolated patches surrounded by previously disturbed or developed lands. It is also commonly found in association with wetlands and drainage ditches. Dominant species are similar to those found in forested uplands including young black cottonwood, red alder, various willows, red-osier dogwood, and red elderberry. Himalayan blackberry is also common in more disturbed areas, as is Scotch broom.

Herbaceous Upland

The herbaceous upland cover type includes those areas dominated by native and nonnative grasses and forbs that are not maintained or managed (e.g., mowed) on a regular basis. Dominant vegetation in these areas is primarily reed canarygrass. Other common species include perennial ryegrass (*Lolium perenne*), colonial bentgrass, haired bentgrass (*Agrostis scabra*), Kentucky bluegrass, fowl bluegrass (*Poa palustris*), orchard grass (*Dactylis glomerata*), short-awn foxtail (*Alopecurus aequalis*), western bittercress (*Cardamine occidentalis*), common horsetail (*Equisetum arvense*), soft rush (*Juncus effusus*), Queen Anne's lace (*Daucus carota*), velvetgrass (*Holcus lanatus*), hairy cat's ear (*Hypochaeris radicata*), English plantain (*Plantago lanceolata*), Canada thistle, bull thistle, black medic (*Medicago lupulina*), red clover (*Trifolium pratense*), and American vetch (*Vicia americana*).

Managed Herbaceous Upland

The managed herbaceous upland cover type is a subset of the herbaceous upland cover type and includes herbaceous areas that are regularly managed by mowing, grazing, or other activities. Dominant vegetation in these areas is nonnative grasses, with some scattered native and nonnative forbs. Species are the same as described above for the herbaceous upland cover type. Shrubs are typically lacking in these areas.

Wetland

The wetland category includes areas that exhibit the three diagnostic wetland characteristics required by state and federal wetland delineation manuals: hydrophytic vegetation, hydric soils, and wetland hydrology.

Forested Wetland

The forested wetland cover type includes palustrine forested (PFO) wetland areas where trees 16 feet in height or higher provide greater than 20% or more canopy cover (Multi-Resolution Land Characteristic Consortium 2011). Dominant vegetation in this cover type includes black cottonwood, Pacific willow, red alder, and Oregon ash, over a shrub layer that includes such species as salmonberry (*Rubus spectabilis*), Himalayan blackberry, other willows, red-osier dogwood, and red elderberry. Scattered Sweetbriar rose (*Rosa eglanteria*) and Douglas spiraea (*Spiraea douglasii*) shrubs are occasionally present. The understory of most of the forested wetland community is dominated by reed canarygrass. Soft rush, fowl bluegrass, and stinging nettle are also common.

Scrub-Shrub Wetland

The scrub-shrub wetland cover type includes palustrine scrub-shrub (PSS) wetland areas where shrubs or small (less than 16 feet in height) trees provide greater than 20% canopy cover (Multi-Resolution Land Characteristic Consortium 2011). Scrub-shrub wetlands are typically dominated by red osier dogwood, Douglas spiraea, Himalayan blackberry, Hooker's willow (*Salix hookeriana*), Pacific willow, Sitka willow, and saplings of red alder, Oregon ash, black cottonwood, Columbia River willow, Nootka rose (*Rosa nutkana*), creeping buttercup (*Ranunculus repens*), and slough sedge (*Carex obnupta*). The understory of such areas is often dominated by reed canarygrass, with narrowleaf cattail (*Typha angustifolia*) common in wetter areas.

Herbaceous Wetland

Herbaceous or palustrine emergent (PEM) wetlands are found in the floodplain of the Columbia River, often along drainage ditches and in areas that were previously disturbed by agriculture and past borrow activities. Most are dominated by a near monoculture of reed canarygrass, with soft rush and narrow-leaf cattail commonly present in wetter areas. Other species noted in herbaceous wetlands include English plantain, curly dock (*Rumex crispus*), common plantain, slough sedge, and giant horsetail (*Equisetum telmateia*). Various willows, red elderberry, Himalayan blackberry, and Canada thistle are often present around their edges where herbaceous wetlands transition into uplands.

Managed Herbaceous Wetland

The managed herbaceous wetland cover type represents a subset of the herbaceous wetlands identified by Grette in their multiple wetland reports (Grette Associates 2014a, b, c, d, i). This cover type includes those herbaceous wetlands that exhibit evidence of regular management by mowing. These areas are typically dominated by reed canarygrass.

Disturbed Wetland

The disturbed wetland cover type represents wetlands that have been altered by past industrial activities to such an extent that they could no longer exhibit the three diagnostic wetland characteristics (i.e., hydrophytic vegetation, hydric soils, and wetland hydrology). For example, a wetland that has been subject to repeated disturbance from surface clearing or grading activities could be largely devoid of hydrophytic vegetation but still exhibit hydric soils and wetland hydrology. If the disturbance was to cease and the area was allowed to revegetate naturally, hydrophytic vegetation would likely become prevalent once again, and all three characteristics would then be present.

Riparian Land

The riparian land cover category includes those areas located along the shoreline of the Columbia River between the ordinary high water mark (OHWM) and the top of the CDID levee. It includes the vegetation growing adjacent to the active channel margin in riparian zones identified by Grette in their upland and shoreline habitat inventories (Grette Associates 2014e, g, h). Vegetation in these areas interacts directly with the Columbia River, with growth and habitat function heavily influenced by river flows, the rise and fall of water levels, and the erosion and deposition of materials along the shoreline. For the purposes of this analysis, riparian vegetation communities are limited to uplands located in the riparian zone; therefore, riparian lands are reported as part of the

upland land cover class. Wetlands located in the riparian zone are included in the wetland vegetation community mapping and discussed under those sections.

Riparian Forest

The riparian forest cover type includes upland areas that have greater than 30% canopy cover of trees 20 feet in height or higher growing along the shoreline of the Columbia River, between the OHWM and the levee. This cover type is found growing within both sandy substrates and amongst riprap and other types of shoreline armoring (i.e., Reno mattress[4]). Dominant vegetation typically includes black cottonwood, Oregon ash, Himalayan blackberry, Scotch broom, Scouler's willow, Hooker's willow, Columbia River willow, Sitka willow, red-osier dogwood, and false indigo bush (*Amorpha fruticosa*). Big-leaf maple, Pacific crabapple, and Douglas hawthorn (*Crataegus douglasii*) are also present in some areas. Underlying herbaceous vegetation typically includes reed canarygrass along with various other grasses and forbs include various bromes (*Bromus* spp.), velvetgrass, red clover, Canada thistle, gumweed (*Grindelia* sp.), poverty rush (*Juncus tenuis*), and stinging nettle, among others.

Riparian Scrub-Shrub

The riparian scrub-shrub cover type includes upland areas that have greater than 30% canopy cover of shrubs or small trees (less than 20 feet in height) growing along the shoreline of the Columbia River, between the OHWM and the levee. It is found in similar substrates as the forest vegetation community and contains similar species.

Riparian Herbaceous

The riparian herbaceous cover type is generally dominated by mown grasses and weeds including reed canarygrass, velvet grass, common horsetail, and English plantain. It is only found in the project areas. It occurs in scattered areas that are too small to be seen on the vegetation cover type figures.

Open Water

The open water land cover category includes the various surface and stormwater ditches and ponds that are present in the project areas. It is described in more detail in the NEPA Surface Water and Floodplains Technical Report (ICF International 2016c). Species present in these fringe areas typically include reed canarygrass, cattails, creeping spikerush, yellowflag iris, and slough sedge.

2.2.2 On-Site Alternative Study Area

The following sections describe the existing conditions relative to vegetation for the On-Site Alternative.

2.2.2.1 General Description of On-Site Alternative Area

The 212-acre direct impact study area lies within the 540-acre site currently leased by the Applicant; the lease area includes Parcels 10213, 61950, 61953, and 619530400, as well as two parcels that are currently owned by Bonneville Power Administration (BPA) (Parcels 6195303 and

[4] Reno mattress is a type of gabion, a wire cage or basket filled with rock that is used for river bank and scour protection, where the depth of the basket is less than its width and length, creating a permeable, flexible 'mattress'.

61954) (Figure 6). Parcel 10213 is located on the north side of Industrial Way (i.e. outside of the direct impact study area) and Parcels 61950, 61953, 6195303, 619530400, and 61954 are located on the south side of Industrial Way. Parcel 10213 is undeveloped; Parcels 619530400, 6195303, and 61953 contain the former Reynolds Metals Aluminum Reduction Plant; Parcel 61950 contains the CDID levee and Columbia River shoreline; and Parcels 6195303 and 61954 are primarily occupied by electrical substations/switchyards. The export terminal would be constructed on portions of Parcels 619530400, 6195303, 61950, and 61954. These parcels are within the direct impact study area and include two parcels of the former Reynolds Metals Aluminum Reduction Plant, a shoreline parcel, and two parcels that are currently owned by BPA.

Parcel 10213

Parcel 10213 is located on the north side of Industrial Way, between the roadway and segments of CDID Ditch 5 and CDID Ditch 10 (Figure 6). It is broken into three portions by 38th Avenue and Parcel 1021401, which contains a part of the BPA Longview Substation. The largest portion is the northern part, which is bounded by Ditch 10 on the north, 38th Avenue on the southeast, and Industrial Way on the southwest. The next largest part is the central portion, an arrow-shaped section that is bounded by 38th Avenue on the northwest, Ditch 5 on the east, and Parcel 1021401 on the south. The third portion is a small, triangular section on the southeast end that is bounded by Industrial Way to the southwest, Parcel 1021401 to the northwest, and Ditch 5 to the east.

With the exception of a former commercial office building at the corner of Industrial Way and 38th Avenue, an overgrown softball field along the north side of 38th Avenue, and multiple transmission lines supported on both wooden pole structures and steel towers, Parcel 10213 is undeveloped. It primarily consists of former agricultural land that is now dominated by a near monoculture of reed canarygrass, with a few areas of trees and shrubs in various locations around its perimeter (Appendix E, *Site Photographs*, Photos 1 and 2).

Surface-water features on or adjacent to Parcel 10213 include CDID Ditch 5 and Ditch 10, and six unnamed privately owned drainage features. These features are described in the NEPA Surface Water and Floodplains Technical Report (ICF International 2016c)

Parcels 619530400 and 61953 (Former Reynolds facility)

Parcels 619530400 and 61953 are located on the south side of Industrial Way and contain the former Reynolds Metals Company Aluminum Reduction Plant (Figure 6). Roughly half of this site is devoid of vegetation having been previously developed as large industrial buildings, parking lots, storage areas, disposal sites, stormwater ponds, interior roads, and railroad tracks. Moving northwest to southeast across the central portion of the site, major structures and facilities remaining include the Cable Plant, outdoor storage area, North Plant Potlines, various maintenance and administrative buildings, coal storage silos, cast houses, and remnant portions of the South Plant Potlines and Cryolite Recovery Plant (Figure 6). Structures bordering the landward side of the CDID levee include the Stormwater Retention Basin and Filter Plant (Facility 73), Wastewater Treatment Facility, alumina storage silos, coal tar pitch tanks, and the sanitary sewer treatment plant. The alumina and coal storage silos, associated conveyors and transloading facilities, and Dock 1 are used by the Applicant for their existing bulk terminal operations. Aside from these structures, the administrative offices, and a few maintenance areas, the remainder of the facility is currently unused. Many of the former plant buildings and other infrastructure is in the process of being demolished.

Figure 6. Features in the Project Area for the On-Site Alternative

Surface-water features on or adjacent to these parcels include two drainage ditches managed by CDID #1 (Ditch 10 and Ditch 14); an off-site, privately owned ditch; the U-Ditch, Interception Ditch, Cryolite Recovery Ditches, and various stormwater conveyance ditches. These features are described in NEPA Surface Water and Floodplains Technical Report (ICF International 2016c).

Parcel 61950

Parcel 61950 includes the shoreline of the Applicant's leased area and the levee, which runs along the entire length of the Applicant's leased area along the Columbia River (Figure 6). The top of the levee lies at an elevation of +30 feet Columbia River Datum (CRD) (Grette Associates 2014e). It is topped by a paved road (Dike Road) along its length, with its riverward and landward faces maintained in grass cover by regular mowing (Appendix E, Photo 37), consistent with U.S. Army Corps of Engineers (Corps) standards for vegetation maintenance on flood control levees.

The project area is located approximately 30 miles upstream of the extent of tidal salinity in the river. The portion of the project area that includes the nearshore zone of the Columbia River is thus characterized as tidal freshwater habitat. The tidal amplitude—the difference between mean lower low water and mean higher high water—is 4.6 feet, creating a daily rise and fall of water levels along the shoreline of approximately 2.3 feet (on average) around the average water level (Grette Associates 2014e). The shoreline along the project area is characterized by a narrow, steep sloping sandy beach, with scattered areas of woody debris and herbaceous, scrub-shrub, and forested vegetation (Appendix E, Photos 32 through 38). Two rock groins and two wooden pile dikes extend out into the river from the shoreline along the Applicant's leased area boundary. Existing facilities located in the river and riparian zone include Dock 1, a trestle-supported access ramp, and an overhead conveyor that extends across the levee and shoreline to the shiploader on Dock 1. The area around Dock 1 and navigation channel in the river are both actively maintained by regular maintenance dredging.

A linear ponded area is located at the southeastern corner of the Applicant's leased area between the river and the CDID levee (Figure 6; Appendix E, Photos 39 and 40). This area was previously used by the Corps as a dredged material disposal site for spoils from routine maintenance dredging of the Columbia River Federal Navigation Channel. Past excavation of the dredged sands from this site by the previous site tenant created a large pond that is separated from the river by a steep shoreline berm. This berm is primarily covered with invasive vegetation such as Scotch broom and Himalayan blackberry on the pond side, and by native willows and black cottonwood trees which overhang the shoreline on the river side (Attachment E, Photo 12).

Parcels 6195303 and 61954

Parcels 6195303 and 61954 (Figure 6) are owned and maintained by BPA. Parcel 6195303 is 2.31 acres in size and currently consists of a fenced-in gravel pad that is partially vegetated with scattered weedy grasses and forbs. Parcel 61954 is located near the center of the project area, between Industrial Way and the South Plant Potlines. It is approximately 22 acres in size and primarily occupied by paved areas and a large electrical substation, which is part of the Longview Substation. The southeastern quarter of this parcel consists of an herbaceous wetland field that contains several high-voltage transmission lines supported on wooden pole structures and metal towers (Appendix E, Photos 41 and 42). Part of a smaller electrical substation owned by the Cowlitz County Public Utilities Department is also present on this and the adjacent parcel (Parcel 61953).

Both of these parcels are accessible from Industrial Way and from internal roads in the Applicant's leased area (Figure 6). Surface-water features are limited to a stormwater conveyance ditch located between Parcel 6195303 and the Reynolds Lead.

2.2.2.2 Land Cover Classification and Vegetation Cover Types in the Direct Impact Study Area

Figure 7 shows land cover classifications and vegetation cover types identified in the direct impact study area. The most dominant land cover class is developed lands, which accounts for 71% of the direct impact study area. This is followed by the upland, wetland, and open water land cover classes. The following sections provide the general locations and descriptions of each of these communities in the direct impact study area.

Developed Lands

Approximately 151.14 acres of the direct impact study area (71.0%) were identified as developed. These lands comprise only one vegetation cover type: disturbed (Figure 7; Appendix E, Photos 7 through 9, 12, 20 through 22, 28, and 29). Widely scattered patches of invasive shrubs such as Himalayan blackberry and Scotch broom occur on higher mounds, and around derelict structures and pieces of equipment. The disturbed cover type occurs on all of the areas previously developed for the former Reynolds facility, with the exception of the closed Black Mud Pond facility, which is classified as a managed herbaceous upland area. The BPA and Cowlitz County Public Utility District substations were also classified as disturbed areas.

Upland

Approximately 26.26 acres of the direct impact study area area (12.0%) were identified as uplands. Of the four upland cover types present, the herbaceous upland cover type was the most prevalent, followed by forested upland, managed herbaceous, and scrub-shrub upland.

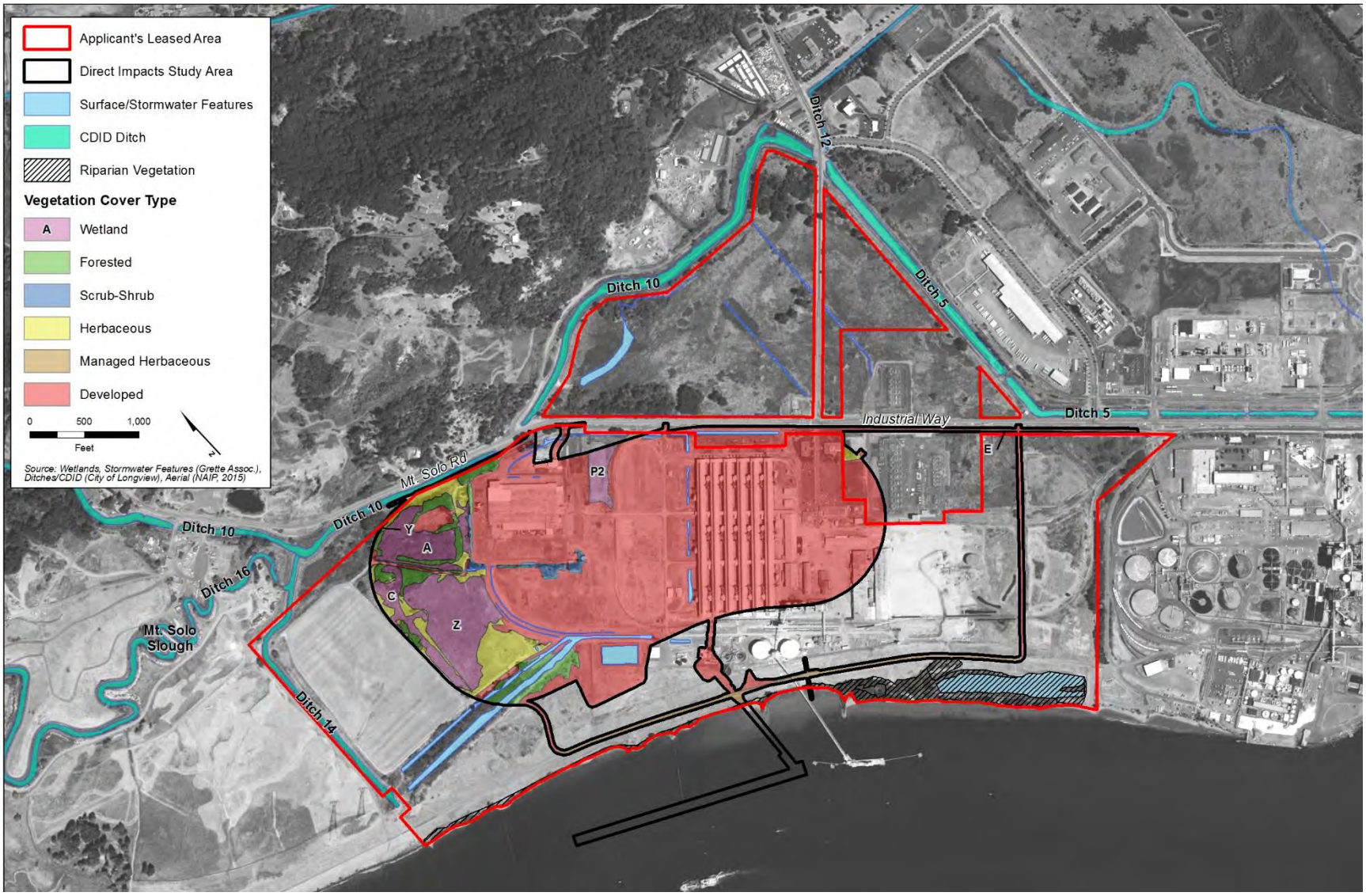
Herbaceous Upland

Approximately 10.88 acres of the direct impact study area (5.0%) were identified as herbaceous uplands. These areas occur on the former Reynolds facility and BPA Parcel 61954 (Figure 7).

Herbaceous uplands in the direct impact study area occur along CDID Ditch 10 to the northwest of the former Cable Plant; in the former borrow area to the east of the closed Black Mud Pond facility (Appendix E, Photo 14); and along the Reynolds Lead (Figure 7). These areas are primarily dominated by reed canarygrass.

Herbaceous uplands on BPA Parcel 61954 are located in a transmission line easement to the northwest of the Longview Substation (Figure 7). This area is dominated by reed canarygrass, scotch broom, and bentgrass, as well as Himalayan blackberry.

Figure 7. Existing Land Cover Classes and Vegetation Cover Types in the Direct Impact Study Area – On-Site Alternative



Forested Upland

Approximately 8.90 acres of the direct impact study area (4.0%) were identified as forested upland.

Forested upland occurs around Wetlands A, C, and Y (described in *Wetlands* below) between the closed Black Mud Pond facility and the former Cable Plant and along the U-Ditch and Interceptor Ditch (Figure 7). Some of these areas are shown in Photos 15 through 17 and 23 through 26 (Appendix E). Dominant trees in the uplands adjacent to Wetlands A, C, and Y include black cottonwood, some Pacific willow, and Oregon ash. Common shrubs include Himalayan blackberry, red elderberry, and sweetbriar rose, with black cottonwood and Oregon ash sapling present. Dominant trees in the forested corridor along the U-Ditch and Interceptor Ditch include black cottonwood, red alder, 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 is also common. Several types and sizes of down wood 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 impact study area area lincludes 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 CDID #1 levee.

Managed Herbaceous Upland

Approximately 4.37 acres of the direct impact study area (2.0%) were identified as managed herbaceous upland cover type. As shown in Figure 7, managed herbaceous upland land cover occurs on the CDID levee, the lawns around the administrative and maintenance buildings, and on the caps of the closed Black Mud Pond facility (Appendix E, Photos 10 and 11). All of these areas are dominated by grasses and forbs that are regularly mown. Species present include reed canarygrass, haired bentgrass, colonial bentgrass, American plantain, orchard grass, short-awn foxtail, western bittercress, blue wildrye (*Elymus glaucus*), common horsetail, Queen Anne's lace, scouring rush (*Equisetum hyemale*), bedstraw, velvetgrass, perennial ryegrass, Kentucky bluegrass, and American vetch.

Scrub-Shrub Upland

Approximately 2.11 acres of the direct impact study area (1.0%) were identified as scrub-shrub upland.

As shown in Figure 7, scrub-shrub uplands on the former Reynolds facility occur around the former Cable Plant (Appendix E, Photo 22) and to the north of the closed Black Mud Pond facility around Wetland Y (Appendix E, Photos 18 and 19). Common species in these areas include young black cottonwood, willows, and Himalayan blackberry. Reed canarygrass is also common in the herbaceous layer.

Wetlands

Approximately 26.93 acres of the direct impact study area were identified as wetland (Table 5, Figure 8). The most prevalent wetland type present is herbaceous wetlands followed by forested wetlands, and scrub-shrub wetlands. As described in Section 2.1.1, *Data Sources*, wetland mapping was based on the wetland delineation and determination studies previously conducted by Grette Associates.

Table 5 provides a summary of the wetlands identified in the direct impact study area area during the Grette Associates determinations and delineations.

Table 5. Wetlands Identified in the Direct Impact Study - On-Site Alternative

Wetland	Location (Parcel)	Cowardin Classification[a]	HGM Classification[b]	Category[c]	Area (acres)
A	619530400	PFO	Depressional	III	6.28
C	619530400	PEM/PFO	Depressional	III	3.38
Y	619530400	PEM/PSS	Depressional	III	3.40
Z	619530400	PEM	Depressional	III	11.22
P2	619530400	PEM	Depressional	IV	2.65
Total					**26.93**

[a] Cowardin classification per Classification of Wetland and Deepwater Habitats of the United States (Cowardin et al. 1979). Values include: PFO = palustrine forested; PSS = palustrine scrub-shrub; and PEM = palustrine emergent

[b] Hydrogeomorphic (HGM) classification per the Washington State Wetland Rating System for Western Washington (Hruby 2006).

[c] Wetland category determined by Grette Associates using the Washington State Wetland Rating System for Western Washington (Hruby 2006).

Source: Grette Associates 2014a, b, c, d.

Forested Wetland

Approximately 6.28 acres of the direct impact study area were identified as forested wetland including all of Wetland A (Figure 8).

This wetland is depressional and is supported primarily by high groundwater and direct precipitation. Common plant species observed in the forested wetlands include a predominately native overstory of black cottonwood (*Populus balsamifera*), Pacific willow (*Salix lucida*), red alder (*Alnus rubra*), and Oregon ash (*Fraxinus latifolia*) trees, overlying a shrub layer dominated by salmonberry (*Rubus spectabilis*) and nonnative Himalayan blackberry (*Rubus armeniacus*). Reed canarygrass (*Phalaris arundinacea*), an invasive grass, is the common herbaceous plant (Appendix E, Photos 15 through 17).

Figure 8. Existing Wetlands in the Direct Impact Study Area - On-Site Alternative

Emergent/Forested Wetlands

Approximately 3.38 acres of emergent/forested wetland occur in the study area including all of Wetland C (Figure 8). This wetland is depressional and is supported primarily by high groundwater and direct precipitation. The emergent portion of the wetland is dominated by reed canarygrass. Common plant species observed in the forested portion include a predominately native overstory of black cottonwood (*Populus balsamifera*), Pacific willow (*Salix lucida*), red alder (*Alnus rubra*), and Oregon ash (*Fraxinus latifolia*) trees, overlying a shrub layer dominated by salmonberry (*Rubus spectabilis*) and nonnative Himalayan blackberry (*Rubus armeniacus*).

Emergent/Scrub-Shrub Wetlands

Approximately 3.40 acres of emergent/scrub-shrub wetland occur in the study area including all of Wetland Y. Wetland Y is north of the closed Black Mud Pond facility and is the only wetland in the direct impact study area that extends outside of the direct impact study area (Figure 8). This wetland is depressional and is supported primarily by high groundwater and direct precipitation. The scrub-shrub component is dominated by Himalayan blackberry, red osier dogwood (*Cornus sericea*), Douglas spirea (*Spiraea douglasii*), and narrowleaf cattail (*Typha angustifolia*). The emergent component is dominated by reed canarygrass and an unidentified bryophyte; some nonnative narrowleaf cattail is also present.

Emergent (Herbaceous) Wetlands

Approximately 13.87 acres of emergent wetland occur in the study area including all of Wetlands Z and P2 (Figure 8). These wetlands are depressional and are supported primarily by high groundwater and direct precipitation. Wetland Z is dominated by reed canarygrass and soft rush (*Juncus effusus*) and contains several brush piles left over from past clearing activities. Wetland P2 is also dominated by reed canarygrass and soft rush.

Open Water

Approximately 10.78 acres of the direct impact study area (5.0%) were identified as open water areas (Figure 7), and include the Columbia River and various ditches and ponds (Appendix E, Photos 2, 16, 23 through 31, 39, and 40). The ditches and ponds are artificially created features; with the exception of the Columbia River, no natural streams or drainages are present in the direct impact study area.

Aquatic Vegetation

Aquatic vegetation was not assessed or quantified in the aquatic portions of the study area during either the Grette Associates studies or the ICF field visits. Grette Associates (2014e) states that curly pondweed (*Potamogeton crispus*) was observed at approximately -1 foot CRD downstream of Dock 1 during a period of high visibility. The report states it is possible that the gently sloping portion of the shallow water habitat area between the east and west pile dikes near the project area could support a narrow band of sparse aquatic vegetation in the upper most elevations where increased light penetration and reduced river velocity are present, relative to the deeper portions of the river in this area.

2.2.2.3 Indirect Impact Study Area Vegetation Communities

Table 6 summarizes the areas and percent cover of land cover classes in the On-Site Alternative's indirect impact study area 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 6. Land Cover in the Indirect Impact Study Area – On-Site Alternative

Land Cover Classification	Area in Indirect Impact Study Area (acres)	Percent Cover in Indirect Impact Study Area
Developed	1631	37
Forest	347	8
Shrub	106	2
Herbaceous	62	1
Agriculture	573	13
Wetlands	719	16
Open Water	880	20
Barren land	83	2
TOTAL	**4401**	**100**

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

Land use adjacent to the direct impact study area is described in detail in the NEPA Land Use Technical Report (ICF International 2016d). In general, land use north of the direct impact study area includes a mix of undeveloped forested areas, rural residences, and lands previously disturbed by various industrial and agricultural activities. Land to the east and southeast is primarily developed for marine industrial and commercial uses and include the Mint Farm Industrial Park and the Weyerhaeuser wood/paper products facility. Land to the northwest includes undeveloped properties that were previously disturbed by agriculture and other recreational activities (project area for the Off-Site Alternative) and a closed construction debris/nonhazardous industrial waste landfill (Mount Solo Landfill). A mix of smaller rural-residential, small-scale industrial, and agricultural sites are also present in this area.

Land cover in the indirect impact study area immediately surrounding the direct impact study area is similar to what is described for the direct impact study area, mostly consisting of developed areas, managed/unmanaged herbaceous areas, wetlands, and open water of the Columbia River. Riparian lands are found predominantly along the Columbia River between the ordinary high water mark (OHWM) and the top of the CDID #1 levee, and include vegetation growing 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 vegetated 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 Dredged Material Storage Area. Dominant vegetation in this cover type includes 12- to 16-inch-diameter 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 (Appendix E,

Photos 32 through 36 and 38). Scattered accumulations of large woody material are present in these areas.

- **Riparian scrub-shrub.** Riparian scrub-shrub contains similar species as 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 (Appendix E, Photos 32 and 42). 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. These sparse patches of emergent vegetation occur under the existing Dock 1 conveyor and trestle, and on the sandy flats laying between OHWM and the approximate elevation of mean high water (Appendix E, Photos 36 and 37).

The following areas in the indirect impact study area contain higher-quality vegetation communities and generally represent contiguous forest and other intact vegetation communities.

- **Mount Solo upland forest.** Mount Solo is a forested ridge that lies to the north of the project area (Appendix E, Photos 18, 20, 22, and 23). It is covered with a large area (around 505 acres) of native forest intermixed with rural residential areas and some light industrial uses. Vegetation observable from Mt. Solo Road and Memorial Park Drive includes Douglas fir (*Pseudotsuga menziesii*), big leaf maple, red alder, and western hemlock. Other native tree, shrub, and herbaceous species are likely present. This area is the largest inland forested area in the indirect study area and likely 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 to the east of the project area, in or within 1mile of the project area. These sites were constructed by the City of Longview in the late 1990s and early 2000s under federal and state permits as compensation for the authorized placement of fill material into wetlands and wetland ditches to construct a light industrial park. The Phase I mitigation site is 4.28 acres in size and has developed into a complex of forested, scrub-shrub and emergent wetlands; the Phase II mitigation site is 67 acres in size and includes a mixture of PEM, PSS, and PFO wetlands intermixed with forested uplands. ICF was unable to determine the current quality and species composition of these areas; however, it is likely that they contain a higher percentage of native vegetation and provide enhanced wetland and habitat functions over other, disturbed wetlands, uplands, and developed areas in the vicinity.
- **Lord Island.** Lord Island is located in the Columbia River near the project area. It consists of a 234-acre island that was previously used for dredge material disposal. It is densely forested and bisected by various high-flow channels that support tidal marshes and shallow habitat areas. Vegetation on the island is largely native. Lord Island provides significant wildlife values including habitat for bald eagles and significant numbers of wintering waterfowl (Oregon Wetlands Joint Venture 1994:20).

2.2.2.4 Special-Status Species

Of the 15 special-status plant species known to occur in Cowlitz County (Table 2), six were identified by ICF as potentially occurring in the project area. These include Nelson's checker-mallow, western wahoo, western false dragonhead, loose-flowered bluegrass, soft-leaved willow, and Columbia water-meal. Botanical surveys for these species have not been conducted in the project area or

vicinity. Based on the typical habitat description, soil type, and associated plant species presented in Table 2, ICF identified potential habitats in the project area that could support these species. Approximate blooming times are provided and typically correspond with the best timeframe for field surveys.

- **Western wahoo**. Potential habitat for western wahoo could exist in and around the forested wetlands (Wetlands A and Y) between the closed Black Mud Pond facility and the former Cable Plant. Grette Associates (2014a) states that presence of suitable habitat for this species in the project area is unlikely because the site is largely constructed from dredge spoils and is not associated with a remnant oak savannah or high-quality forest. Western wahoo blooms between May to June (Washington Department of Natural Resources 2015).
- **Western false dragonhead.** Potential habitat for western false dragonhead could occur in and around the forested wetlands (Wetlands A and Y) between the closed Black Mud Pond facility and the former Cable Plant, along the bank of CDID Ditches 10 and 14, and in other low, wet places in the project area. Western false dragonhead blooms between July and September (Herbarium, Burke Museum of Natural History and Culture 2014).
- **Loose-flowered bluegrass.** Potential habitat for loose-flowered bluegrass exists in the forested wetland and emergent/scrub-shrub wetlands (Wetlands C and Z) located between the closed Black Mud Pond facility and the former Cable Plant. Such habitat could also occur along CDID Ditch 10, Ditch 14, and along the U-Ditch and Interception Ditch. Loose-flowered bluegrass flower between from late May through June (Washington Department of Natural Resources 2015).
- **Soft-leaved willow.** Potential habitat for soft-leaved willow occurs along the Columbia River, in and around the Dredged Material Storage Area, and possibly in the wetlands (Wetland A, C, Z, and Y) located between the closed Black Mud Pond facility and the former Cable Plant. Soft-leave willow flowers from May to June (Washington Department of Natural Resources 2015).
- **Nelson's checker-mallow.** Given its regional distribution, documented occurrence within Cowlitz County, and association with semi disturbed habitats and species; Nelson's checker-mallow could occur in the project area. Potential occurrence locations include the outer edges of the project area in relatively undisturbed habitats along Industrial Way, adjacent to the CDID and privately owned ditches that fringe the northern edge of the project area, and/or adjacent to Wetlands A and Y in the northern portion of the area. Nelson's checker-mallow typically blooms between May and September (Washington Department of Natural Resources 2015).
- **Columbia water-meal.** Given its regional distribution, documented occurrence within 1.5 miles of the project area, and its known association with ponded habitats and more common species such as duckweed, this species could occur in the pond at the Dredged Material Storage Area and in the ditches maintained by CDID #1 and private entities. Bloom time of Columbia water-meal in Washington is unknown but not necessary for identification (Washington Department of Natural Resources 2015).

2.2.2.5 Noxious Weeds

Table 7 presents the noxious weed species identified in the project area during various site investigations. The project area supports plant species regulated as noxious weeds under the law. Fourteen noxious weed species have been documented in the project area (Table 7) (Cowlitz County Noxious Weed Control Board 2015; Washington State Noxious Weed Control Board 2015).

Table 7. Noxious Weeds Identified in the Project Area

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

[a] Observations made by Grette Associates, as presented in *Appendix F: Noxious Weeds and Sensitive Plants* in Grette Associates 2014a. Location values: W = wetland; U = upland; D = Ditches; OW = open water

[b] Observations made by ICF during site investigations in April and December 2014

[c] Observations by Washington State Noxious Weed Control Board (2015)

[d] State noxious weed classification based on Washington State Noxious Weed Control Board 2015 Noxious Weed List

[e] Noxious weed 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)

None of the species designated as Class A noxious weeds by the Cowlitz County Noxious Weed Control Board have been observed in or within 1 mile of the project area. Six species documented in the project area are listed Class B noxious weeds, a classification assigned to plants considered a priority for weed control to prevent new infestations and to contain existing populations.

- **Indigobush.** Indigobush was observed by ICF in the riparian plant community along the western shoreline of the project area, near the outlet of CDID #1's Reynolds Pump Station. It likely occurs along other portions of the shoreline of the project area.
- **Scotch broom.** As noted by Grette Associates (2014a) and ICF during the 2014 field reconnaissance, Scotch broom is present in scattered patches throughout the project area in disturbed uplands including the former Outdoor Storage Area, north end of U-Ditch, along the outer edges of Wetland Z, throughout Landfill 2 (Industrial Landfill), Fill Deposit A (White Mud Pond), Fill Deposits B-1 and B-2 (Eastern Black Mud Ponds), portions of Fill Deposit B-3 (Black Mud Deposits), and along the berm around the Dredged Material Storage Area (Figure 7).

- **Policeman's helmet.** Policeman's helmet was listed as being present in the project area by Grette Associates (2014a), but no specific locations for this species were provided. Based on documented habitat preferences and site conditions, policeman's helmet could be present in the understory/herbaceous layer of Wetlands A and Y.
- **Eurasian watermilfoil and parrotfeather.** Both of these species were identified by Grette Associates (2014a) as being present in or within 1 mile of the project area. However, no specific location for where these species were observed was provided. These aquatic species typically occur in permanently ponded areas. Given their habitat requirements, they could occur in CDID Ditch 4, 10, and 14, and possibly in part of the Dredged Material Storage Area pond.
- **Water primrose (Ludwigia hexapetala).** Water primrose has been identified by as occurring in drainage ditches within the CDID # 1. Water primrose is typically found creeping along the shoreline, floating on the water surface, or growing upright. It is possible that water primrose could occur in CDID Ditches 4, 10 and 14, and possibly the Dredged Material Storage Area pond.

Eight species present in this study area are listed Class C noxious weeds, a classification assigned to weeds that are not typically considered a priority for weed control because they are already widespread throughout the state.

- **Canada thistle and bull thistle.** Both of these species are listed as being present in the project area by Grette Associates (2014a) and recorded in the uplands of Parcel 10213 and former Reynolds facility (Grette Associates 2014e). Canada thistle was also observed by ICF in Wetland Z during the December 2014 site visit.
- **English ivy.** English ivy was identified by Grette Associates (2014a) as being present in the project area; however, they did not state where it was observed. Given its habitat preferences, it could be present in Wetland A, as well as in scattered forested areas along Industrial Way and Memorial Park Drive in Parcel 10213.
- **Yellowflag iris.** Yellowflag iris was observed by ICF along the edges of the U-Ditch and Interception Ditch during the December 2014 site visit. Grette Associates (2014b) also recorded it in Wetland X along the shoreline of the Columbia River.
- **Reed canarygrass and Himalayan blackberry.** Both of these species are present in disturbed areas, uplands, and wetlands throughout the project area, including in Wetlands A, C, and Z, as well as along the shoreline of the river, and within the herbaceous wetland and upland areas north of Industrial Way (Grette Associates 2014c). Reed canarygrass is a dominant understory species in forested Wetland A and is a dominate species in emergent Wetlands P2, C, Y, and Z (Grette Associates 2014a). Blackberry occurs in scattered areas throughout the project area, particularly along the U-Ditch/Interception Ditch, off the southeast corner of the former Cable Plant, along the margins of various stormwater conveyance features, along the south side of Industrial Way, and along the Reynolds Lead (Grette Associates 2014a).
- **Common tansy.** Grette Associates (2014a) lists this species as present in the project area but does not indicate where this species was observed.
- **Nonnative cattail.** Nonnative cattails were recorded within Wetland Y (Grette Associates 2014a) and are a dominate species in Wetland E and in the stormwater conveyance features of the far eastern end of the project area (Grette Associates 2014d); cattails were also observed at the eastern end of the Dredged Material Storage Area pond at the southeastern end of the

project area, as well as at the eastern end of the U-Ditch and in a shallow ponded area off the project area.

2.2.3 Off-Site Alternative Study Area

2.2.3.1 General Description of Off-Site Alternative Area

The Off-Site Alternative is adjacent to the project area for the On-Site Alternative. Therefore, some of the regional context provided in Section 2.2.2.1, *General Description of On-Site Alternative Area,* applies to this alternative as well.

The project area is located to the west or downstream from the project area for the On-Site Alternative, between the Columbia River and Mt. Solo Road (Figure 9). It is entirely within the historical Columbia River Floodplain and, with the exception of the shoreline, is protected by the CDID levee. The project area is generally bounded on the north by a hay field; on the northeast by Mount Solo Slough and the closed Mount Solo Landfill; on the east by CDID Ditch 14 and the closed Black Mud Pond facility; and on the southwest by the Columbia River. It includes all or portions of Parcels 106990100, 107110100, 107150100, 107160100, 107170100, 107180100, 107840100, 608600100, and WL2608003 and is within the City of Longview.

The project area is currently undeveloped and vegetation primarily consists of grassy fields that extend to the CDID levee along the Columbia River (Appendix E, Photos 43 through 54). Forested areas occur in one location near the center of the project area and along the shoreline, riverward of the levee. Individual trees and clumps of shrubs are also present in scattered locations throughout the project area and along Mount Solo Slough. Much of the project area appears to have been previously used for agricultural purposes including hay production and grazing. Between the early 2000s and 2012, multiple motocross tracks and a sand drag strip were also present in the project area, per aerial photographs. These facilities have since been abandoned and are now revegetated with herbaceous vegetation. One agricultural building (likely a pole-barn) is present in the northwest portion of the project area (Appendix E, Photo 50). Overhead BPA power lines and an associated easement run diagonally at the southeast end of the project area and converge with other power lines north of Mt. Solo Road (Appendix E, Photos 43, 44, and 54).

Access to the project area is currently provided from the east by a gravel road that extends from Mt. Solo Road through the Mount Solo Landfill site. It can also be accessed via both Dike Road and Barlow Point Road on the west. No rail service currently exists to the project area.

Surface-water features on or adjacent to the project area include the Columbia River, Mount Solo Slough, and CDID Ditches 10, 14, and 16 (Figure 9). The project area is also crossed by a network of smaller excavated ditches that drain into Mount Solo Slough. Each of these is briefly described below. These features are described in the NEPA Surface Water and Floodplains Technical Report (ICF International 2016c).

Figure 9. Features in the Project Area – Off-Site Alternative

2.2.3.2 Land Cover Classification and Vegetation Cover Types in the Indirect Impact Study Area

Figure 10 shows land cover classifications and vegetation cover types identified in the direct impact study area. The approximate acreage and relative cover for each of these cover classes and types is summarized below. As indicated, the most dominant land cover class is upland, which accounts for 69% of the direct impact study area. This is followed by the wetland, developed land, and open water cover classes.

Developed Land

Approximately 9.62 acres of the project area (4%) were identified as developed. It includes an existing residence and a few outbuildings in the northwest corner of the project area (Appendix E, Photo 50); 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. All of these areas are considered to be within the disturbed vegetation cover type (Figure 10).

Disturbed

The disturbed cover type in the project area (Figure 10) includes sparsely vegetated areas dominated by nonnative species including Himalayan blackberry, Scotch broom, reed canarygrass, other common grasses, and weedy forbs. Many of these areas are unvegetated. These areas also include several brush piles that have been placed along Mount Solo Slough (Appendix E, Photos 47 and 48).

Upland

Approximately 155.46 acres of the direct impact study area (69%) were identified as upland, the most extensive cover class in the direct impact study area (Figure 10). Of the four upland cover types present, the herbaceous upland cover type was the most prevalent, followed by managed herbaceous, forested upland, and scrub-shrub upland.

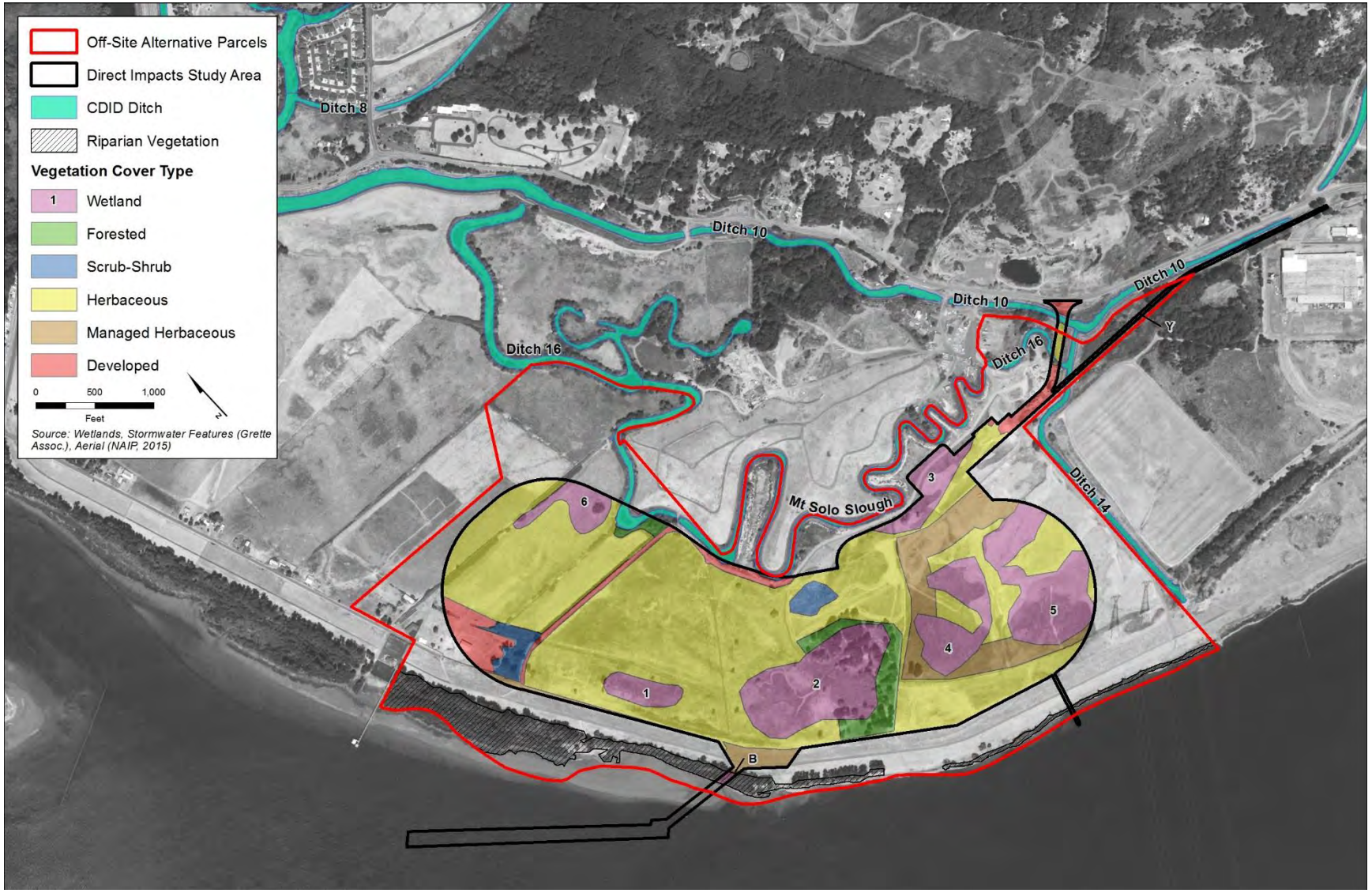
Forested Upland

Approximately 6.74 acres of the direct impact study area (3%) were identified as forested upland. This cover type occurs in the south-central portion of the site, adjacent to Wetland 2 (Figure 10). Dominant species include black cottonwood and red alder, with some willow present (Appendix E, Photos 51 and 53). At the time of the December 2014 site visit, this area had little to no understory present.

Scrub-Shrub Upland

Approximately 4.42 acres of the direct impact study area (2%) was identified as scrub-shrub upland. These areas occur near the center of the project area and near the existing agricultural complex in the northwestern portion (Figure 10). Dominant vegetation includes young cottonwood, red alder, and willows.

Figure 10. Existing Land Cover Classes and Vegetation Cover Types in the Direct Impact Study Area – Off-Site Alternative



Scrub-shrub upland in the direct impacts study area also includes a small area (0.01 acre) of scrub-shrub riparian lands along the Columbia River shoreline.

Herbaceous Upland

Approximately 126.57 acres of the direct impact study area (56%) were identified as herbaceous uplands, the largest cover type present. These areas occur throughout the majority of the project area where previous agricultural and recreational (motocross) uses have occurred (Figure 10). Dominant vegetation is primarily reed canarygrass mixed with other common grasses and weedy forbs including bentgrass, Canada thistle, soft rush, orchard grass, velvetgrass, hairy cat's ear, perennial ryegrass, English plantain, broad-leaf plantain, fowl and Kentucky bluegrass, curly dock, red clover, and American vetch (Appendix E, Photos 43 through 50).

Managed Herbaceous Upland

Approximately 17.73 acres of the project area (8%) were identified as managed herbaceous upland cover type. This cover type was mapped for a recently mown area in the southern portion of the project area and for the CDID levee (Figure 10). These areas are dominated by grasses and forbs that are regularly mown (Appendix E, Photos 43, 44, and 52 through 54). Reed canarygrass is the dominant species present with the remaining vegetation similar to that found in the herbaceous upland cover type.

Wetlands

Approximately 64.76 acres of the direct impact study area were identified as wetland by Grette Figure 11). The most prevalent wetland type present is herbaceous wetland followed by forested wetland, and scrub-shrub wetland. Because they did not have permission to access the project area, Grette Associates' wetland mapping was limited to reconnaissance-level surveys using aerial photographs, existing resource maps (e.g., National Wetland Inventory), LiDAR, and limited field verification.

Wetlands identified in the project area during these studies are summarized in Table 8.

Forested/Emergent

Approximately 17 acres of forested/emergent wetland occur in the study area (Table 8) and includes all of Wetland 2. Wetland 2 is behind the levee with dominant vegetation that includes black cottonwood, Oregon ash, and red alder underlain by a shrub layer composed of saplings of these species as well as various willows. The emergent layer consists of reed canarygrass.

Scrub-Shrub

Approximately 9 acres of the project area were identified as scrub-shrub wetlands (Table 8) including all of Wetland 3. Wetland 3 is behind the levee with dominant vegetation that includes young black cottonwood, red alder, and Oregon ash, as well as red osier dogwood, Nootka rose, willows, and Himalayan blackberry. Approximately 4.98 acres of this wetland was identified as disturbed from vegetation clearing within the last year from the date of the field effort. Remnant vegetation around the edges of the disturbed area includes black cottonwood, red alder, Pacific willow, Himalayan blackberry, and soft rush.

Herbaceous

Approximately 32 acres of the project area were identified as emergent wetlands (Table 8), including all of Wetlands 1, 4, 5, and 6. These wetlands are behind the levee and are dominated by reed canarygrass. Approximately 6.76 acres of Wetlands 4 and 5 were identified as managed wetlands because they appear to be regularly mowed.

Forested/Scrub-Shrub

Approximately 3.36 acres of the project area were identified as forested/scrub wetlands (Table 8), including all of Wetland B. WetlandB is riparian wetlands that are along the Columbia River on the waterward side of the levee. This wetland is dominated by black cottonwood, Oregon ash, red osier dogwood, Pacific willow, Nootka rose, Columbia River willow, reed canarygrass, creeping buttercup, and slough sedge.

Emergent/Scrub-Shrub

Approximately 3.4 acres of the project area were identified as emergent/scrub-shrub wetlands (Table 8), including all of Wetland Y. This wetland is behind the level and is dominated by reed canarygrass, Himalayan blackberry, red osier dogwood, rose spiraea, and narrowleaf cattail.

Table 8. Wetlands Identified in the Project Area—Off-Site Alternative

Wetland	Location (Parcel)	Cowardin Classification[a]	HGM Classification[b]	Category[c]	Area (acres)
1	107150100	PEM	Depressional	III	3
2	107150100, 10716011	PFO/PEM	Depressional	III	17
3	106990100, 107170100	PSS	Depressional	III	9
4	107170100	PEM	Depressional	III	8
5	107170100, 107180100	PEM	Depressional	III	15
6	107840100	PEM	Depressional	III	6
B	107140100, 107190100	PFO/PSS	Riverine	III[d]	3.36
Y	106980100, 106970100	PEM/PSS	Depressional	III	3.4
	Total				**64.76**

[a] Cowardin classification per Classification of Wetland and Deepwater Habitats of the United States (Cowardin et al. 1979). Values include PFO = palustrine forested; PSS = palustrine scrub-shrub; PEM = palustrine emergent

[b] Hydrogeomorphic (HGM) classification per the Washington State Wetland Rating System for Western Washington (Hruby 2006).

[c] Wetland Type determined by Grette using the Washington State Wetland Rating System for Western Washington (Hruby 2006).

[d] Wetland B was not rated by Grette. Rating shown were determined by ICF based on wetland descriptions provided in Off-Site Alternative–Barlow Point Shoreline Habitat Inventory (Grette Associates 2014h).

Source: Grette Associates 2014h, i

Figure 11. Existing Wetlands in the Direct Impact Study Area – Off-Site Alternative

Open Water

Approximately 8.61 acres of the project area (4%) were identified as open water areas. These areas include the sections of Mount Solo Slough (Appendix E, Photos 47 through 51) and portions of CDID Ditches 14 and 16 that fall within the site boundary (Figure 10).

Aquatic Vegetation

Aquatic vegetation was not assessed or quantified in the study area during either the Grette studies or the ICF field visits. However, Grette Associates (2014e) states that during a separate study near the project area, curly pondweed was observed in an unspecified location off the shoreline in shallow-water habitat (Grette Associates 2014e). Given this observation, it is possible that a narrow band of similar aquatic vegetation could similarly exist along other areas of the shoreline.

Indirect Impact Study Area Vegetation Communities

Table 9 summarizes the areas and percent cover of the different land cover classes in the Off-Site Alternative's indirect impact 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 9. Land Cover in the Indirect Impact Study Area – Off-Site Alternative

Land Cover Classification	Area in Indirect Impact Study Area (acres)	Percent Cover in Indirect Impact Study Area
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
TOTAL	4686	100

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

Land use adjacent to the direct impact study area includes agricultural lands and the former Mount Solo Landfill to the north, the closed Black Mud Pond facility and former industrial land of the project area for the On-Site Alternative to the east, and the Columbia River to the south and west. Low-density residential neighborhoods at Barlow Point, Memorial Park, and West Longview also exist further to the north of the project area on the other side of Mt. Solo Road. Adjacent lands within Cowlitz County are zoned for Heavy Manufacturing (Cowlitz County 2015a, b), while those within the Longview city limits are designated as Mixed Use Commercial/Industrial (City of Longview 2015).

Land cover in the indirect impact study area immediately surrounding the direct impact study area is similar to what is described for the direct impact 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 vegetated 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, Sitka willow, and Pacific willow. Other species present include big leaf maple, Nootka rose, Himalayan blackberry, trailing blackberry, Scouler's willow, 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 and big leaf maple. Occasional black cottonwood trees are also present. Scattered patches of spikerush 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 impact study area include the plant communities described for the On-Site Alternative (Section 2.2.2.3 *Indirect Impact Study Area Vegetation Communities*): Mount Solo, Mint Farm Wetland Mitigation Sites, and Lord Island. In addition, three other high-quality vegetation communities are present.

- **Walker Island.** Walker Island is a 190-acre island in the Columbia River that is downstream from Lord Island and connected to that 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 that are indirectly connected to the Columbia River by Coal Creek Slough (Ecological Land Services, Inc. 2014:6). Vegetation includes a mix of native and nonnative emergent plants, with native shrubs and trees dominant along tidal channels and shoreline areas. Although the vegetation in this area has been degraded by past grading and ditching activities, it is still a high-quality vegetation community because 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, Inc. 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 provides important wildlife habitat.

2.2.3.3 Special-Status Species

Botanical surveys for special-status species have not been conducted in the project area or in its vicinity. Based on the typical habitat description, soil type, and associated plant species presented in

Table 3, ICF identified potentially suitable habitats in the project area that could support the following species.

- **Nelson's checker-mallow.** Given its regional distribution, documented occurrence within Cowlitz County, and association with semidisturbed habitats and species, Nelson's checker-mallow could occur in the project area. Potential occurrence locations in the project area include within and around the edges of the herbaceous fields, along the drainage ditches, and around the perimeter of the forested areas.
- **Western wahoo.** Potential habitat for western wahoo in the project area exists in and around Wetlands B and 2 and in the forested riparian areas.
- **Western false dragonhead.** Potential habitat for western false dragonhead occurs in and around Wetlands B and 2 and in other low, wet places in the project area.
- **Loose-flowered bluegrass.** Potential habitat for loose-flowered bluegrass in the project area exists in and around Wetlands 2 and Y, and possibly along Mount Solo Slough and the CDID ditches bordering the project area.
- **Soft-leaved willow.** Potential habitat for soft-leaved willow in the project area occurs in the forested and scrub-shrub areas along the Columbia River and possibly in and around Wetlands B and Y.
- **Columbia water-meal.** Given its regional distribution, documented occurrence within 0.5 mile of the project area, and its known association with ponded habitats and more common species such as duckweed, this species could occur in Mount Solo Slough and the CDID ditches on the site.

Refer to Section 2.2.2.4, *Special-Status Species* for the blooming/optimal field survey times for these species.

2.2.3.4 Noxious weeds

Table 10 presents the noxious weed species identified in the project area during various site investigations, along with the typical vegetation communities in which they have been observed.

Three of the same Class B noxious weed species documented in the project area for the On-Site Alternative have been documented in the project area for the Off-Site Alternative; these plants are considered a priority by the Cowlitz County Noxious Weed Control Board for weed control to prevent new infestations and to contain existing populations.

- **Indigobush.** Indigobush occurs along the shoreline edge of the project area, along the active channel margin of the Columbia River and in the riparian plant community, continuing east into the riparian plant community along the shoreline of the project area for the On-Site Alternative (Grette Associates 2014h).
- **Scotch Broom.** Scotch broom is present in scattered patches throughout the project area, including in the wetland buffers. It is also a component of the forested and scrub-shrub upland areas (Grette Associates 2014g, i).
- **Eurasian Watermilfoil.** Eurasian watermilfoil is present in the CDID Ditch 10 along the south side of Industrial Way/Mt. Solo Road (Grette Associates 2014i).

Table 10. Noxious Weeds Identified in the Project Area—Off-Site Alternative

Noxious Weed Species		Location Observed[a, b]	Classification		State/County Priority Weed for Control?[d]
Common Name	Scientific Name		State[c]	Cowlitz County[d]	
Indigobush	*Amorpha fruticosa*	Riparian[a,b]	B	B	Yes/no
Scotch broom	*Cytisus scoparius*	U[a, b]	B	B	No/Yes
Eurasian water milfoil	*Myriophyllum spicatum*	OW[a]	B	B	Yes/No
Canada thistle	*Cirsium arvense*	W/U[a, b]	C	C	No/Yes
Reed canarygrass	*Phalaris arundinacea*	W/U[a, b]	C	Not listed	No/No
Himalayan blackberry	*Rubus armeniacus*	U[a, b]	C	C	No/No
Nonnative cattail	*Typha angustifolia*	W[a]	C	C	No/No

[a] Observations made by Grette Associates, as presented in in Grette Associates 2014g, h, i, Location: W = wetland; U = upland; and OW = open water.

[b] Observations made by ICF during visual reconnaissance of project area without site access in December 2014;

[c] State noxious weed classification based on Washington State Noxious Weed Control Board 2015 Noxious Weed List.

[d] County noxious weed 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)

Four of the same Class C noxious weed species documented in the project area for the On-Site Alternative have been documented in the project area for the Off-Site Alternative; these plants are not typically considered a priority by the Cowlitz County Noxious Weed Control Board for weed control because they are already widespread throughout the state.

- **Canada thistle.** Canada thistle is present in the riparian zone along the Columbia River (Grette Associates 2014h) and was observed by ICF during the December 2014 site visit as a scattered component of the disturbed upland areas of the project area.
- **Reed canarygrass.** Reed canarygrass is the dominant plant species in several of the wetlands in the project area, including Wetlands 1, 4, 5, and 6 (Grette Associates 2014i). It is also present in Wetlands 2 and 3 and in riparian zone within Wetland B and throughout the understory of the riparian zone (Grette Associates 2014h). Reed canarygrass is also a common component of the disturbed uplands throughout the project area (Grette Associates 2014g).
- **Himalayan blackberry.** Himalayan blackberry is present in Wetland 6 and is a common component in the understory of the upland forested and scrub-shrub areas of the project area, particularly along the northern edge of the site (Grette Associates 2014g).
- **Nonnative cattail.** Nonnative cattail was recorded within Wetland 6 (Grette Associates 2014g) and could be present in the stormwater conveyance feature along the northern edge of the project area.

Chapter 3
Impacts

This chapter describes the impacts on vegetation that could result from construction and operation of the On-Site Alternative, Off-Site Alternative, or the ongoing activities of the No-Action Alternative.

3.1 On-Site Alternative

Potential impacts on vegetation from the On-Site Alternative are described below.

3.1.1 Construction: Direct Impacts

Construction of the On-Site Alternative would result in the following direct impacts.

Permanently Remove Vegetation

Construction of the On-Site Alternative would require removal of vegetation as shown on Figure 12. Clearing and grading would result in the permanent removal of approximately 212 acres of land cover types from the direct impact study area (Table 11). The majority (71%) of the total impact would occur in areas occupied by the disturbed cover type (i.e., scattered grasses and weeds in and around the developed portions of the project area). These areas of disturbed vegetation are early successional and weedy areas that generally do not support native plant species or provide suitable wildlife habitat.

Under the On-Site Alternative, approximately 26.26 acres of upland vegetation or 12% of the total upland vegetation within the project area would be removed (Table 11). 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 one-third of the upland forest in the project area would be removed. The majority of the 8.90 acres of upland forest impacts would occur to the upland forested areas surrounding Wetland A and the upland forested areas surrounding the interception ditch and stormwater conveyance feature SC11. 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 because 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. These impacts would occur because of construction of the trestle conveyor that connects 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.

Figure 12. Impacts on Existing Land Cover Classes and Vegetation Cover Types in the Direct Impact Study Area – On-Site Alternative

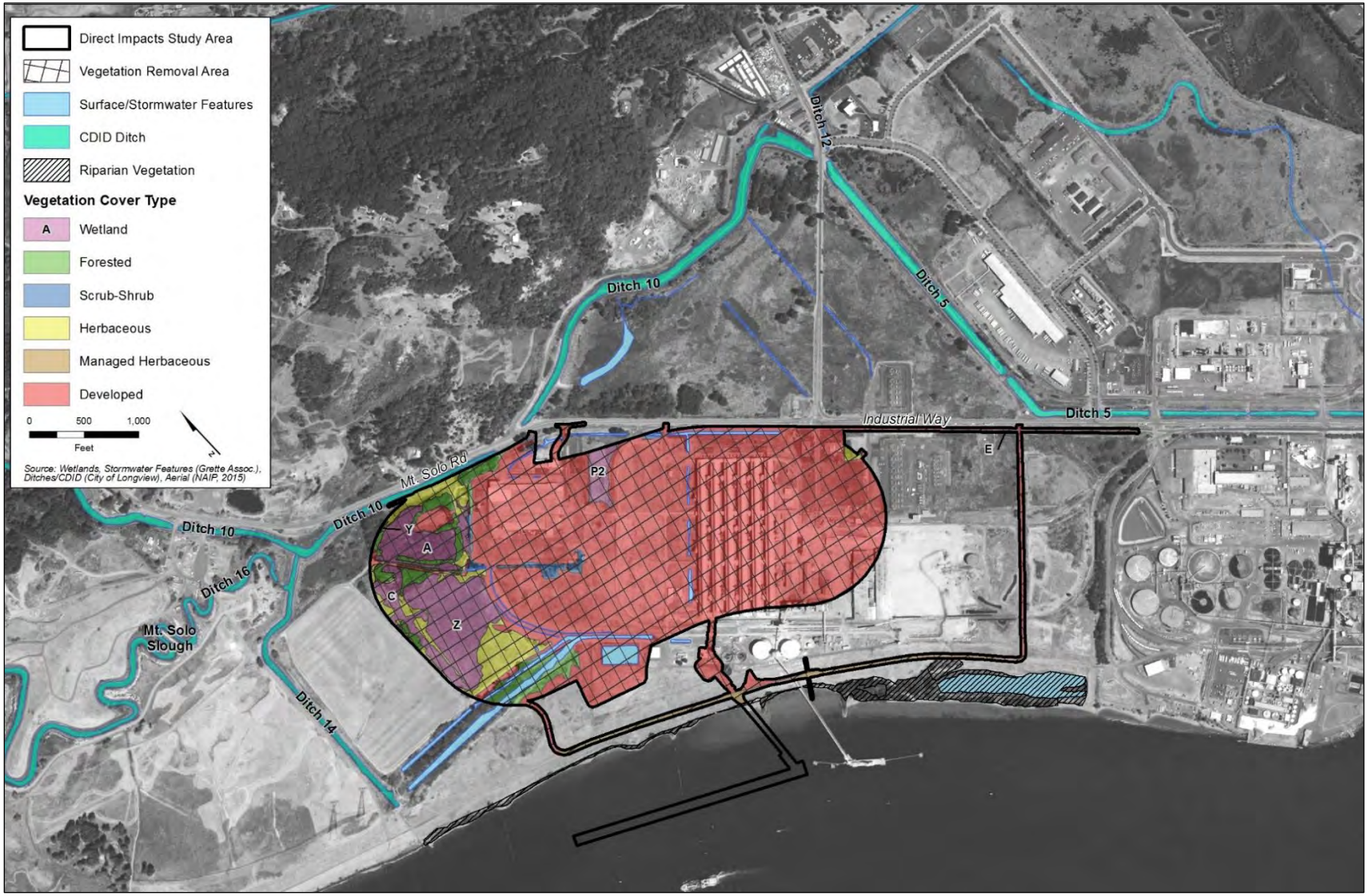


Table 11. Permanent Direct Impacts by Land Cover and Vegetation Cover Type in the Project Area

Land Cover Category	Vegetation Cover Type	Impacts (Acres)[b]	Percentage of Cover Type[c, d]
Developed land	**Developed land total**	**151.14**	**71**
Upland	*Forested*	*8.90*	*4*
	Scrub-shrub	*2.11*	*1*
	Herbaceous	*10.88*	*5*
	Managed herbaceous	*4.37*	*2*
	Upland total	**26.26**	**12**
Wetlands[a]	PFO	*6.28*	*3*
	PEM/PFO	*3.38*	*2*
	PEM	*13.87*	*7*
	PEM/PSS	*0.57*	*0*
	Wetlands total	**24.10**	**11**
Open water	**Open water total**	**10.78**	**5**
Total		**212.28**	**100**

[a]Cowardin classification per Classification of Wetland and Deepwater Habitats of the United States (Cowardin et al. 1979). Values include PFO = palustrine forested; PSS = palustrine scrub-shrub; PEM = palustrine emergent

[b]These are direct impacts on vegetation in the 212-acre project area, which includes the 190 acre terminal plus additional elements (e.g. access roads, docks, and rail line).

[c]This column represents the percent of cover type in the direct impacts study area affected by construction.

[d]Total does not equal sum of values due to rounding.

Affect Special-Status Plants

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 permanently removed as a result of project construction. As mentioned previously, six special-status plant species were identified as potentially occurring in the study area for direct impacts, based on the presence of potentially suitable habitat. These plant species are Nelson's checker-mallow, western wahoo, western false dragonhead, loose-flowered bluegrass, soft-leaved willow, and Columbia water-meal. The spatial extent of any impact on special-status plants cannot be quantified until a special-status plant survey is conducted. Such surveys would be required mitigation. These surveys would occur during the appropriate time of year, prior to any On-Site Alternative-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).

Temporarily Disturb Adjacent Vegetation during Construction

Construction activities could temporarily affect vegetation adjacent to the project area, including wetland and riparian vegetation, through vehicle usage, material storage and stockpiling, and

ground disturbance. Construction and staging activities along the edges of the project area could result in the crushing and burying of adjacent vegetation and compaction of soil by construction equipment and material staging. Such impacts are not likely to permanently alter the vegetation in these areas, as the areas would likely revegetate with similar species following completion of construction. 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 the vegetation in these areas. 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. Depending on the material used and the BMPs employed, the 35-foot-high preload material piles could provide an area for invasive plant species, including noxious weeds, to temporarily 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.

The potential for temporary construction impacts on vegetation would be minimized by adhering to permit conditions, such as those required by the National Pollutant Discharge Elimination System Construction Stormwater General Permit from Washington State Department of Ecology (Ecology) and the Fill and Grade Permit, Critical Areas, Shoreline Development, and Floodplain Development permits issued by Cowlitz County. Compliance with these permits would require implementation of the Stormwater Drainage Control Plan, Temporary Erosion and Sedimentation Control Plan, and other relevant BMPs to reduce the potential for soil erosion during construction and related impacts on water quality or adjacent vegetated areas. This would also require developing and implementing a Spill Prevention, Control, and Countermeasures Plan and a site-specific Construction Stormwater Pollution Prevention Plan that includes BMPs for equipment and material handling and construction waste management. Implementation of the measures outlined in these plans would reduce the potential for temporary construction impacts on vegetation from construction equipment and materials usage.

3.1.2 Construction: Indirect Impacts

Construction of the On-Site Alternative would not result in indirect impacts on vegetation because the effects of construction would be limited to the project area.

3.1.3 Operations: Direct Impacts

Direct impacts on vegetation from operation of the 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 rail tracks, and control of vegetation under the conveyor and along the rail tracks and rail loop.

Operation of the On-Site Alternative would result in the following direct impacts.

Colonization by Noxious Weeds

Because the project area would be mostly developed, colonization of the project area by native plants would not likely occur during operations. Invasive plant species, including several of the noxious weed species already present in and around the project area, are generally adapted to colonize highly disturbed areas and could thus colonize the periphery of the project area. Reed canarygrass, Himalayan blackberry, Canadian and/or bull thistle, and Scotch broom are the noxious weed species most likely to occur in and around the project area. These species are already present on the project area and are common in adjacent areas, and would likely continue to persist during operations. Areas along rail tracks, along stacking conveyors, and between tracks of the rail loop would be most likely to support such noxious weed species in scattered patches.

Disturb Vegetation As a Result of Rail Transport and Vessel Loading in the Project Area

Operation of the terminal could disturb upland, wetland, and riparian vegetation along the rail tracks entering the project area and along the shoreline of the Columbia River, as well as scattered areas of aquatic vegetation that could be present in the shallow waters of the Columbia River near the site. Such impacts could occur as the result of potential spills of coal or other materials or fluids associated with operation of the machinery and equipment associated with the trains and rail cars, the export terminal's conveyor and stockpiling systems, the mobile equipment used to maintain the facilities, and the shiploaders. Direct impacts on aquatic vegetation along the shoreline of the Columbia River cannot be quantified until an aquatic vegetation survey(s) is conducted and occurrence of aquatic vegetation is determined.

Impacts on water quality associated with the routine movement of coal across the shoreline zone and along the shiploaders into vessels at the docks could also affect vegetation along or in receiving waters. However, stormwater runoff would be collected at the project area and treated to remove potential contaminants associated with the operations and maintenance activities (e.g., coal, diesel fuel, oil, hydraulic fuel, antifreeze, tire, and brake dust, exhaust particulates) prior to discharge to the Columbia River. BMPs and mitigation to reduce potential water quality impacts are detailed in the NEPA Water Quality Technical Report (ICF International 2016e).

Although spills or leaks could occur as the result of human error or minor equipment failure, the potential for these to occur and affect the environment would be minimized by appropriate training and the implementation of prevention and control measures. BMPs and mitigation to reduce potential impacts from spills and leaks are detailed in the NEPA Hazardous Materials Technical Report (ICF International 2016f), the NEPA Vessel Transportation Technical Report (ICF International 2016g) and the NEPA Rail Transportation Technical Report (ICF International 2016h). Specifically, prior to the commencement of operations, all personnel would be trained in proper operating and spill-prevention procedures. Specific prevention and response actions would be described in the export terminal's spill prevention, control, and countermeasure plan. All conveyors and loading equipment would be regularly inspected and promptly repaired as necessary. During loading operations, the dock would be constantly attended to by the terminal operator who would have the ability to immediately stop a transfer if a spill or leak occurred from the conveyors, shiploaders, or other equipment. If a spill occurs, it must be reported and cleanup actions taken. Depending on the spill, a natural resource damage assessment could be required under WAC 173-183, Oil Spill Natural Resource Damage Assessment.

Affect Vegetation during Maintenance of Vegetation under Conveyor to Docks 2 and 3

Vegetation maintenance during operation of the terminal could affect riparian trees and tall shrubs beneath and adjacent to the conveyor that would be used to transport coal from the storage facility to the shiploaders on Docks 2 and 3. Trees and tall shrubs in the approximately 45- to 50-foot-wide area beneath and around the conveyor would likely be regularly trimmed and/or removed to ensure that branches and leaves do not interfere with the operation of the conveyor. This maintenance would limit the height of trees and the aerial spread of shrubs that develop in this location, slightly reducing the ability of the site's shoreline to provide organic material to the river, shade the upper beach and shoreline, and provide native foraging, resting, and perching opportunities for passerine birds. This area is small, however, relative to the total length of vegetated shoreline.

Affect Vegetation during Maintenance of Vegetation along Rail Tracks and Rail Loop

Routine vegetation maintenance during operation of the terminal could affect both upland and wetland vegetation along the perimeter road and rail tracks entering the project area and along the rail loop used to stage trains within the site. 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 into and through the site. Similarly, any vegetation that colonizes the interior of the site 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. This maintenance would result in artificial stunting of tree and shrub species in these areas; it would not reduce the functions of native plant communities, however, because it would be confined to the outermost edges of such communities.

Affect Special-Status Plants

Any special-status plants that occur in areas along the periphery of the project area, along the rail tracks and rail loop, or under the conveyor would be affected by operation of the export terminal in the same manner as described above. The potential for and spatial extent of any such impact cannot be quantified until a special-status plant survey(s) is conducted and occurrence of special-status species is determined.

Deposit Coal Dust on Vegetation during Operations

Under the On-Site Alternative, the movement of coal into and around the project area, creation of large stockpiles of coal within the project area, and use of 29,100 linear feet of open conveyors to move coal within the project area and onto vessels, create the potential for coal particles and fugitive coal dust to be generated. For example, coal dust deposition was noted within 8 months of the start of coal stockpiling in areas adjacent to and downwind of coal stockpiles associated with a Portland General Electric coal-fired power plant near Boardman, Oregon (approximately 158 miles southeast and across the Columbia River from the project area) (Spencer and Tinnin 1997:476). Similarly, air quality sampling conducted by concerned citizens in Seward, Alaska, downwind of the Seward Coal Loading Facility, indicated that the air samples collected on windy days while coal was being loaded or unloaded at the facility were highly enriched with total carbon in the form of particulate matter. Most of the total carbon in the air samples was organic carbon, indicating the presence of coal dust in the air (Zimmer

2014:4–10). Similarly, coal concentration in estuarine sediments doubled from 1.8 to 3.6% in the uppermost 2 to 3 centimeters of sediment within about 3 square kilometers of the Roberts Bank coal loading terminal in British Columbia, Canada, between 1975 and 1999 (Johnson and Bustin 2006:67).

Although concerns regarding coal dust are commonly articulated relative to air quality and human health concerns, wind-born coal dust can also deposit on vegetation, soils, and sediments. The potential extent and deposition rate of coal dust particles less than 75 microns in diameter was modeled as part of the analysis conducted relative to air quality; see the NEPA Air Quality Technical Report (ICF International 2016a) for additional details.

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 would also be expected to 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 (g/m^2/year) closest to the project area, gradually declining to less than 0.01 g/m^2/year approximately 2.41 miles from the project area.

The 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 g/m^2/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 effects of dust (arising from a variety of sources) on vegetation vary depending on dust load, climatic conditions, and the physical characteristics of the vegetation. Effects can be physical, such as blocked stomata which alters gas diffusion into/out of the leaves, causing reduced respiration (smothering of leaves) or increased transpiration (water loss), alteration in leaf surface reflectance and light absorption potential, and increased in leaf temperature due to optical properties of the dust including its particle size and color (Chaston and Doley 2006:42–44, Doley 2006:38–41; Farmer 1993:63–66). Such effects can be complex. Experimental manipulation of desert soil dust deposition on the leaves of the endangered Lane Mountain milk-vetch (*Astragalus jaegerianus*), a Mohave desert perennial affected by U.S. Army training center vehicular traffic, showed a decrease in average shoot growth but an increase in seasonal net photosynthesis (Wijayratne et. al. 2009:84–86). Increased leaf temperature caused increased photosynthesis early in the growing season but ultimately resulted in reduced shoot growth as seasonal air temperatures increased.

Research conducted in the more arid climates of eastern Oregon investigated species composition and plant growth of vegetation growing on and off a plume of coal dust, which had deposited adjacent to a coal yard holding area for the Portland General Electric power plant near Boardman, Oregon. Coal dust deposition was correlated with increases in soil temperature and moisture holding capacity; accumulation of iron, copper, zinc, lead, and sulfates; and lower soil pH (Spencer 2001:847–848). While studies did not find significant differences in total plant biomass within and outside of the dust deposition plume, significantly lower frequency of occurrence and lower percent cover of lichens in areas within the coal dust plume was documented (Spencer 2001:847–848; Spencer and Tinnin 1997:479).

It is not known whether the climatic conditions in the area where these studies occurred are directly applicable to the climatic conditions in the study area. Neither the specific mechanisms of effect nor a threshold for potential physical or biological effects of coal dust deposition has

been studied and/or identified relative to the climate and native vegetation of the Columbia River Gorge or the study area. Similarly, there are no studies relative to the deposition rate or particle size at which impacts on native Pacific Northwest tree, shrub, or herbaceous plants would occur. Given the number and variety of environmental, climatic and plant factors affecting the deposition of dust (Doley 2006:36), 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 might potentially affect sensitive plant species or functions.

Cause Release of Coal from a Spill

Direct impacts resulting from a coal spill during coal handling at the export terminal would likely be negligible because the amount of coal that could be spilled would be relatively small. Also, impacts would be minor 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 could be better able to withstand the weight and force of a coal spill, depending on the magnitude of the spill. The magnitude of potential impacts would depend on the size (volume) and extent (area) of the coal spill. The physical impact of coal spilled on vegetation would range from minor plant damage to complete loss of vegetation. Some plant species could be more sensitive to coal than other species. 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. The magnitude of a coal dust impact would depend on duration of exposure, tolerance of vegetation, and aggressiveness of nonnative species. Cleanup of coal spilled during operations could further affect vegetation by either removing or further damaging vegetation because of ground disturbance related to cleanup activities. Any pieces of residual coal that might remain 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, limited to the extent of the spill, and unlikely to disrupt the overall plant ecosystem.

3.1.4 Operations: Indirect Impacts

Operation of the On-Site Alternative would result in the following indirect impacts.

Deposit Coal Dust on Vegetation

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. Potential impacts from coal dust deposition on vegetation is described the *Operations—Direct Impacts* section.

Cause Erosion of Vegetation due to Vessel Wakes during Operations

Operation of the On-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 sediment erosion.

There could be an increase in the potential for impacts on vegetation associated with vessel wakes compared with current conditions. Approximately six vessels per year currently deliver alumina over Dock 1 to the existing bulk product terminal. Operation of the On-Site Alternative at maximum throughput would result in the loading and movement to and from the export terminal of 70 vessels per month (80% Panamax size; 20% Handymax size) at Docks 2 and 3 or 1,680 vessel transits a year. Shoreline erosion is a natural process that removes sediments from the shoreline; it is caused by a number of factors including storms, wave action, and wind. The removal 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 effects and/or rate of the erosion process. In riverine environments the wave periods of vessels are longer compared to waves generated by wind. River bank vegetation is naturally adapted to shorter period of wind waves, but not to long periods, which may be present in vessel wakes. The introduction of long-period waves brings a new erosion mechanism to which the riverbank vegetation may be susceptible (Macfarlane and Cox 2004 in Gourlay 2011). While vessel wakes and associated shoreline erosion of the Columbia River currently occurs due to existing vessel traffic, the operations of the proposed export terminal would increase vessel traffic and could potentially increase or intensify the extent and/or rate of shoreline erosion process and subsequent loss of shoreline vegetation.

Increased vessel traffic in the Columbia River has the potential to increase vessel wakes, which could cause an increase in shoreline erosion and possibly affect vegetation. The average number of annual vessel transits in the Columbia River over a 5-year period (2010–2014) is approximately 3,358 (ICF International 2016g). With operation of the On-Site Alternative at maximum throughput and projected growth in other commercial vessel traffic, annual transits are expected to increase up to 7,342 by 2024–2027 when the export terminal becomes operational and up to 8,672 moving beyond 2028. The potential for vessel wake impacts on vegetation along the shoreline in the immediate vicinity of the project area is limited due to the slope of the shoreline and the general lack of aquatic vegetation near the docks. Additionally, On-Site Alternative-related vessels maneuvering near the docks would be moving slowly as they prepare to dock, and likely not putting out a wake sufficient to cause shoreline erosion. However, there could be a potential for such impacts on the thin strip of shoreline vegetation along the northern end of Lord Island from large wakes, and/or wakes oriented perpendicular to the main navigation channel and docks, such as those that can occur when tugs are oriented perpendicular to the shoreline as they push vessels into position at docks. However, the impact on shoreline vegetation associated with vessel wakes cannot be quantified or measurably attributed to potential On-Site Alternative-related vessels.

The actual extent, location, and magnitude of shoreline erosion impacts is influenced by the complex interaction of multiple factors that affect when, where, and with what intensity vessel wakes would interact with the shorelines of the river. Such factors can include 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 can also be influenced by the slope and physical character of the

shoreline (i.e., soil susceptibility to erosion), as well as the amount and type of vegetation that occurs along the shoreline. Measures that could be implemented to reduce shoreline erosion and impacts to 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.

Affect Special-Status Plants

Any special-status plants that occur in areas along the along the rail tracks entering the project area, along the shoreline of the Columbia River, or in any area receiving coal dust deposition could be indirectly affected by operation of the export terminal in the same manner as described above. The potential for and spatial extent of any such impact cannot be quantified until a special-status plant survey(s) is conducted and occurrence of special-status species is determined.

3.2 Off-Site Alternative

Potential impacts on vegetation from the Off-Site Alternative are described below.

3.2.1 Construction: Direct Impacts

Construction of the Off-Site Alternative would result in the following direct impacts.

Permanently Remove Vegetation

Vegetation would be removed from the project area as depicted in Figure 13.

Construction of the Off-Site Alternative would result in the permanent removal of a total of approximately 225 acres of land cover types, from the project area (Table 12), similar to the removal of 212 acres under the On-Site Alternative. However, the majority of the vegetation impact (56%) under the Off-Site Alternative would occur in areas characterized as herbaceous upland vegetation (i.e., large areas of unmaintained grasses that support a mixture of native and invasive plant species that provide some wildlife habitat); under the On-Site Alternative, the majority of the impact (71%) would be to developed lands mostly characterized as disturbed vegetation areas.

The impacts on these forested areas would occur as a result of construction of the buildings and surge bin components and the southeastern end of the stockpiles. Vegetation removed would include black cottonwood, willow, and red alder trees. Approximately 0.01 acre of upland scrub-shrub impact consists of riparian scrub-shrub vegetation. Vegetation removed would include noxious weed species (indigobush and Himalayan blackberry) and native species such as Pacific crabapple and big-leaf maple. The impacts would occur as a result of installation of the new stormwater outfall.

The Off-Site Alternative would remove nearly six times the area of upland vegetation compared to the On-Site Alternative (155.46 acres compared to 26.26 acres).

Figure 13. Impacts on Existing Land Cover Classes and Vegetation Cover Types in the Direct Impact Study Area – Off-Site Alternative

Table 12. Permanent Direct Impacts by Land Cover and Vegetation Cover Type in the Project Area—Off-Site Alternative

Land Cover Category	Vegetation Cover Type	Impacts (Acres)	Percentage of Cover Type
Developed Land	**Developed Land Total**	**9.62**	**4**
Upland	*Forested*	*6.74*	*3*
	Scrub-Shrub	*4.42*	*2*
	Herbaceous	*126.57*	*56*
	Managed Herbaceous	*17.73*	*8*
	Upland Total	**155.46**	**69**
Wetlands	PEM	*30*	*13*
	PSS	*3*	*1*
	PFO/PEM	*17*	*8*
	PFO/PSS	*0.08*	*<.001*
	PEM/PSS	*1.2*	*1*
	Wetland Total	**51.28**	**23**
Open Water	**Open Water Total**	**8.61**	**4**
Total		**224.97**	**100**

Affect Special-Status Plants

Any special-status plants that occur within the footprint of project construction would be permanently affected by construction in the same manner as described for the various vegetation cover types. The potential for and spatial extent of any such impact cannot be quantified until a special-status plant survey(s) is conducted and occurrence of special-status species is determined.

Temporarily Disturb Adjacent Vegetation during Construction

Construction activities could temporarily affect vegetation adjacent to the project area. This 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. Temporary disturbance could occur through the same mechanisms described for the On-Site Alternative.

The potential for temporary construction impacts on vegetation would be avoided and minimized by adhering to permit conditions described for the On-Site Alternative (Section 3.1.1.1, *Construction: Direct Impacts*).

3.2.2 Construction: Indirect Impacts

Construction of the Off-Site Alternative would not result in indirect impacts on vegetation because effects of construction would be limited to the project area.

3.2.3 Operations: Direct Impacts

Operation of the Off-Site Alternative would be similar to that described for the On-Site Alternative (Section 3.1.1.2, *Operations: Direct Impacts*) and result in the following direct impacts.

Result in 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. The magnitude of the potential impacts could be greater under the Off-Site Alternative because of the extent of the vegetation, the relatively lower occurrence of noxious weeds, and the larger extent of ground disturbance that would occur at the Off-Site Alternative project area. Colonization by noxious weeds could increase the prevalence of such species in an area of closer proximity to intact native vegetation (e.g., Willow Grove Wetland Complex).

Disturb Vegetation as a Result of On-Site Rail Transport and Vessel Loading during Operations

Operation of 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 that could be present in the shallow waters of the Columbia River near the project area. The mechanisms and likelihood of these impacts is the same as described for the On-Site Alternative.

Affect Vegetation during Maintenance of Vegetation under Conveyor to Docks A and B

The potential for the Off-Site Alternative to affect vegetation during maintenance of vegetation under the proposed docks would be the same as described for the On-Site Alternative (Section 3.1.1.3, *Operations: Direct Impacts*).

Affect Vegetation during Maintenance of Vegetation along Rail Tracks and Rail Loop

Operation of the Off-Site Alternative could affect both upland and wetland vegetation along the rail tracks entering the project area, including a large portion of Wetland Y, and along the rail loop used to stage coal within the site. 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 into and through the site. This maintenance would result in direct impacts on the shrubs in Wetland Y and a degree of artificial stunting of tree and shrub species in the adjacent affected uplands by reducing the ability of this largely native plant community to provide wildlife habitat for songbirds and other animals and shading for this linear wetland.

Affect Special-Status Plants

Any special-status plants that occur in areas along the periphery of the project area, along the rail tracks and rail loop, or under the conveyor would be affected by operation of the export terminal in the same manner as described above. The potential for and spatial extent of any such impact cannot be quantified until a special-status plant survey(s) is conducted and occurrence of special-status species is determined.

Deposit Coal Dust on Vegetation during Operations

As described for the On-Site Alternative, the movement of coal into and around the project area, and the creation of large stockpiles of coal within the site, and the use of 17,900 linear feet of open conveyors within the site create the potential for coal dust could become wind-born and deposit on vegetation (ICF International 2016a).

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

As noted for the On-Site Alternative, neither the mechanisms of effect nor a threshold for any potential physical or biological effects of coal dust deposition have been studied relative to the climate and native vegetation of the Pacific Northwest. Similarly, there are no studies relative to the deposition rate or particle size at which impacts on native Pacific Northwest vegetation species would occur.

The potential effect of coal dust would be similar to that expected from the On-Site Alternative but would include an area extending further downriver. The 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. 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^2/year, including the native wetland vegetation communities of the Willow Grove Wetland Complex, as well as the native forested communities on Walker Island, Fisher Island, and Hump Island within the Columbia River, which could affect vegetation. However, given the number and variety of environmental and plant factors that affect 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 in order to determine the level of dust deposition that might pose a potential to affect sensitive plant species or functions.

Cause Release of Coal from a Spill

Direct impacts on the natural environment from a coal spill during operations of the Off-Site Alternative could occur. Direct impacts resulting from a spill during coal handling at the export terminal would likely be negligible because the amount of coal that could be spilled would be relatively small. Also, impacts would be minor because of the absence of terrestrial environments in the project area and the contained nature and features of the terminal (e.g., fully enclosed belt conveyors, transfer towers, and shiploaders).

Coal released as the result of a spill into terrestrial environments could result in impacts. 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 could be better able to withstand the weight and force of a coal spill, depending on the magnitude of the spill. The magnitude of potential impacts would depend on the size (volume) and extent (area) of the coal spill. The physical impact of coal spilled on vegetation would range from minor plant damage to complete loss of vegetation. Some plant species could be more sensitive to coal than other species. 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. The magnitude of a coal dust impact would depend on duration of exposure, tolerance of vegetation, and aggressiveness of nonnative species. Cleanup of coal spilled during operations could further affect vegetation by either removing or further damaging vegetation as a result of ground disturbance related to cleanup activities. Any pieces of residual coal that might remain 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 ecosystem.

3.2.4 Operations: Indirect Impacts

Operation of the Off-Site Alternative would result in the following indirect impacts.

Cause Erosion of Vegetation due to Vessel Wakes during Operations

Operation of the Off-Site Alternative could result in indirect impacts on tidal marsh vegetation along the shoreline of the Columbia River related to increased vessel traffic and associated vessel wakes and sediment erosion. Like the On-Site Alternative, there would be 1,680 vessel transits per year at the Off-Site Alternative.

Increased vessel traffic in the Columbia River has the potential to increase the impact of vessel wakes, which could cause an increase in shoreline erosion and affect vegetation in low-lying areas along the shoreline of the river through the same mechanisms and to the same extent as could occur under the On-Site Alternative, in that the impact on shoreline vegetation associated with vessel wakes cannot be quantified or measurably attributed to potential project related vessels.

The actual extent, location, and magnitude of potential shoreline erosion impacts is influenced by the complex interaction of multiple factors that affect when, where, and with what intensity vessel wakes would interact with the shorelines of the river, 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 can also be influenced by the slope and physical character of the shoreline (i.e., soils susceptibility to erosion), as well as the amount and type of vegetation that occurs along the shoreline.

There could be a potential for such impacts on the thin strip of shoreline vegetation along the north\eastern end of Walker Island from large wakes, and/or wakes oriented perpendicular to the main navigation channel and docks, such as those that can occur when tugs are oriented perpendicular to the shoreline as they push vessels into position at docks.

Affect Special-Status Plants

Any special-status plants that occur in areas along the along the rail tracks entering the project area, along the shoreline of the Columbia River, or in any area receiving coal dust deposition could be indirectly affected by operation of the export terminal in the same manner as described above. The potential for and spatial extent of any such impact cannot be quantified until a special-status plant survey(s) is conducted and occurrence of special-status species is determined.

3.3 No-Action Alternative

Under the No-Action Alternative, impacts on vegetation related to construction and operation of the export terminal would not occur. The Applicant would continue to operate the existing bulk product terminal and could develop the project area for another use.

If the On-Site Alternative project area is developed for another use, these activities would not trigger a Clean Water Act permit, a new waste discharge permit, or shoreline permit; thus, no impacts on wetland vegetation or riparian vegetation within the shoreline zone would occur. Continued industrial use of the project area would likely result in the redevelopment of the largely developed upland areas of the project area. New construction, demolition, and activities related to this development could result in impacts on the areas of disturbed vegetation (i.e., scattered grasses and weeds) that are present throughout the developed portions of the site.

Although construction of the export terminal would not occur, it is assumed that growth in the region would continue, which would allow continued operations in the project area within the 20-year analysis period (2018 to 2038). Cleanup activities, relative to past industrial uses, would continue to occur. This could result in impacts on developed areas and associated disturbed vegetation in a similar manner as described for the On-Site Alternative and Off-Site Alternative

Chapter 4
Required Permits

Either the On-Site Alternative or the Off-Site Alternative would require the following permits related to vegetation.

- **Clean Water Act Section 404 Permit and Rivers and Harbors Act Section 10 Permit.** The Corps must issue a Section 404 Permit for all work in waters of the United States and a Section 10 permit for all work within navigation waters. The On-Site Alternative or Off-Site Alternative would affect wetlands (waters of the United States) and would require work within the Columbia River (navigable waters). Therefore, either alternative would require both a Clean Water Act Section 404 permit and a Rivers and Harbors Act Section 10 Permit.
- **Local Critical Areas and Construction Permits.** The On-Site Alternative or Off-Site Alternative would require local permits related to clearing and grading of the project area and relative to impacts on regulated critical areas. Cowlitz County would require an application for planning clearance, a fill and grade permit, and a shoreline permit. The County would review either the On-Site Alternative or the Off-Site Alternative for consistency with the County's critical areas ordinance.

The Applicant will implement proposed BMPs that minimize the potential for erosion, including a stormwater pollution prevention plan. The Applicant will complete these activities far in advance of construction.

Chapter 5
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Appendix A

Descriptions of Special-Status Plant Species with Potential to Occur in the Project Areas

- **Western wahoo (*Euonymus occidentalis var. occidentalis*)**. Western wahoo is a deciduous, opposite-leaved shrub that grows up to 6 to 15 feet in height. It has a straggling or sometimes climbing growth form, with hairless branches that have narrow, parallel, longitudinal ridges. Flowers are greenish- and purplish-mottled to purplish red. Flowering typically occurs between May and June. Fruits are a 3-lobed capsule with a reddish-orange seed coat. Western wahoo does not have a federal status but is considered to be a *sensitive* species by Washington State.

Photo source: http://www.northbanknow.com/2014/07/save-western-wahoo/ [*permission pending*]

Western wahoo typically grows in moist woods and forested areas on the west side of the Cascades, often in shaded draws, riparian areas and ravines and sometimes in grassy areas with scattered trees. In Washington, it typically grows in fine sandy loams, silty loams, and silty clay loams. Associated plant species include Oregon white oak (*Quercus garryana*), Douglas-fir (*Pseudotsuga menziesii*), western redcedar (*Thuja plicata*), big-leaf maple (*Acer macrophyllum*), red alder, vine maple (*Acer circinatum*), service berry (*Amelanchier alnifolia*), salmonberry, and sword fern (*Polystichum munitum*). Occurrence records indicate that this species has been previously recorded near the Columbia River in the general vicinity of Longview.

- **Western false dragonhead (*Physostegia parviflora*)**. Western false dragonhead is a perennial herb that grows approximately 8 to 12 inches tall. It blooms between July and September, with lavender-purple flowers occurring in a close-flowered, elongate, terminal raceme. Leaves are stem-borne, opposite and linear-oblong, with serrate or nearly entire leaf margins. (Herbarium, Burke Museum of Natural History and Culture 2014). Western false dragonhead has no federal status but is considered a *Review Group 1* species by Washington State. Such species are considered to be of potential concern, but in need of more field work to more definitively assign it a status under the Washington Natural Heritage Program.

Photo source: Clarence A. Rechenthin, hosted by the USDA-NRCS PLANTS Database: http://plants.usda.gov/java/largeImage?imageID=phpa10_001_ahp.tif

Western false dragonhead is known to occur along the shores of streams and lakes, marshes, and other low, wet places in the valleys and foothills (Herbarium, Burke Museum of Natural History and Culture 2014). It was last documented in Cowlitz County prior to 1977.

- **Loose-flowered bluegrass (*Poa laxiflora*).** Loose-flowered bluegrass is a perennial grass with creeping rhizomes that typically grows in single stalks between 3 and 4 feet in height. Stems and sheaths are rough to the touch when pulling upward. Leaf blades are flat, loosely arranged, and strongly roughened on both sides, with abruptly prow-like tips. Flowers are borne in an open loose panicle, with widely spreading branches. Loose-flowered bluegrass flowers from late May through June. This species has no federal status under but is considered to be a *sensitive* species by Washington State.

Photo source: Mary Clay Stensvold, hosted by the USDA-NRCS PLANTS Database: http://plants.usda.gov/java/usageGuidelines?imageID=pola3_002_ahp.tif

  In the Pacific Northwest, loose-flowered bluegrass is commonly found on moss covered rocks and logs, along streams and rivers, and on edges of wet meadows in moist shady woods. Associated species include red alder, red elderberry, buttercup (*Ranunculus uncinatus*), sword fern, monkeyflower (*Mimulus dentatus*), little-leaf miner's lettuce (*Montia parvifolia*), reed canarygrass, and other grasses. Documented occurrence in Cowlitz County is in the northwestern portion of the county in the general vicinity of Longview.

- **Soft-leaved willow (*Salix sessilifolia*)**. Soft-leaved willow grows as a shrub or small tree that varies in height between 6 and 24 feet tall. Its leaves, young twigs, and capsules are copiously covered with long, soft, loose, unmated hairs, which become less apparent as the plant ages. Leaf blades are lance-shaped to oblong, with widely spaced teeth along the margins. Flowering typically occurs between May and June. Soft-leaved willow has no federal status but is considered to be a *sensitive* species by Washington State.


Photo source: Stephen Laymon, Bureau of Land Management - http://www.blm.gov/ca/st/en/fo/bakersfield/Programs/atwell_island/atwellplantlist/salix_sessilifolia.html

  Soft-leaved willow typically occurs in wet lowland habitats, including silty or sandy riverbanks, riparian forests, dredge spoils, sandy beaches, and at the upper edge of an intertidal zone. Documented occurrence in Cowlitz County is limited to the northern portion of the county; however, this species has been found along the Columbia River in multiple locations in adjacent Wahkiakum County.

- **Nelson's checker-mallow (*Sidalcea nelsoniana*)**. Nelson's checker-mallow is a perennial herb that grows from 16 to 40 inches in height. Flowers are pinkish-lavender in color and are borne on a spike-like raceme. Flowering occurs in mid-May to September. Nelson's checker-mallow is listed as *threatened* by the federal government and *endangered* by Washington State.

  

  Photo source: United States Fish and Wildlife Service: http://www.fws.gov/oregonfwo/Species/Data/NelsonsCheckerMallow/

  Nelson's checker-mallow is known to occur in two populations in Washington—one in Cowlitz County and one in Lewis County. It is a regionally endemic species and is rare throughout its range from Benton County, Oregon north to Lewis County, Washington, and from central Linn County, Oregon to just west of the crest of the Coast Range. The known habitat of Nelson's checker-mallow includes low-elevation meadows, prairie or grassland habitats, along fencerows, streams, and roadsides, drainage swales, and edges of plowed fields adjacent to woodland areas (Table 2). Standing water is present in some sites. It is associated with wetland species such as western buttercup (*Ranunculus occidentalis*), sedges (*Carex* spp.), and common rush (*Juncus effusus*), as well as drier species such as tall fescue (*Schedonorus pratensis*), velvetgrass (*Holcus lanatus*), and oxeye daisy (*Leucanthemum vulgare*).

- **Columbia water-meal (*Wolffia Columbiana*)**. Columbia water-meal is a tiny, perennial aquatic plant that floats just below the water surface in colonies in freshwater lakes, ponds, and slow-moving streams. It consists of a transparent green spherical plant body that lacks roots, definite leaves, or stems. Bloom time in Washington is unknown. Columbia water-meal has no federal status but is considered a *Review Group 1* species by Washington State.

  

  Photo source: http://fieldguide.mt.gov/detail_PMLEM03030.aspx [*permission pending*]

  Columbia water-meal is found in association with common duckweed (*Lemna minor*) in freshwater lakes, ponds and slow streams. It has been found in Clark, Cowlitz, and Wahkiakum Counties in Washington, but is known from fewer than five occurrences across the state.

Appendix B

State Noxious Weed List

- **Indigobush (*Amorpha fruticosa*).** Indigobush, also known as false indigobush and desert false indigo, is an introduced, leguminous shrub native to the southern United States and Atlantic coast. The shrub is typically three to ten feet in height, with showy purplish-blue, scented flowers that appear in upright spikes; it grows along streams and canyons, as well as in disturbed areas with infertile, dry and sandy soils (U.S. Department of Agriculture Plant Guide 2015). In Washington, indigobush has been documented along the Columbia River in Wahkiakum, Cowlitz, Clark, Skamania, and Klickitat counties, as well as in the extreme southeastern corner of the state in Adams, Franklin, Whitman, Columbia, and Asotin counties (Herbarium, Burke Museum of Natural History and Culture 2015a).

Photo Source: Jennifer Anderson 2002, hosted by the USDA-NRCS PLANTS Database. Available: http://plants.usda.gov/java/largeImage?imageID=amfr_003_avp.tif

- **Scotch broom (*Cytisus scouparius*).** Scotch broom is an introduced, now widely distributed, tall shrub with showy yellow flowers that is native to Europe. It occurs throughout western Washington, especially in disturbed lowlands, along roadsides, in pastures, grasslands, and open areas of recent soil disturbance (Herbarium, Burke Museum of Natural History and Culture 2015b). It is able to fix nitrogen and is thus able to colonize poor soils.

Photo source: Danny S 2012 Available: http://en.wikipedia.org/wiki/Cytisus_scoparius

- **Policeman's helmet (*Impatiens glandulifera*)**. Policeman's helmet is an introduced annual herbaceous species, with large white to pink/red 'touch-me-not' flowers that was introduced into western Washington and British Columbia from Asia; it has been recorded in Whatcom, Skagit, Snohomish, King, Clallam and Pacific counties (Herbarium, Burke Museum of Natural History and Culture 2015c), as well as in Cowlitz county (Cowlitz County Noxious Weed Control Board 2015). It commonly invades the herbaceous layer in seasonally saturated wetlands.

Photo source: http://en.wikipedia.org/wiki/Policeman%27s_helmet

- **Eurasian watermilfoil (*Myriophyllum spicatum*)**. Eurasian watermilfoil is a perennial, submersed, aquatic plant with dissected leaves that forms dense mats in streams, lakes, ponds, quiet streams, and ditches. It is an ornamental aquatic plant native to Europe, Asia, and Northern Africa that escaped cultivation and is now widely distributed throughout Washington with records of occurrence in multiple counties including Cowlitz, Wahkiakum, and Skamania (Herbarium, Burke Museum of Natural History and Culture 2015d).

Photo source: Alison Fox, University of Florida, Bugwood.org. Available: http://www.invasive.org/weedcd/images/1536x1024/1624031.jpg [*permission pending*]

- P**arrotfeather (*Myriophyllum aquaticum*)**. Parrotfeather is a submerged aquatic plant with both emergent and submersed feather-like leaves. It is usually found on mud banks along the edges of freshwater ponds, streams, lakes, and canals. It is an escaped ornamental plant native to South America that is now found in several Washington counties on both sides of the Cascade Crest (Herbarium, Burke Museum of Natural History and Culture 2015e). In 2011, Cowlitz County was known to have one of the higher distributions of this species in the state (Washington State Department of Agriculture 2011a).

Photo source: André Karwath. 2005. Available: http://en.wikipedia.org/wiki/Myriophyllum_aquaticum

Eight species present in the study areas are listed as Class C noxious weeds, a classification assigned to weeds that are not typically considered a priority for weed control because they are already widespread throughout the state. Brief descriptions for each of these species are provided below.

- **Canada thistle (*Cirsium arvense*).** Canada thistle is an aggressive colony-forming perennial weed with a deep root system characterized by extensive horizontal spreading roots. It grows 2 to 5 feet tall and frequently occurs in cultivated fields, riparian areas, pastures, rangeland, forests, lawns, gardens, roadsides, and waste areas. Canada thistle is an introduced species native to Europe and Asia that is now widespread in Washington, inhabiting nearly every county in the state (Washington State Department of Agriculture 2011b).

Photo source: Al Schneider, hosted by the USDA-NRCS PLANTS Database. Available: http://plants.usda.gov/core/profile?symbol=ciar4 [permission pending]

- **Bull thistle (*Cirsium vulgare*)**. Bull thistle is a many-branched biennial herbaceous plant growing from 3 to 7 feet tall, with coarsely lobed leaves tipped with spines. It commonly occurs in disturbed areas including pastures, roadsides, hayfields, and ditch banks. Bull thistle is native to Europe, Asia, and Northern Africa but is now widespread in Washington, commonly occurring in most counties. As of 2011, distribution is Cowlitz was known to be less than other counties in the state (Washington State Department of Agriculture 2011c).

Photo source: ICF International. 2012.

- **English ivy (*Hedera helix*)**. English ivy is a highly invasive woody, evergreen vine native to most of Europe that has leathery broadly ovate to triangular leaves that can occur both in vine (juvenile) and shrub (adult) form. It spreads rapidly by vegetative stem growth, aggressively climbing on other plants and trees and outcompeting native vegetation. Adult plants can also spread by seed. English ivy is an introduced ornamental plant that is widely established in most counties in western Washington including Cowlitz, Wahkiakum, Clark, Skamania, and Lewis counties (Herbarium, Burke Museum of Natural History and Culture 2015f).

Photo source: ICF International. 2015.

- **Yellowflag iris (*Iris pseudacorus*).** Yellowflag iris is a large, introduced perennial iris native to North Africa and Europe. It is highly tolerant of low oxygen conditions in the soils with high levels of soluble organics; it is also very efficient at absorbing heavy metals. It forms dense clumps in shallow water and along the edges of rivers, ponds, and lakes, as well as in the understory of wetlands (U.S. Department of Agriculture Plant Guide 2015b). Yellowflag iris is widely distributed throughout western and central Washington including Cowlitz, Wahkiakum, and Skamania counties, among others (Herbarium, Burke Museum of Natural History and Culture 2015g).

Photo source: Robert H. Mohlenbrock, hosted by the USDA-NRCS PLANTS Database / USDA NRCS. 1995. Northeast wetland flora: Field office guide to plant species. Northeast National Technical Center, Chester. Available: http://plants.usda.gov/java/largeImage?imageID=irps_002_ahp.tif

- **Reed canarygrass (*Phalaris arundinacea*)**. Reed canarygrass is a rhizomatous, perennial, cool season grass native to Eurasia that spreads both by seed and creeping rhizomes. It is known to form dense, monotypic stands in wetlands but can also be found in roadside ditches, along river and streams, and in upland meadows. It is widely distributed throughout Washington and present in nearly every county in the state (Washington State Department of Agriculture 2011d).

Photo source: ICF International. 2012.

- **Himalayan blackberry (*Rubus armeniacus*).** Himalayan blackberry is rambling evergreen, perennial, wood shrub with stout stems that are armed with stiff, hooked thorns. It commonly grows in dense, often nearly impenetrable thickets in a variety of disturbed habitats including roadsides, field margins, riparian areas, and around the edges of both upland and wetland forests. Native to Asia, it is now widespread in western Washington, including Cowlitz, Lewis, and Skamania counties, among others (Washington State Department of Agriculture 2011e).

Photo source: Robin R. Buckallew, hosted by the USDA-NRCS PLANTS Database. Available: http://plants.usda.gov/java/largeImage?imageID=ruar9_001_ahp.jpg [*permission pending*]

- **Common tansy (*Tanacetum vulgare*).** Common tansy is an introduced aromatic, upright perennial herb with fern-like foliage and yellow flowers. It is common in open herbaceous areas on disturbed sites and can be found along roadsides, in waste areas, along stream banks, and in pastures. It was introduced from Europe and Asia and is now common throughout Washington including Cowlitz, Wahkiakum, Skamania, Clark, and Lewis counties, among others (Washington State Department of Agriculture 2011f).

Photo source: William S. Justice, hosted by the USDA-NRCS PLANTS Database. Available: http://plants.usda.gov/java/largeImage?imageID=tavu_1v.jpg [*permission pending*]

- **Nonnative cattail (*Typha angustifolia*) and Hybrids**. Cattails are a perennial emergent species that grow in fresh to slightly brackish wetlands. They are characterized by erect, linear, sheathed leaves that are thickened and spongy, with flowers borne in dense cylindrical spikes. They most commonly spread by rhizomes and frequently form dense monocultures in saturated soils and wetlands. "Nonnative cattail species and hybrids" are considered Class C noxious weeds in Cowlitz County (Cowlitz County Noxious Weed Control Board 2015) and include narrow-leaf cattail and similar species introduced from Europe and/or eastern North America. Nonnative cattails species are frequently found in marshes, wet meadows, lakeshores, pond margins, estuaries, ditches, bogs, and fens.

Photo source: Nelson DeBarros, hosted by the USDA-NRCS PLANTS Database Available: http://plants.usda.gov/java/largeImage?imageID=tyan_006_avp.tif [*permission pending*]

Appendix C

Cowlitz County Noxious Weed List

Class A Weeds : Non-native species whose distribution in Washington is still limited. Preventing new infestations and eradicating existing infestations are the highest priority. Eradication of all Class A plants is required by law.

Class B Weeds: Non-native 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. Please contact your County Noxious Weed Control Coordinator to learn which species are designated in your area.

Class C Weeds: These are noxious weeds typically widespread in WA State 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.

*Class A Weeds
Eradication is required

common crupina	*Crupina vulgaris*
cordgrass, common	*Spartina anglica*
cordgrass, dense-flowered	*Spartina densiflora*
cordgrass, saltmeadow	*Spartina patens*
cordgrass, smooth	*Spartina alterniflora*
dyer's woad	*Isatis tinctoria*
eggleaf spurge	*Euphorbia oblongata*
false brome	*Brachypodium sylvaticum*
floating primrose-willow	*Ludwigia peploides*
flowering rush	*Butomus umbellatus*
French broom	*Genista monspessulana*
garlic mustard	*Alliaria petiolata*
giant hogweed	*Heracleum mantegazzianum*
goatsrue	*Galega officinalis*
hydrilla	*Hydrilla verticillata*
Johnsongrass	*Sorghum halepense*
knapweed, bighead	*Centaurea macrocephala*
knapweed, Vochin	*Centaurea nigrescens*
kudzu	*Pueraria montana* var. *lobata*
meadow clary	*Salvia pratensis*
oriental clematis	*Clematis orientalis*
ravenna grass	*Saccharum ravennae*
purple starthistle	*Centaurea calcitrapa*
reed sweetgrass	*Glyceria maxima*
ricefield bulrush	*Schoenoplectus mucronatus*
sage, clary	*Salvia sclarea*
sage, Mediterranean	*Salvia aethiopis*
silverleaf nightshade	*Solanum elaeagnifolium*
Spanish broom	*Spartium junceum*
spurge flax	*Thymelaea passerina*
Syrian beancaper	*Zygophyllum fabago*
Texas blueweed	*Helianthus ciliaris*
thistle, Italian	*Carduus pycnocephalus*
thistle, milk	*Silybum marianum*
thistle, slenderflower	*Carduus tenuiflorus*
variable-leaf milfoil	*Myriophyllum heterophyllum*
wild four-o'clock	*Mirabilis nyctaginea*

Class B Weeds

*blueweed	*Echium vulgare*
*Brazilian elodea	*Egeria densa*
*bugloss, annual	*Anchusa arvensis*
*bugloss, common	*Anchusa officinalis*
*butterfly bush	*Buddleja davidii*
*camelthorn	*Alhagi maurorum*
*common fennel, (except bulbing fennel)	*Foeniculum vulgare* (except *F. vulgare var. azoricum*)
*common reed (nonnative genotypes only)	*Phragmites australis*
Dalmatian toadflax	*Linaria dalmatica* ssp *. dalmatica*
*Eurasian watermilfoil	*Myriophyllum spicatum*
*fanwort	*Cabomba caroliniana*
*gorse	*Ulex europaeus*
*grass-leaved arrowhead	*Sagittaria graminea*
*hairy willowherb	*Epilobium hirsutum*
*hawkweed, oxtongue	*Picris hieracioides*
*hawkweed, orange	*Hieracium aurantiacum*
*hawkweeds : All nonnative species and hybrids of the meadow subgenus	*Hieracium,* subgenus *Pilosella*
*hawkweeds : All nonnative species and hybrids of the wal subgenus	*Hieracium,* subgenus *Hieracium*
herb-Robert	*Geranium robertianum*
*hoary alyssum	*Berteroa incana*
*houndstongue	*Cynoglossum officinale*
*indigobush	*Amorpha fruticosa*
*knapweed, black	*Centaurea nigra*
*knapweed, brown	*Centaurea jacea*
knapweed, diffuse	*Centaurea diffusa*
knapweed, meadow	*Centaurea x moncktonii*
*knapweed, Russian	*Acroptilon repens*
knapweed, spotted	*Centaurea stoebe*
knotweed, Bohemian	*Polygonum x bohemicum*
knotweed, giant	*Polygonum sachalinense*
*knotweed, Himalayan	*Polygonum polystachyum*
knotweed, Japanese	*Polygonum cuspidatum*
*kochia	*Kochia scoparia*
*lesser celandine	*Ficaria verna*
*loosestrife, garden	*Lysimachia vulgaris*
loosestrife, purple	*Lythrum salicaria*
*loosestrife, wand	*Lythrum virgatum*
parrotfeather	*Myriophyllum aquaticum*
perennial pepperweed	*Lepidium latifolium*
poison hemlock	*Conium maculatum*
*policeman 's helmet	*Impatiens glandulifera*
*puncturevine	*Tribulus terrestris*
*rush skeletonweed	*Chondrilla juncea*
*saltcedar	*Tamarix ramosissima*
Scotch broom	*Cytisus scoparius*
shiny geranium	*Geranium lucidum*
*spurge laurel	*Daphne laureola*
*spurge, leafy	*Euphorbia esula*
*spurge, myrtle	*Euphorbia myrsinites*
*sulfur cinquefoil	*Potentilla recta*
tansy ragwort	*Senecio jacobaea*
*thistle, musk	*Carduus nutans*
*thistle, plumeless	*Carduus acanthoides*
*thistle, Scotch	*Onopordum acanthium*
*velvetleaf	*Abutilon theophrasti*
water primrose	*Ludwigia hexapetala*
*white bryony	*Bryonia alba*
wild chervil	*Anthriscus sylvestris*
yellow archangel	*Lamiastrum galeobdolon*
*yellow floatingheart	*Nymphoides peltata*
*yellow nutsedge	*Cyperus esculentus*
*yellow starthistle	*Centaurea solstitialis*

Class C Weeds

buffalobur	*Solanum rostratum*
nonnative cattail species and hybrids	*Typha* spp.
common groundsel	*Senecio vulgaris*
common St. Johnswort	*Hypericum perforatum*
common tansy	*Tanacetum vulgare*
common teasel	*Dipsacus fullonum*
English ivy - four cultivars only	*Hedera helix* 'Baltica', 'Pittsburgh', and 'Star'; *H. hibernica*

	'Hibernica'
evergreen blackberry	*Rubus laciniatus*
field bindweed	*Convolvulus arvensis*
Himalayan blackberry	*Rubus armeniacus*
Italian arum	*Arum italicum*
Jubata grass	*Cortaderia jubata*
old man's beard	*Clematis vitalba*
oxeye daisy	*Leucanthemum vulgare*
Pampas grass	*Cortaderia selloana*
Russian olive	*Elaeagnus angustifolia*
s centless mayweed	*Matricaria perforata*
spiny cocklebur	*Xanthium spinosum*
Swainsonpea	*Sphaerophysa salsula*
thistle, bull	*Cirsium vulgare*
thistle, Canada	*Cirsium arvense*
tree-of-heaven	*Ailanthus altissima*
white cockle	*Silene latifolia* ssp . *alba*
wild carrot (except where commercially grown)	*Daucus carota*
yellow flag iris	*Iris pseudacorus*
yellow toadflax	*Linaria vulgaris*

New additions to the 2015 List

Changes in class for 2015

*
State designated high priority for control and enforcement

Control required along transportation right-of -ways, near residential communities (fire danger), areas where plants create a significant impact to managed pastures or farmland.

Bold listings – documented plant species in Cowlitz Co.

Highlighted listings – County select class B and C high priority weeds for control and enforcement action.

Noxious Weeds are non-native plants introduced to Washington State that can be highly destructive, competitive, and difficult to control. These plants invade our croplands, rangeland, forests, parks, rivers, lakes, wetlands, and estuaries causing both ecological and economical damage that affects us all. Noxious weeds can:

- Lower crop yields
- Reduce forage quality
- Destroy plant and animal habitat
- Displace native plants
- Reduce recreational opportunities (*e.g.*, fishing, hunting, swimming and hiking)
- Clog waterways
- Decrease land values
- Increase erosion and wildfire risk
- And some are toxic to humans and livestock

Please help protect Washington's economy and environment from noxious weeds!

To help protect the State's resources and economy, the Washington State Noxious Weed Control Board adopts a State Noxious Weed List each year (WAC 16-750). This list classifies weeds into three major classes – A, B, and C – based on the stage of invasion of each species and the seriousness of the threat they pose to Washington State. This classification system is designed to:

- Prevent small infestations from expanding by eradicating them when they are first detected
- Restrict already established weed populations to regions of the state where they occur and prevent their movement to un-infested areas
- Allow flexibility of weed control at the local level for weeds that are already widespread.

To learn more about noxious weeds and noxious weed control in Washington State, please contact:

Cowlitz County
Noxious Weed Control Board
207 Fourth Ave. N.
Kelso, WA 98628-4124
Tel. (360)577-3117
Email: noxiousweeds@co.cowlitz.wa.us
Website: http://co.cowlitz.wa.us

Or

WA State Noxious Weed Control Board
P.O. Box 42560
Olympia, WA 98504-2560
(360) 725-5764

Email: noxiousweeds@agr.wa.gov

Website: http://nwcb.wa.gov

Or

WA State Department of Agriculture
Natural Resource Building
P.O. Box 42560
1111 Washington St. SE
Olympia, WA 98504-2560
Tel. (360)902-1800

Website: http://agr.wa.gov

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Cowlitz County Noxious Weed List

Brigitte E.M. Daniel SBA (Beaconsfield 1959); Her work is held in the RHS Lindley Library, The National Gallery and Museum of Wales.

List arranged alphabetically by:
COMMON NAME

Appendix D

Descriptions of Noxious Weeds with Potential to Occur in the Project Areas

- **Indigobush (*Amorpha fruticosa*).** Indigobush, also known as false indigobush and desert false indigo, is an introduced, leguminous shrub native to the southern United States and Atlantic coast. The shrub is typically three to ten feet in height, with showy purplish-blue, scented flowers that appear in upright spikes; it grows along streams and canyons, as well as in disturbed areas with infertile, dry and sandy soils (U.S. Department of Agriculture Plant Guide 2015). In Washington, indigobush has been documented along the Columbia River in Wahkiakum, Cowlitz, Clark, Skamania, and Klickitat counties, as well as in the extreme southeastern corner of the state in Adams, Franklin, Whitman, Columbia, and Asotin counties (Herbarium, Burke Museum of Natural History and Culture 2015a).

Photo Source: Jennifer Anderson 2002, hosted by the USDA-NRCS PLANTS Database. Available: http://plants.usda.gov/java/largeImage?imageID=amfr_003_avp.tif

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Photo source: Alison Fox, University of Florida, Bugwood.org. Available: http://www.invasive.org/weedcd/images/1536x1024/1624031.jpg [*permission pending*]

- P**arrotfeather (*Myriophyllum aquaticum*)**. Parrotfeather is a submerged aquatic plant with both emergent and submersed feather-like leaves. It is usually found on mud banks along the edges of freshwater ponds, streams, lakes, and canals. It is an escaped ornamental plant native to South America that is now found in several Washington counties on both sides of the Cascade Crest (Herbarium, Burke Museum of Natural History and Culture 2015e). In 2011, Cowlitz County was known to have one of the higher distributions of this species in the state (Washington State Department of Agriculture 2011a).

Photo source: André Karwath. 2005. Available: http://en.wikipedia.org/wiki/Myriophyllum_aquaticum

Eight species present in the study areas are listed as Class C noxious weeds, a classification assigned to weeds that are not typically considered a priority for weed control because they are already widespread throughout the state. Brief descriptions for each of these species are provided below.

- **Canada thistle (*Cirsium arvense*).** Canada thistle is an aggressive colony-forming perennial weed with a deep root system characterized by extensive horizontal spreading roots. It grows 2 to 5 feet tall and frequently occurs in cultivated fields, riparian areas, pastures, rangeland, forests, lawns, gardens, roadsides, and waste areas. Canada thistle is an introduced species native to Europe and Asia that is now widespread in Washington, inhabiting nearly every county in the state (Washington State Department of Agriculture 2011b).

Photo source: Al Schneider, hosted by the USDA-NRCS PLANTS Database. Available: http://plants.usda.gov/core/profile?symbol=ciar4 [permission pending]

- **Bull thistle (*Cirsium vulgare*)**. Bull thistle is a many-branched biennial herbaceous plant growing from 3 to 7 feet tall, with coarsely lobed leaves tipped with spines. It commonly occurs in disturbed areas including pastures, roadsides, hayfields, and ditch banks. Bull thistle is native to Europe, Asia, and Northern Africa but is now widespread in Washington, commonly occurring in most counties. As of 2011, distribution is Cowlitz was known to be less than other counties in the state (Washington State Department of Agriculture 2011c).

Photo source: ICF International. 2012.

- **English ivy (*Hedera helix*)**. English ivy is a highly invasive woody, evergreen vine native to most of Europe that has leathery broadly ovate to triangular leaves that can occur both in vine (juvenile) and shrub (adult) form. It spreads rapidly by vegetative stem growth, aggressively climbing on other plants and trees and outcompeting native vegetation. Adult plants can also spread by seed. English ivy is an introduced ornamental plant that is widely established in most counties in western Washington including Cowlitz, Wahkiakum, Clark, Skamania, and Lewis counties (Herbarium, Burke Museum of Natural History and Culture 2015f).

Photo source: ICF International. 2015.

- **Yellowflag iris (*Iris pseudacorus*).** Yellowflag iris is a large, introduced perennial iris native to North Africa and Europe. It is highly tolerant of low oxygen conditions in the soils with high levels of soluble organics; it is also very efficient at absorbing heavy metals. It forms dense clumps in shallow water and along the edges of rivers, ponds, and lakes, as well as in the understory of wetlands (U.S. Department of Agriculture Plant Guide 2015b). Yellowflag iris is widely distributed throughout western and central Washington including Cowlitz, Wahkiakum, and Skamania counties, among others (Herbarium, Burke Museum of Natural History and Culture 2015g).

Photo source: Robert H. Mohlenbrock, hosted by the USDA-NRCS PLANTS Database / USDA NRCS. 1995. Northeast wetland flora: Field office guide to plant species. Northeast National Technical Center, Chester. Available: http://plants.usda.gov/java/largeImage?imageID=irps_002_ahp.tif

- **Reed canarygrass (*Phalaris arundinacea*)**. Reed canarygrass is a rhizomatous, perennial, cool season grass native to Eurasia that spreads both by seed and creeping rhizomes. It is known to form dense, monotypic stands in wetlands but can also be found in roadside ditches, along river and streams, and in upland meadows. It is widely distributed throughout Washington and present in nearly every county in the state (Washington State Department of Agriculture 2011d).

Photo source: ICF International. 2012.

- **Himalayan blackberry (*Rubus armeniacus*).** Himalayan blackberry is rambling evergreen, perennial, wood shrub with stout stems that are armed with stiff, hooked thorns. It commonly grows in dense, often nearly impenetrable thickets in a variety of disturbed habitats including roadsides, field margins, riparian areas, and around the edges of both upland and wetland forests. Native to Asia, it is now widespread in western Washington, including Cowlitz, Lewis, and Skamania counties, among others (Washington State Department of Agriculture 2011e).

Photo source: Robin R. Buckallew, hosted by the USDA-NRCS PLANTS Database. Available: http://plants.usda.gov/java/largeImage?imageID=ruar9_001_ahp.jpg [*permission pending*]

- **Common tansy (*Tanacetum vulgare*).** Common tansy is an introduced aromatic, upright perennial herb with fern-like foliage and yellow flowers. It is common in open herbaceous areas on disturbed sites and can be found along roadsides, in waste areas, along stream banks, and in pastures. It was introduced from Europe and Asia and is now common throughout Washington including Cowlitz, Wahkiakum, Skamania, Clark, and Lewis counties, among others (Washington State Department of Agriculture 2011f).

Photo source: William S. Justice, hosted by the USDA-NRCS PLANTS Database. Available: http://plants.usda.gov/java/largeImage?imageID=tavu_1v.jpg [*permission pending*]

- **Nonnative cattail (*Typha angustifolia*) and Hybrids**. Cattails are a perennial emergent species that grow in fresh to slightly brackish wetlands. They are characterized by erect, linear, sheathed leaves that are thickened and spongy, with flowers borne in dense cylindrical spikes. They most commonly spread by rhizomes and frequently form dense monocultures in saturated soils and wetlands. "Nonnative cattail species and hybrids" are considered Class C noxious weeds in Cowlitz County (Cowlitz County Noxious Weed Control Board 2015) and include narrow-leaf cattail and similar species introduced from Europe and/or eastern North America. Nonnative cattails species are frequently found in marshes, wet meadows, lakeshores, pond margins, estuaries, ditches, bogs, and fens.

Photo source: Nelson DeBarros, hosted by the USDA-NRCS PLANTS Database Available: http://plants.usda.gov/java/largeImage?imageID=tyan_006_avp.tif [*permission pending*]

Appendix E

Site Photographs

Appendix E – Site Photographs

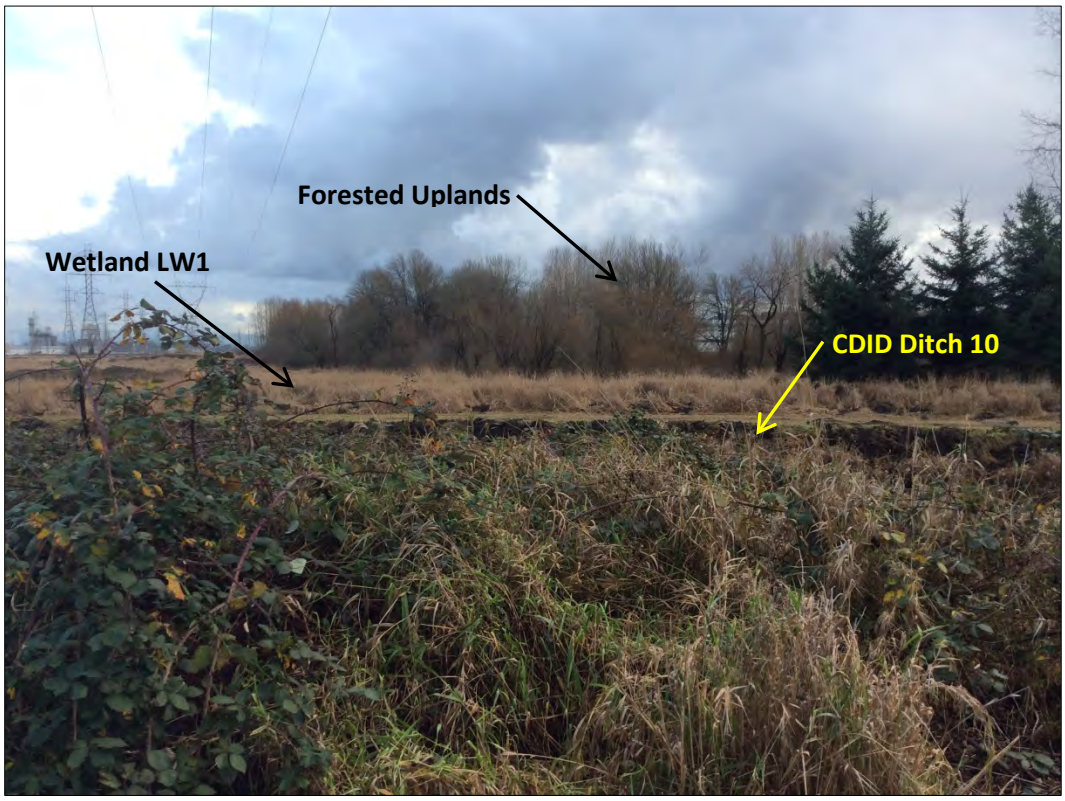

Photo 1. Photo shows typical vegetation present on Parcel 10213 of the MBTL Site including reed canarygrass and Himalayan blackberry growing in upland areas along CDID Ditch 10 and Memorial Park Drive, reed canarygrass in Wetland LW1, and forested uplands. (Photo Date: 12/12/2014)

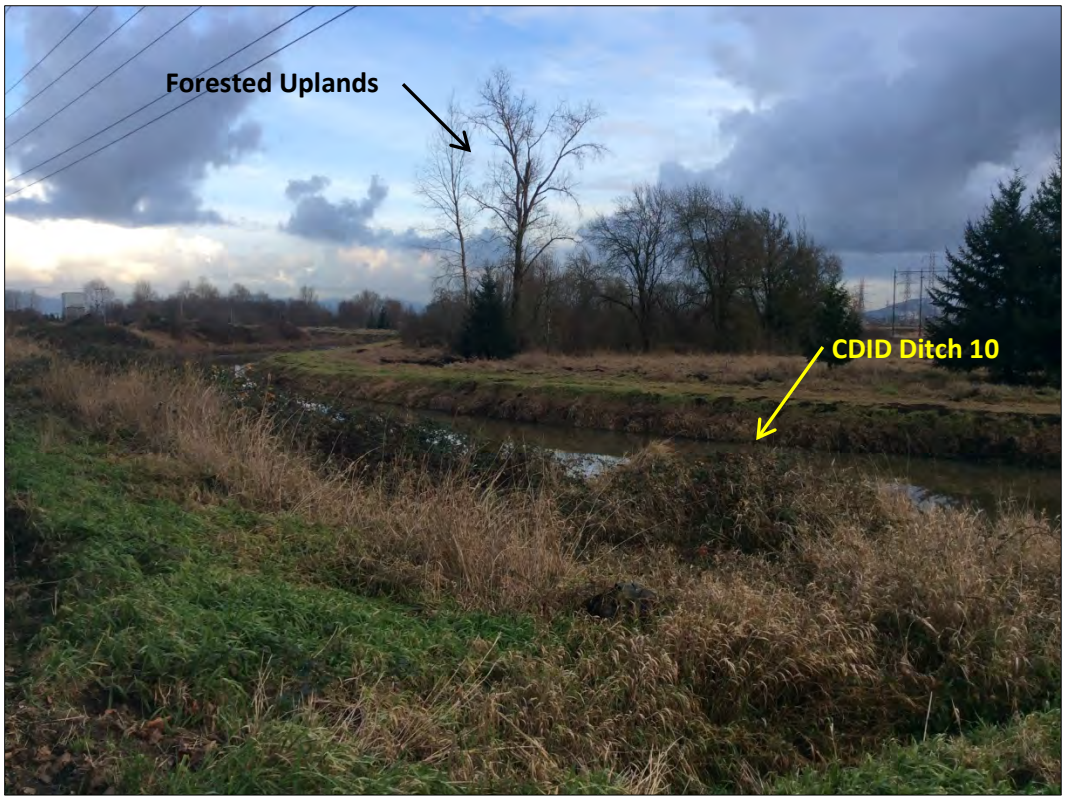

Photo 2. Photo shows typical vegetation on Parcel 10213 of the MBTL Site including reed canarygrass and Himalayan blackberry growing in upland areas around CDID Ditch 10 and forested upland areas. (Photo Date: 12/12/2014)

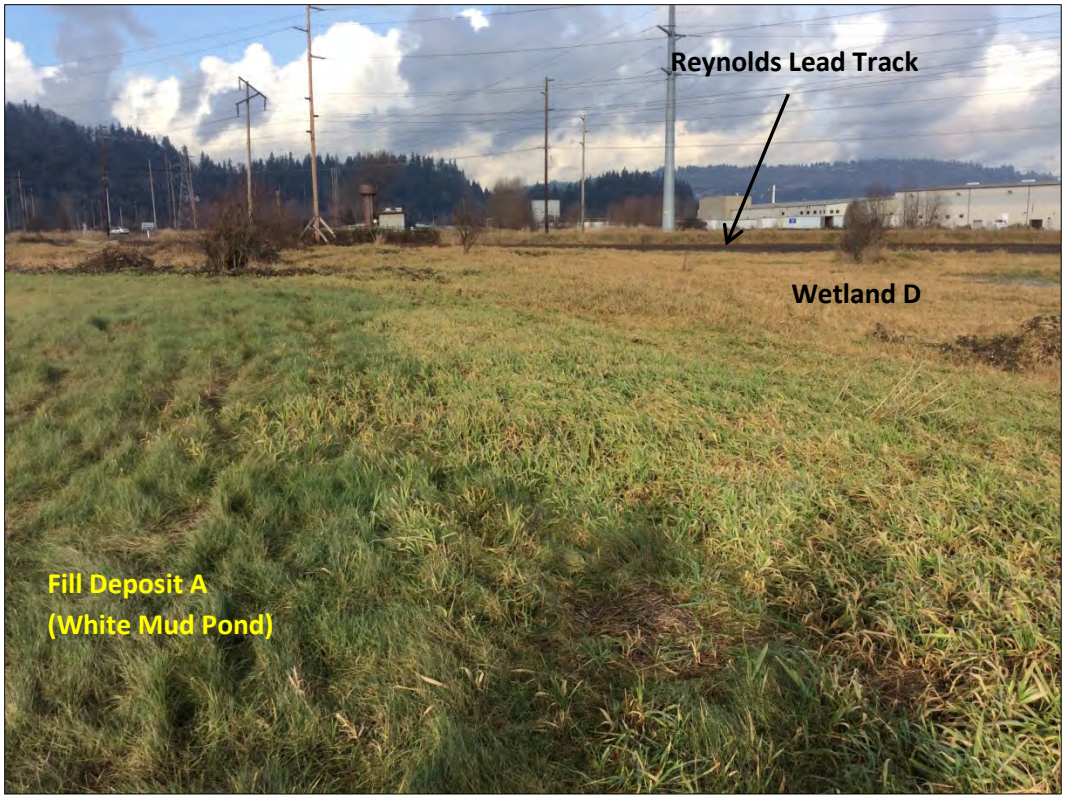

Photo 3. Photo shows herbaceous wetland vegetation cover type in Wetland D between Fill Deposit A (White Mud Pond) and Reynolds Lead Track on the MBTL site. (Photo Date: 12/12/2014)

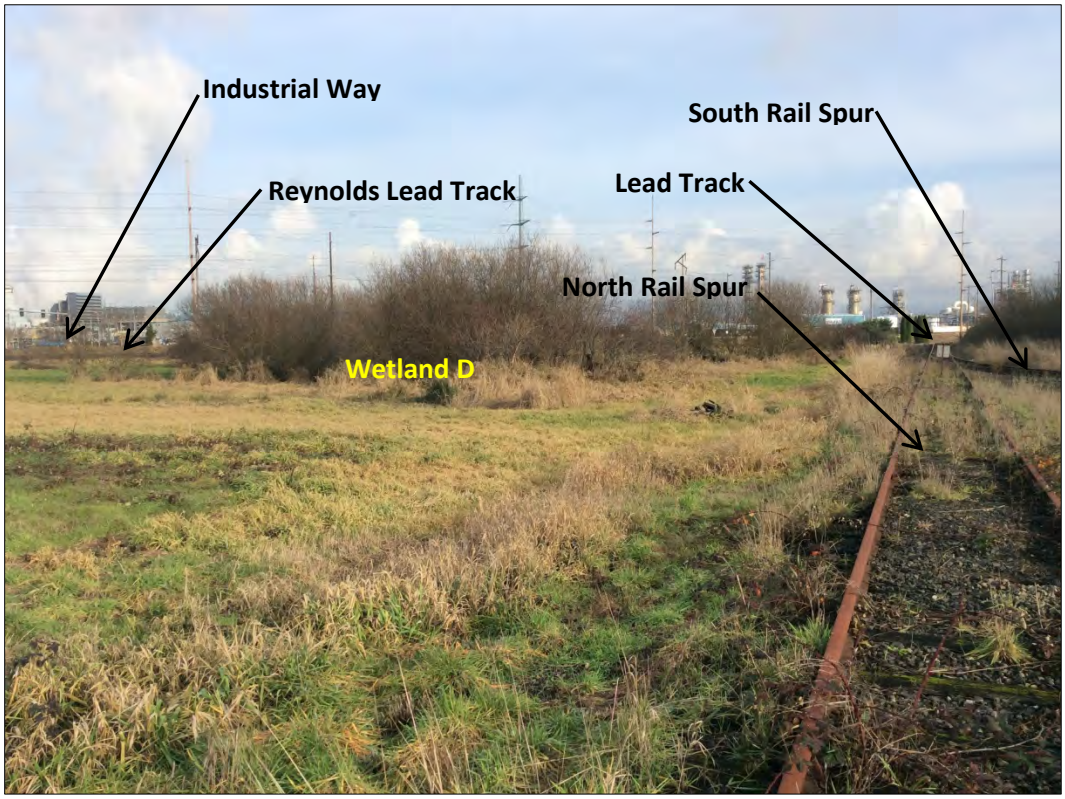

Photo 4. Photo shows scrub-shrub and herbaceous wetland vegetation cover types of Wetland D on the MBTL Site. (Photo Date: 12/12/2014)

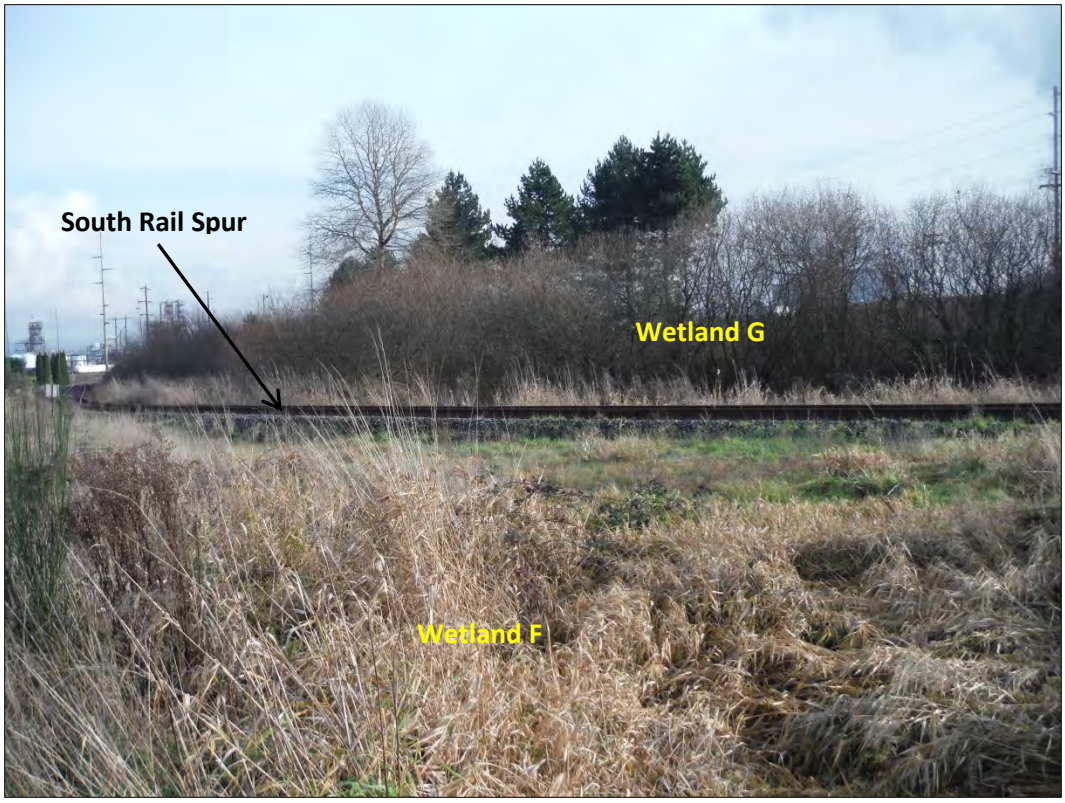

Photo 5. Photo shows herbaceous and scrub-shrub wetlands cover types in Wetlands F (foreground) and G (background) along the south rail spur on the MBTL Site. Wetland F is characterized as a disturbed wetland cover type. (Photo Date: 12/12/2014)

Photo 6. Photo shows typical herbaceous wetland vegetation cover type in Wetland F between the South Rail Spur and Fill Deposit B-1 (East Black Mud Pond) on the MBTL Site. Wetland F is characterized as a disturbed wetland cover type. (Photo Date: 12/12/2014)

Photo 7. Photo shows disturbed cover type around the railroad tracks that extend from the South Rail Spur through the transloading area. (Photo Date: 12/4/2013)

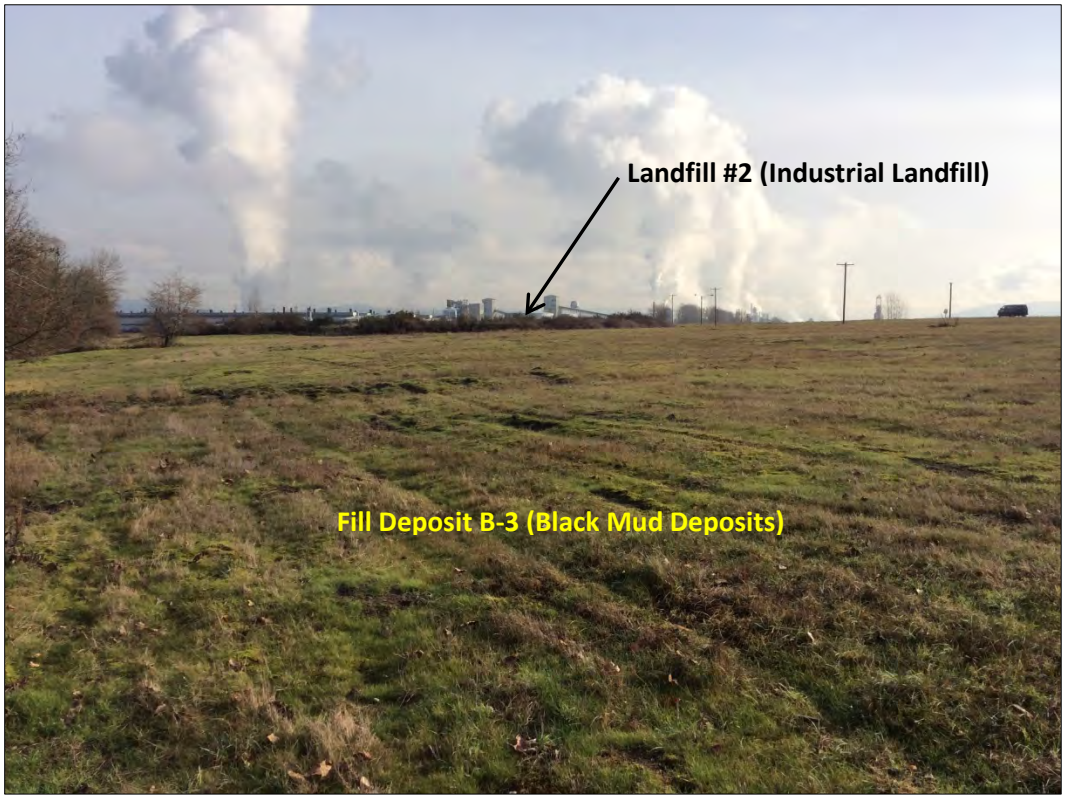

Photo 8. Photo shows typical vegetation present in Fill Deposit B-3 (Black Mud Deposits) area, which is located between the U-Ditch and CDID levee on the MBTL Site. Landfill #2 (Industrial Landfill) can be seen in the background. (Photo Date: 12/12/2014)

Photo 9. Photo shows typical disturbed vegetation cover type present on Landfill #2 (Industrial Landfill) and central portion of Fill Deposit B-3 (Black Mud Deposits) on the MBTL Site. (Photo Date: 12/12/2014)

Photo 10. Photo shows managed herbaceous vegetation growing on Closed BMP Facility on the MBTL Site. This area is regularly mown. (Photo Date: 12/12/2014)

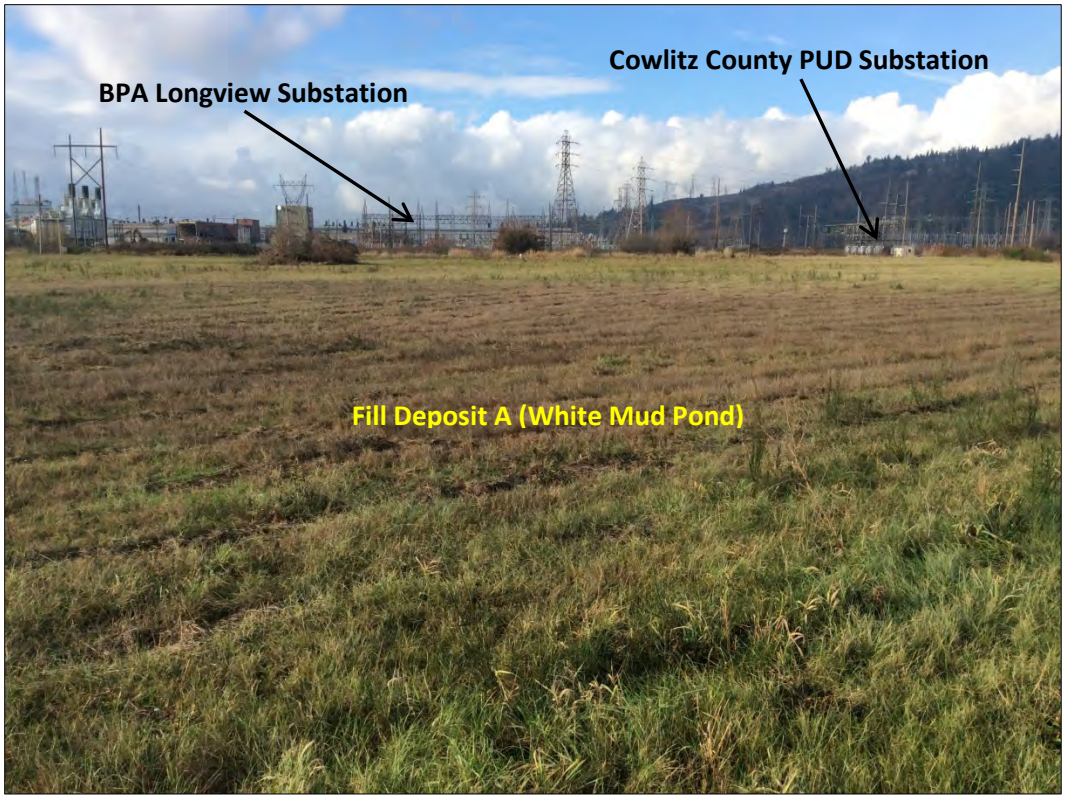

Photo 11. Photo shows typical managed vegetation cover type growing on Fill Deposit A (White Mud Pond) on the MBTL Site. (Photo Date: 12/12/2014)

Photo 12. Photo shows managed herbaceous vegetation cover type growing on Fill Deposit B-2 (Eastern Black Mud Pond) on the MBTL Site. (Photo Date: 4/8/2014)

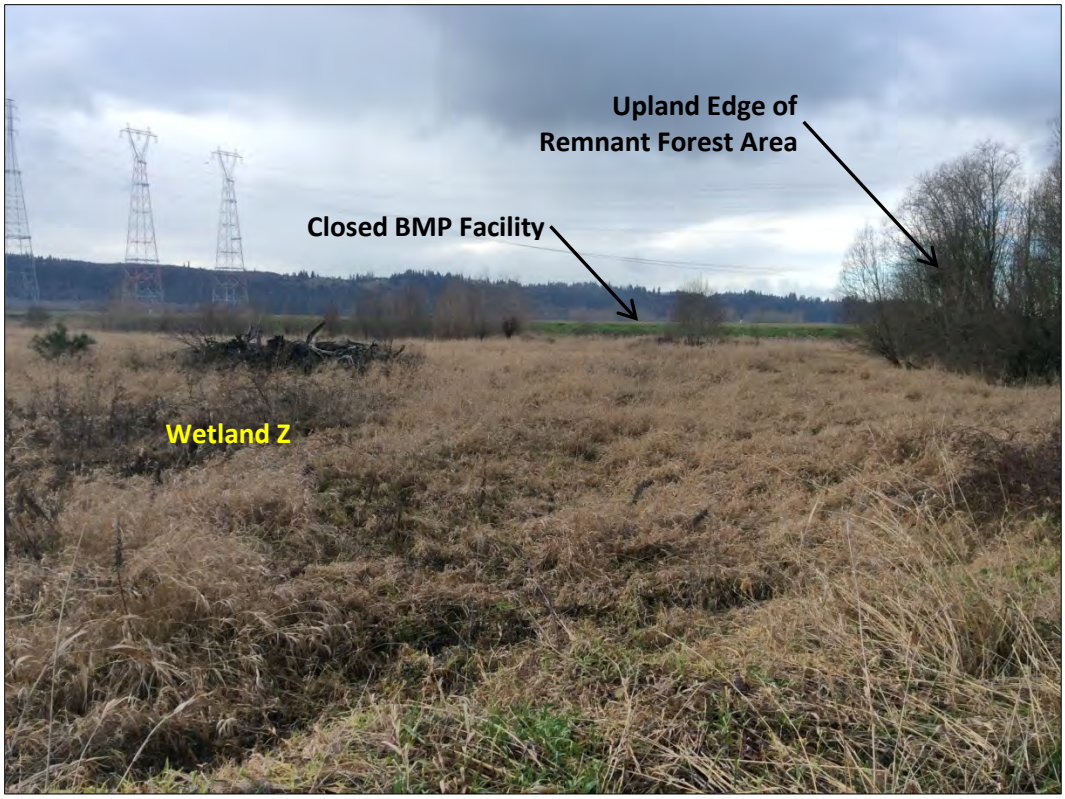

Photo 13. Photo shows typical conditions present in southern portion of the former Borrow Area located between Closed BMP Facility and Former Cable Plant on the MBTL Site. This area includes Wetland Z and a portion of Wetland C (not visible in photo), and is bordered by the upland edge of the Remnant Forest Area. (Photo Date: 12/12/2014)

Photo 14. Photo shows northern portion of Borrow Area, which contains the herbaceous portion of Wetland C, as well as adjacent uplands dominated by reed canarygrass and Himalayan blackberry in the foreground and between the wetland and the Closed BMP Facility. (Photo Date: 12/12/2014)

Photo 15. Photo shows typical conditions present in the Remnant Forest Area that lies between the Closed BMP Facility and Former Cable Plant on the Former Cable Plant on the MBTL Site. Most of this area consists of forested wetlands. (Photo Date: 12/12/2014)

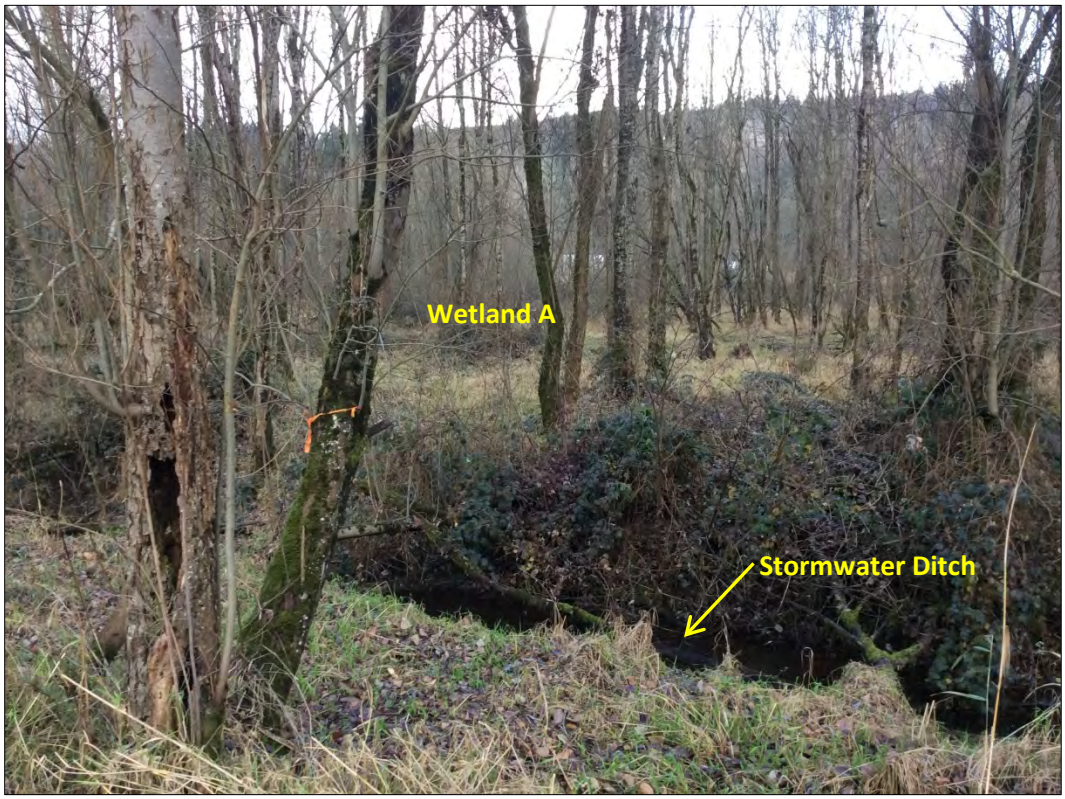

Photo 16. Photo shows Wetland A and a stormwater conveyance ditch in Remnant Forest Area on MBTL Site. (Photo Date: 12/12/2014)

Photo 17. Photo shows forested portion of Wetland C in the Remnant Forest Area on the MBTL Site. (Photo Date: 12/12/2014)

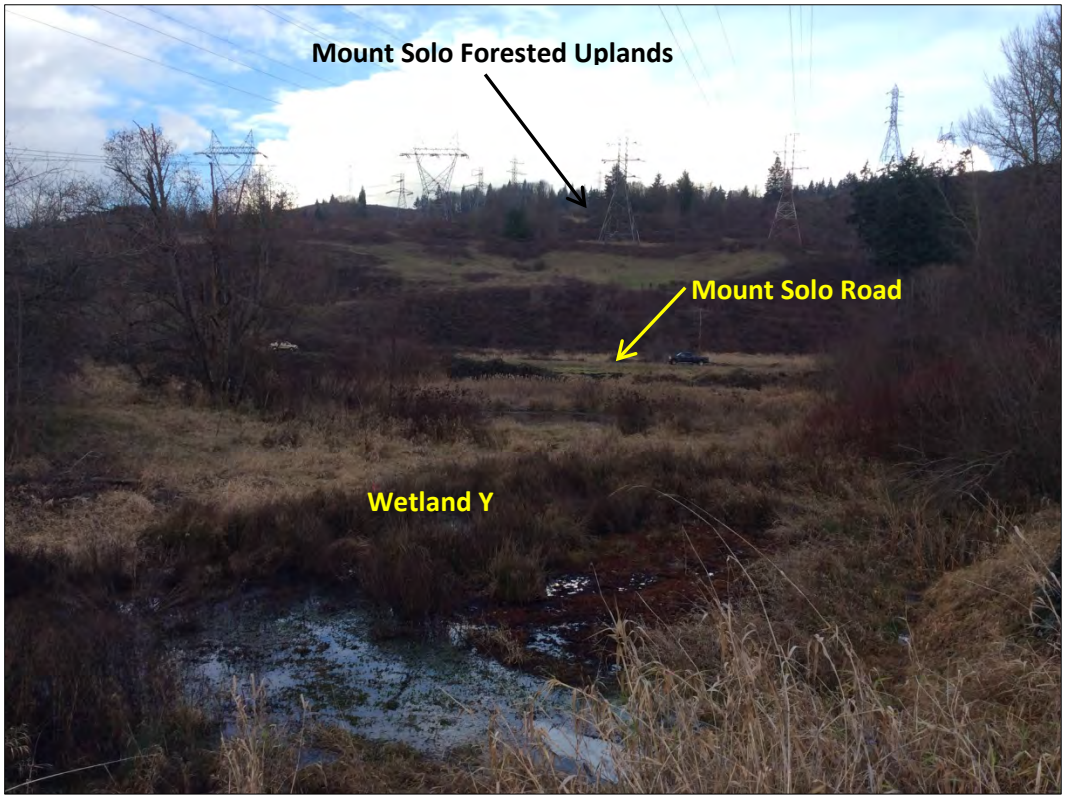

Photo 18. Photo shows the herbaceous and scrub-shrub areas of Wetland Y and surrounding upland vegetation on the MBTL Site. Some of the forested uplands on Mount Solo can be seen in the background on the other side of Mount Solo Road. (Photo Date: 12/12/2014)

Photo 19. Photo shows typical wetland and upland vegetation cover types present in and around Wetland Y on the MBTL Site. This wetland extends onto the Barlow Point Site. (Photo Date: 12/12/2014)

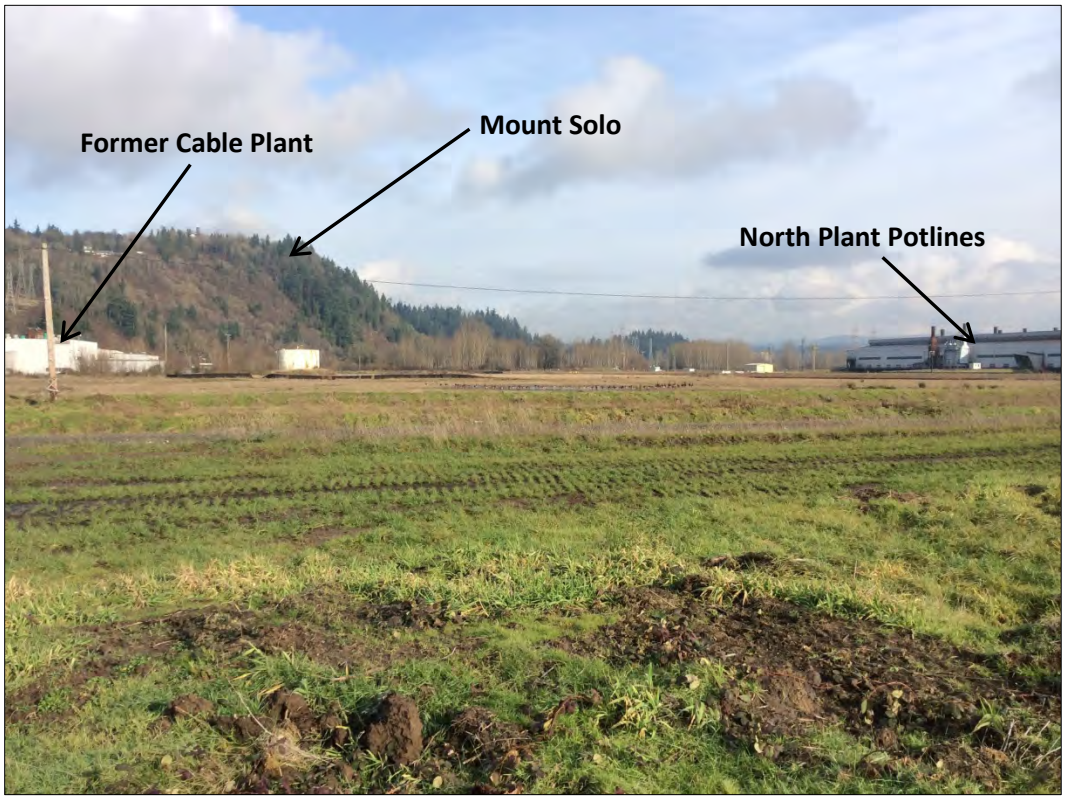

Photo 20. Photo shows typical disturbed vegetation cover type in southern portion of Outdoor Storage Area between the Cable Plant and North Plant Potlines on the MBTL Site. Upland forested areas on Mount Solo are visible in the background (Photo Date: 12/12/2014)

Photo 21. Photo shows typical disturbed vegetation cover type in central portion of Outdoor Storage Area between the Cable Plant and North Plant Potlines on the MBTL Site. (Photo Date: 4/8/2014)

Photo 22. Photo shows upland scrub-shrub cover type along the edge of the former Cable Plant parking lot on the MBTL Site. Parking lot and Cable Plant are classified as disturbed lands. Forested uplands on Mount Solo are visible in the background. (Photo Date: 12/12/2014)

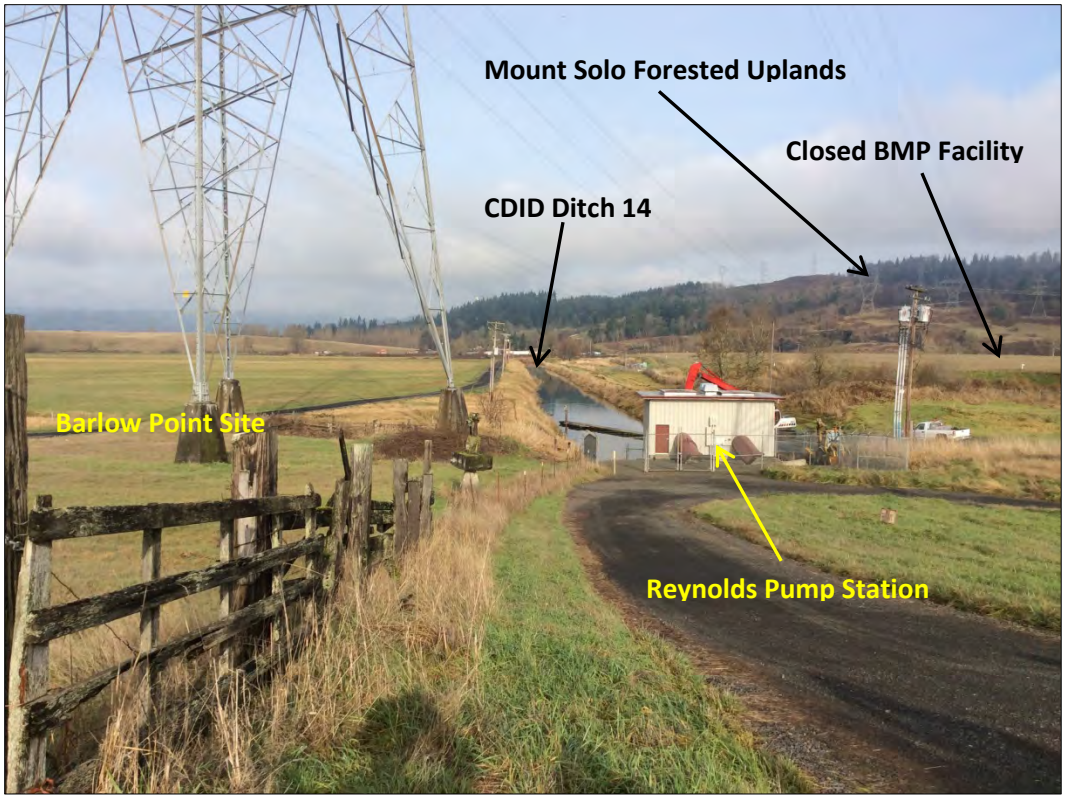

Photo 23. Photo shows CDID's Reynolds Pump Station and CDID Ditch 14 on the MBTL Site. Forested uplands of Mount Solo are visible in the background (Photo Date: 12/12/2014)

Photo 24. Photo shows typical forested upland vegetation along the south channel of the U-Ditch on the MBTL Site. (Photo Date: 12/12/2014)

Photo 25. Photo shows forested uplands adjacent to the north channel of the U-Ditch on the MBTL Site. The earthen embankment that separates the U-Ditch from the Interception Ditch is visible on the right. (Photo Date: 12/12/2014)

Photo 26. Photo shows forested uplands along the Interception Ditch, which lies to the south of the Closed BMP Facility on the MBTL Site. (Photo Date: 12/12/2014)

Photo 27. Photo shows typical vegetation present around the western end of the U-Ditch near the confluence of the north and south channels on the MBTL Site. (Photo Date: 12/12/2014)

Photo 28. Photo shows combined channel of the U-Ditch that flows to the stormwater treat facility on the MBTL Site. Adjacent areas are classified as the disturbed cover type (Photo Date: 12/12/2014)

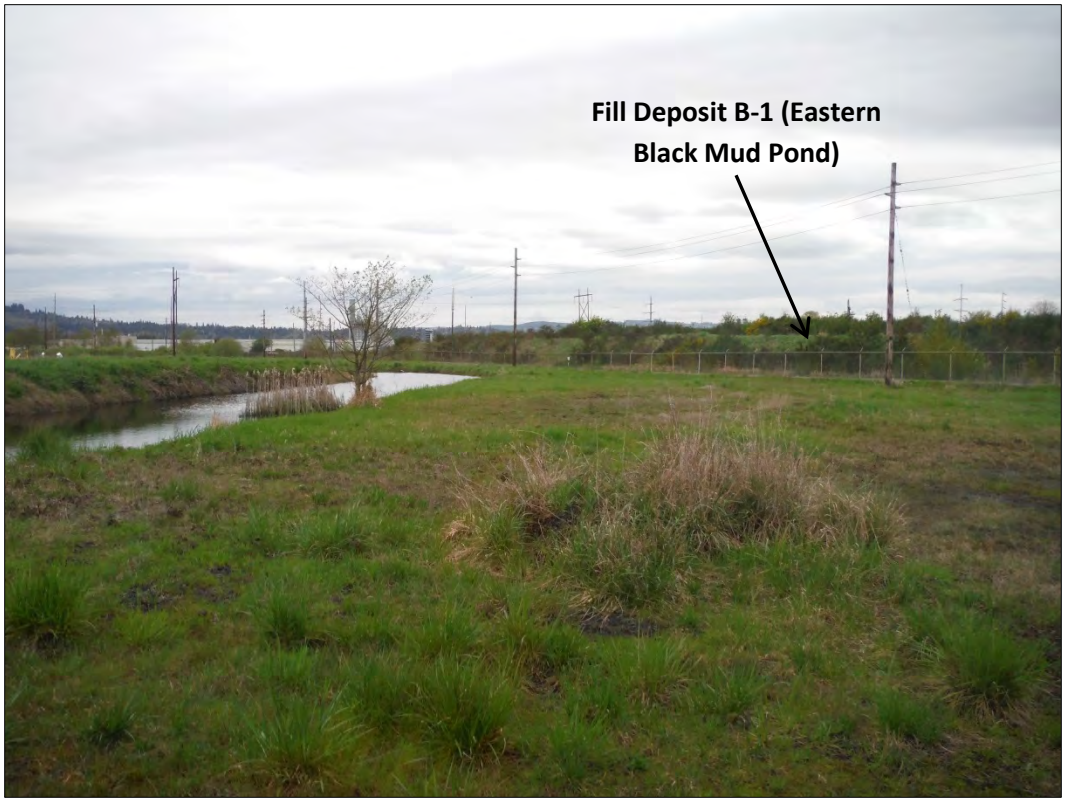

Photo 29. Photo shows typical disturbed vegetation cover type growing around one of the Cryolite Recovery Ditches on the MBTL site. Fill Deposit B-1 (Eastern Black Mud Pond) can be seen in background. (Photo Date: 4/8/2014)

Photo 30. Photo shows unnamed stormwater conveyance ditch to south of Cable Plant on MBTL Site. This ditch flows through Remnant Forest Area and into Wetland Y. (Photo Date: 12/12/2014)

Photo 31 Photo show vegetation in a roadside ditch between Fill Deposit A (White Mud Pond) and the eastern access road. This area is mapped as an herbaceous upland cover type. (Photo Date: 12/12/2014)

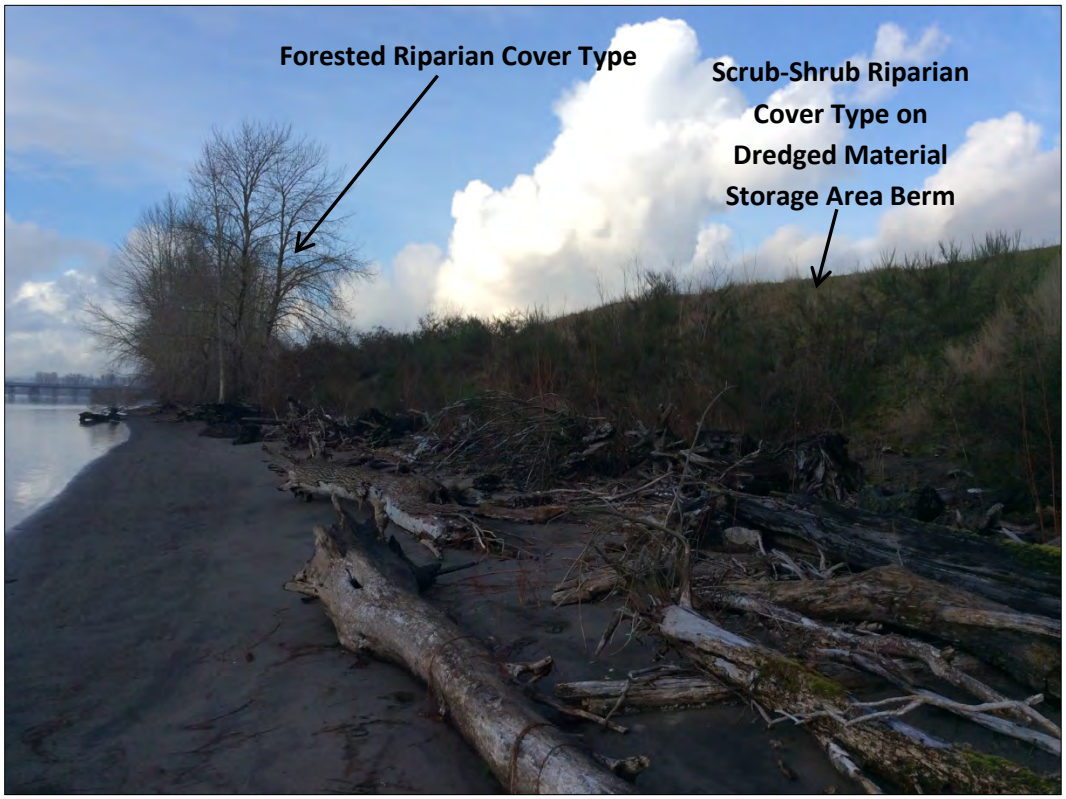

Photo 32. Photo shows typical conditions present along the southern shoreline of the MBTL Site including the scrub-shrub riparian cover type on the berm around the Dredged Material Disposal Area and a forested riparian area. (Photo Date: 12/12/2014)

Photo 33. Photo shows forested riparian cover type along southern portion of the MBTL Site shoreline. (Photo Date: 12/12/2014)

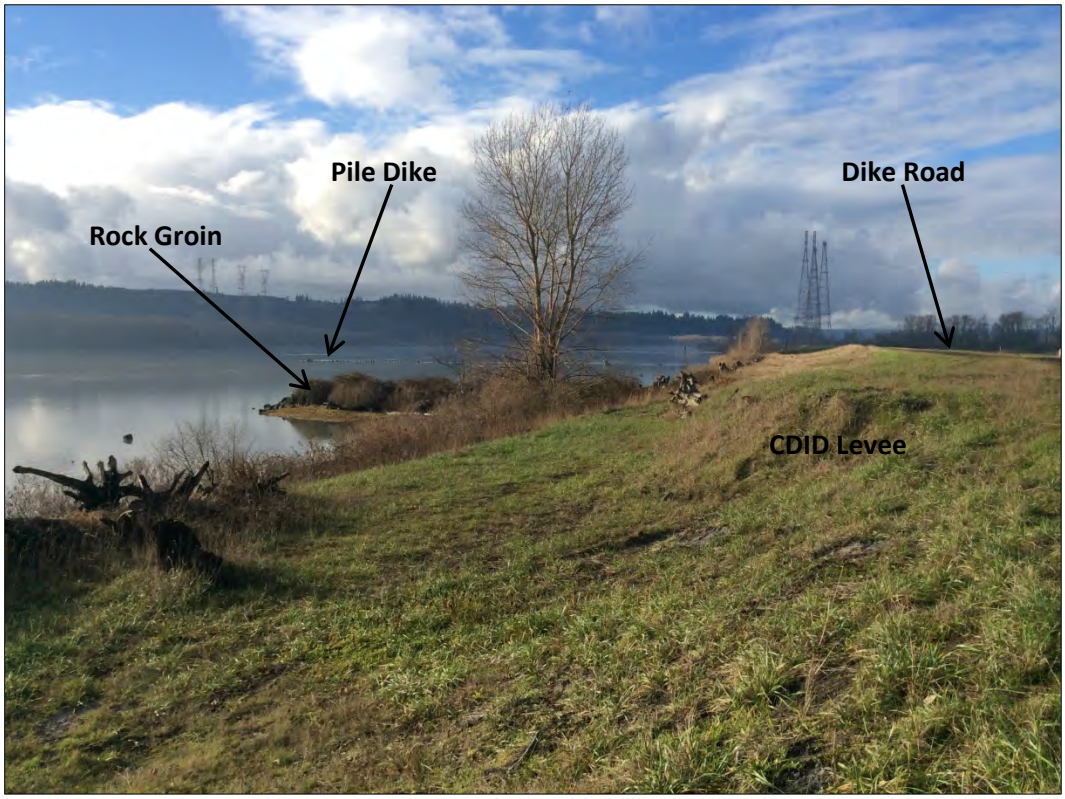

Photo 34. Photo shows typical managed herbaceous vegetation cover type growing on the river side of the CDID Columbia River Levee. Existing rock groin and pile dikes are also visible. (Photo Date: 12/12/2014)

Photo 35. Photo shows typical managed herbaceous vegetation cover type growing on the river side of the CDID Columbia River Levee downstream of the existing Dock 1 conveyor and trestle on the MBTL Site. Forested riparian areas are also shown. (Photo Date: 4/8/2014)

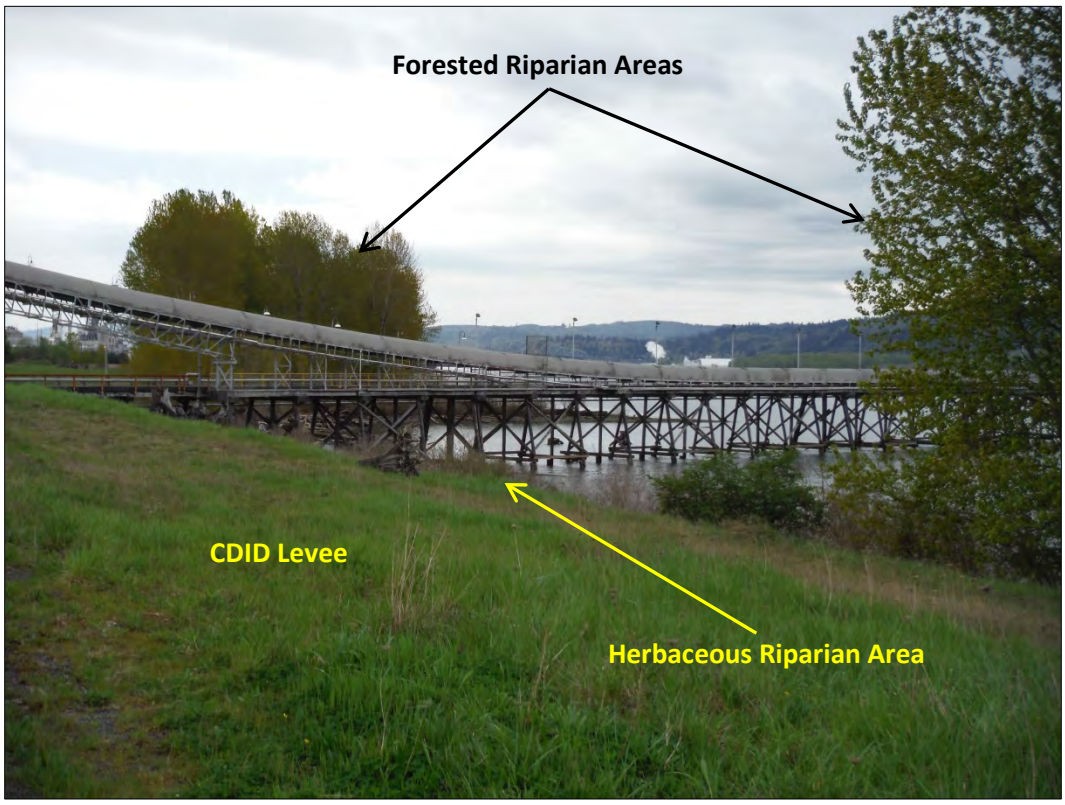

Photo 36. Photo shows typical managed herbaceous vegetation cover type growing on the river side of the CDID Columbia River Levee and in the vicinity of the existing Dock 1 conveyor and trestle on the MBTL Site. Forested riparian vegetation cover types are also shown (Photo Date: 4/8/2014)

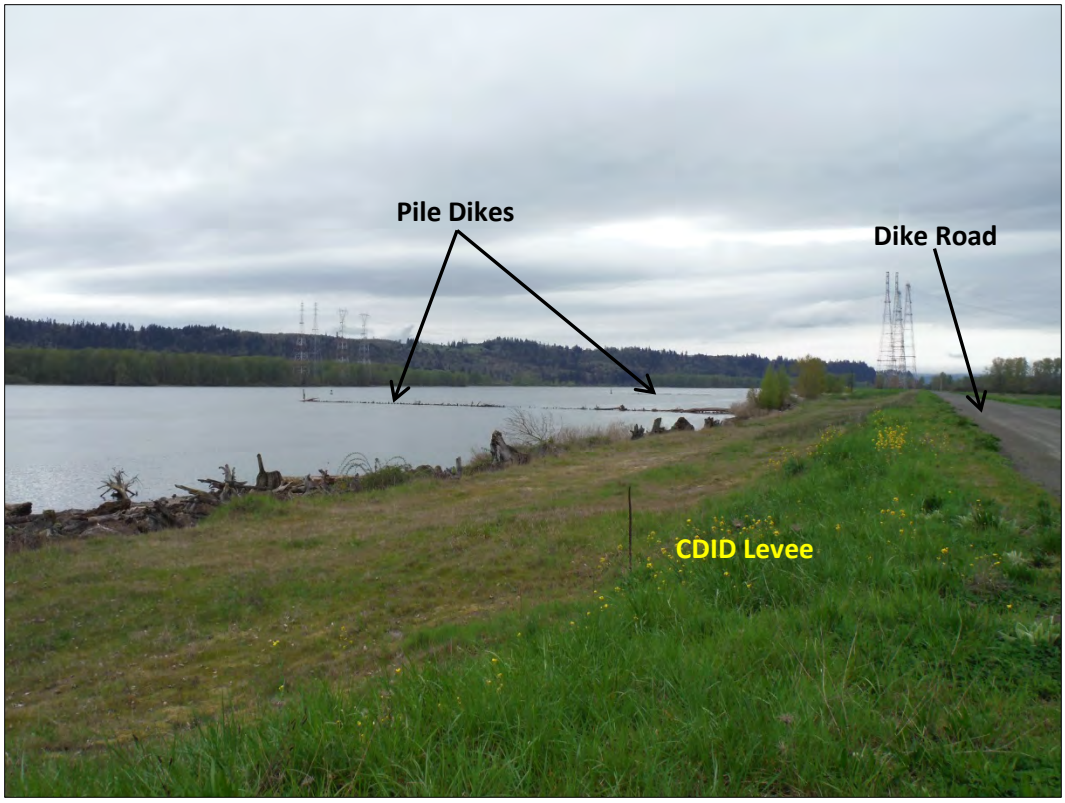

Photo 37. Photo shows typical managed herbaceous vegetation cover type growing on the river side of the CDID Columbia River Levee and herbaceous riparian area along shoreline. Existing pile dikes are also visible. (Photo Date: 4/8/2014)

Photo 38. Photo shows typical conditions present along the northern shoreline of the MBTL Site near the CDID Reynolds Pump Station outfall. (Photo Date: 12/12/2014)

Photo 39. Photo shows the typical conditions present in the Dredged Material Storage Area on the MBTL Site. (Photo Date: 12/12/2014)

Photo 40. Photo shows typical vegetation growing on the landward side of the berm around the Dredged Material Storage Area on the MBTL site. This area was classified as scrub-shrub riparian (Photo Date: 12/12/2014)

Photo 41. Photo shows typical herbaceous wetland vegetation cover type in the northern portion of Wetland E on Parcel 61954 of the MBTL Site (Photo Date: 12/12/2014)

Photo 42. Photo shows typical herbaceous wetland vegetation cover type in the southern portion of Wetland E on Parcel 61954 of the MBTL Site (Photo Date: 12/12/2014)

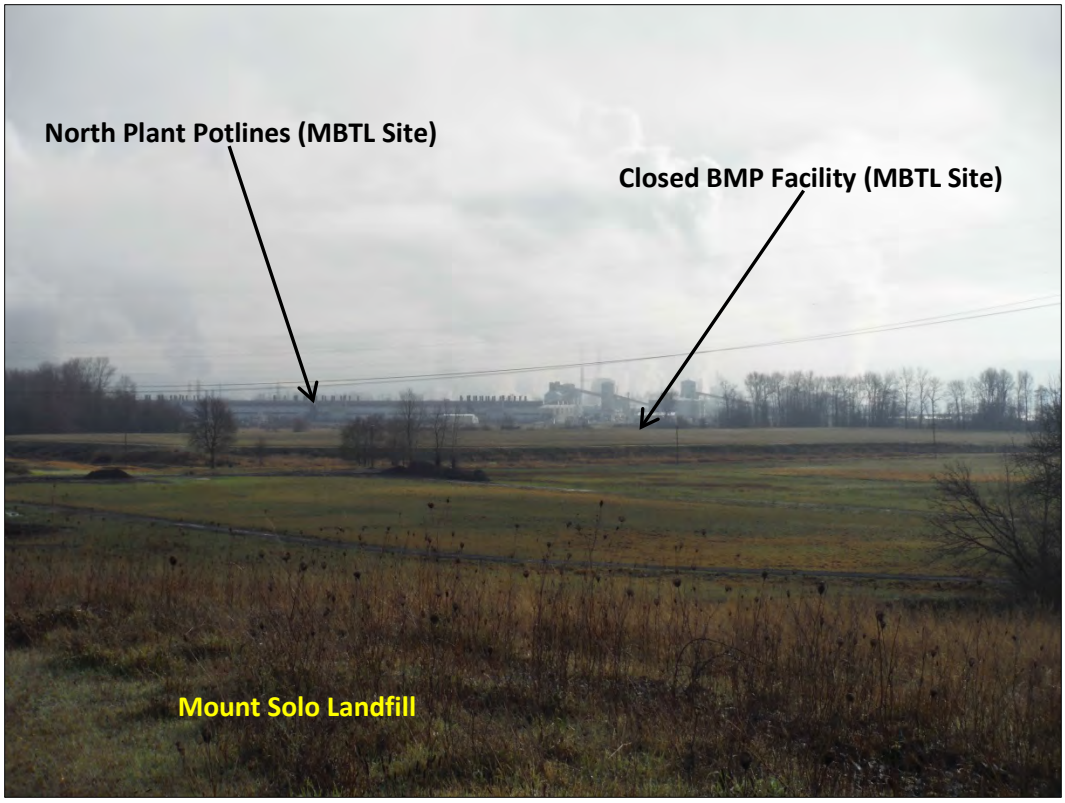

Photo 43. Photo shows disturbed, herbaceous upland, managed herbaceous upland, and herbaceous wetland cover types present in the southern portion of Barlow Point Site, as viewed from the Mount Solo Landfill. Wetlands 3 and 5 are present in the center of the photo but are not readily discernable. (Photo Date: 12/12/2014)

Photo 44. Photo shows disturbed, herbaceous upland, managed herbaceous upland, and herbaceous wetland cover types present in the southern portion of Barlow Point Site, as viewed from the Mount Solo Landfill. (Photo Date: 12/12/2014)

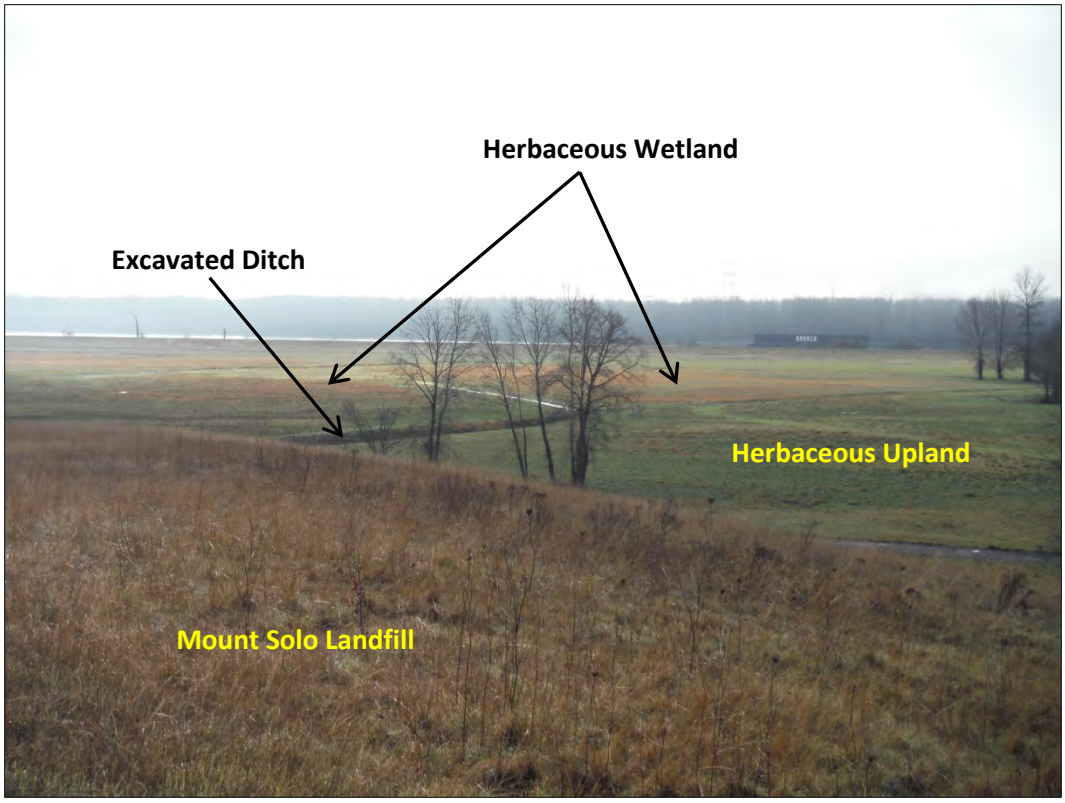

Photo 45. Photo shows disturbed, herbaceous upland, managed herbaceous upland, and herbaceous wetland cover types present in the southern portion of Barlow Point Site, as viewed from the Mount Solo Landfill. Wetland 4 is present on both sides of the excavated ditch. (Photo Date: 12/12/2014)

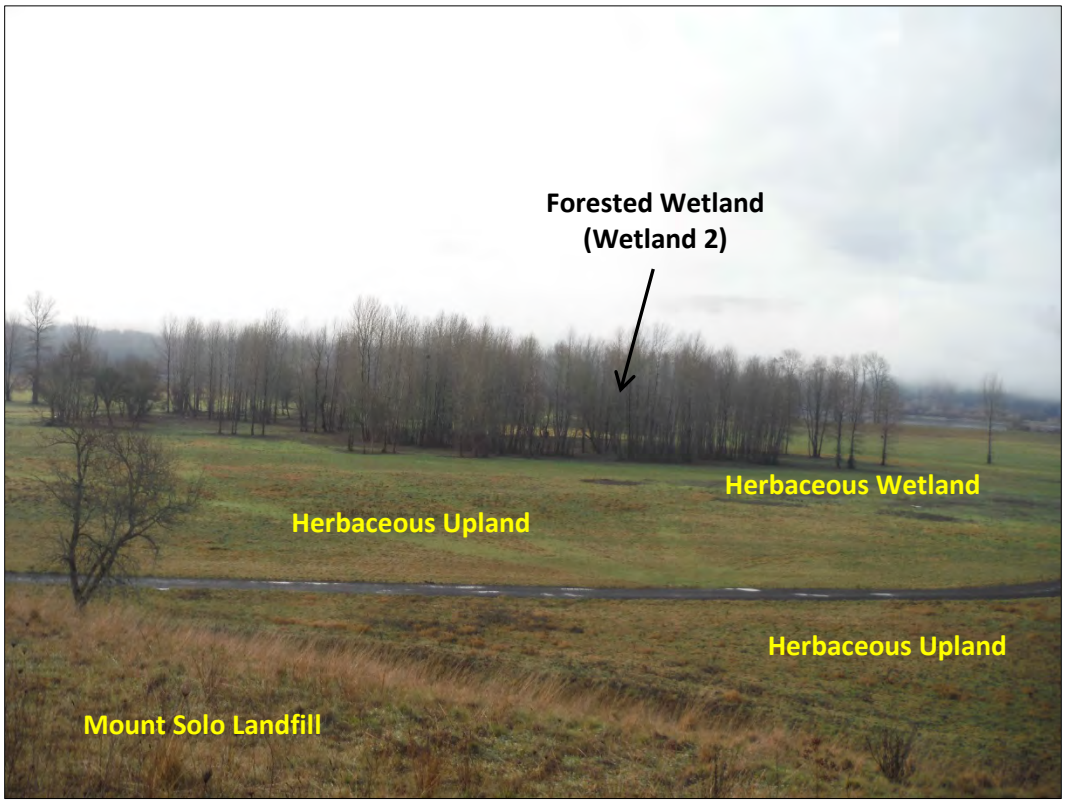

Photo 46. Photo shows multiple vegetation cover types present in the of central portion of Barlow Point Site including herbaceous upland and the herbaceous and forested wetland cover types in Wetland 2, as viewed from the Mount Solo Landfill. (Photo Date: 12/12/2014)

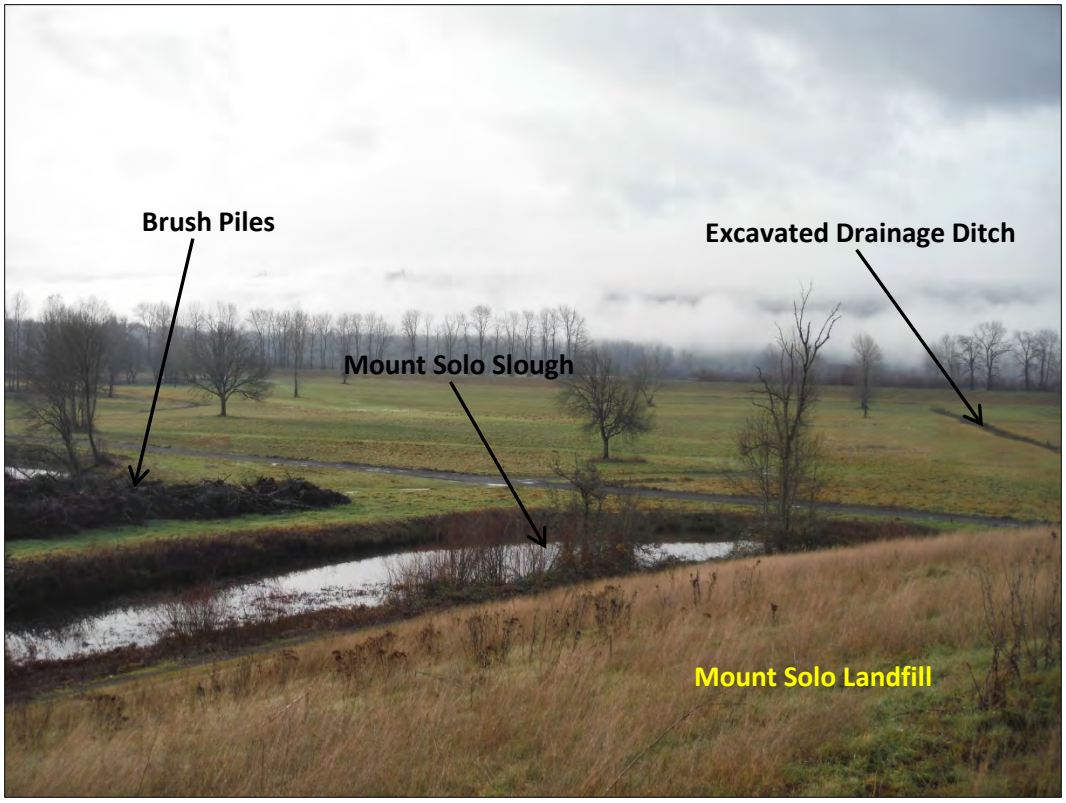

Photo 47. Photo shows typical herbaceous upland vegetation cover type of central portion of Barlow Point Site as viewed from the Mount Solo Landfill. Recently placed brush piles in the disturbed cover type, Mount Solo Slough, and an excavated drainage ditch are also shown. (Photo Date: 12/12/2014)

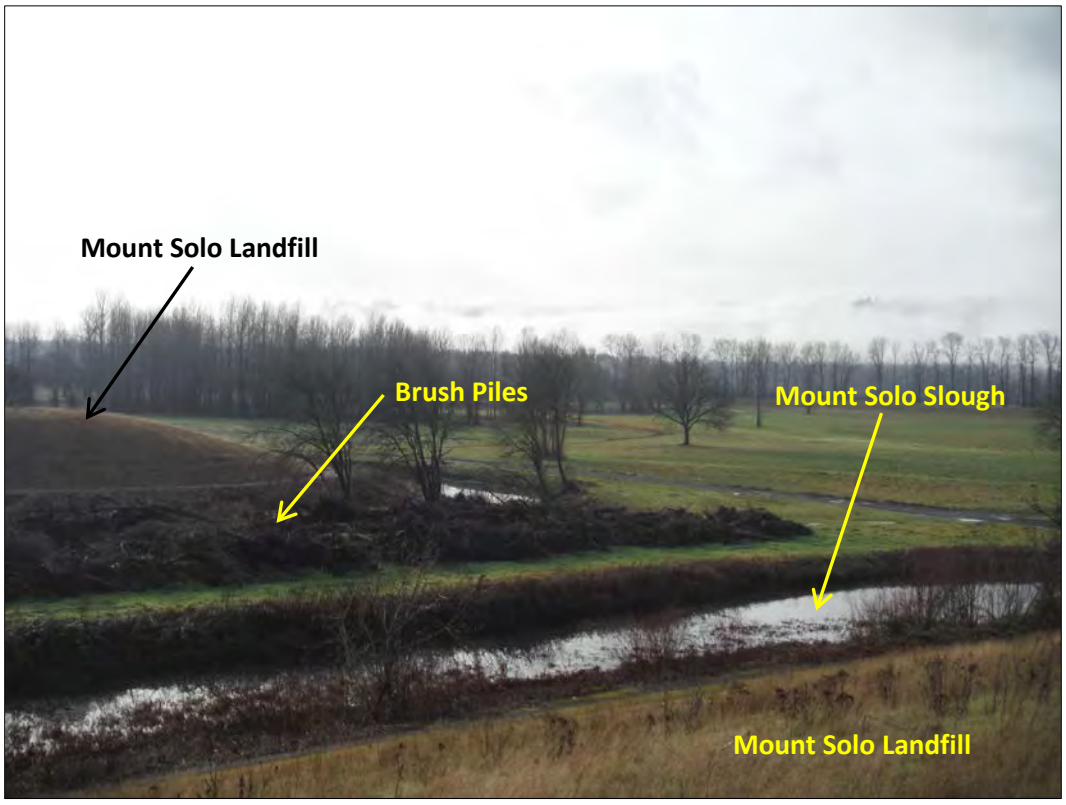

Photo 48. Photo shows recently placed brush piles in the disturbed cover type along Mount Solo Slough. (Photo Date: 12/12/2014)

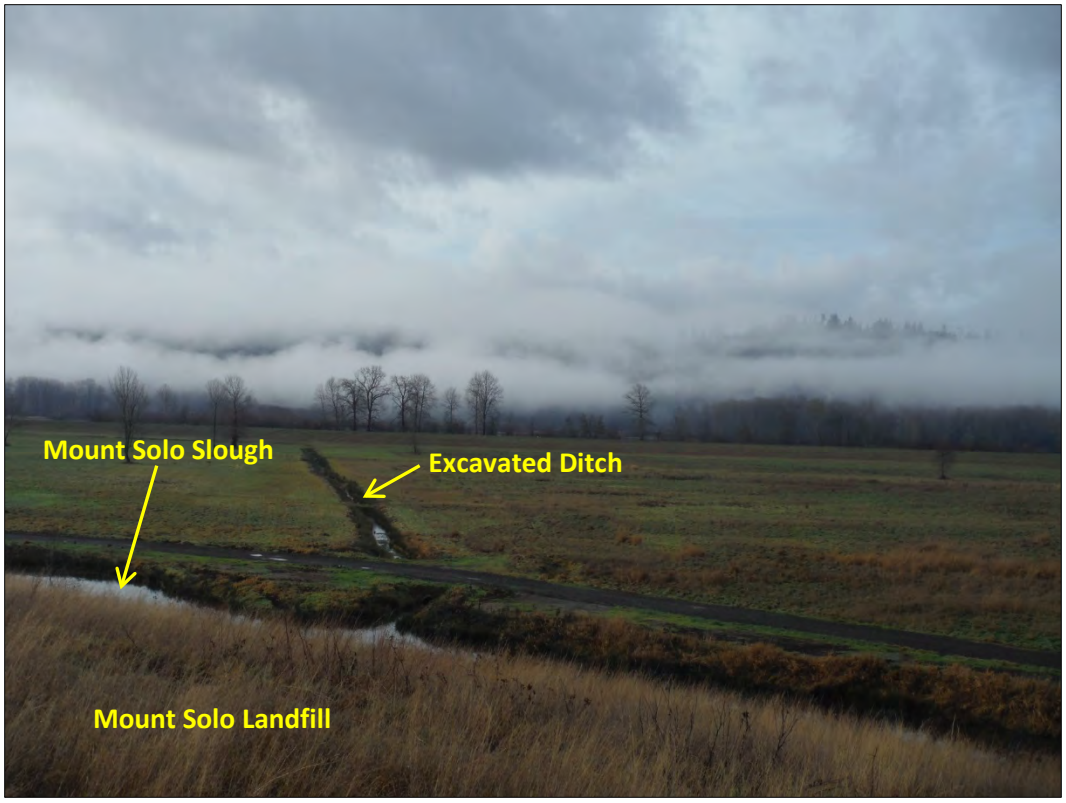

Photo 49. Photo shows herbaceous upland cover type present in the central portion of Barlow Point Site, as viewed from the Mount Solo Landfill. Excavated ditch draining to Mount Solo Slough is also shown. (Photo Date: 12/12/2014)

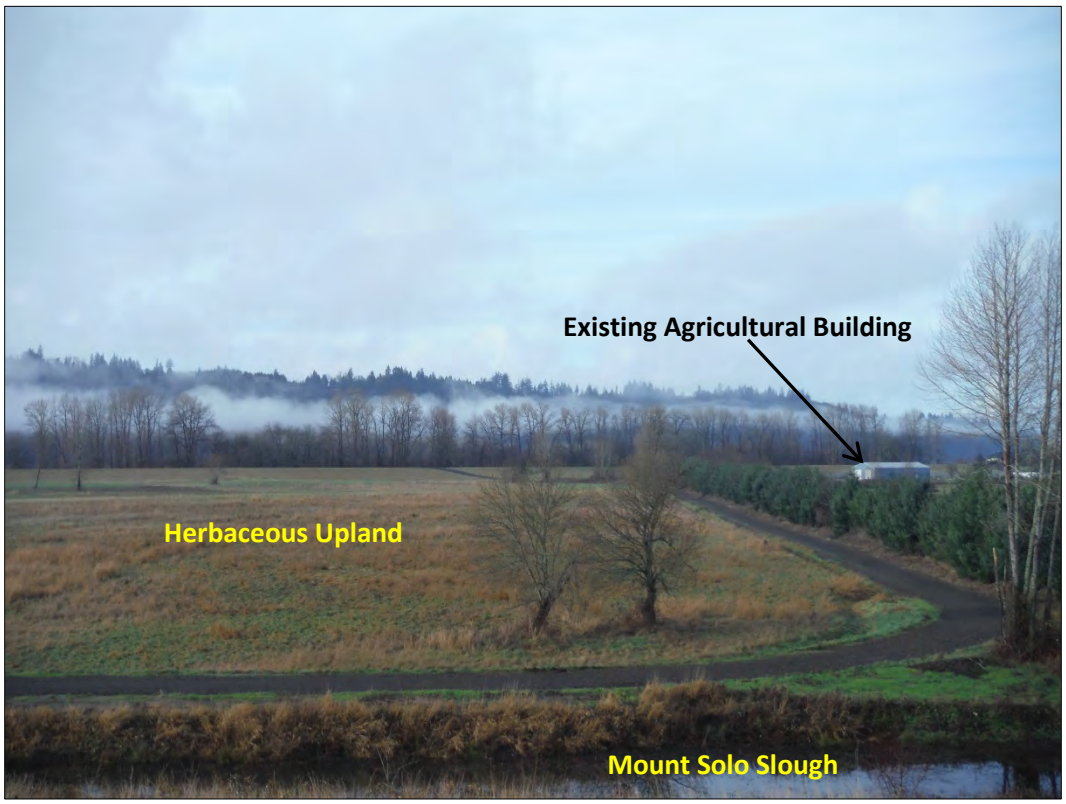

Photo 50. Photo shows herbaceous upland cover type present in the central portion of Barlow Point Site, as viewed from the Mount Solo Landfill. Existing agricultural building is shown on the right in an area classified as disturbed cover type. (Photo Date: 12/12/2014)

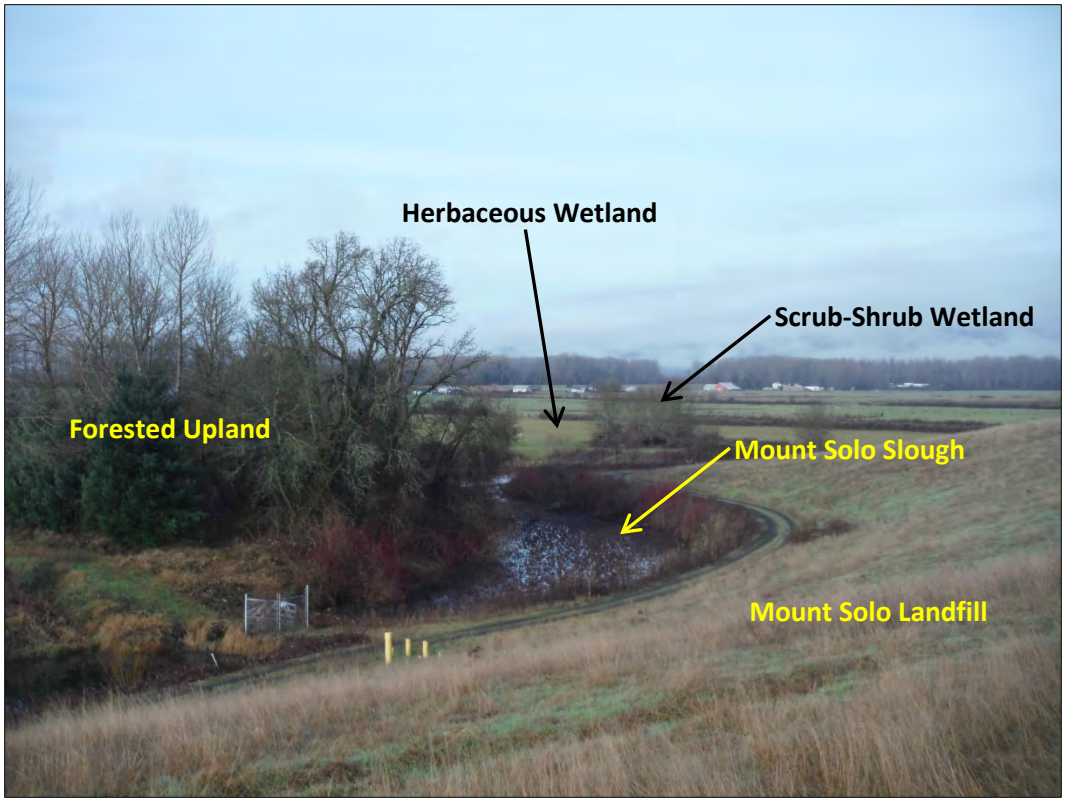

Photo 51. Photo shows northern portion of Barlow Point Site as viewed from the Mount Solo Landfill including herbaceous and scrub-shrub wetland cover types in Wetland 6. (Photo Date: 12/12/2014)

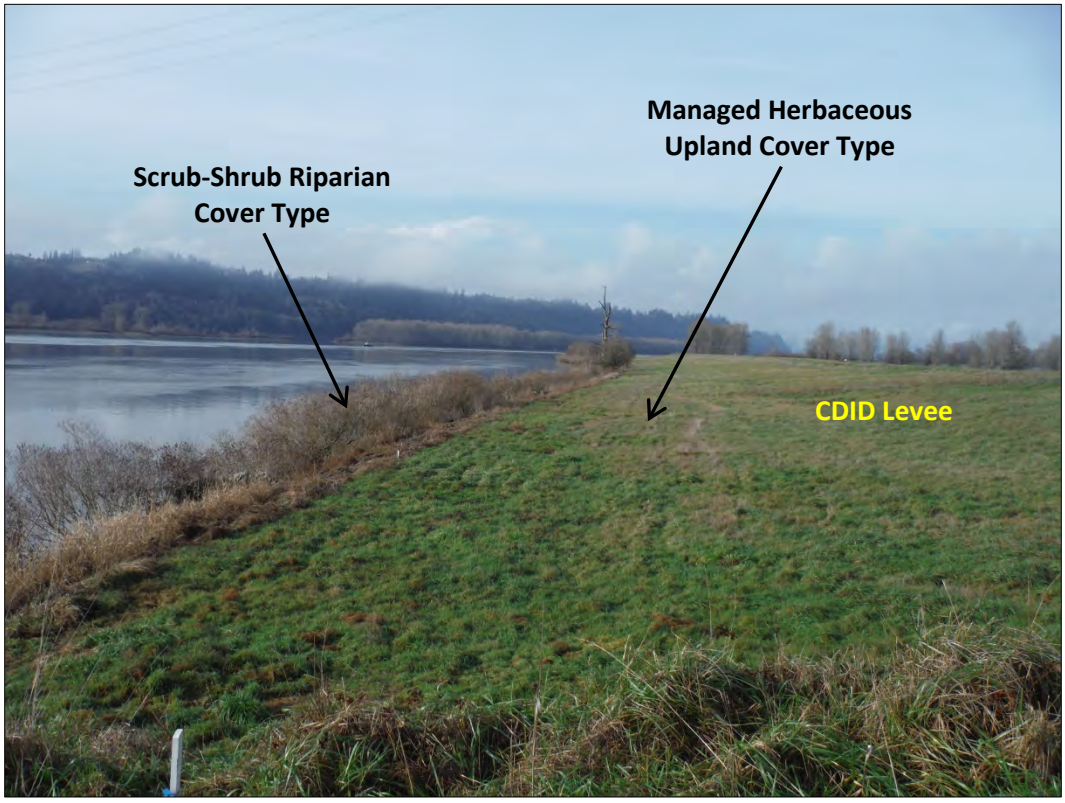

Photo 52. Photo shows typical managed herbaceous upland cover type growing on the river side of the CDID Columbia River Levee on the Barlow Point Site. A thin band of scrub-shrub riparian vegetation cover types is also shown (Photo Date: 12/12/2014)

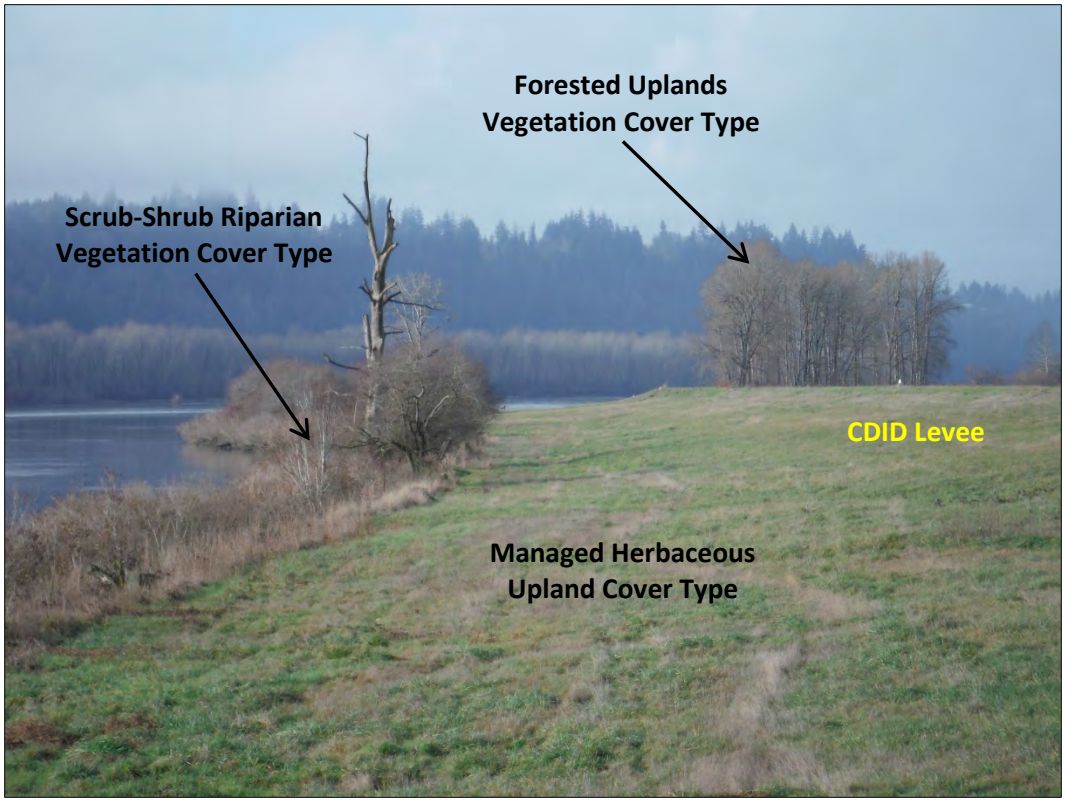

Photo 53. Photo shows typical managed herbaceous upland cover type growing on the river side of the CDID Columbia River Levee on the Barlow Point Site. The scrub-shrub riparian and forested upland cover types are also shown. (Photo Date: 12/12/2014)

Photo 54. Photo shows herbaceous and managed herbaceous upland cover types present in the southern portion of Barlow Point Site, as viewed from the MBTL Site. Wetlands 4 and 5 are present in the background but difficult to discern on the photo. (Photo Date: 12/12/2014)