3.4 Plants

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

This section describes plants in the study area, including high-quality vegetation and special-status species. It then describes impacts on plants that could result under the no-action alternative or as a result of the construction and routine operation[1] of the proposed action. Finally, the section presents any measures identified to mitigate impacts of the proposed action and any remaining unavoidable and significant adverse impacts.

3.4.1 What is the study area for plants?

The study area for plants consists of plants on and near the project site that could be affected during construction and routine operations at the project site. The study area also includes plants that could be affected during rail transport along the Puget Sound & Pacific Railroad (PS&P)[2] rail line and vessel transport through Grays Harbor out to 3 nautical miles from the mouth of the harbor.

3.4.2 What laws and regulations apply to plants?

Laws and regulations for determining potential impacts on plants are summarized in Table 3.4-1. More information about these laws and regulations is provided in Appendix B, *Laws and Regulations*.

Table 3.4-1. Laws and Regulations for Plants

Laws and Regulations	Description
Federal	
Clean Water Act, Section 301 (33 U.S.C. 1251 et seq.)	Prohibits the discharge of any pollutant to a water of the United States without a permit.
Clean Water Act, Section 401 (33 U.S.C. 1251 et seq.)	Ensures that projects within the waters of the United States comply with water quality and related aquatic resource protection requirements.
Clean Water Act, Section 402 (33 U.S.C. 1251 et seq.)	Establishes the NPDES permitting program, under which discharges of pollutants are regulated.
Endangered Species Act (16 U.S.C. 1531 et seq.)	Established with the intent of providing protections for imperiled species and the ecosystems upon which they depend.

[1] Chapter 4, *Environmental Health and Safety*, addresses the potential impacts from increased risk of incidents (e.g., storage tank failure, train derailments, vessel collisions) and related consequences (e.g., release of crude oil).
[2] The PS&P rail line refers to the rail line between Centralia and the project site.

Laws and Regulations	Description
State	
Natural Area Preserves Act (RCW 79.70)	Establishes a framework for identifying and cataloging special-status plant species and regionally important or unique plant communities in Washington State.
Noxious Weed Law (RCW 17.10) and Noxious Weed List and Schedule of Monetary Penalties (WAC 16-750)	Establishes the list of noxious weeds within classes that reflect the level of concern and are related to specific mandatory control and prevention measures that are required for managing the spread of those weeds.
Growth Management Act (RCW 36.70Aand WAC 365-190-080–180)	Requires the counties and cities of the state to prepare and adopt comprehensive plans that keep with the Growth Management Act planning goals. Identifies critical areas of Washington State and establishes minimum regulatory standards for local governments to implement.
Water Pollution Control (RCW 90.48)	Regulates the discharge of pollutants into waters of the state, including streams, lakes, rivers, ponds, inland waters, salt waters, watercourses, and other surface and underground waters.
Water Rights—Oil and Hazardous Substance Spill Prevention and Response "Oil Spill Act" (RCW 90.56)	Provides a simplified process to calculate damages from an oil spill and holds responsible parties liable for damages resulting from injuries to public resources.
Oil Spill Natural Resources Damage Assessment (WAC 173-183)	Establishes procedures for convening a resource damage assessment committee, preassessment screening of damages, and selecting the damage assessment methodology.
Local	
Critical Areas Ordinance (HMC 11.06 and AMC 14.100)	Sets forth the definitions and process for designating and protecting critical areas within the city limits of Hoquiam and Aberdeen, respectively.
Hoquiam: Landscaping and Screening Ordinance (HMC 10.05.65)	Requires that 18 inches total caliper of new trees be planted per gross acre of new development.

U.S.C. = United States Code; NPDES = National Pollutant Discharge Elimination System; RCW = Revised Code of Washington; WAC = Washington Administrative Code; HMC = Hoquiam Municipal Code; AMC = Aberdeen Municipal Code

3.4.3 How were impacts on plants evaluated?

This section describes the sources of information and methods used to evaluate impacts.

3.4.3.1 Information Sources

Washington Natural Heritage Program (WNHP) manages the state's only comprehensive database of rare plant species and high-quality native plant communities. WNHP's 2014 global information system (GIS) data, as well as information from the WNHP's online Reference Desk, were used to determine known occurrences of special-status plant species and high-quality native plant communities (including their characteristic plant species) in the study area. A list of special-status plant species for Grays Harbor, Lewis, and Thurston Counties was also generated from the iPAC online system (U.S. Fish and Wildlife Service 2014a).

Special-status plant species are those species regulated by the U.S. Fish and Wildlife Service (USFWS) as threatened, endangered, sensitive, or candidate species under the Endangered Species Act (ESA), and plant species regulated or tracked by the Washington State Department of Natural Resources as state threatened, endangered, or sensitive.

Terrestrial plant communities were characterized using aerial photographs available through GoogleEarth and the 2011 National Land Cover Dataset (Multi-Resolution Land Characteristics Consortium 2014), as well as information gathered from references cited herein. Plants in the study area were characterized during a reconnaissance-level visit conducted in September 2014 at the project site and vicinity, Grays Harbor National Wildlife Refuge, and along publicly accessible portions of the PS&P rail line corridor near Hoquiam.

3.4.3.2 Impact Analysis

Impacts on vegetation at the project site were determined by examining the vegetation relative to proposed construction plans. Impacts on vegetation within 0.5 mile of the PS&P rail line and both in and within 0.5 mile of Grays Harbor were qualitatively assessed using the information sources described above.

3.4.4 What plants are in the study area?

This section describes plants in the study area that could be affected by construction and operation of the proposed action. This section provides the general context for plants in the study area and describes plants at the project site and plant communities along the PS&P rail line and in and along the shoreline of Grays Harbor, including possible resources out to 3 nautical miles from the mouth of Grays Harbor.

The study area is in the Northwest Coast ecoregion. This region is characterized by a temperate climate with summer fog and generally cool temperatures, particularly along the coastline and adjacent estuaries, such as Grays Harbor and river valleys such as the Chehalis River (Washington State Department of Natural Resources 2007; Franklin and Dyrness 1973).

Undeveloped lowland areas in this ecoregion are typically coniferous forests, characterized by western hemlock (*Tsuga heterophylla*), Douglas-fir (*Pseudotsuga menziesii*), and western red cedar (*Thuja plicata*) as the dominant tree species. Sitka spruce (*Picea sitchensis*) is also a dominant tree in

the lowlands adjacent to the coastline and in areas immediately surrounding Grays Harbor (Washington State Department of Natural Resources 2007; Franklin and Dyrness 1973). Undeveloped lowland floodplains and forested wetlands in this ecoregion (as described in Section 3.3, *Water*) are typically characterized by deciduous and mixed forest communities dominated by red alder (*Alnus rubra*), western red cedar, Sitka spruce, black cottonwood (*Populus balsamifera*), and willow (*Salix* spp.) trees.

Relative to special-status species, five of the six plants listed under the ESA have been documented in Grays Harbor, Thurston, and Lewis Counties (Washington Natural Heritage Program 2014a).

- Marsh sandwort (*Arenaria paludicola*): historically documented in Grays Harbor County
- Golden Paintbrush (*Castilleja levisecta*): documented in Thurston County
- Water howellia (*Howellia aquatilis*): documented in Thurston County
- Kincaid's lupine (*Lupinus sulphureus* ssp*. kincaidii*): documented in Lewis County
- Nelson's checker-mallow (*Sidalcea nelsoniana*): documented in Lewis County

However, the WNHP database contains no records of these ESA-listed plant species having been documented in the portions of these counties in the study area (Washington Natural Heritage Program 2014b).

3.4.4.1 Project Site

The project site does not support a native vegetation community. It was created as a result of the filling of former boat slip #2 with dredge material in 1994 (Conestoga-Rovers & Associates 2013:10). This dredge material fill was covered with crushed rock and paved. Fifteen of the project site's 16 acres are currently paved with asphalt, supporting no vegetation of any kind (Chapter 2, *Proposed Action and Alternatives*, Figure 2-2). No landscaping is present around the existing storage tanks. The 1-acre unpaved portion of the project site exists as scattered areas around the periphery of the project site that support upland grasses.

The industrialized shoreline along Terminal 1, including the shoreline adjacent to the project site, is heavily rocked or riprapped and thus lacks the intertidal marsh communities that characterize the undeveloped portions of the Grays Harbor shoreline. Scattered beach logs are lodged on top of the riprap along the approximate elevation of mean higher high water (MHHW). Blackberry canes are interspersed with the riprap and beach logs above MHHW.

The WNHP database contains no records of any federal or state special-status plant species having been documented at the project site. The nearest documented current occurrence[3] of a special-status plant is approximately 7 miles to the west-northwest of the project site along the shoreline of Grays Harbor (Washington Natural Heritage Program 2014b).

3.4.4.2 PS&P Rail Line

Four special-status plant species have been recorded in the WNHP database within the 0.5-mile study area along the PS&P rail line (Washington Natural Heritage Program 2014b).

[3] The WNHP database defines a current occurrence as an occurrence in which the most recent record was after 1977. Species for which the most current occurrence was prior to 1977 are considered historic occurrences.

- Four 1991 occurrences of the white-topped aster (*Sericocarpus rigidus;* USFWS Species of Concern, WNHP Sensitive), in four locations along the north side of the PS&P rail line near Rochester and to the east of Scatter Creek. Two of these occurrences are recorded as adjacent to the rail line.
- A 1995 occurrence of tall bugbane (*Cimicifuga elata;* USFWS Species of Concern, WNHP Sensitive), approximately 1 mile southeast of the PS&P rail yard in Centralia.
- A 1997 occurrence of the western wahoo (*Euonymus occidentalis var. occidentalis;* WNHP Sensitive), along the south side of the PS&P rail line near Rochester.
- Eight 2007 occurrences of the small-flowered trillium (*Trillium parviflorum;* WNHP Sensitive). Six of these are recorded 1.5 to 2.5 miles northwest of the Centralia PS&P rail yard (three of which are recorded near the rail line itself) and two occurrences are recorded to the north of the PS&P rail line near US Route 12 (US 12) and Prairie Creek.

Six general types of terrestrial vegetation communities occur along the PS&P rail line based on the 2011 National Land Cover Data Set (Multi-Resolution Land Characteristics Consortium 2014).

Coniferous, Deciduous, and Mixed Forests

Much of the area along the PS&P rail line between approximately Malone-Porter and Oakville is a mixture of coniferous, deciduous, and mixed forests characteristic of the broader region. These forests are generally dominated by Douglas-fir, western red cedar, Sitka spruce, red alder, and black cottonwood trees with an understory that varies depending on the type of overstory vegetation and local soil and moisture conditions. Forested wetlands also occur along the PS&P rail line in areas hydrologically influenced by the Chehalis River and its tributaries and in areas influenced by high groundwater conditions. Wetlands are described in more detail in Section 3.3, *Water*.

Shrub-Scrub Vegetation

Some areas along the PS&P rail line, including northwest of Malone-Porter, are characterized by a shrub-scrub vegetation community. Shrub-scrub areas are generally dominated by a dense mixture of young trees and shrubs less than 20 feet tall, intermixed with multiple-stemmed small trees, such as willows. Recently harvested timberlands are also frequently characterized as shrub-scrub while they are in the early stages of revegetating after trees have been harvested. Scrub-shrub wetlands also occur along the PS&P rail line in areas hydrologically influenced by the Chehalis River and its tributaries and in areas influenced by high groundwater conditions. Wetlands are described in more detail in Section 3.3, *Water*.

Herbaceous Vegetation

Small, generally scattered areas along the PS&P rail line are characterized as herbaceous (i.e., non-woody) vegetation. These areas are typically low-lying areas dominated by grasses such as invasive, but well-established, reed canarygrass (*Phalaris arundinacea*) and emergent wetlands associated with the floodplain of the Chehalis River, as described in more detail in Section 3.3, *Water*.

Cultivated Crops

Some areas along the PS&P rail line, including areas south of the rail line between Centralia and Oakville and west of Malone-Porter, are cultivated as cropland. These areas are generally in or near the Chehalis River floodplain and typically no longer support a native plant community.

Hay and Pasture Land

Several areas along the PS&P rail line, including south of the rail line between Grand Mound and Oakville and between Malone-Porter and Montesano, are characterized as hay or pasture. These areas are also in or near the Chehalis River floodplain and typically no longer support a native plant community. They are dominated by herbaceous vegetation, a mixture of grasses palatable to cattle, horses, and sheep.

Developed Land

The urbanized areas associated with the Cities and Towns of Centralia, Fords Prairie, Grand Mound, Rochester, Chehalis Village, Oakville, Elma, Satsop, Brady, Montesano, Central Park, Cosmopolis, Aberdeen, and Hoquiam are characterized as developed. These areas generally support a mixture of nonnative and native plants, typically associated with residential and commercial landscaping, public open spaces (such as parks), and small extents of otherwise protected sensitive areas (such as floodplain wetlands) that lie within the cities' urbanized areas but are too small to be mapped separately.

3.4.4.3 Grays Harbor

The WNHP database includes one historically documented special-status plant along the Grays Harbor shoreline near Pt. New and Brackenridge Bluff: a 1982 occurrence of the pink fawn-lily (*Erythronium revolutum*), a plant species classified by the WNHP as Sensitive (Washington Natural Heritage Program 2014b).

Several types of high-quality aquatic and intertidal vegetation communities occur in and along the Grays Harbor shoreline. Eelgrass, macroalgae, salt marshes, and dunegrass, as well as low-elevation freshwater wetlands and tidal surge plain wetlands, are present in the study area along the Grays Harbor shoreline. These vegetation communities provide habitat for a variety of fish, shellfish, benthic invertebrates, shorebirds, and other wildlife that use the study area and are critical elements of both primary production and the benthic/detrital foodweb of the estuary.

The portion of the study area that extends 3 nautical miles into the Pacific Ocean from the mouth of Grays Harbor is characterized by shifting sands and other soft sediments, which are influenced by the Bar Channel and South Jetty Reaches of the Grays Harbor Navigation Channel. These features concentrate flows into and out of Grays Harbor and create an environment that is generally not conducive to the establishment of plants. However, kelp, a group of large seaweeds in the Order *Laminariales*, occurs along the Pacific coast of Washington (as well as in Puget Sound), and has been documented near the mouth of Grays Harbor (Washington State Department of Natural Resources 2001).

Aquatic Vegetation

Grays Harbor supports vast areas of intertidal mudflats that support native eelgrass (*Zostera marina*) and both high-and low-elevation intertidal salt marshes, as well as scattered areas of rocky substrate that support a variety of macroalgae and nonfloating kelp species. These vegetation communities create patches of intertidal and shallow subtidal habitat that are important to a variety of wildlife species, including juvenile salmonids, Dungeness crabs, and migratory shorebirds. Per Washington Administrative Code (WAC) 220.110.250(3)(a,b), eelgrass, macroalgae, and kelp are defined as saltwater habitats of special concern. According to WAC 365-190-130, kelp and eelgrass beds are critical saltwater habitat for forage fish spawning areas.

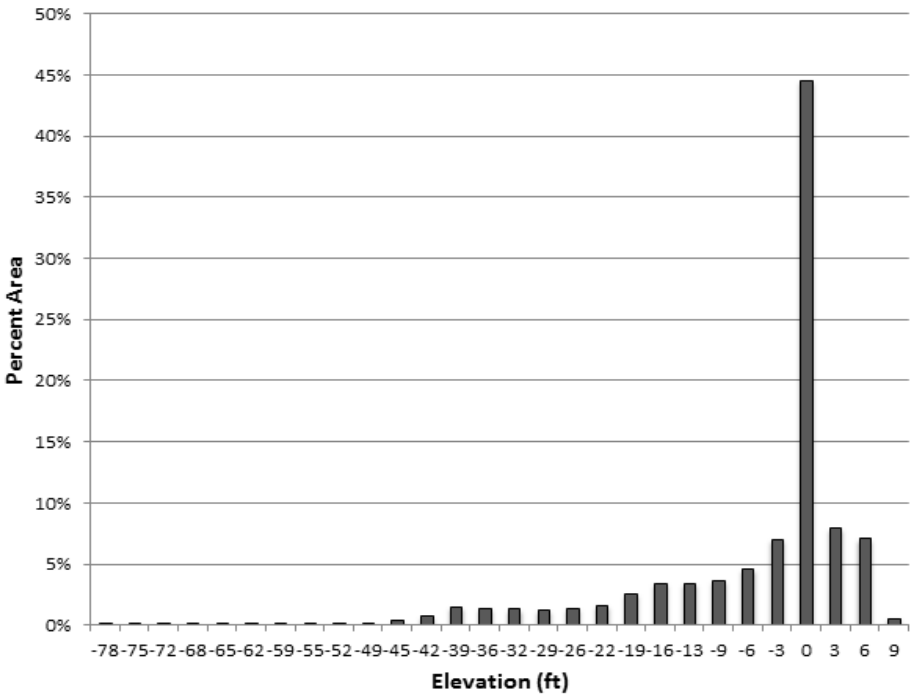
Eelgrass

Eelgrass beds support the thousands of ducks and geese that winter in Grays Harbor, and the vast numbers of shorebirds that stop in Grays Harbor to rest and feed during their annual spring migration to artic breeding grounds (U.S. Fish and Wildlife Service 2014b). Eelgrass flourishes in shallow, sunlit environments with unconsolidated substrate that are protected from strong currents and heavy, repeated wave action. Eelgrass prefers currents less than 3.5 knots, depths less than 22 feet, and salinity greater than or equal to 20 parts per thousand (Phillips 1984:14).

These environmental parameters (i.e., current speed, water depth, salinity, and low turbidity) are not found in the navigation channel, along the shoreline, or in the immediate vicinity of the project site. The landscape that drains to the Chehalis River is high in clay content and, as such, the Chehalis River is highly turbid with suspended sediments. Turbidity levels in the waters of the inner harbor near the project site and at the mouth of the Chehalis River tend to fluctuate, particularly near the middle and bottom of the water column. Turbidity ranging from 3 to 233 nephelometric turbidity units was documented during water quality sampling conducted in January 2008 (U.S. Army Corps of Engineers 2008:6). The shoreline of the inner harbor and the shoreline adjacent to the project site do not support eelgrass (ICF Jones & Stokes 2009:4-1–4-4).

As the turbid waters of the Chehalis River are diluted farther from the river mouth, the increased water clarity creates conditions for eelgrass to grow where substrate, current, and elevation conditions are appropriate. Geospatial analysis conducted in 2003 found an increase in potential eelgrass habitat (based on elevation) in Grays Harbor of approximately 4,430 acres compared to historic (1883) conditions. At least 7,605 acres of Grays Harbor were estimated to lie at elevations found suitable for eelgrass meadows (i.e., between 0 feet and 3.9 feet mean lower low water) (Borde et al. 2003:1109). Similarly, bathymetric analysis of Grays Harbor indicates that nearly 60% of the harbor (approximately 15,000 acres) is between −6 feet and +3 feet elevation, elevations that typically support eelgrass (Figure 3.4-1).

Figure 3.4-1. Percentage of Grays Harbor Estuary by Elevation



Macroalgae

Because most of Grays Harbor is unconsolidated sand and mud, macroalgae distribution is limited to rocked shoreline areas and the rocked surface of the jetties where macroalgae can find hard substrates for attachment. Low densities of leafy green sea lettuce (*Ulva lactuca*), rockweed (*Fucus distichus*), and green gut weed (*Enteromorpha intestinalis*) have been found distributed sparsely in the inner margins of the harbor near the project site close to Cow Point. Small amounts of sea lettuce and rockweed were also found attached to derelict pilings and on boulder riprap armoring the shoreline (ICF Jones & Stokes 2009:4-1–4-4).

Salt Marsh and Dunegrass

Salt marshes are essential elements of the estuarine landscape and represent an important intertidal component of the aquatic vegetation community in the Grays Harbor estuary. They provide habitat for a variety of fish, bird, and other animal species and are sources of both primary production and benthic foodweb support for the larger estuarine system (Seliskar and Gallagher 1983:37–41). Historically, this type of marsh extended many miles upstream of the estuary, becoming progressively dominated by freshwater species at the upper extent of tidal influence.

Salt marsh plants are generally categorized by their elevational range as low-marsh or high-marsh species. Species such as seaside arrowgrass (*Triglochin maritima*) and pickleweed (*Salicornia virginica*) are generally characterized as low-marsh species, and species such as Baltic rush (*Juncus balticus*), tufted hairgrass (*Descampsia cespitosa*), and Lyngby's sedge (*Carex lynbyei*) are generally characterized as high-marsh species (Seliskar and Gallagher 1983:17–19). Both low-marsh and

high-marsh habitats provide important resting and foraging habitat for migrating birds and rearing juvenile fishes. They also contribute to the benthic productivity of the system by seasonally contributing large amounts of organic material as their leaves and stems die back in the winter.

Although diking of intertidal areas has transformed many areas of salt marsh into wet pasturelands removed from tidal influence, Grays Harbor retains large areas of intact native salt marshes in the Grays Harbor National Wildlife refuge. The harbor also has numerous high-quality salt marshes documented in the WNHP database along the northern shoreline of Grays Harbor, including along the shorelines of the North Bay, of the South Bay near the mouth of the Elk River, and at the mouth of the Johns River (Figure 3.4-2) (Washington Natural Heritage Program 2014b; Northwest Area Committee 2013:6-3–6-8). These marshes are characterized by high quality, characteristic native salt marsh communities dominated by Baltic rush, seaside arrowgrass, pickleweed, tufted hairgrass, and Lyngby's sedge.

Salt marsh is also present along the shoreline of Rennie Island, approximately 1,500 feet to the southwest across the navigation channel from the project site. As described in Section 3.3, *Water*, Rennie Island is surrounded by a band of tidally exposed mudflats and salt marsh, and supports tidally influenced forested and scrub-shrub wetlands. The interior of the island also contains emergent wetlands and open water areas that are remnants of the now defunct ITT Rayonier pulp mill effluent pond.

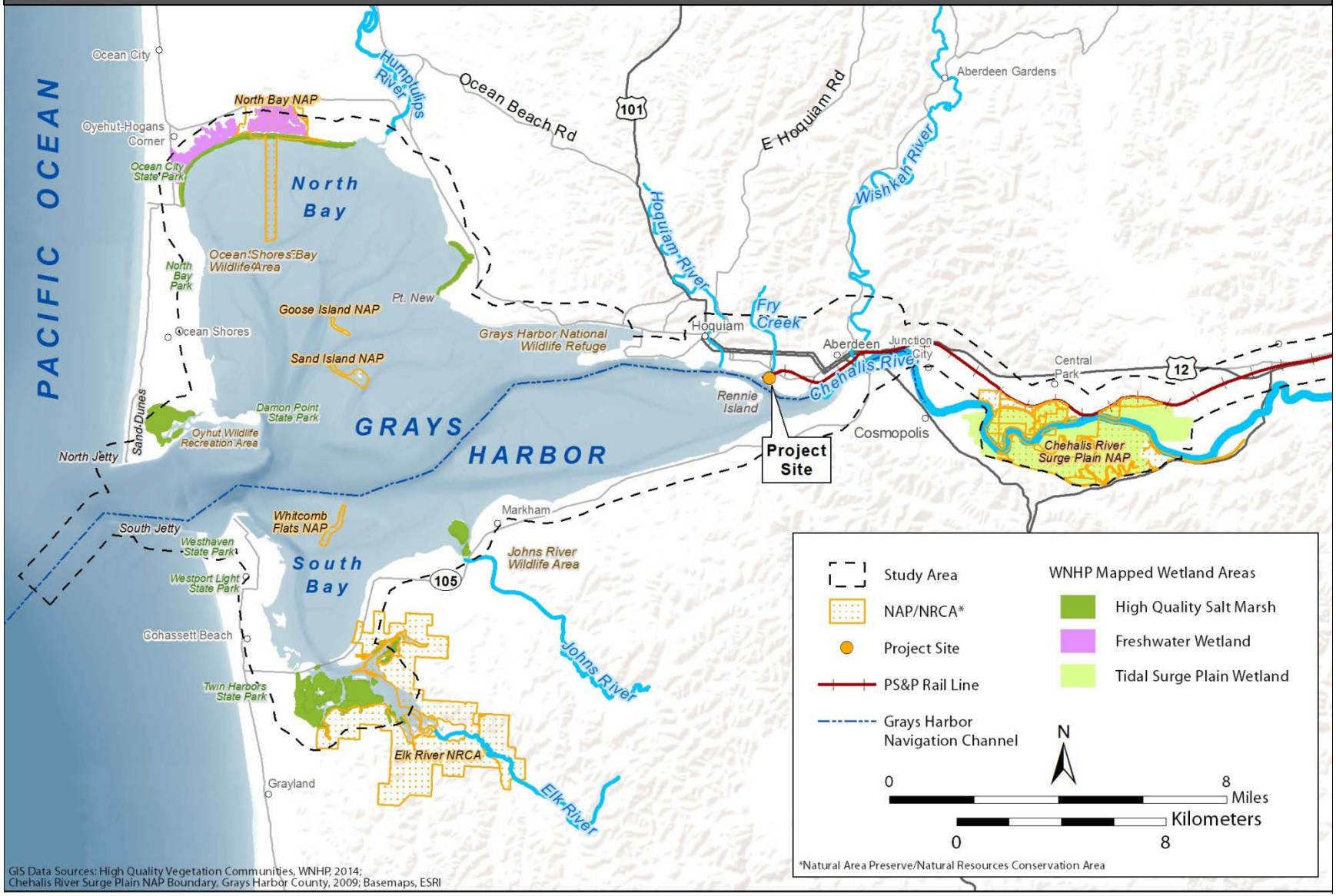
Native dunegrass (*Elymus mollis*) and the introduced European beach grass (*Ammophila arenaria*) occur on sand dunes above MHHW upslope of the South Jetty and Half Moon Bay, where they stabilize the sand dunes and provide nesting habitat for some species of shorebirds, and foraging habitat and shelter for a variety of wildlife. Dunegrass in the Damon Point area provides one of three critical nesting habitat areas for the snowy plover (*Charadrius alexandrius nivosus)*, a federally listed shorebird (Northwest Area Committee 2013:6-3–6-8).

Kelp

Twenty-six species of kelp occur along Washington's shorelines; they are categorized as *floating* or *nonfloating*. Floating kelp species include the familiar bull kelp (*Nereocystis luetkeana*) and giant kelp (*Macrocystis integrifolia*) that form the offshore kelp forests common in rocky, high-energy environments (Mumford 2007). The soft sediments and relatively low-energy waters of Grays Harbor do not support floating kelp forests (Washington State Department of Natural Resources 2001).

Nonfloating kelp, of which 21 species are found in Washington waters, are widely distributed along the northern Pacific coast and the waters of Puget Sound. Approximately 6% of Gray Harbor County's shoreline supports nonfloating kelp (Mumford 2007). Nonfloating kelp species require some solid substrate for growth, but can anchor on rocks as small as pebbles; they tend to grow in areas of high to moderate wave energy or currents. Nonfloating kelp has been documented in Grays Harbor, on the intertidal and shallow subtidal areas of the South Bay/Whitcomb Flats (Mumford 2007; Washington State Department of Natural Resources 2015).

Figure 3.4-2. High-Quality Vegetation Communities in and along the Shoreline of Grays Harbor



Low-Elevation Freshwater Wetlands

The north shore of Grays Harbor also supports a high quality, low-elevation wetland community dominated by species associated with acidic soils and bog-like conditions (Figure 3.4-2). This plant community is dominated by shrubby areas of Labrador tea (*Ledum groenlandicum*), sweetgale (*Myrica gale*), *Sphagnum* moss, and skunk cabbage (*Lysichiton americanum*), interspersed with forested areas of western red cedar, shore pine (*Pinus contorta*), and Sitka spruce trees (Washington Natural Heritage Program 2014b).

Low-elevation freshwater wetlands also support numerous plants that are culturally important for Native American inhabitants of Grays Harbor such as several species of trees and shrubs (e.g., vine maple (*Acer circinatum*), Sitka spruce, western red cedar, willows, rushes and reeds (e.g., species in the genus *Juncus*, *Scirpus*, and *Schoenoplectus*), and cattail (*Typha latifolia*), which were used in basket making (James and Martino 1986:76–83).

Grays Harbor Protected Areas

Grays Harbor National Wildlife Refuge

The Grays Harbor National Wildlife Refuge is located approximately 3 miles west of the project site (Figure 3.4-2) and managed by USFWS. As described in Section 3.5, *Animals*, the refuge was developed to preserve 1,500 acres of high-quality native terrestrial and intertidal communities, as well as crucial habitat foraging and resting habitat for migratory shorebirds, raptors, and waterfowl (U.S. Fish and Wildlife Service 2014b). Native terrestrial plants such as red alder, salmonberry (*Rubus spectabilis*) and red elderberry (*Sambucus racemosa*) present along the higher elevation portions of the refuge provide habitat for terrestrial animals such as neotropical[4] songbirds, raptors, and resident mammals such as black–tailed deer (U.S. Fish and Wildlife Service 2014b).

Native aquatic vegetation communities protected in the Grays Harbor National Wildlife refuge include high-quality low and high marshes dominated by salt marsh species such as pickleweed (*Salicornia virginica*), Lyngby's sedge (*Carex lyngbyei*), and coastal saltgrass (*Distichlis spicata*) (Washington Natural Heritage Program 2014b; U.S. Fish and Wildlife Service 2014b).

In addition, basket grass, also known as American or common three-square or chair-maker's rush (*Schoenoplectus pungens* [formerly classified as *Scirpus americanus*]), is a common, relatively tall sedge. It is a culturally important plant for regional basket makers of the Chehalis, Quileute, Hoh, Quinault, and Makah Tribes, as well as basket makers of several Puget Sound tribes (Natural Resources Conservation Service 2000; James and Martino 1986:71–76). Sweet grass grows in either freshwater or brackish marshes on the flats of the intertidal zone and exists in the area along the shoreline of Bowerman Basin in the Grays Harbor National Wildlife Refuge, where it has been harvested for generations by Native American inhabitants of Grays Harbor (Natural Resources Conservation Service 2000; James and Martino 1986:71–76).

Johns River Wildlife Unit

The 6,700-acre Johns River Wildlife Unit is composed of 15 separate units, each managed to protect or restore particular estuarine and wetland habitats.

[4] *Neotropical* is a common term for songbirds that migrate between the tropics and North America.

The 683-acre Oyhut Wildlife Recreation Area and adjacent Damon Point are located at the south end of the Ocean Shores Peninsula at the mouth of Grays Harbor (Figure 3.4-2) (Washington Department of Fish and Wildlife 2014). High-quality salt marsh plant communities characterized by pickleweed and coastal saltgrass, as well as associated mudflats that are protected in this area (Washington Natural Heritage Program 2014b). Sand dune habitats protected in this area support one of only four remaining nesting areas for snowy plovers in Washington State (Section 3.5, *Animals*).

The 63-acre South Grays Harbor unit along the south shore of Grays Harbor is managed to protect shoreline and estuarine habitats. Inclusion of an additional 800 acres is pending.

The 1,500-acre Johns River Wildlife Area, also along the south shore of Grays Harbor, is managed for waterfowl habitat and hunting and protects areas of high-quality low marsh, dominated by seaside arrowgrass (*Triglochin maritima*) and pickleweed (Figure 3.4-2) (Washington Natural Heritage Program 2014b). This area also protects a high-quality western red cedar swamp (Washington Department of Fish and Wildlife 2014).

The 41-acre Elk River unit, located at the mouth of the Elk River at the southwestern corner of Grays Harbor, protects estuary, tide flat and salt marsh habitats, including extensive areas of high-quality low and high marsh dominated by Baltic rush, coastal saltgrass, tufted hairgrass, and Lyngby's sedge (Figure3.4-2) (Washington Natural Heritage Program 2014b).

Chehalis River Surge Plain Natural Area Preserve

The Chehalis River Surge Plain Natural Area Preserve is located just upstream of Cosmopolis near the downstream end of the Chehalis River approximately between river miles 3.8 and 10.8 (Figure 3.4-2). The Washington State Department of Natural Resources manages approximately 2,345 acres to protect the largest and highest quality Sitka spruce-dominated coastal surge plain wetland in Washington State. There are only four other known wetlands of this type in Washington, all smaller and in poorer ecological condition (Washington State Department of Natural Resources 2009).

The plant community in the Chehalis River Surge Plain Natural Area Preserve is characterized by WNHP as a high-quality/rare plant community (Washington Natural Heritage Program 2014c). The forested areas are characterized by deep, organic alluvium soils over clay and are dominated by Sitka spruce trees. Mature trees in the preserve range from about 50 to more than 200 years old. The forested areas are also dominated by red alder and western red cedar trees, with a dense understory of red-osier dogwood (*Cornus sericea*), salmonberry, slough sedge (*Carex obnupta*) and skunk cabbage (*Lysichiton americanum*). Shrub-scrub areas are characterized by a mixture of red-osier dogwood and willow trees, interspersed with dense patches of Douglas spirea (*Spiraea douglasii*); lady-fern (*Athyrium filix-femina*) and skunk cabbage dominate the herbaceous layer. Mixed herbaceous areas are characterized by species such as soft-stem bulrush (*Schoenoplectus tabernaemontani*), small-fruited bulrush (*Scirpus microcarpus*), Lyngby's sedge, and common cattail. Lyngby's sedge forms vast swaths of native intertidal marsh along the low banks of the river and sloughs (Washington State Department of Natural Resources 2009; Washington Natural Heritage Program 2014b).

3.4.5 What are the potential impacts on plants?

This section describes impacts on plants that could occur in the study area. Potential impacts of the no-action alternative are described first, followed by potential impacts of the proposed action.

3.4.5.1 No-Action Alternative

Under the no-action alternative, impacts on plants from the construction of the proposed action would not occur. The applicant would continue to operate its existing facility as described in Chapter 2, Section 2.1.3.2, *Existing Operations*. Although the proposed action would not occur, it is assumed that growth in the region would continue under the no-action alternative. This growth could lead to development of another industrial use at the project site, which could result in impacts similar to those described for construction and routine operation of the proposed action. However, for the purposes of this analysis, it is assumed that no future development would occur at the project site.

3.4.5.2 Proposed Action

This section describes the impacts that could occur in the study area as a result of construction and routine operation of the proposed action. First, this section describes impacts from construction of the proposed action. It then describes impacts of routine operation at the project site and of routine rail and vessel transport to and from the project site.

Construction

No construction activities would occur outside of the project site; therefore, no construction activities would remove vegetation along Grays Harbor, in Grays Harbor, or along the PS&P rail line. Although construction would occur within 200 feet of Grays Harbor, no in-water work or shoreline work would be required, and thus, no impacts on shoreline or aquatic vegetation would occur. Therefore, the potential for construction to affect vegetation would be limited to onsite vegetation removal and impacts related to increased erosion from ground disturbance and the use of chemicals during construction and hydrostatic testing of the storage tanks as the result of exposure to contaminated stormwater runoff.

Ground disturbance related to construction of the proposed action would result in the loss of approximately 1 acre of vegetation in the form of the scattered grasses and weeds around the periphery of the project site. These scattered grassy areas are early successional and weedy areas that do not support native plant species or provide valuable wildlife habitat. Such ground disturbance would also remove any noxious weeds from the project site. Additionally, vegetation loss would be mitigated through tree planting required under the City of Hoquiam's Landscaping and Screening Ordinance (Hoquiam Municipal Code [HMC] 10.05.065) based on the gross area of construction. The permit requirements specific to the proposed action are detailed in Section 3.4.6.

As described in Section 3.3*, Water*, construction activities could temporarily affect biological resources, including shoreline and aquatic vegetation near the project site, through soil disturbance, stockpiling and erosion of sediment, stormwater contamination from equipment and material usage, and temporary increases in turbidity during release of storage tank hydrostatic testing waters. These disturbances could temporarily increase total suspended solids near the project site and result in the release of construction vehicle fluids or construction materials. Such releases could result in increased turbidity and impacts on surface water quality. Depending on the extent and duration of the impairment, vegetation could be affected through interference with photosynthesis, respiration, growth, and reproduction.

As further discussed in Section 3.3, *Water*, the potential for water quality impacts during construction would be reduced by the implementation of permit conditions required by the NPDES Construction Stormwater General Permit from Ecology and Grade and Fill Permit issued by the city.

Compliance with these permits would require implementation of the Stormwater Drainage Control Plan, Temporary Erosion and Sedimentation Control Plan, and best management practices (BMP) to reduce the potential for water quality and associated biological impacts resulting from soil disturbance. This would also require developing and implementing a spill prevention, control, and countermeasures plan, an oil spill prevention plan, and a site-specific Construction Stormwater Pollution Prevention Plan that includes BMPs for material handling and construction waste management would reduce the potential for impacts from these sources.

Upon completion of hydrostatic testing of each newly constructed storage tank, the volume of water of the largest tank (200,000 barrels [8.4 million gallons]) would be discharged into Grays Harbor. Such activities could carry residual chemicals and other materials from tank construction into the harbor, potentially affecting water quality and increasing turbidity and thus affecting biological resources, including shoreline and aquatic vegetation near the project site.

No dyes or other additives would be used during this testing. Only one tank would be tested at a time, with the testing water pumped to each of the remaining tanks in succession as each test is completed. The potential for any impacts on vegetation along the shoreline of Grays Harbor or within Grays Harbor or the Chehalis River would be reduced by testing of the hydrotest water to confirm compliance with Ecology's discharge requirements. Special treatment of the hydrotest water prior to discharge is not expected but if it is found that the water exceeds discharge requirements, the water would be treated appropriately (e.g., filtering, pH adjustment) onsite prior to discharge or shipped for offsite disposal if it cannot be handled onsite. The water would be released into Grays Harbor through the Port of Grays Harbor stormwater system at a controlled rate to reduce the potential for erosion and increased turbidity around the outfall. Because these activities would occur during the construction period, they would be covered under the applicant NPDES Construction Stormwater General Permit and would be subject to the terms and conditions of that permit including any applicable BMPs, as describe in Section 3.3*, Water*.

Operations

This section describes impacts that would occur as a result of routine operations at the project site, rail transport along the PS&P rail line, and vessel transport through Grays Harbor.

Impacts on plants could occur as direct disturbance or exposure to contaminants, as discussed below. Potential impacts of exposure to crude oil spills[5] are addressed in Chapter 4, *Environmental Health and Safety*.

Onsite

Operation of the proposed action would not affect plants at the project site, because the project site would be completely paved and no plants would be expected to colonize the developed site. Because the project site would be completely paved, colonization by noxious weeds would not likely occur during operations. The proposed action could affect plants in and around the harbor as the result of impacts on water quality and pollutant emissions associated with routine operations.

[5] All oil or hazardous material spills must be reported by the spiller, who must respond appropriately. Under Washington Water Rights—Oil and Hazardous Substance Spill Prevention and Response law (Revised Code of Washington [RCW] 90.56.370), anyone responsible for spilling oil into state waters is liable for damages resulting from injuries to public resources, including plants. The process for determining damages for an oil spill is called a Natural Resource Damage Assessment, as defined in WAC 173-183.

As discussed in detail in Section 3.3, *Water*, stormwater runoff collected at the project site could contain contaminants associated with the operation and maintenance of vehicles and equipment (e.g., diesel fuel, oil, hydraulic fuel, antifreeze, tire and brake dust, exhaust particulates) and associated with spills or leaks of crude oil related to the bulk loading transfer facilities. However, as discussed in Section 3.3, the proposed design features, including containment structures and the oil/water separator, and the implementation of prevention and control measures and stormwater BMPs required by state and federal law and applicable permits, would ensure that impacts from contaminated stormwater would be low and would present a very low risk to plants likely to be present along the shoreline near the project site. The potential for larger spills during terminal (onsite) operations (e.g., storage tank failure) to directly affect plants and the related environmental consequences (e.g., release of crude oil) are addressed in Section 4.4, *Environmental Risks—Terminal (Onsite)*. Potential impacts from such spills are presented in Section 4.7, *Impacts on Resources*.

Air pollutant emissions from onsite operations are estimated in Section 3.2, *Air*. Emissions of nitrogen dioxide (NO_2) and nitrogen oxides (NO_X) from rail-unloading operations would have the greatest potential to affect plants near the project site. According to Honour et al. (2009), impacts on vegetation are documented at NO_X concentrations ranging from 77 to 98 micrograms per cubic meter ($\mu g/m^3$) and NO_2 concentrations ranging from 57 to 67 $\mu g/m^3$. Other studies had similar conclusions (Davies et al. 2007; Bignal et al. 2007). Under worst-case conditions (maximum 1-hour concentration), NO_2 concentrations are estimated to be 114 $\mu g/m^3$ from the proposed facility at approximately 30 feet from the rail-loading area on the project site; however, under annual average conditions the NO_2 concentrations would be in the range of 33 to 43 $\mu g/m^3$ at approximately 30 feet. Therefore, under worst-case conditions, onsite emissions could result in some impacts on vegetative growth and physiology, but these would be short-term and limited to areas near the project site, which include the industrial shoreline, roadways, and developed uses.

Rail

Operation of the proposed action at maximum throughput would add 458 unit train trips[6] per year (1.25 trips per day on average) along the PS&P rail line, compared to the approximately 1,100 train trips per year (three trips per day on average) under the no-action alternative (Section 3.15, *Rail Traffic*). This increased traffic and the associated routine operations activities could affect vegetation along the PS&P rail line as the result of increased exposure to pollutants from leaks and spills and pollutant air emissions.

Leaks and Spills

An increase in leaks and spills of petrochemicals used in routine rail operations could occur due to the increased frequency of rail traffic and associated maintenance; the increase would be slightly higher compared to the no-action alternative. Diesel fuel, oils, grease, and other petrochemicals required for rail operation and maintenance could reach vegetation along the rail line through a small-scale spill or dripping from the train. These materials could be carried short distances by precipitation or surface waters to more sensitive areas such as streams and wetlands through the openings on bridges and trestles.

As noted in Section 3.3, *Water*, the potential for leaks and spills to occur would be minimized by regularly inspecting and maintaining railroad engines and rail cars and by implementing standard

[6] A trip represents one-way travel; in other words, an inbound trip and an outbound trip are counted as two trips.

good housekeeping BMPs. Additionally, impacts from a minor spill would be expected to be localized to the area of the spill adjacent to the rail line and would not be expected to spread across a wide area and would be likely captured in the underlying ballast rock. Although the proposed action would result in a slight increase in leaks and spills of petrochemicals due to the increased frequency of rail traffic and maintenance activities compared to the no-action alternative, the overall impacts on plants are anticipated to remain low. The potential for larger spills to occur during rail transport that could directly affect plants is addressed in Section 4.5, *Environmental Health Risks—Rail Transport*. Potential impacts from such spills are presented in Section 4.7, *Impacts on Resources*.

Air Emissions

As described above for onsite operations, emissions of NO_2 and NO_X can result in impacts on vegetative growth and physiology depending on the concentration of emission and distance from plants. Rail transport along the PS&P rail line would also emit NO_2 and NO_X; however, typical concentrations would be considerably lower (approximately 10 to 15 $\mu g/m^3$) than described for onsite operations (Section 3.2, *Air*) and are not anticipated to result in impacts on plant growth and physiology.

Vessel

Operation of the proposed action at maximum throughput would 238 tank vessel trips per year (0.7 trip per day on average) along the navigation channel to projected large commercial vessel trips under the no-action alternative—between 338 and 436 large commercial vessel[7] trips per year in 2017 and 2037, respectively, or approximately one trip per day on average (Section 3.17, *Vessel Traffic*). This increased traffic and associated routine operation could result in potential impacts on plants through ballast water discharge, propeller wash and vessel wake, vessel shading, and increased potential for leaks and spills. These impacts would be similar to, but slightly greater than, conditions under the no-action alternative.

Ballast Water

Vessels calling at the Terminal 1 berth would be required to discharge ballast water during the loading process. Ballast water is carried by empty vessel to provide stability during transit. As a vessel is loaded with cargo, ballast water is discharged to balance the weight of the new cargo. Ballast water discharge could contain a variety of materials that could harm aquatic plants. Primary among these contaminants are invasive marine plants and animals, bacteria, and pathogens that could displace native populations and harm aquatic life. Should an introduced species become a successful invader in a new environment, it can cause a range of ecological impacts. These include competing with native species and altering environmental conditions (e.g., increased water clarity due to mass filter-feeding), altering the foodweb and the overall ecosystem and displacing native species, reducing native biodiversity and even causing local extinctions (Ibrahim and El-naggar 2012). These aquatic system impacts can also lead to economic and public health impacts.

As noted in Section 3.3, *Water*, the likelihood of such occurrences is considered low because vessels calling at Terminal 1 related to the proposed action are required to comply with the federal and state regulatory requirements listed in that section. However, requirements for ballast water treatment or exchange are not 100% effective. While following the ballast water requirements

[7] The term *large commercial vessels* refers collectively to tank and cargo vessels.

would reduce most of the potential for impacts on aquatic plants, the increase in the number of vessels related to the proposed action (a maximum of 119 per year) would increase the risk of introducing invasive aquatic plants and other organisms. Because the consequences of such an event would affect the native vegetation communities in Grays Harbor, additional monitoring requirements have been recommended, as described in Section 3.4.7.1, *Applicant Mitigation*.

Propeller Wash and Vessel Wake

As noted in Section 3.1, *Earth*, vessel activity related to operation of the proposed action could result in increased erosion within and along Grays Harbor related to increased vessel traffic. Propeller wash and wakes that extend farther or are more intense than those already occurring in the navigation channel and turning basin have the potential to cause erosion of sediments and possibly also low-lying intertidal vegetation along the shorelines closest to the navigation channel and turning basin (e.g., salt marsh along the northern shoreline of Rennie Island). Similarly, increased intensity of wash or wakes could uproot aquatic vegetation such as eelgrass and macroalgae if present in shallow areas along the outer boundaries of the navigation channel.

The potential for wake and propeller wash impacts along the shoreline of the turning basin near the project site is limited due to the lack of intertidal and aquatic vegetation along the northern banks of the turning basin. There is a potential for such impacts on intertidal vegetation along the northern shoreline of Rennie Island from large wakes, or wakes oriented perpendicular to the navigation channel or dock.

The actual extent, location, and magnitude of any such shoreline erosion impacts are influenced by the complex interaction of multiple factors that affect when, where, and with what intensity vessel wakes or prop wash turbulence would interact with the shorelines of the turning basin and Grays Harbor. 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). The potential for shoreline erosion can also be influenced by the slope and physical character of the shoreline, as well as its amount and type of vegetation.

As described in Section 3.17, *Vessel Traffic*, transit by deep-draft vessels through the navigation channel is typically planned when tidal elevations are close to high tides and outgoing loaded vessels may wait until the tide is even higher for safety purposes. Moreover, the majority of the Grays Harbor shoreline is thousands of feet or more from the navigation channel (e.g., the farthest point of the North Bay shoreline is 8 miles from the navigation channel).

Further, as described in Section 3.1, *Earth*, a wave modeling study to address concerns about potential wave impacts on aquatic lands caused by vessel traffic in the navigation channel concluded that waves from large vessels made an insignificant contribution to all waves and that natural waves (storm waves and swell from ocean) were the driving force that affected the movement and erosion of these lands (Pacific International Engineering 2003).

For the above reasons, proposed action vessel trips would result in a small, incremental increase in the potential for impacts on plants associated with wake and wash compared to the no-action alternative.

Vessel Shading

Docked large vessels can increase shading in the aquatic environment beneath and adjacent to existing berthing structures (e.g., docks, trestles). Shade can change primary productivity of aquatic

plants, which can in turn affect fish behavior, predation, and migration (additional information about potential impacts on fish is presented in Section 3.5, *Animals*). As reviewed in Carrasquero (2001), light attenuation from overwater structures in freshwater environments can lead to lowered primary productivity in phytoplankton and macrophyte (e.g., eelgrass and macroalgae) producers. Reduced primary productivity, including reduced stock of algae and macrophytes, can in turn influence the epibenthic community on which fish and other aquatic organisms depend, particularly the epibenthic communities prevalent in shallow-water habitats.

The existing Terminal 1 dock generates shade in shallow-water habitat immediately adjacent to the shoreline, but the degree of shading is limited because the dock has a small footprint and is elevated over the water surface, allowing light to penetrate beneath it. Due to the dock's primarily east-west orientation, most of the shading around the dock occurs in the area between the dock and the shoreline and does not extend into the deepwater habitat of the adjacent navigation channel and turning basin.

Vessels berthed at the dock increase the shading of both shallow and deepwater habitat. The extent of this increased shading is determined by the size of the vessel and the length of time it is docked. Under the proposed action, tank vessels calling at Terminal 1 would be either tank barges or tankers (Section 3.17, *Vessel Traffic*). The typical 550-class tank barge is approximately 512 feet in length and a maximum of 78 feet wide and is assisted by a tug that is approximately 127 feet long and a maximum of 42 feet wide, representing approximately 45,270 square feet (1.04 acres) of overwater shading of deepwater habitat.[8] With a maximum overall length of up to 950 feet and a maximum width of approximately 106 feet, Panamax class tankers would add approximately 100,700 square feet (2.31 acres) of overwater shading of deepwater habitat. The operational assumption is that a tank barge would occupy the berth for 24 hours and a tanker would occupy the berth for 48 hours (WorleyParsons 2014). At maximum throughput, a tank vessel related to the proposed action would be docked at Terminal 1 up to 119 days per year.

As described in Section 3.4.4.3, *Grays Harbor*, eelgrass does not occur under the dock or along the adjacent shoreline. Low densities of sparsely distributed macroalgae have been found in the inner margins of the harbor on derelict pilings and boulder riprap armoring the shoreline near the project site. Neither eelgrass nor macroalgae occur in the deepwater habitat of the navigation channel. Macroalgae on derelict pilings and boulder riprap armoring the shoreline would not be affected by vessel shading because these substrates are not located beneath the dock where the vessels would be berthed.

Although some reduction in primary productivity from vessel shading is possible, the combination of tidal currents and the flow of the Chehalis River at Terminal 1 continually circulate water along the shoreline, around berthed vessels and the dock, and within the navigation channel and large body of Grays Harbor. As discussed in Section 3.5.4.1, *Project Site*, approximately 8,088 acres of deepwater habitat (areas that are maintain more than 18 feet of water at mean lower low water) are present in Grays Harbor, including the navigation channel and turning basin. Under the proposed action, the largest vessel size (Panamax) would create shade over 0.03% of the deepwater habitat in Grays Harbor. Deepwater habitats generally have lower primary production potential due to

[8] This estimate is slightly high as the total length of the coupled tank barge is less than the collective lengths of the tank barge and tug.

reduced penetration of sunlight with depth and increased turbidity. Therefore, the proposed action would not reduce the primary productivity of plankton or aquatic plants to any measurable extent.

Leaks and Spills

Diesel fuel, oils, grease, and other fluids required for the operation and maintenance of vessels could be deposited onto vessel surfaces where precipitation and storm flows could carry them into adjacent surface waters and wetlands where they could adversely affect plants. However, the potential for these types of leaks and spills to occur would be reduced by regular inspections and by implementing standard good housekeeping BMPs. These releases would be limited to minor drips and leaks from equipment located within contained areas of the vessel such that there would be limited risk of exposing plants to contaminated stormwater. Although the proposed action would result in a slight increase in leaks and spills of petrochemicals due to the increased frequency of vessel traffic and maintenance activities compared to the no-action alternative, the overall impacts on plants are anticipated to remain low. The potential for larger spills to occur during vessel transport that could directly affect plants are addressed in Section 4.6, *Environmental Health Risks—Vessel Transport.* Potential impacts from such spills are presented in Section 4.7, *Impacts on Resources*.

3.4.6 What required permits and plans apply to plants?

The following permits conditions and required plans are expected to reduce impacts on plants. Additional requirements specific to the handling, storage, and transport of crude oil are discussed in Chapter 4, *Environmental Health and Safety*.

- City of Hoquiam Conditional Land Use Permit
    - Comply with HMC 10.05.065 requiring planting 63 deciduous trees and planting 42 evergreen trees, based on the requirement to achieve 18 inches total caliper inches (i.e., 18 inches worth of tree trunk diameter—a measure of the size of trees at installation) of new deciduous trees and 18 feet total height of new evergreen trees (each tree being 3 feet high) for every gross acre of construction.

3.4.7 What mitigation measures would reduce impacts on plants?

This section describes the applicant mitigation that would reduce impacts on plants from construction and routine operation of the proposed action. Mitigation measures to reduce potential impacts related to increased risk of incidents and related consequences are presented in Chapter 4, *Environmental Health and Safety*.

3.4.7.1 Applicant Mitigation

The applicant will implement the following mitigation.

- To reduce the potential for impacts on aquatic plants from the increase in ballast water discharges during bulk liquid operations, the applicant will prepare an invasive species monitoring plan in consultation with Washington Department of Fish and Wildlife and implement prior to the start of the proposed operation.

3.4.8 Would the proposed action have unavoidable and significant adverse impacts on plants?

Compliance with the applicable regulations and permits along with implementation of the mitigation measure described above would reduce impacts on plants. There would be no unavoidable and significant adverse impacts from construction or routine operation. Potential impacts related to increased risk of incidents and related consequences are addressed in Chapter 4, *Environmental Health and Safety*.