# Attachment A: Project Description – Section 6 Narrative

## A.1: Joint Permit Application Box 6 Project Description Narrative

# TECHNICAL MEMORANDUM

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| **DATE:** | October 13, 2017 |
| **SUBJECT:** | USACE Section 404 Application Attachment A: Box 6 |
| **DEA PROJECT NAME:** | Jordan Cove Energy Project |
| **DEA PROJECT NO:** | JLNG0000-0003 |
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## *6. PROJECT DESCRIPTION*

The following narrative, detailed in this Attachment A below, is provided for Box 6 of the Section 404 permit application.

## Section A

### 6.1 *BRIEFLY* SUMMARIZE *THE OVERALL PROJECT INCLUDING WORK IN AREAS BOTH IN AND OUTSIDE OF WATERS OR WETLANDS.*

Jordan Cove Energy Project, LP ("JCEP") is seeking authorization from the Federal Energy Regulatory Commission ("FERC") under Section 3 of the Natural Gas Act ("NGA") to site, construct, and operate a natural gas liquefaction and liquefied natural gas ("LNG") export facility ("LNG Terminal"), to be located on the bay side of the North Spit of Coos Bay, Oregon. JCEP will design the LNG Terminal to receive a maximum of 1,200,000 dekatherms (a unit of energy used to measure natural gas, approximately equal to one thousand cubic feet) per day ("dth/d") of natural gas and produce a maximum of 7.8 million tons per annum ("mtpa") of LNG for export. The LNG Terminal will turn natural gas into its liquid form via cooling to about -260 degrees Fahrenheit ("F"), and in doing so, it will reduce in volume to approximately 1/600th of its original volume, making it easier and more efficient to transport. The LNG Terminal, related facilities, temporary construction sites, and other sites/actions associated with LNG Terminal construction are collectively referred to as the "JCEP Project Area."

In order to supply the LNG Terminal with natural gas, Pacific Connector Gas Pipeline, LP ("PCGP") is proposing to contemporaneously construct and operate a new, approximately 229-mile-long, 36-inch-diameter natural gas transmission pipeline from interconnections with the existing Ruby Pipeline LLC and Gas Transmission Northwest LLC ("GTN") systems to the LNG Terminal ("Pipeline," and collectively with the LNG Terminal, the "Project"). PCGP will address the potential environmental effects of constructing the Pipeline in Part 1 of this 404/10 Permit Application.

### 6.1.1 Project Components

The JCEP Project Area is made up of the following components, which are also shown in Resource Report 1 (Attachment A.2):

- Ingram Yard – the portion of the LNG Terminal site that will house permanent LNG Terminal facilities including LNG tanks and liquefaction equipment, and temporary facilities such as the Temporary Materials Barge Berth ("TMBB") . Impacts to freshwater wetlands in the vicinity of the LNG Terminal construction activities will be avoided.
- Slip – a permanent facility on Ingram Yard adjacent to the access channel. LNG carriers will enter the slip via the access channel, be loaded with LNG, and leave for export. The slip will include an LNG carrier loading berth and LNG loading facilities, a tug berth, and an emergency lay berth to safely moor a temporarily disabled LNG carrier. Construction of the slip, which will include the use of a hydraulic dredge pipeline for sand translocation, will take place entirely within an upland area that will be separated from Coos Bay by a berm that will subsequently be removed to connect it to the access channel;
- Access channel – the access channel will be dredged north of the Federal Navigation Channel ("FNC") to provide LNG carriers with access from the FNC to the slip.
- Material Offloading Facility ("MOF") – a permanent facility east of the slip where fill will be placed to construct a barge berth. Dredging will occur to access the MOF.
- Temporary Materials Barge Berth ("TMBB") - An offloading facility that will be constructed on an existing berm west of the MOF to facilitate early construction activities and removed when the access channel is dredged and the berm related to the slip construction is removed.
- Access and Utility Corridor – a corridor connecting Ingram Yard and the South Dunes site that will provide temporary construction and permanent access roads and facilities, and will include the Fire Department Facility, underground utilities and gas feed to the LNG Terminal.
- South Dunes – the portion of the LNG Terminal site that will house temporary construction and permanent facilities, including a Workforce Housing Facility, metering station, administrative building, and the Southwest Oregon Regional Safety Center ("SORSC"), which will provide emergency response services for the facility and the southern Oregon region.
- Navigation Reliability Improvements – four permanent dredge areas adjacent to the FNC that will allow for navigation efficiency and reliability for vessel transit under a broader weather window.
- Meteorological Station – a permanent facility consisting of a tower located on the west side of the lagoon on the North Spit, used to measure wind speed, direction, and other weather data to provide weather information to the LNG Terminal facility and to support ship navigation.
- Industrial Wastewater Line and Water Line Relocation – an industrial wastewater line and water line, which will be permanently relocated in the vicinity of Trans Pacific Parkway.
- Trans Pacific Parkway and U.S. Highway 101 ("US-101") Intersection Widening – the asymmetrical widening of Trans Pacific Parkway to the north and US-101 to the west to provide safe ingress/egress for construction traffic, by creating a left-turn lane from Trans Pacific

Parkway onto northbound US-101 and a right-turn lane from US-101 onto Trans Pacific Parkway.

- Temporary Construction Sites – additional construction staging and temporary laydown of equipment will occur during construction of the LNG Terminal at the Roseburg Forest Products property, Boxcar Hill, Port Laydown site, and APCO Sites 1. Off-site park & ride lots will be developed as temporary facilities at Mill Casino in Coos Bay and Myrtlewood Factory & RV Park north of North Bend.
- Kentuck Project site – approximately 100-acre proposed mitigation and habitat restoration site associated with the LNG Terminal and the Pipeline.
- Eelgrass Mitigation site – approximately 9.3-acre proposed mitigation site for unavoidable eelgrass impacts associated with dredging of the access channel.
- Meteorological Data Buoys – Meteorological ocean data collection buoys would be installed to measure wind speed and direction, current speed and direction, and tide height in real time. The buoys would be located in the Pacific Ocean near the bay entrance, and within Coos Bay along the LNG carrier route. The updated buoys would be identified in coordination with the National Oceanic and Atmospheric Administration and the USCG, and permitted through applicable agencies. For the purposes of this application, it was assumed that the buoy anchoring system would need to be replaced at existing buoy locations. Removal of the existing anchor and installation of new industry standard anchoring systems would result in temporary disturbance to the channel bed, resulting in localized turbidity.

### 6.1.2 Site Preparation and Ground Improvements

Construction site preparation will require clearing, ground improvements (using vibratory compaction and removal of an organic layer, for example), filling, and grading of the site to design elevations to an approximate elevation of +46 feet North American Vertical Datum of 1988 ("NAVD 88") for the base of the LNG storage tank area, approximately +46 to 66 feet NAVD 88 for the Access and Utility Corridor, and +63 to 70 feet NAVD 88 for the South Dunes site. Temporary ditches, sediment fences, and silt traps will be installed as necessary. Individual excavations will then be made for equipment foundations. Following completion of foundations, the site will be brought up to final grade. Final grading and landscaping will consist of gravel-surfaced areas, asphalt-surfaced areas, concrete-paved surfaces, and grass areas (the final site elevation will be raised above the tsunami inundation zone).

Ground improvements refer to the removal of an organic layer of soil, followed by vibratory compaction of the subsurface sand below and on the perimeters of the project design footprint. Any ground improvements will occur within the JCEP Project Area and under the toe of the slope. Site work will begin with grubbing and removal of the organic layer, followed by sand vibratory compaction, which includes filling localized compacted areas with sand to make the soils more dense. Compaction may be followed by excavation and deep soil mixing or peat removal in areas containing peat to reduce settlement. Ground improvements will result in temporary impacts where they affect wetlands and overall are not anticipated to affect wetland hydrology.

# Section B

## 6.2 *DESCRIBE WORK WITHIN WATERS AND WETLANDS.*

Work within wetlands and waters of the United States would occur due to activities associated with the following project components:

(1) Access channel
(2) MOF
(3) Access and Utility Corridor
(4) South Dunes site
(5) Navigation Reliability Improvements
(6) Trans Pacific Parkway/US-101 Intersection Widening
(7) APCO Site 1 and APCO Site 2
(8) Kentuck Project site
(9) Eelgrass Mitigation site

### 6.2.1 Access Channel

Access to the marine slip will be via a newly constructed access channel that will connect the slip to the FNC at approximate Channel Mile ("CM") 7.3. The access channel will be dredged to expand and deepen the area between the FNC and the existing shoreline, and will be connected to the slip via removal of the barrier berm at the south (Coos Bay) side of the slip. Dredging of the access channel and berm will result in the removal of approximately 1.9 mcy of material. The amount of material to be dredged from the access channel and berm, and its placement location, are shown in Table 6-2 below and detailed in the Project's Dredged Material Management Plan ("DMMP"), which is included as Attachment E. Design details regarding the access channel, barrier berm, and associated temporary facilities are provided in Attachment D.2.

The access channel and slip will be configured and oriented so that LNG carriers can dock safely, away from other ship traffic in the FNC, and to facilitate emergency egress. The access channel will flare from its narrowest point at the mouth of the slip, where it will have a minimum width of approximately 780 feet, to the intersection with the existing FNC, where it will have an approximate width of 2,200 feet. The perimeter of the access channel will be sloped to meet the existing bottom contours at an approximate angle of 3 feet horizontal to 1 foot vertical (3(h):1(v)). The marine slip and access channel will have a minimum depth of -45 feet below the mean lower low water ("MLLW") elevation (-45.97 feet NAVD 88) to ensure minimum under-keel clearance is achieved for the safe maneuvering and berthing of loaded LNG carriers. An additional 1.7-foot of advanced maintenance dredge ("AMD") and 2 feet of allowable overdepth will be included above the minimum dredge depth.

Based on modelling performed by Moffatt & Nichol ("M&N") (see Attachment E,DMMP), maintenance dredging is recommended to occur every three years for the first ten years and every five years thereafter. The estimated total dredge volumes are approximately 115,000 cubic yards ("cy") and 160,000 cy for the three-year and five-year maintenance dredging events, respectively. Activities associated with long-term maintenance dredging requirements for the access channel are detailed in the DMMP (Attachment E).

The marine slip will be 800 ft wide, and 1,500 ft and 1,200 ft long along the west and east boundaries respectively. The slip will be bounded on the east and west sides by sheet pile walls, creating a vertical face to support mooring structures for LNG carriers. The northern side of the slip will be sloped to meet the existing bottom contours at an angle between 2.5 and 3 feet horizontal to 1 foot vertical (2.5-3:1) and will feature riprap armoring along the submerged bank. The slip will be sized to provide the flexibility needed to safely maneuver an LNG carrier from the access channel into the slip when another LNG carrier is already berthed on the east side, and for tugs to move a temporarily disabled LNG vessel away from the loading berth on the east side of the slip to the emergency lay berth on the west side of the slip, if necessary.

After the access channel has been dredged, the barrier berm will be removed using a hydraulic or clamshell dredge in order to connect the slip to the bay.

#### 6.2.1.1 Construction Means and Methods

Dredging of the access channel will occur while the earthen barrier berm, which will separate the access channel from the slip, is in place. Both mechanical and hydraulic dredging methods may be used, depending on the type of material encountered, site constraints, and availability of dredging equipment at the time of construction. Mechanical dredging will be performed using a clamshell bucket or an excavator mounted on a barge. After excavation, rock material will be placed on a truck and deposited at the Ingram Yard site and the Roseburg site. Hydraulic dredging will use a rotating cutterhead that breaks up material and suctions water-sediment slurry into a scow for transit and offloading at the disposal site; alternatively, the slurry is pumped via a dredge line to an upland location, where dewatering occurs.

A detailed discussion of dredging methods is provided in the DMMP (Attachment E). Dredging methods described for the access channel will be generally similar to those that will be used in other dredge areas associated with the Project, including those for the Navigation Reliability Improvements and Eelgrass Mitigation site. Activities taking place at those sites are described in further detail in Section C below.

The TMBB will be constructed in the earthen barrier berm within the access channel footprint. It will be used to convey large cargoes, such as steel tank elements, sheet pile, and large equipment, to the site before the MOF is completed. Construction of the TMBB will result in fewer trucks trips to the site, thus reducing project-related road traffic. The TMBB will be an excavated slot in the shoreline that will be removed prior to the dredging of the slip and access channel. The TMBB will be constructed in the first available in-water work window that occurs after the initiation of overall construction activities. It will accommodate ocean-going barges that are from 100 to 250 feet in length. The barges will be berthed with one end pushed approximately 60 feet into the excavated shoreline slot. The excavated floor of the berth will be approximately 65 feet wide and extend 500 feet into the access channel footprint from the back of the berth. Use of the TMBB is likely to be restricted during low tides in order to prevent grounding of a barge.

This berth will be used until the MOF is able to receive materials. The construction sequence for the TMBB will be as follows:

(1) An excavator and 40-ton articulated trucks will cut and haul soil from the shoreline area near the face of the west side of the slip. The contractor will cut a notch large enough to receive and moor the end of an ocean-going barge. The excavators will cut down to an elevation of -12.97 feet NAVD 88 (-12 feet MLLW) and create a channel to deeper water. The excavator will mine material as it works away from the channel, passing excavated material back to the trucks for upland disposal.

(2) A crane will be used to install six temporary steel mooring piles: two in the end of the berth and two on each of the berth sides. The piles will be driven using a vibratory hammer until resistance is met, and then will be finished with an impact hammer. These piles will be removed during the berm excavation.

#### 6.2.1.2 Fill Material and Disposal Locations

As described in the DMMP (Attachment E), approximately 1.9 mcy of dredge materials from the access channel and barrier berm are proposed for disposal at the following locations: Ingram Yard, South Dunes site, Roseburg site, and the Kentuck Project site. Ingram Yard, the South Dunes site, and the Roseburg site are confined disposal facilities, and decant water will be directed to the slip. Dredge material placed at the Kentuck Project site will be barged to a temporary dredge offloading area and hydraulically pumped to the Kentuck Project site. Further details regarding the transfer of dredge materials, decanting, and processing of dredge materials are detailed in the DMMP (Attachment E).

In November 2011, the Portland Sediment Evaluation Team ("PSET") issued a suitability determination regarding sediment quality and suitability of dredged material from proposed deepening of the FNC. The PSET determined at the time that dredge prism material was suitable for unconfined aquatic disposal. In January 2016, the PSET issued a suitability determination regarding sediment quality and suitability of Project-related sediment for unconfined or aquatic disposal. In general, sediment was deemed suitable for the following planned disposal activities (see Attachment F):

- Upland disposal at the LNG Terminal site (by extension, given that upland disposal requirements are less onerous than those of aquatic disposal);
- Unconfined, aquatic placement within JCEP's restoration project area at the Kentuck Project site (it is noted that additional testing at the Kentuck Project site has been requested by Oregon Department of Environmental Quality (ODEQ) for PSET review); and
- Unconfined, aquatic placement of material from the Eelgrass Mitigation site within JCEP's restoration project areas.

#### 6.2.1.3 Wetland and Waterway Impacts

Fill and removal impacts will result from construction of the TMBB and access channel. These impacts are detailed in Table 4-2 and Figures 6.1-4 and 6.1-14. Impact figures indicate areas to be rectified upon project completion. Dredging of the access channel and removal of the berm will permanently impact unvegetated intertidal mudflats and vegetated shallows by converting these areas to deep subtidal habitat. Dredging will also impact deep subtidal habitat; however, impacts to deep subtidal habitat will be temporary, because natural recovery of benthic communities present within this habitat is expected within

a relatively short time frame following dredging. A study of benthic community recovery following maintenance dredging for a dredging project in Coos Bay, Oregon, documented recovery times of one month (McCauley et al. 1977, as cited in Wilber and Clarke 2007) in an area dominated by silt and clay at depths of approximately 35 feet. Another dredging project in Yaquina Bay, Oregon, documented recovery times of one year (Swartz et al. 1980, as cited in Wilber and Clarke 2007). The substrates at the Yaquina Bay dredging project—fine sand and silts—are similar to the substrates found in and around the access channel; therefore, recovery times are expected to be similar for benthic habitats disturbed by construction of the access channel. For these reasons, impacts to deep subtidal habitat is considered temporary, thus no mitigation is proposed.

For the TMBB, the impacts are completely within the permanent access channel footprint. Since the impacts of the TMBB are interim and will be subsumed by the permanent impacts from the dredging of the access channel, the impacts will not be counted separately toward the sum of all impacts. These impacts are shown in Tables 4-2 and 6-1 of this application for the sake of completeness and so the temporary placement of construction materials (e.g. temporary mooring piles) within the jurisdictional limits can be authorized. Impacts will include excavation of the barge berth slot, and installation of eight mooring and fender piles and eco-blocks to stabilize the slopes within the berth.

The areas east and west of the access channel footprint will be disturbed during the performance of dredging work, but they will not require fill or removal of material. Disturbance would be low-impact and could result from anchoring, setting hydraulic pile, or otherwise contacting the bottom of the existing channel with dredging or other marine construction equipment.

### 6.2.2 Material Offloading Facility ("MOF")

The MOF will be constructed on the east side of the access channel. It will be used to deliver components that are too large or heavy to be delivered by road or rail. In general, the MOF will feature sheetpile wall, mooring structures, and breasting structures, as detailed in Attachment D.1.

During construction of the LNG Terminal, the MOF will receive equipment and large modules (upwards of 6,000 short tons) by break bulk cargo carriers, roll-on/roll-off cargo carriers, and barges, and will allow other bulk materials to be delivered by sea in order to minimize impacts on the local road network. After project construction, the MOF will be retained as a permanent feature of the LNG Terminal to support the maintenance and replacement of equipment components that are too large to be transported by rail and road.

The location for the MOF is guided by the location of the mooring bollards, vessel mooring needs, and offloading requirements. The MOF has been designed for the range of vessels and cargoes expected to use the facility.

During operation of the LNG Terminal, the large equipment components or modules delivered to the LNG Terminal during the construction phase will need to be maintained and possibly replaced over the useful life of the LNG Terminal. Access by water remains the only method to move the damaged or large components requiring repair off the site and to deliver new or refurbished large components to the site.

The MOF provides the only location for these components to be delivered once the facility is constructed and placed in operation, because equipment congestion on the site will preclude the use of other marine landing areas either within the slip or at other marine facilities located on the North Spit.

#### 6.2.2.1 Construction Means and Methods

Construction of the MOF will generally be sequenced as follows:

(1) Soil will be excavated from the southern portion of the existing dune using an excavator and 40-ton articulated trucks. Clean fill sourced from dune areas of Ingram Yard will be placed beyond the shoreline, extending up to approximately 30 feet outside of the MOF footprint and above the Highest Measured Tide ("HMT") elevation. Riprap or equivalent shore protection will be temporarily placed on the face of the slope to protect sandy material from tidal erosion while it remains in place for two to three years.

(2) Using the placed fill to locate construction equipment, sheet piles will be driven as a land-based activity in order to reduce acoustic impact to the marine environment. Following installation of the sheetpile wall, the MOF will be backfilled to elevation +13 feet NAVD 88.

(3) A clamshell and/or cutter suction dredge operation will remove all material from the front of the MOF during the approved in-water work window to achieve operational depth requirements. After the sheet pile wall system has settled, a topping-off operation behind the sheetpile wall will occur before concrete and rock are placed on top of the MOF. Piling for mooring bollards and mooring structures will be installed in the MOF fill, as well as fender pile in the water in front of the MOF, to make it fully operational. In-water fender piles will be installed during the in-water construction window.

#### 6.2.2.2 Fill Material and Disposal Locations

Temporary sand fill that is placed within Coos Bay beyond the MOF footprint will consist of approximately 30,000 cy of clean sand fill sourced from dune areas of Ingram Yard. The temporary fill will be permanently disposed of at Ingram Yard, the South Dunes site, and the Roseburg site following removal. Decant water will be directed to the slip. Details regarding the decanting and processing of dredge materials are provided in the DMMP (Attachment E).

#### 6.2.2.3 Wetland and Waterway Impacts

Construction of the MOF will result in temporary fill and subsequent removal, and permanent fill impacts within Coos Bay, as detailed in Table 4-2 and Figures 6.1-4 and 6.1-15. Riprap will be temporarily installed on the face of the temporary sand fill slope to prevent the sand from eroding while it is in place. The in-water portions of the construction of the MOF will take place over multiple in-water work windows (October 1 to February 15). Impacts related to the placement and subsequent removal of sand fill and riprap are not counted toward the sum total of impacts, because these impacts will take place entirely within the footprint of permanent impacts associated with dredging of the access channel. These impacts are shown in Tables 4-2 and 6-1 for completeness, and to provide information necessary for permitting the placement of fill within the estuary. Construction of the MOF will permanently impact

areas of tidal mudflats within Coos Bay, because the finished footprint of the MOF will extend seaward of the current shoreline.

### 6.2.3 Access and Utility Corridor

An approximately 1-mile-long permanent access and utility corridor will be constructed between Ingram Yard and the South Dunes site to provide a conduit for the underground feed gas supply to the LNG Terminal and a number of underground utilities, as well as a location for permanent aboveground facilities, including fire water storage tanks for the LNG Terminal and the Fire Department facility.

A temporary construction haul road will be constructed within the Access and Utility Corridor to facilitate movement of equipment and materials during construction. During operation of the LNG Terminal, the western portion of the Access and Utility Corridor between the LNG Terminal and Jordan Cove Road will be paved and will provide primary permanent access; it will include two lanes into the LNG Terminal and a single lane out. The corridor east of Jordan Cove Road will be provided with a crushed rock track for infrequent maintenance access. The Access and Utility Corridor will provide access to the South Dunes site from Jordan Cove Road.

In addition to vehicle access at Jordan Cove Road and the South Dunes site, an access road will be developed at the northwest corner of Ingram Yard to provide an alternative or emergency access to the facility and direct access to marine slip and LNG carrier berths.

#### 6.2.3.1 Construction Means and Methods

Conventional earth-moving equipment will be used to construct the Access and Utility Corridor.

Retaining walls will be constructed to avoid permanent impacts to Wetland 2013-1 and 2013-2. Areas where ground improvements and/or disturbance will occur in wetlands outside the toe of slope will be restored to pre-project conditions following construction , per the Site Restoration Plan detailed in Attachment I. Additional measures for avoiding and minimizing impacts to wetlands and waters are discussed further under Section C, below.

#### 6.2.3.2 Fill Material and Disposal Locations

Fill material used for construction of the Access and Utility Corridor, similar to the fill material used at Ingram Yard and the South Dunes site (described below) will generally be sourced from areas excavated to construct the slip and the access channel. Sources of fill to be used for construction of the Access and Utility Corridor are listed in the DMMP (Attachment E).

#### 6.2.3.3 Wetland and Waterway Impacts

Construction of the Access and Utility Corridor will require excavation and placement of fill within wetlands. The construction will result in permanent and temporary impacts to Wetlands 2013-6 and 2012-2 west of Jordan Cove Road, and Wetlands C and E east of Jordan Cove Road, as detailed in Table 4-2, Table 6.1, and Figures 6.1-5, 6.1-6, and 6.1-16.

Permanent impacts to Wetlands 2013-6, 2012-2, and E will result from the building of the new embankment and any potential slope stabilization or subsurface treatment at the toe of the slope. Temporary impacts at Wetlands 2013-6 and 2012-2 will result from the installation of a new pipe culvert that connects the two wetlands. Temporary impacts could also result from the operation of construction equipment and temporarily installed access (fill or matting). These areas will be restored to pre-project conditions after construction is completed.

The south slope of the Access and Utility Corridor in the vicinity of Wetland C will require bank armoring to prevent potential slope failure resulting from storm surges, resulting in permanent impacts to Wetland C. Wetland C cannot be avoided without causing notable impacts to other nearby wetlands or the estuary. Shifting the Access and Utility Corridor to avoid these resources would result in notable impacts to other wetlands, other portions of the same wetlands, or to the estuary.

### 6.2.4 South Dunes Site

Most of the permanent freshwater wetland impacts associated with construction of the LNG Terminal and related facilities will occur as a result of site preparation, grading, and facilities construction at the South Dunes site, which has experienced past industrial development that has lowered the quality of the wetlands in these areas. Once raised to a finished grade of 63 to 70 feet, the South Dunes site will serve as the location for a temporary Workforce Housing Facility, an administrative building, an LNG pipeline metering station, and the SORSC. After construction, the temporary Workforce Housing Facility will be removed, and the area will be used for an operational and maintenance laydown area.

The fill at the South Dunes site is necessary in order to establish all permanent infrastructure above the design tsunami flood elevation of +34.5 feet NAVD88. It is also needed in order to achieve a uniform site grade and elevation and to avoid trucking millions of cubic yards of fill to off-site disposal areas. Impacts to the affected low-value wetlands on the South Dunes site are mitigated at the Kentuck Project.

#### 6.2.4.1 Construction Means and Methods

Demolition and removal at the South Dunes site will begin with the breaking up of all concrete and asphalt surfaces in areas requiring soil improvement to allow equipment to penetrate the ground. Concrete and asphalt in other areas will be penetrated sufficiently to allow stormwater percolation into the underlying soil, and buildings, steel tanks, and aboveground features will be removed.

Salvage of topsoil and organic material will occur on all portions of the site. In areas requiring fill, soil improvements will be performed prior to embankment of fill. In areas requiring cut, soil improvements will be performed after the area is rough graded to reduce the depth of these improvements. Soil improvements will include vibro-compaction with sand to densify the soil in order to reduce the potential for liquefaction; vibro-compaction will be followed by excavation and deep soil mixing (or peat removal in areas containing peat) to reduce settlement.

Conventional earth-moving equipment will be used to grade the site and raise the site elevations to +63 feet to 70 feet NAVD88, as required for the JCEP Project Area. Retaining walls on the north side of Wetland 2012-5 and near Wetland L will be installed to minimize permanent wetland impacts. Areas

where ground improvements occur in wetlands outside the toe of slope will be restored to pre-project wetland conditions to the extent practicable, per the Site Restoration Plan (Attachment I).

#### 6.2.4.2 Fill Material and Disposal Locations

Development of the South Dunes site will rely on excavated material from the slip, access channel, and Ingram Yard to increase the finished grade at the site and raise the elevation out of the tsunami inundation zone. Details regarding the placement of dredge materials at the South Dunes site, and the decanting and processing of dredge materials are provided in the DMMP (Attachment E).

#### 6.2.4.3 Wetland and Waterway Impacts

Wetland impacts associated with development of the South Dunes site are detailed in Tables 4.2 and Table 6-1, and shown in Figures 6.1-8, 6.1-9, and 6.1-17 to 6.1-19.

Fill and grading of the South Dunes site, along with construction of the temporary Workforce Housing Facility, administrative building, LNG pipeline metering station, and SORSC, will result in permanent impacts to Wetlands I (north and south), H (east and west), and N. Following removal of the temporary Workforce Housing Facility, its footprint area will be permanently used to maintain elevation above tsunami design height criteria and for equipment staging and maintenance during operations. As a result, the wetland areas currently located within the footprint of the temporary Workforce Housing Facility could not feasibly be restored.

Permanent impacts to Wetland J will result from changes to its upstream hydrology from soil preparation and installation of permanent fill on other areas of the South Dunes site. These impacts will eliminate the existing source of drainage to the freshwater portion of Wetland J that would otherwise be temporarily disturbed. Therefore, it is not anticipated that wetlands could be re-established within the area of temporary disturbance after construction is complete.

Wetlands F and G are not subject to regulation under Section 404, because they are subject to National Pollutant Discharge Elimination System ("NPDES") authority under the exclusive jurisdiction of the Oregon Department of Environmental Quality ("DEQ"). These wetlands were constructed as wastewater treatment facilities associated with a former mill at the site, are not hydrologically connected to Coos Bay, and are subject to an ongoing site closure process overseen by DEQ. DEQ has determined that barring any expansion of these wastewater treatment facilities into surrounding jurisdictional waters, no permit is required under Section 404 as detailed in Attachment C.4.

### 6.2.5 Navigation Reliability Improvements

The Navigation Reliability Improvements ("NRIs") will allow for navigation efficiency and reliability for vessel transit under a broader weather window, to enable JCEP to export the full capacity of the optimized design production of 7.8 mtpa from the LNG Terminal. JCEP plans to excavate four submerged areas lying adjacent to the FNC; these areas are referred to individually as Dredge Areas 1 through 4.

JCEP proposes to lower Dredge Areas 1 through 4 to a navigation depth of -37 feet MLLW, plus advance maintenance dredge of 2 feet and Allowable Overdepth of an additional 2 feet for a total combined depth of -41 feet MLLW. Design channel side slopes are proposed at three horizontal to one vertical (3:1) in sandy material at Dredge Areas 1 through 3; at four horizontal to one vertical (4:1) side slope in sandy material at Dredge Area 4; and at one horizontal to one vertical (1:1) in the rock areas. The dredge areas are located adjacent to the FNC roughly between CM 2 to CM 7, respectively, as illustrated in Attachment D.3. Dredge material from the NRIs would be disposed of at the APCO Sites 1 and 2

Further details regarding NRI dredging activities are outlined in the DMMP (Attachment E).

#### 6.2.5.1 Construction Means and Methods

Similar to methods described above for the slip, two methods of dredging could be used for the NRIs: mechanical dredging via clamshell or excavator, and hydraulic cutter suction ("CS") dredging. Mechanical dredging via clamshell or excavator would involve placement into a scow or hopper barge for transit to a temporary dredge offloading area and hydraulic pumping to disposal sites. Hydraulic CS dredging could involve pumping material via temporary dredge lines directly to a scow or barge for offloading at disposal sites, or pumping the material via temporary dredge lines directly to disposal sites.

Dredging of the NRIs will remove approximately 590,000 cy of material. Dredge material from the NRIs will be placed at APCO Sites 1 and 2. Two options are available to place material at the APCO Sites 1 and 2: direct hydraulic placement and hydraulic placement via mechanical offloading. Dredging will require a temporary dredge slurry pipeline to be placed on the bottom, running along the outer limits of the Coos Bay FNC, to connect the first deepening location to APCO Site 2. Navigation markers will be used where the dredge slurry pipeline temporarily crosses the FNC for Dredge Areas 2 and 3. The pipeline would be elevated at fixed locations to feed booster pumps. The booster pumps would be located on barges, which would be moored on the eastern side of the FNC using temporary piles and/or spuds, and which will be used to move the dredge slurry toward APCO Sites 1 and 2 for disposal.

The temporary dredge slurry pipeline would be elevated through the use of temporary structures or floats before the dredge material is discharged at APCO Site 2. It is anticipated that the pipeline would largely be able to span or avoid vegetated shallows (eelgrass) and estuarine wetland habitat disturbances by this method.

If dredge material is offloaded from a barge/scow, a temporary dredge offload facility would need to be constructed to hydraulically transfer dredge material to APCO Site 2. The hydraulic unloader will operate from a deck barge up to 40 feet by 100 feet in size, similar to the Kentuck Mitigation site, Dredged Material Unloading Feasibility Memo depicted provided in Attachment D.4. Two flat deck mooring/fleeting barges (measuring 40± feet by 160± feet) will be moored adjacent to the unloader barge. Approximately 16 temporary piles and/or spuds 24 inches in diameter would be used to moor the barges, depending on actual equipment and configuration.

A detailed discussion of dredging and dredge material disposal methods is provided in the DMMP (Attachment E).

#### 6.2.5.2 Fill Material and Disposal Locations

The total volume of material to be hydraulically dredged from the NRIs will be approximately 590,000 cy. All of the dredge material will be disposed of in upland confined sites located at APCO Site 1 and APCO Site 2. The DMMP (Attachment E) provides details regarding the decanting and processing of dredge materials to APCO Sites 1 and 2. Sources of fill are further detailed in Table 6-2 below.

#### 6.2.5.3 Wetland and Waterway Impacts

Dredging of the NRIs will result in impacts to deep subtidal habitat similar to those described above for the access channel. These would be temporary and localized, and due to the short time in which benthic communities would be expected to recover, no mitigation is proposed.

The Temporary Dredge Line will be supported in one location by steel piles that span a band of eelgrass within vegetated shallows on the northern shore of APCO Site 2 (see Attachment D.6). While up to five piles might need to be located in the eelgrass area, the crossing is at the narrowest band of eelgrass on the northern shore of APCO Site 2. The piles will be installed using vibration equipment; however, an impact hammer could be required if resistance is met. The temporary piles will be removed once all dredging operations are completed.

All work associated with the NRIs will take place during the approved in-water work period for Coos Bay (October 1 to February 15). The wetland and waterway impacts associated with the NRIs are detailed in Tables 4-2 and 6-1 and Figure 6.1-12.

### 6.2.6 Trans Pacific Parkway/US-101 Intersection Widening

These improvements will involve widening Trans Pacific Parkway on the north side to provide a left-turn lane onto northbound US-101 to accommodate larger vehicles that require access to the JCEP Project Area during construction and operation of the LNG Terminal. The existing travel lanes are 11 feet wide, with less than 1 foot between the edge of the pavement and the fog line; most areas have a wide gravel shoulder. The proposed improvements would provide a wider turning radius from southbound US-101 onto Trans Pacific Parkway, two 12-foot travel lanes, a 14-foot left-turn lane, 6-foot shoulders with guardrail, and a 2-foot gravel shoulder on the north side of the guardrail. The existing gravel shoulder on the south side of the parkway will remain as currently configured. Intersection improvement plans and stormwater treatment details are included in the Trans Pacific Parkway / US 101 Intersection Widening design drawing (Attachment D.5).

#### 6.2.6.1 Construction Means and Methods

Embankment widening on the north side of the causeway at Trans Pacific Parkway/US-101 will extend for approximately 650 feet and will be constructed on a grid of untreated timber piling driven in the soft bay mud. No treated timbers will be used. To drive the pile grid, the contractor will construct a work access bridge as pile driving is progressed parallel to Trans Pacific Parkway. The grid of piling will then be capped with riprap embankment, providing a foundation to widen the roadway to the north. Construction will be isolated from Coos Bay with a temporary sheetpile work isolation containment system and turbidity curtain. These measures to isolate the work area will minimize fill impacts.

#### 6.2.6.2 Fill Material and Disposal Locations

Riprap fill will be imported from an approved facility. No soil will be removed from this location.

#### 6.2.6.3 Wetland and Waterway Impacts

Embankment widening and placement of riprap below HMT elevation will result in permanent impacts to unvegetated mudflats, as detailed in Tables 4-2 and 6-1 and Figures 6.1-12 and 6.1-20.

### 6.2.7 APCO Site 1 (East) and APCO Site 2 (West)

APCO Site 1 and APCO Site 2 consist of two relatively level sandy fill pads that are currently vacant, separated by a tidal mudflat, and surrounded by estuarine wetlands. APCO Sites 1 and 2 will be used as upland dredge disposal sites for the Project.

Disposal of dredge material at APCO Sites 1 and 2 will require the "on-shoring" of the temporary dredge material pipeline discussed under the NRIs for hydraulically and mechanically dredged material, as detailed above, in order to provide for direct pumping to the sites. If material needs to be offloaded from a barge/scow, a deck barge would also need to be moored adjacent to APCO Sites 1 and 2 using temporary piles or spuds, to provide an offloading facility for dredged materials that would be mechanically offloaded (as depicted in Attachment D.6).

Hydraulically dredged (or offloaded) material will be transported via pipeline as described under the NRIs, and will be discharged directly within the containment berms at both APCO Sites 1 and 2, if deemed feasible. Decant water would be discharged to Pony Slough via a controlled outlet.

Alternatively, dredge material could be mechanically offloaded from the barge moored adjacent to APCO Site 2. Mechanical offloading reduces the amount of water discharged onto the site, allowing direct placement of the material without an explicit need for containment berms. Details regarding the disposal, decanting, and processing of dredge materials to APCO Sites 1 and 2 are provided in the DMMP (Attachment E).

Management of dredge material at APCO Sites 1 and 2 will require the construction of a permanent bridge connecting the two sites to provide access from APCO Site 1 to APCO Site 2 for heavy earth-moving equipment (as detailed in Attachment D.7).

The permanent bridge will be single-lane, single-span approximately 200 feet long and approximately 40.5 feet wide, and will include two concrete abutments on pile-supported footings with material-stabilized earth walls that extend landward. The bridge will completely span the intertidal wetland separating the sites, and the material-stabilized earth walls extending from the abutments will eliminate the need for fill material to extend below the HMT or wetlands.

#### 6.2.7.1 Construction Means and Methods

The APCO Site is a confined site. Containment berms will be constructed around the perimeter of both APCO Site 1 and APCO Site 2 with earth-moving equipment using on-site material and, where practical, incoming dredge material to build up the perimeter berms to receive dredge materials.

Construction of the permanent access bridge between the two sites will begin with construction of a temporary work bridge to the north of the location of the permanent bridge that will provide access for construction of the permanent structure. The temporary work bridge will be approximately 30 feet wide and 280 feet long, and will have seven 40-foot spans. It is likely that the temporary work bridge would use three steel piles per cross support structure, and have a steel frame and a steel or concrete bridge deck. The steel plate girders for the bridge will be assembled and installed on-site. Precast deck panels will be installed between each of the four steel girders, and a cast-in-place concrete deck will be poured over the steel girders and deck. All water that comes in contact with green concrete during pouring of the concrete bridge deck will be pumped into tanks for disposal at an approved off-site location.

#### 6.2.7.2 Fill Material and Disposal Locations

The placement of fill is limited to the installation of temporary piling for the eelgrass crossing of the temporary dredge pipeline and temporary piling or spuds associated with the dredge offload facility.

#### 6.2.7.3 Wetland and Waterway Impacts

The temporary bridge will begin and end on dry land, and the end bents will be outside the HMT boundary; however, approximately fifteen 24-inch-diameter steel piles would need to be installed below HMT within the mudflat that separates APCO Sites 1 and 2 to support the five interior bents. The temporary bridge will be in place for less than 24 months, and therefore no permanent wetland and waterway impacts are anticipated.

Impacts to wetlands and waters associated with APCO Sites 1 and 2 are further detailed in Tables 4-2 and 6-1 and Figures 6.1-10, 6.1-11, and 6.1-21.

### 6.2.8 Kentuck Project Site

The Kentuck Project is a roughly 100-acre wetland mitigation and coho salmon habitat rehabilitation project located on the western shore of Coos Bay at the mouth of the Kentuck Slough. Construction activities at the Kentuck Project include earthwork and civil infrastructure improvements to re-establish a tidal connection to this former golf course site that more closely approximates conditions at the site prior to the creation of the golf course (see Attachment J – Compensatory Wetland Mitigation Plan).

Kentuck Slough has subsided approximately 2 to 3 feet from its historical profile as a result of diking and drainage; therefore, earthwork activities will include importing of dredge materials from other areas of the JCEP Project Area to raise the subgrade to a profile conducive to establishing appropriate estuarine habitat and some freshwater habitats. Historical drainage patterns will be re-established to the extent practical given the site constraints.

Infrastructure improvements will include:

- Constructing a new bridge in East Bay Drive to allow tidal exchange between Kentuck Inlet and the Kentuck Project;
- Improving the existing dike separating the site from Kentuck Slough;
- Constructing a new muted tidal regulator (i.e., a "fish-friendly" tidegate) in the upper portion of the Kentuck Project to redirect a portion of Kentuck Slough flows into the Kentuck Project site;
- Raising the profile of East Bay Drive and approximately 1,900 lineal feet of Golf Course Lane to be above the zone of tidal influence;
- Installing stormwater treatment facilities for new impervious surfaces along East Bay Drive and Golf Course Lane;
- Constructing a fish-friendly culvert or other structure within Golf Course Lane to allow passage into the drainage above the former golf course irrigation sump pond;
- Constructing a temporary unloading facility, including a hydraulic unloader on a deck barge, mooring/fleeting barges, booster pump(s), and a dredge material transport pipeline; and
- Constructing a boardwalk path upland, on the southern boundary of site.

#### 6.2.8.1 Construction Means and Methods

Construction will require a variety of temporary structures and detour facilities to isolate work areas from aquatic resources and provide access to adjacent private property. The proposed work will also remove, to the greatest extent practicable, relic golf course facilities such as fencing, ditches, foot bridges, and culverts.

Similar to the dredge offloading detailed for NRIs in Section 6.2.5 above, dredge materials will be mobilized to the site by barge and an approximately 24-inch diameter Temporary Dredge Transfer Line (from barge to site) to minimize traffic and safety impacts to the local road system. The length of the Temporary Dredge Transfer Line between the proposed hydraulic unloader and the point where the pipeline will cross under East Bay Drive and enter the Kentuck mitigation site is approximately 7,900 feet. Additional upland pipe within the mitigation site could extend up to approximately 5,000 feet from the pipeline's entrance to the site. The dredge offloading activities are illustrated in Figure 6.1-13 and further detailed in Attachment D.4.

#### 6.2.8.2 Fill Material and Disposal Locations

JCEP anticipates that approximately 300,000 cy of imported dredge material would be mobilized to the site by barge and temporary hydraulic dredge pipeline. The DMMP (Attachment E) provides details regarding the trans-shipment of dredge materials, and the decanting and processing of dredge materials at the Kentuck Project site. Sources of fill are listed in Table 6-2.

#### 6.2.8.3 Wetland and Waterway Impacts

The Kentuck Project is being developed to restore estuarine habitat and provide mitigation for wetland impacts within the JCEP Project Area and PCGP. Details regarding mitigation goals and objectives as it relates to wetland and waterway impacts are provided in the CWMP (Attachment J). Incidental impacts of work in waters and wetlands associated with the Kentuck Project are not included in tables and figures,

because the overall impacts associated with mitigation and habitat restoration are considered to be beneficial.

#### 6.2.8.4 Eelgrass Mitigation Site

The Eelgrass Mitigation site is approximately 9.3 acres in size and is located approximately 500 feet southeast of the offshore end of the North Bend Municipal Airport runway and about 200 feet off the opposite North Bend shoreline (see Attachment J – Compensatory Wetland Mitigation Plan). The area of Coos Bay surrounding the Eelgrass Mitigation site and extending west to the FNC is composed of lower intertidal mudflat and shallow subtidal habitat(s), including eelgrass beds. Construction of the Eelgrass Mitigation site will involve lowering the bottom grade of a high spot in the bay bordered by existing eelgrass bed. This elevated area (mound) is currently not supporting eelgrass because of its elevation. Most of this area is currently between elevations +2 and +3 ft MLLW (+1.and +2 ft NAVD 88) and will be lowered to an elevation between approximately 0 to -1 ft MLLW (-1 to -2 ft NAVD 88).

#### 6.2.8.5 Construction Means and Methods

The Eelgrass Mitigation site will be excavated and/or dredged down to approximately an elevation between approximately 0 to -1 ft MLLW (-1 to -2 ft NAVD 88).-4.25 feet NAVD 88 (-3.28 feet MLLW) to +2.3 feet NAVD 88 (+3.27 feet MLLW), resulting in the removal of approximately 40,000 cy of material. The site will be allowed to stabilize for one winter storm cycle and will then be transplanted with eelgrass donor stock in subsequent years.

As depicted in Attachment D.8, construction will use a small, self-propelled hydraulic dredge designed to access and work in shallow-water sensitive habitats such as marshes and nearshore areas. The dredge will be equipped with a hydraulic dredge pump system mounted on an excavator arm. These dredges are typically equipped with a spud system for positioning and holding the dredge in place.

The dredge will pump material from the site through a pipeline to a barge-mounted, scow loading facility of up to approximately 60 feet by 200 feet in size, sited as close to the Eelgrass Mitigation site as possible in a minimum 20-foot water depth. Temporary piles and/or spuds 24 inches in diameter will be used to moor the barge and material scows. Approximately 10 piles are expected to be required, but the number will vary depending on the contractor's actual equipment and configuration.

Approximately two booster pumps will be needed to maintain the necessary flow within the pipeline. These would likely need to be mounted on small anchored/spudded barges capable of grounding, or placed on small temporary platforms constructed with three or four support piles. The pipeline length from the Eelgrass Mitigation site to the proposed hydraulic loader location is approximately 4,500 feet. Most of the pipeline would extend across shallow, subtidal mudflats, lower intertidal areas, and some eelgrass areas close to the mitigation site. It is anticipated that the pipeline would be elevated in a manner similar to that described for the APCO Sites 1 and 2 in order to avoid impacts to these habitats.

#### 6.2.8.6 Fill Material and Disposal Locations

Approximately 40,000 cy of material will need to be removed to bring the area down to design grade. Material excavated/dredged from the Eelgrass Mitigation site will be transported to APCO Sites 1 and 2 for disposal. As noted above, PSET has issued a determination that material from the Eelgrass Mitigation site is suitable for unconfined aquatic placement within JCEP's restoration project areas. Details regarding the trans-shipment of dredge materials, and the decanting and processing of dredge materials to APCO Sites 1 and 2 are provided in the DMMP (Attachment E).

#### 6.2.8.7 Wetland and Waterway Impacts

Excavation and dredging of the Eelgrass Mitigation site will result in short-term turbidity impacts similar to those described above for other dredging activities associated with the access channel, MOF, and NRIs. These turbidity impacts will be temporary and localized. No permanent impacts are expected.

The Eelgrass Mitigation site is being developed to provide mitigation for eelgrass impacts within the JCEP Project Area. Details regarding mitigation goals and objectives as it relates to eelgrass impacts are provided in the CWMP (Attachment J). Incidental impacts of work in waters and wetlands associated with the eelgrass mitigation site are not included in tables and figures, because the overall impacts associated with mitigation and habitat restoration are considered to be beneficial.

## Section C

### 6.3 CONSTRUCTION METHODS

For site-specific methods, see "Construction Means and Methods" subsections of Section B above. Below are project-wide or general methods that would apply. These methods are specific to wetlands and waters only; many other conservation measures and best management practices are not included here.

#### 6.3.1 LNG Facilities

- Temporary ditches, sediment fences, and silt traps will be installed as necessary as the site is cleared, filled, and graded.
- Before filling the LNG storage tanks, the hydrotest water source will be tested to ensure that the water will meet all applicable code requirements and to prevent discharge of contaminated water.
- In each case the small amount of water that remains in the tank after the bulk transfer/emptying operation will be discharged under the applicable NPDES permit requirements, and treated if necessary.
- LNG spills will be contained within a bermed area around the LNG storage tanks, and will gravity drain to an LNG impoundment basin. An LNG spill containment trench will also collect any LNG from spills outside of the bermed area around the LNG storage tank area and gravity drain to the same LNG impoundment basin.
- Wetlands 2013-3 and 2013-4 will be designated No Work Zones to avoid permanent wetland impacts.

### 6.3.2 Stormwater Treatment

- Stormwater collected in areas that have no potential for contamination will be allowed to flow or be pumped directly to a system of stormwater ditches, which ultimately drain to the slip.
- Stormwater collected in areas that are potentially contaminated with oil or grease will be pumped or will flow to the oily water collection sumps. Stormwater collected from these sumps will flow to the oily water separator packages before discharging to the industrial wastewater pipeline (Attachment G - Stormwater Management Plan).

### 6.3.3 Pile Driving

- Project specifications will require a pile to be driven using a vibratory hammer to the extent practicable to prevent noise impacts to mammals, and fish and bird species. The piles might be proofed with impact pile drivers to properly set the pile.

### 6.3.4 Dredging of Access Channel, Slip, Navigation Reliability Improvements, and Removal of Barrier Berm

- To minimize the impacts of construction of the marine facilities on fisheries, reduce the total period of estuary turbidity, and extend the time available for construction, a two-phase construction methodology will be used to construct the slip. Phase 1, the upland phase, will consist of excavation and dredging of the slip, which will be isolated from Coos Bay by an earthen barrier berm and therefore will not be subject to the ODFW in-water work window. During Phase 2, the in-water phase, the berm will be removed during the in-water work period to minimize effects of turbidity on sensitive fish and invertebrate resources.
- To the extent feasible, dredging of the access channel and slip will be performed with a CS dredge to minimize turbidity.
- The hydraulic dredge transport pipeline for hydraulic transportation of excavated materials (including the decant water return line) will follow the shoreline of the site of the Roseburg Forest Products chip loading facility and will not result in additional land disturbance. It will be approximately 8,650 feet long, with an approximate construction right-of-way width of 8 feet, and will be placed directly on the ground surface from the slip site across the Roseburg Forest Products property until the point where it follows the route of the future Access and Utility Corridor.
- The pipeline will be able to span any affected wetlands or waterbodies without the need to place any structures in the wetlands or waterbodies. At all points along the pipeline route where the slurry pipeline could rupture and the contents could potentially enter the waters of Coos Bay, secondary containment will be provided around the slurry pipeline.
- When the hydraulic transport has been completed, the pipelines will be drained, flushed with clean water, and cut apart only in those areas where any residual material in the pipeline could not potentially be released into the bay, wetlands, or other waterbodies. The pipeline will be removed by the contractor and taken off-site for reuse, recycling, or disposal in a permitted landfill. Since the pipelines will be on existing developed surfaces (grassed, paved, graveled, and rip-rap area of the RFP property) and areas to be developed for the Project (Access and Utility Corridor), post-

construction restoration will include reseeding of grassed areas that were disturbed by the location of the pipelines on the grassed area.

- Any large human-made debris removed during dredging will be transported to an appropriate disposal site.
- Eelgrass and estuarine habitat disturbances resulting from the pipeline will be minimized by spanning these eelgrass areas or avoidance through the use of temporary structures or floats.
- All in-water work will be conducted during the ODFW-approved in-water work period for Coos Bay (October 1 to February 15).
- If used, the dredge cutter head, which potentially will be operated from a barge, will be held at the substrate level to the extent practicable. To minimize turbidity, the intake will be raised no more than a maximum of 3 feet above the sediment surface for brief periods of purging or flushing the intake system.
- Material removed by the hydraulic CS dredges will be sent via a submerged and/or floating pipeline to approved disposal sites, where dewatering would occur.
- If mechanical dredging is required in the bay, a close-lipped clamshell bucket will be used that seals around its edges to minimize the potential for entrainment of listed fish species, and to minimize turbidity and contaminant releases to the water column.
- If used, the clamshell bucket will be lowered and raised slowly through the water column to reduce the potential for entrainment of fish species and minimize turbidity increases.
- A post-dredge bathymetry survey will be conducted to ensure that only the material that was identified to be dredged was removed to the proper, authorized depth and width.
- Construction access points through shoreline areas will use removable pads or mats to prevent soil compaction, unless the shoreline is composed of imported rock.
- Dredged or other excavated material will be placed on areas having stable slopes, and will be prevented from eroding back into waterways and estuarine wetlands.
- Barges or scows will have containment systems to effectively prevent petroleum products or other deleterious materials from entering waters of the State and U.S.
- All dredging contractors working on the JCEP will be required to adhere to the applicable requirements contained in the US Army Corp of Engineers EM_385-1-1 Dredging Safety and Health Requirements Manual – dated 2014NOV30.

### 6.3.5 Slip and Access Channel Dredge Disposal

- Permanent or long-term disposal sites will be stabilized using a seed mix to minimize windblown sand from being deposited on roads, upland habitats, and waterways.
- The South Dunes site, LNG Terminal site, and stockpile locations will be contained by berms, and will be sufficiently large to dewater the dredge slurry. With the exception of the maintenance dredge material, no in-water disposal of dredge material or rehandling activities will occur in Coos Bay.
- In the case of fresh (low-salinity) decant water from material dredged behind the berm, the water that doesn't percolate into the sand below will be returned to the dredge pocket, thus eliminating impacts to Coos Bay at the disposal site location.

- In the case of saline decant water from material dredged to remove the barrier berm, the decant water that does not percolate into the sand below will be discharged to the slip via a submerged outfall pipe, thus reducing impacts from increased turbidity.
- Maintenance dredge material will be transported via a contained barge to APCO Site 1.

### 6.3.6 Large Module Transport, Materials, and Equipment Delivery

- Fuel storage and equipment servicing areas will be located at least 150 feet from wetlands and waterways, unless full containment of potential contaminants are provided.
- The use of track-mounted equipment, large cranes, and other equipment whose limited mobility makes it impractical to move for refueling will include precautions to minimize the risk of fuel reaching wetlands and waterways.

### 6.3.7 Spill Prevention and Design

- The contractor will follow best management practices for in-water installation of green concrete during construction of the concrete slabs, abutments, or other pier structures.
- All equipment used will be cleaned and inspected daily before being used to ensure that the equipment has no fluid leaks. Should a leak develop during use, the leaking equipment will be shut down and not used again until it has been adequately repaired. At no time will fuels or oils be allowed to enter a water body.
- Floating spill containment booms and absorbent booms will be maintained on-site during all phases of construction to facilitate cleanup in the case of accidental spills. Containment booms will be installed in instances where there is a potential for release of petroleum or other toxic substances. Absorbent booms will be deployed within the containment boom if any sheen is observed.

### 6.3.8 Erosion Control

- Areas disturbed by construction of the JCEP Project Area facilities will be stabilized with temporary erosion control measures until construction is complete, unless covered by equipment, gravel or other covering.
- During clearing and grubbing, the contractor will windrow preexisting logging debris and tree stumps, and woody material will be chipped and used for temporary and permanent site erosion control.
- Staging areas and access roads will comply with NPDES and other permitting requirements that pertain to erosion and sediment control and pollution control.
- Following construction and where appropriate, the site will be final graded, and best management practices will be applied to prevent erosion.
- To minimize the potential for erosion, JCEP has modified the FERC's Upland Erosion Control, Revegetation, and Maintenance Plan ("Plan") and Wetland and Waterbody Construction and Mitigation Procedures ("Procedures") to create a project-specific Plan and project-specific Procedures. A copy of the project-specific Procedures is provided in Appendix C.2 of FERC

Resource Report 2 – Water Use and Quality, and a copy of the project-specific Plan is provided in Appendix B.7 of FERC Resource Report 7 – Soils.

- After water line and wastewater line installation, sites will be graded and reseeded to the extent practicable to comply with anticipated 1200-C requirements.
- Disturbed areas not already covered by equipment, such as long-term exposed slopes, will be stabilized with a seed mixture specified by the Natural Resources Conservation Service ("NRCS") as being capable of surviving in highly permeable, xeric regimes, binding loose sand, and withstanding burial and deflation from aeolian processes, as appropriate.
- Fertilizers will be prohibited within 150 feet of wetlands and waterways except when required to vegetate slopes that are close to wetlands and waterways for the purposes of stabilization and erosion control. If fertilizers are applied to vegetated slopes that are closer than 150 feet away from wetlands and waterways, then best management practices (e.g., silt fences, straw bales, earthen berms, etc.) will be implemented to prevent fertilizer from entering the wetland or waterway.

### 6.3.9 Site Restoration

- Following the slip and access channel dredging activities and site-filling activities, long-term exposed slopes will be stabilized with a seed mixture specified by the NRCS as being capable of surviving in highly permeable, xeric regimes, binding loose sand, and withstanding burial and deflation from aeolian processes.
- Native species will be used for reseeding of disturbed areas. If any non-native species are required for specific problem areas, species will be selected that will not become nuisance species to the surrounding areas.
- The slurry and decant water pipelines will be removed, and any areas disturbed by these pipelines will be restored to pre-construction conditions.

***Table 6-2: Proposed Dredged Material Management for Construction Activities***

| Area | Construction Phase | Volume (mcy) | Placement Location |
|---|---|---|---|
| **Freshwater Dredging Phase 1** | | | |
| Slip | Land-Based Excavation | 1.40 | LNG Terminal |
| Slip | Dredging in Pocket Behind Berm | 2.40 | LNG Terminal Site and Roseburg Site |
| **Saltwater Dredging Phase 2** | | | |
| Access Channel | Dredging from Bay | 1.40 | LNG Terminal Site and Roseburg Site |
| Slip | Removal of Berm | 0.20 | LNG Terminal Site |
| Slip | Removal of Berm | 0.30 | Kentuck Project Site |
| **Total** | **5.70** | | |
| Eelgrass Mitigation Dredging | | 0.04 | APCO Site 1 and 2 |
| Navigation Reliability Improvements | | 0.59 | APCO Site 1 and 2 |

# SECTION D

## 6.4 DESCRIBE SOURCE OF FILL MATERIAL AND DISPOSAL LOCATIONS IF KNOWN.

See "Source of Fill Material and Disposal Locations" subsections of Section B and Table 6-2.

Attachment E, DMMP, also detail the source and volume of fill and removal for each fill and removal activity.

## REFERENCES

Wilber, D. H. and D. G. Clarke. 2007. Defining and assessing benthic recovery following dredging and dredged material disposal. Proceedings XXVII World Dredging Congress 2007.