2.0 DESCRIPTION OF THE PROPOSED ACTION

The proposed action consists of the activities outlined by Jordan Cove and Pacific Connector in their applications to the FERC. The proposed facilities are more fully described in section 2.1 below.

This EIS addresses all facilities associated with the JCE & PCGP Project. That includes facilities that come under the jurisdiction of the FERC and some that do not. The non-jurisdictional facilities include the South Dunes Power Plant that would serve the Jordan Cove terminal, the SORSC, the vessels used for maritime transport of LNG, and various utility services to aboveground facilities along the Pacific Connector pipeline.

2.1 PROJECT COMPONENTS

The main Project components consist of Jordan Cove's LNG export terminal and Pacific Connector's pipeline and ancillary facilities. Chapter 4 of this EIS addresses specific environmental resources that may be potentially impacted by construction and operation of the proposed facilities.

2.1.1 Jordan Cove LNG Terminal

Jordan Cove proposes to construct and operate a new LNG export terminal on the bay side of the North Spit of Coos Bay, Oregon. The general location of the terminal is shown on figure 2.1-1. As listed in section 1.1.2 of this EIS, the main components of Jordan Cove's LNG export terminal include a connection to the Pacific Connector pipeline and gas processing plant, an electric power plant and utility corridor, four liquefaction trains, two full-containment LNG storage tanks, a transfer pipeline to the berth, loading facilities at the berth, a marine slip, and an access channel for LNG vessels. The main facilities at the LNG terminal are shown on figure 2.1-2. In addition, there is a discussion of the disposal of excavated and dredged materials, wetland mitigation areas, and temporary construction use areas and staging areas, including a temporary construction workers camp known as the NPWHC.

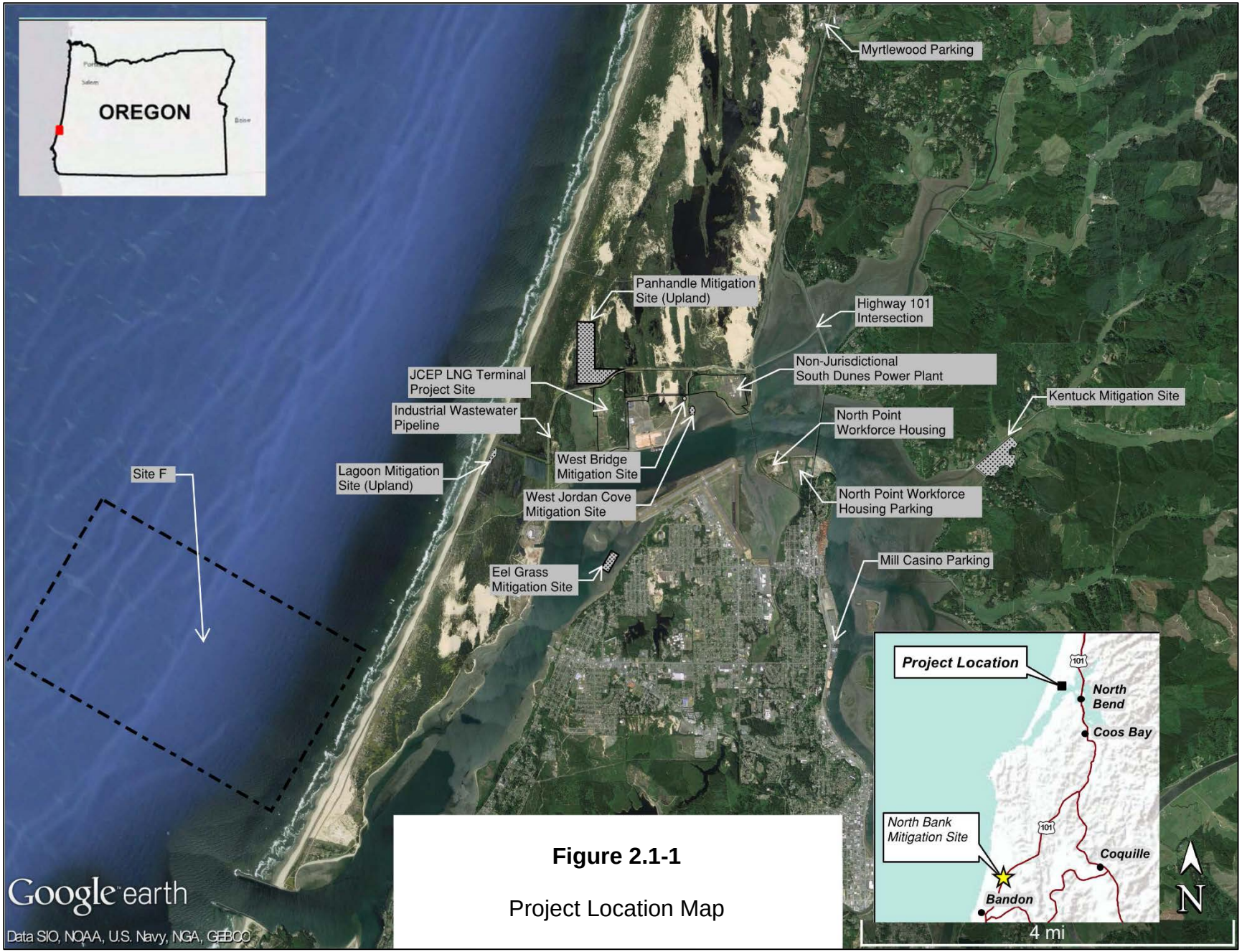
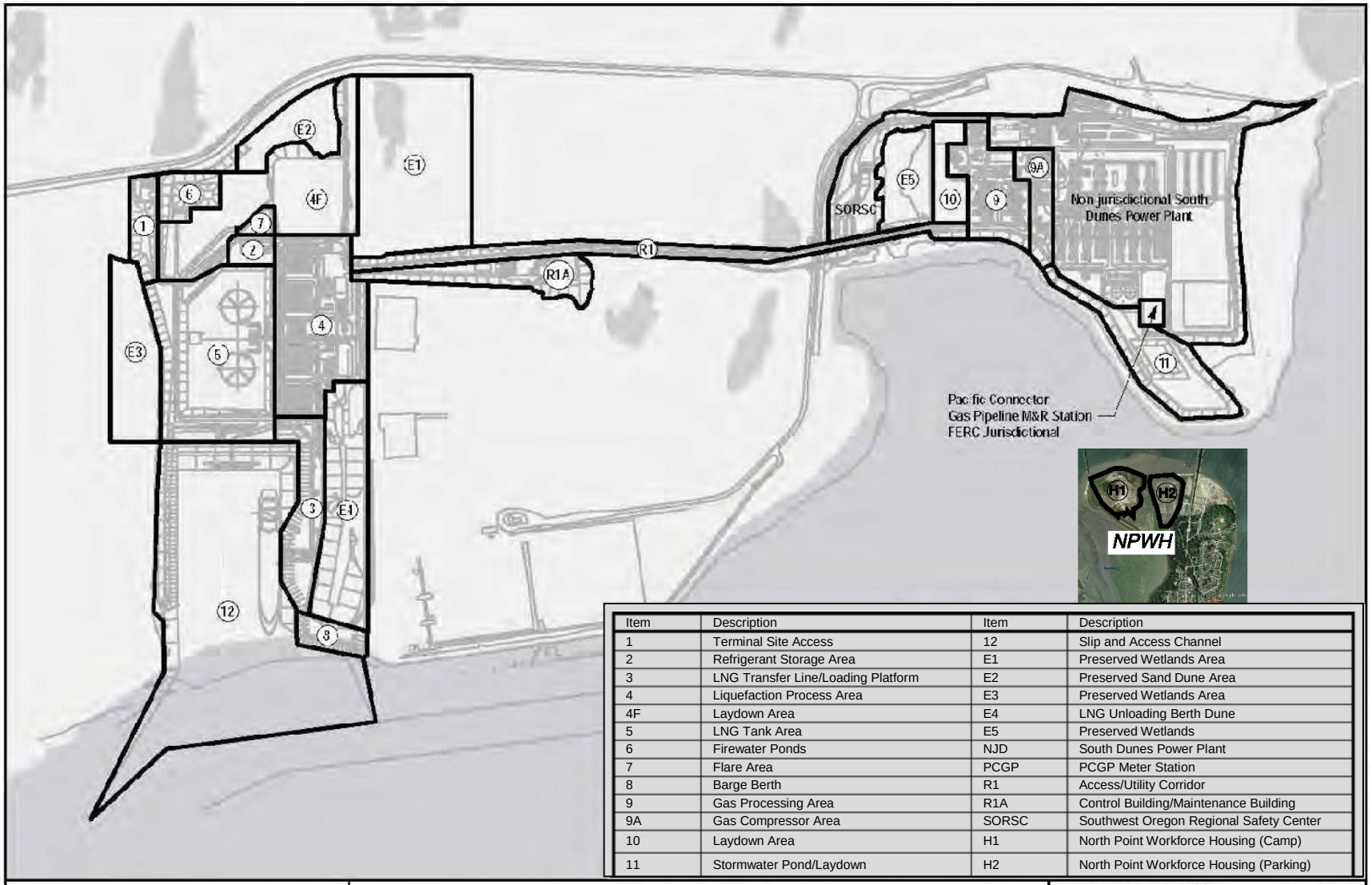


Figure 2.1-1

Project Location Map



Item	Description	Item	Description
1	Terminal Site Access	12	Slip and Access Channel
2	Refrigerant Storage Area	E1	Preserved Wetlands Area
3	LNG Transfer Line/Loading Platform	E2	Preserved Sand Dune Area
4	Liquefaction Process Area	E3	Preserved Wetlands Area
4F	Laydown Area	E4	LNG Unloading Berth Dune
5	LNG Tank Area	E5	Preserved Wetlands
6	Firewater Ponds	NJD	South Dunes Power Plant
7	Flare Area	PCGP	PCGP Meter Station
8	Barge Berth	R1	Access/Utility Corridor
9	Gas Processing Area	R1A	Control Building/Maintenance Building
9A	Gas Compressor Area	SORSC	Southwest Oregon Regional Safety Center
10	Laydown Area	H1	North Point Workforce Housing (Camp)
11	Stormwater Pond/Laydown	H2	North Point Workforce Housing (Parking)

Figure 2.1-2

LNG Terminal Facilities

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Source:

Black and Veatch

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2.1.1.1 LNG Marine Traffic

The Coast Guard defines the waterway for LNG marine traffic for the Jordan Cove Project as extending from the outer limits of the United States territorial waters, 12 nautical miles off the coast of Oregon, and 7.5 nautical miles up the Coos Bay navigation channel to the proposed location of the Jordan Cove LNG terminal (figure 2.1-3). The federally maintained Coos Bay navigation channel extends from the mouth of Coos Bay to the city of Coos Bay Docks at about navigation channel mile (NCM) 15.1 (figure 2.1-4). For the analysis in this EIS and the corresponding BA and EFH Assessment specific to species covered by the ESA and MSA, we also considered impacts from LNG vessel marine traffic extending out to the economic exclusion zone (EEZ).

Jordan Cove estimated that it would take an LNG vessel between 1.5 hours (at 6 knots) and 2 hours (at 4 knots) to travel through the waterway from Buoy "K" to the terminal. An additional 90 minutes would be necessary for the LNG vessel to be turned in the access channel and parked at the terminal berth, with the assistance of tug boats. The entire round-trip transit time for a single LNG vessel to travel from Buoy K through the waterway, turn and dock at the berth, take on a full cargo of LNG, and then exist the terminal slip and travel through the waterway back out to the open ocean past Buoy K would be about 22 hours.

2.1.1.2 Access Channel

An access channel would connect the existing Coos Bay navigation channel with the Jordan Cove LNG terminal marine slip (figure 2.1-5). The access channel would begin at the confluence between the Jarvis Turn and the Upper Jarvis Range at about NCM 7.5 along the Coos Bay navigation channel. The access channel would be about 2,300 feet wide at the navigation channel and about 800 feet wide at the mouth of the proposed slip. The distance from the north edge of the navigation channel to the mouth of the slip would be about 700 feet. The walls of the access channel would be sloped to meet the existing bottom contours at an angle of 3 feet horizontal to one foot vertical (3:1). The access channel would be approximately 45 feet deep.

The access channel would cover about 30 acres below the mean higher high water (MHHW) line. Dredging of the access channel would affect about 15.2 acres of currently existing deep subtidal below -15.3 feet in depth; about 5.8 acres of existing shallow subtidal to the MLLW line; and about 8.1 acres of existing intertidal strata between the MHHW and MLLW lines. Details about dredging and the disposal of dredged materials are discussed in section 2.1.1.11 below.

The access channel would be within state waters in Coos Bay managed by the ODSL. Jordan Cove would construct the access channel and the marine slip at its proposed LNG terminal. After construction, Jordan Cove would transfer responsibility for maintenance of the access channel and marine slip to the Oregon International Port of Coos Bay (Port). The Port has already obtained an easement from ODSL for operation and maintenance of the access channel and the in-water portion of the slip.[1] Jordan Cove would reimburse the Port for costs associated with its operation and maintenance of the access channel and slip.

[1] The ODSL issued an Amended Proposed Order for the access channel and in-bay portion of the slip on February 19, 2013.

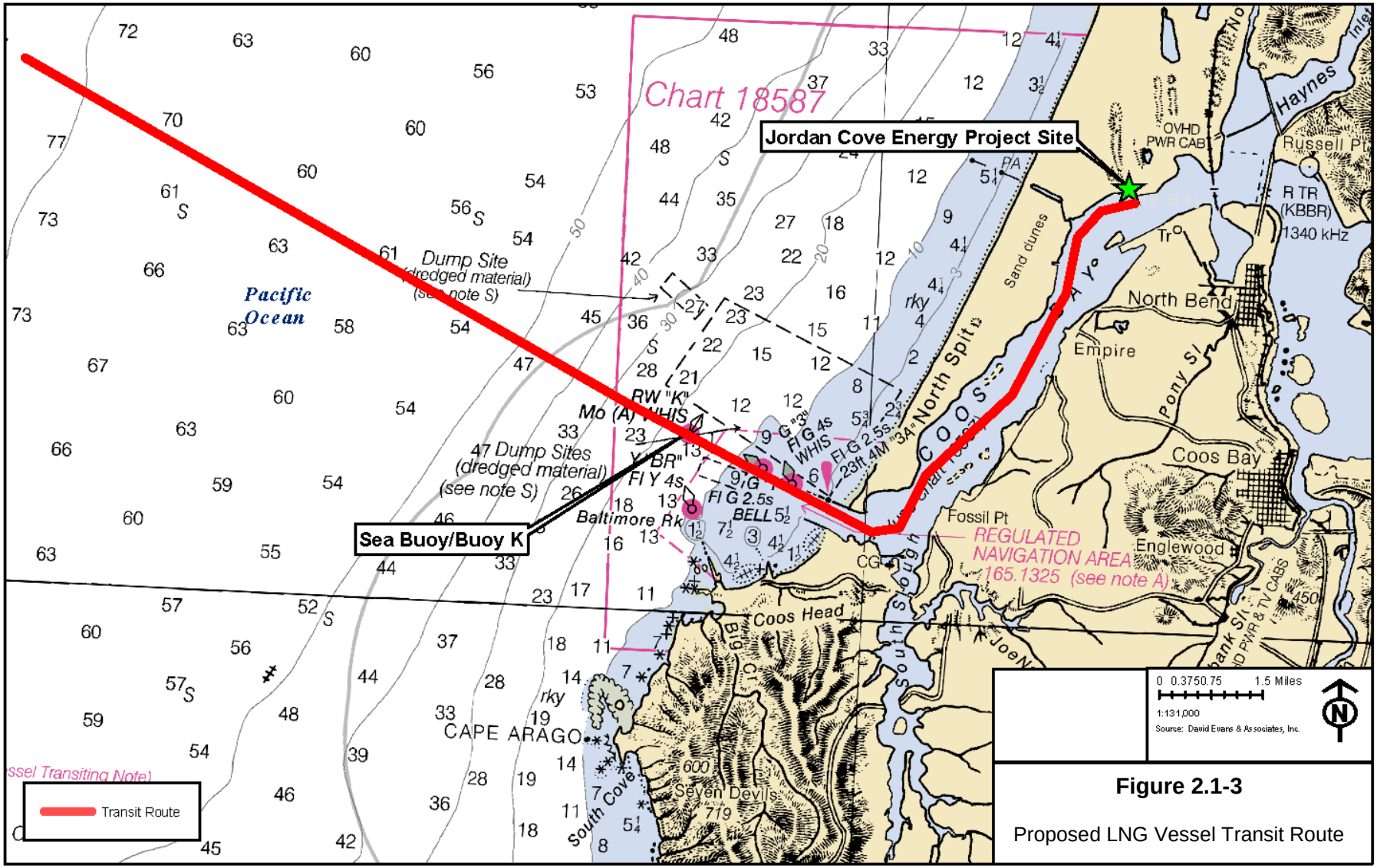


Figure 2.1-3

Proposed LNG Vessel Transit Route

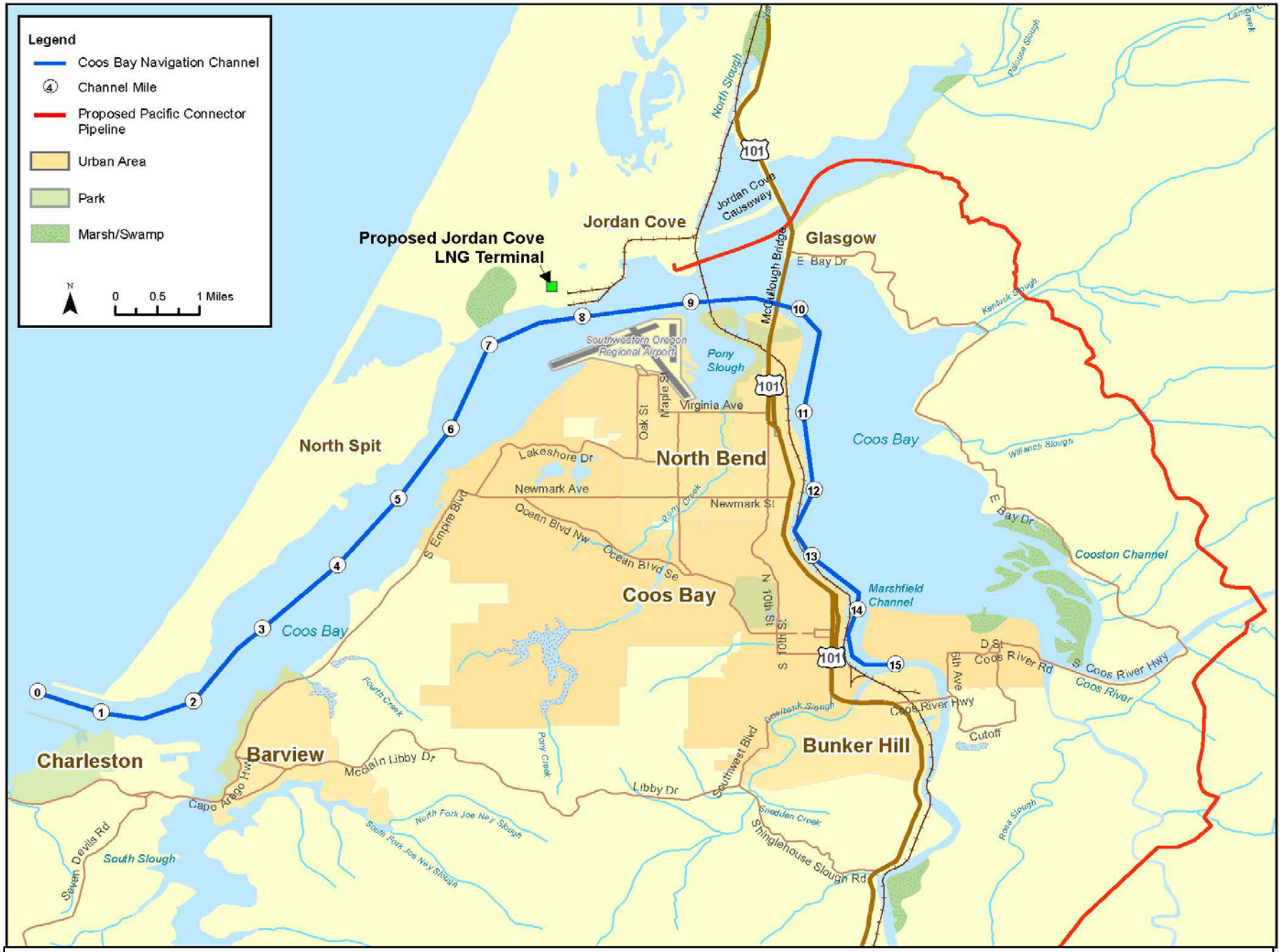


Figure 2.1-4. Coos Bay Navigation Channel and Other Features in the Vicinity of the Proposed LNG Terminal

Figure 2.1-5
Plot Plan of the Marine Facilities

2.1.1.3 Marine Slip and Berths

Jordan Cove would construct the marine slip at its proposed LNG terminal, at the north end of the access channel. Part of the marine slip would be constructed within state-waters of Coos Bay to the MLLW line, for which the Port has obtained an easement from the ODSL. The majority of the terminal marine slip would be excavated from current uplands owned by Jordan Cove. For state-owned materials on-site, a sand and gravel lease/license may be required. The upland portion of the proposed marine slip would cover about 36 acres (see Area 12 on figure 2.1-2).

The inside dimensions at the toe of the slope of the slip would measure approximately 800 feet along the north boundary and approximately 1,500 feet and 1,200 feet along the western and eastern boundaries, respectively. The minimum water depth within the slip would be -45 feet NAVD88 (North American Vertical Datum of 1988). The northern side of the slip would be constructed at three feet horizontal to one foot vertical.

This would be a single use slip dedicated to support the LNG terminal. Having the 800-foot slip width provides the flexibility needed for tugs to move the LNG vessel away from a hazard at the terminal or at the LNG loading dock to the relative safety of the west side of the slip.[2]

About 4.3 million cubic yards (mcy) of material would need to be removed to create the slip basin. Of this, about 2.3 mcy would be dry excavated and about 2.0 mcy would be hydraulically dredged. The excavated and dredged materials would be transported to the planned location of the South Dunes Power Plant, where they would be used to raise the elevation of that site. Section 2.1.1.11 provides more details about the dredging operations and disposal of materials. At the end of the construction sequence for the marine slip, sheet pile walls would be installed on the east and west sides. Riprap would be placed on the north side.

The terminal slip would contain an LNG berth on the east side, and a berth for tugboats and escort ships on the north side. A berm would be constructed to an elevation of +31 feet between the western edge of the slip and Henderson Marsh for tsunami resistance. After construction, Jordan Cove would convey the operation and maintenance of the marine slip to the Port, and reimburse the Port the costs of those activities.

Barge Berth

The barge berth would cover about 2.9 acres that is currently a forested sand dune within the Ingram Yard tract, on the west side of the Roseburg property (southeast side of the slip). During terminal construction, Jordan Cove indicated that equipment and large modules would be brought in by both break bulk cargo vessels and barges to the berth. Jordan Cove estimated about 18 barge visits and 92 cargo vessel visits over a two-year period during construction. However, the barge berth would be retained as a permanent feature of the terminal to support eventual maintenance and replacement for large equipment components. Riprap is proposed east and west of the barge berth to prevent scour erosion.

LNG Vessel Berth and Loading Platform

An LNG vessel loading berth would occupy the eastern side of the slip. Although the slip and berth could accommodate LNG vessels as large as 217,000 m^3 in capacity in the future, at present the Coast

[2] Memo from Jordan Coved dated February 23, 2015, and filed February 25, 2015.

Guard LOR and WSR would only allow LNG vessels up to 148,000 m^3 in capacity to dock at the terminal.

The LNG vessel loading berth would consist of open cell sheet pile technology developed and patented by PND Engineers, Inc. (figure 2.1-6). A similar berth design was constructed at the Sabine Pass LNG terminal in Cameron Parish, Louisiana. The open cell sheet piling would allow LNG vessels to be moored about one meter from the side of the slip. This change in design eliminated the need for a dock supported by piles extending from shore into the marine slip to the vessel, as previously proposed for the original Jordan Cove LNG import terminal in Docket No. CP07-444-000. For the new berth, all of the piles would be installed land-side, with the mooring dolphins located onshore and the breasting dolphins attached to the front of the concrete loading platform. The total number of battered steel piles required for the vessel berth and loading platform combined would be 112, as listed below on table 2.1.1.3-1. The battered steel piles would be driven, to a depth of refusal, while the marine slip is isolated from the bay by a berm. The piles would support surface structures (i.e., the loading platform), or provide the foundation for the breasting and mooring dolphins.

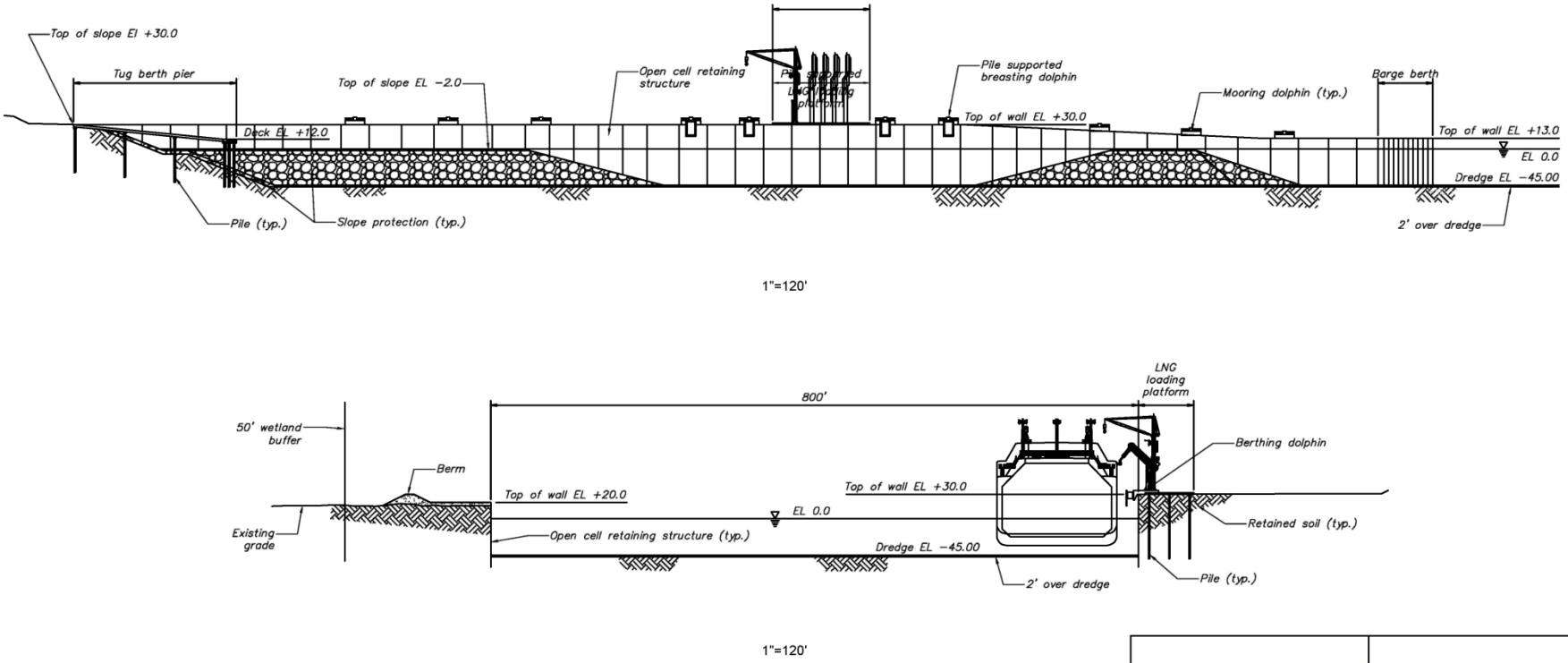
TABLE 2.1.1.3-1

Piles Supporting the LNG Vessel Berth and Loading Platform

Facility	Number of Piles	Diameter of Piles & Wall Thickness
Mooring Dolphins	48	30-inch-diameter & 1-inch wall thickness
Breasting Dolphins	32	30-inch-diameter & 1-inch wall thickness
Loading Platform	32	24-inch-diameter & 5/8-inch wall thickness

The LNG vessel berth would be about 1,249 feet long between the centers of the end mooring dolphins, and 182 feet wide from the center of the mooring dolphins to the edge of the breasting dolphins. The loading platform would be installed directly above the vessel berth, and would be about 120 feet long and 60 feet wide. The top of the LNG vessel loading platform would be at an elevation of 30 feet. Combined, the vessel berth and loading platform would occupy about 9 acres of uplands.

The vessel cargo loading facilities would consist of three 16-inch-diameter loading arms, and one 16-inch-diameter vapor return arm, installed on a concrete base of the platform slab deck (figure 2.1-6). Space would be provided for one additional LNG loading arm. A mezzanine type elevated platform above the concrete support deck would be constructed of steel. The main concrete lower platform level would contain curbs for and sloped to contain spills. The two middle arms would be piped for dual service capable of loading LNG to the ships or returning vapor to the storage tanks. The loading arms would be designed with swivel joints to provide the required range of movement between the ship and the shore connections. Each arm would be fitted with a hydraulically interlocked double ball valve and powered emergency release coupling (DBV/PERC) to isolate the arm and the ship in the event of an emergency condition where rapid disconnection of connected arms is required. Each arm would be fully balanced in the empty condition by a counterweight system and maneuvered by hydraulic cylinder drives.



Sources: David Evans &Associates, Inc.

Figure 2.1-6
Plot Plan of Marine Berth

The LNG cargo loading arms would be designed for a design loading rate of 10,000 m^3/hr. Additional structures at the vessel berth and loading platform would include a ship gangway, area lighting facilities, aids to navigation, firewater monitors, and a dry chemical firefighting system.

Tug and Escort Boat Berth

On the north side of the marine slip would be a berth that could accommodate three tugboats and three Sheriff's escort boats. This dock would be about 480 feet long and 18 feet wide. It would be supported by 98 battered steel piles as listed below in table 2.1.1.3-2. The piles would be driven, to a depth of refusal, while the slip is isolated from the bay. Included as part of the dock would be two boat houses. North of the dock would be a tug operator building.

TABLE 2.1.1.3-2

Piles Supporting the Tug Boat Berth

Tug Boat Dock Facility	Number of Piles	Diameter of Piles & Length of Structure
Pier Structure	44	24-inch-diameter & 5/8-inch wall thickness
Pier Fender Structure	28	12-inch-diameter by 55 feet
Pier Corner Fenders	10	12-inch-diameter by 65 feet
Floating Pier/Boat House	16	24-inch-diameter & 5/8-inch wall thickness

2.1.1.4 LNG Transfer Line

LNG would be fed from the LNG storage tanks to the LNG vessel loading facilities through one 2,300-foot-long, 36-inch-diameter cryogenic transfer line. The area occupied by the transfer pipeline would be within the 9 acres of uplands where the loading berth and platform are located (see Area 3 on figure 2.1-2).

2.1.1.5 LNG Storage Tanks

Once the liquefaction process is complete, the LNG would be stored in two full-containment LNG storage tanks, each designed to store 160,000 m^3 (1,006,000 barrels) of LNG at an approximate temperature of -260°F and atmospheric pressure. Each LNG storage tank would consist of a primary nine percent nickel inner steel container and a secondary post-stressed concrete outer container wall. These tanks would be designed so that both the primary inner container and the secondary outer concrete shell are capable of independently containing the stored LNG.

The two LNG storage tanks and surrounding storm surge barrier would occupy an area of about 27 acres within the terminal processing area, just north of the marine slip (see Area 5 on figure 2.1-2). The base elevation of the storage tanks would be at about +30 feet above mean sea level (MSL). The top of the dome of a tank would be about 180 feet above grade, and the diameter of the outer tank would be about 267 feet wide. Jordan Cove proposes to enclose the LNG storage tanks within an earthen berm or storm surge barrier that would be about +60 feet high. The storm surge barrier would be designed to contain the contents of one 160,000 m^3 storage tank.

The final design and supplier for the LNG storage tanks have not yet been selected by Jordan Cove. The conceptual preliminary design of all facility features is discussed in section 4.13.2 of this EIS. In general, each LNG storage tank would consist of the following elements:

- 9 percent nickel steel open top inner primary container;
- carbon steel liner around the primary container;
- concrete domed roof;

- insulated aluminum deck over the inner container suspended from the roof;
- reinforced concrete bottom slab with pedestals and seismic isolators;
- reinforced concrete tank base slab with carbon steel liner plate; and
- reinforced post-tensioned concrete wall and reinforced concrete roof on the secondary outer container.

Each storage tank would be built on a reinforced concrete slab foundation. The soil beneath the foundation would be improved using methods defined during subsequent geotechnical studies for the final design (see section 4.3 for more details about ground improvement based on geotechnical studies to meet seismic design standards). Base heating would not be necessary, as the tank base slab would be elevated. The load-bearing insulation on top of the base, beneath the inner storage tank container, would be cellular glass, capable of supporting the weight of the inner container and LNG.

The exterior walls of the outer container would be of reinforced concrete, lined with a butt-welded compression ring and welded steel plates, and a reinforced concrete dome poured over a carbon steel framework. The inner liner of the outer container would be carbon steel, while the bottom corner protection would be 9 percent nickel steel. The carbon steel inner liner would serve as a barrier to moisture migrating from the outside atmosphere to the insulation between the containers, and would also prevent vapor from escaping from the inner container during normal operations. An aluminum deck would be suspended from the outer roof by hangers made of stainless steel. The top surface of the deck would be insulated with fiberglass. The outer tank roof and vapor space about the suspended deck would be at ambient temperature.

The space between the inner and outer containers would be insulated with expanded perlite to keep the stored LNG at a temperature of approximately -260°F while maintaining the outer container at near ambient temperature. There would be no penetrations through the inner container or outer container sidewall or bottom below the maximum liquid level. All piping into and out of the tank would enter from the top of the tank. A conceptual design drawing of a typical full containment LNG storage tank is illustrated in figure 2.1-7.

2.1.1.6 Liquefaction Process

Once the feed gas is treated, it would then be sent to four parallel trains of a liquefaction process. The process utilizes a single mixed refrigerant circuit with a two-stage compressor and a refrigerant exchanger. The conditioned gas, at 745 pounds per square inch gauge (psig) and 95°F, is divided equally among the four liquefaction trains.

The refrigerant exchanger consists of 10 brazed aluminum cores arranged in a cold box. The cores are installed vertically inside the cold boxes. The refrigeration is supplied by a closed loop refrigeration cycle in which the refrigerant is compressed, partially condensed, cooled, expanded, and then heated as it supplies refrigeration and flows back to the compressor.

Low pressure refrigerant is compressed in a refrigerant compressor and is cooled by a refrigerant condenser and flows to a refrigerant discharge separator. The partially condensed refrigerant is separated into vapor and liquid in this vessel. The high-pressure refrigerant vapor and liquid from the refrigerant discharge separator flow through separate lines to the cold box. The vapor and liquid are recombined internally in the cold box as they enter each of the brazed aluminum cores.

The high pressure refrigerant flows downward through the cold box and exits each core from the bottom, totally condensed and sub-cooled. It then flows through a Joule-Thompson valve, reducing the pressure. This pressure reduction causes some vaporization of refrigerant, reducing the temperature further. This cold, low-pressure refrigerant reenters the cold box at the cold end and flows upward, removing heat from the feed gas and high pressure refrigerant streams in the exchanger as it vaporizes. The low-pressure refrigerant from the cold box then flows back to the refrigerant compressor inlet.

LNG exits the four trains at 730 psig and -245°F and is directed to an LNG expander where electricity is generated while the pressure is reduced to 30 psig. The LNG is then sent through a second expansion where the pressure is reduced to 1 psig. This expansion lowers the LNG temperature, but also causes approximately 5 percent (volume basis) of the LNG to be vaporized. The two-phase stream exits the valve at around -260°F and would then be sent to the LNG storage tanks.

The four liquefaction trains process area would cover about 20 acres within the terminal tract (see Area 4 on figure 2.1-2). Jordan Cove indicated that the process area would be at an elevation of about +46 feet. The LNG would be conveyed from the liquefaction trains to the storage tanks via piping.

2.1.1.7 Refrigerant Makeup System

During operation, the refrigeration loop components would be replenished periodically. Three of the hydrocarbon refrigerants used in the four closed-loop trains cannot be generated on-site: ethylene, propane and isopentane. These components would be delivered to and stored in pressure vessels on site. At a minimum, the stored refrigerant capacity is equal to the estimated loss of refrigerant from one train in a year of continuous operation. Refrigerants would be stored in bullet-type vessels located in the refrigerant storage area as shown on figure 2.1-5. The ethylene bullet would be approximately 144 inches in diameter and 28 feet in length. The propane bullet would be approximately 132 inches in diameter and 26 feet in length. The isopentane bullet would be approximately 144 inches in diameter and 40 feet in length. The refrigerant storage area would occupy about 2 acres just north of the LNG storage tanks (see Area 2 on figure 2.1-2).

2.1.1.8 Gas Conditioning Plant

Pacific Connector would bring natural gas through its pipeline from near Malin, Oregon, to the Jordan Cove terminal, where it would construct and operate a meter station connecting with the Jordan Cove facility. Once the natural gas is transferred to Jordan Cove, it would go through a treatment plant, situated within an approximately 13-acre area on the west side of the South Dunes Power Plant (see Areas 9 and 9A on figure 2.1-2). The elevation of the gas pretreatment facility would be about +40 feet.

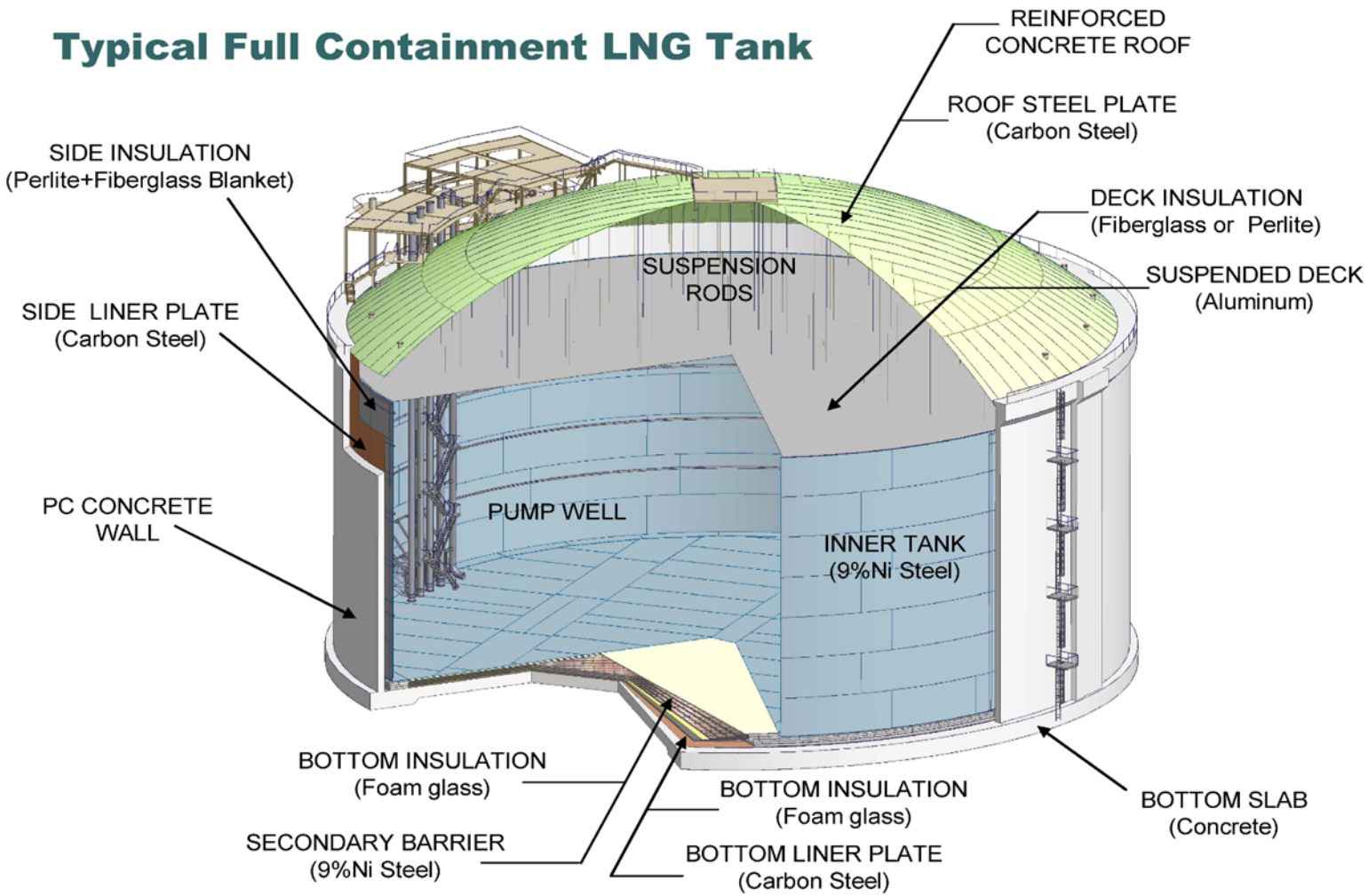


Figure 2.1-7

Conceptual Design of the LNG Storage Tanks

The gas conditioning units would remove substances that would freeze during the liquefaction process, namely CO_2 and water. Mercury would also be removed to prevent corrosion in downstream equipment. Trace amounts of hydrogen sulfide (H_2S) would be removed as well in the CO_2 removal system, due to the characteristics of the absorbent employed. The pipeline gas conditioning unit consists of two parallel trains, each containing two systems in series: a CO_2 removal process which utilizes a primary amine to absorb CO_2, followed by a dehydration system which uses two distinct solid adsorbents to remove water and mercury from the feed gas.

2.1.1.9 Utility Corridor, Haul Road, Access Roads, and Parking Lots

A new utility corridor would be constructed between the LNG terminal tract and the planned South Dunes Power Plant. The corridor would be approximately one mile in length and 150 feet wide (toe of slope to toe of slope). It would be located entirely on property owned by Jordan Cove. The utility corridor would cover about 11 acres (see Area R1 on figure 2.1-2).

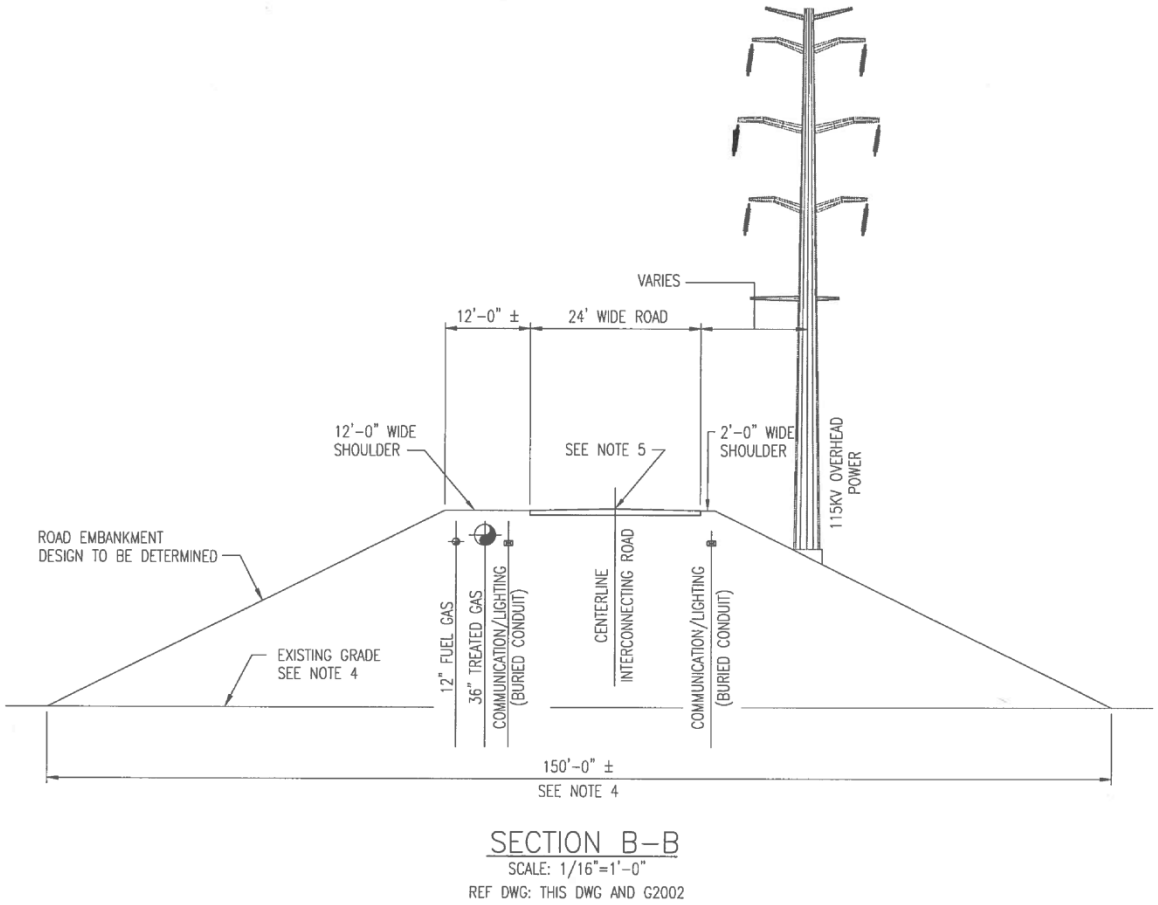
The corridor would be utilized initially during construction for the movement of equipment and materials, then during operations for control of access to the terminal. Use of the corridor for construction traffic and access to the LNG terminal would reduce impacts on the Trans-Pacific Parkway and the existing Roseburg Forest Products facility.

The utility corridor would include a two lane 24-foot-wide roadway, with 12-foot-wide shoulder and bridge structures to reduce impacts to wetlands and to fly-over the access road and rail spur serving the Roseburg Forest Products facility. Additionally, the corridor would contain overhead 115 kV power transmission lines and an underground pipe way corridor that includes the feed gas supply to the LNG terminal, a fuel gas pipeline to the South Dunes Power Plant, backup pilot gas line, telecommunications lines and redundant control circuitry (see figure 2.1-8).

A temporary heavy equipment haul road would be utilized during terminal construction, extending from the barge berth on the east side of the marine slip to the planned South Dunes Power Plant tract. It would cross the Roseburg Forest Products parcel. The haul road would be about 5,925 feet long, 60 feet wide, and cover about 8 acres (see figure 2.1-9). The road would be used to haul materials excavated from the upland portions of the marine slip to the South Dunes Power Plant area.

Another terminal access road would be located within an approximately 4-acre area in the northwestern portion of the tract (Area 1 on figure 2.1-2). This road would extend from the Trans-Pacific Parkway south through the terminal tract to the slip. It would be 25 feet in width and 995 feet long, with 11-foot-wide asphalt paved lanes and 1.5-foot-wide aggregate shoulders. During construction of the terminal, this road would be used for material deliveries and access to the concrete batch plant. During terminal operations, this road would serve mainly for emergency situations, or for occasional deliveries or maintenance activities.

Permanent operational roads within the terminal complex would be graveled or asphalt surfaced. Roads within the liquefaction area would be about 46 feet wide. Roads within the South Dunes Power Plant area would be about 40 feet wide.



SECTION B–B

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Source:
Black and Veatch

Figure 2.1-8
Cross Section Drawing of Access Road and Utility Corridor

Figure 2.1-9
Truck Haul/Hydraulic Transport Pipeline Route

There would be internal permanent operational parking lots. One employee parking lot would be on top of existing Landfill Cell #2, north of the South Dunes Power Plant, east of the South Dunes Administrative Building. The SORSC would have its own parking lot on its north side, east of Jordan Cove Road. Other parking lots would be associated with the Liquefaction Plant and Maintenance Building and Control Building, on the south side of the utility corridor, north of the Roseburg Forest Products property, to the east of the LNG terminal process area.

2.1.1.10 Other Terminal Support Systems

Jordan Cove would have to install a number of other utilities and systems within its LNG terminal tract to support its liquefaction and LNG delivery functions. These other systems include vapor handling, vent stacks and flares, electrical and lighting, control instrumentation, instrument and utility air, inert gas and nitrogen, fire water and fire protection, hazard detection and spill containment, site security, and support buildings.

Vapor Handling System

During liquefaction, a small amount of the produced LNG is vaporized during let-down to storage pressure. The produced LNG would also displace some storage tank vapor. In addition, ambient heat input would cause a small amount of LNG to be vaporized. Some vaporization of LNG would be caused by other factors, such as barometric pressure changes, heat input due to pumping, and vessel flash vapor. The vapor handling system would recover these vapors for use in the facility fuel gas system that supplies the South Dunes Power Plant.

During LNG vessel loading operations, vapors are also released from the vessel cargo tanks due to simple displacement as the tanks are filled. This vapor would be returned to the LNG storage tanks. The BOG compressors would be located between the liquefaction trains, east of the LNG storage tanks.

Ground Flares

There would be two ground flares installed at the complex: one located within a 1-acre area north of the refrigerant storage area within the LNG terminal south of the Trans-Pacific Parkway (Area 7 on figure 2.1-2), and the other within the South Dunes Power Plant area west of the gas conditioning plant and north of geographic Jordan Cove. The flares would each be about 60 feet high and 55 feet wide at the base.

The ground flares would mostly be used on a temporary basis to burn off gas as a relief system during upset conditions, or under the following circumstances:

- initial cool down of the facility;
- extended power outages;
- extended emergency shut-down events; and
- unexpected loss of vapor handling equipment during LNG vessel loading with the LNG storage tanks operating near maximum normal pressure.

Instrument Air and Plant Air Systems

Plant air would be used through the facility to power tools and equipment used during plant operation and maintenance activities. Dry instrument air would be used for instrumentation and

control systems. The plant instrument air packages would be located within the terminal process area, on the east side, between Liquefaction Trains #2 and #3.

Nitrogen

Liquid nitrogen would be trucked to the terminal from outside regional sources, and stored in a tank within the site. The pressure swing adsorption type nitrogen system would occupy an area 35 feet wide by 75 feet long or less than a tenth of an acre. Ambient air vaporizers would supply gaseous nitrogen for various uses in the terminal. The nitrogen would serve as the inert gas necessary for pre-commissioning and start-up, to test the tanks, and for drying out and cool down activities. Nitrogen would also be used to purge piping and equipment in preparation for operation, maintenance, and return to service.

Instrumentation and Process Control System

Overall plant process control and monitoring would be performed at consoles located in the various control rooms. The operator control level would consist of workstations, hardware pushbutton control stations, and peripherals. Operators would monitor liquefaction plant operations in the Liquefaction Control Room (Control Room #1). That control room would also be able to redundantly monitor operations at the South Dunes Power Plant. However, there would be separate South Dunes Site Control Room (Control Room #2), which could also redundantly monitor operations at the liquefaction terminal. The South Dunes Site Control Room would have the primary operator interfaces for the gas treatment plant. Controls for LNG vessel loading operations would be available at the LNG Berth Operator Building. The controls in the building would include the loading arm dedicated control system, ship-to-shore control system, and LNG vessel berthing system.

The terminal would be highly automated. The control systems consist of field instrumentation and a number of microprocessor based sub-systems. Operators would control and monitor the facility through a distributed control system (DCS). The DCS would be configured so that no single failure in a control room would result in a complete plant failure, or failure to inhibit a hazardous condition.

Electrical Systems

Electrical power for the LNG terminal would be provided from dedicated power generation provided by the South Dunes Power Plant. This power generation facility would be rated at approximately 420 MW and would be an independent power generation system exclusively for the terminal and associated facilities. A PacifiCorp connection would be provided by tapping the high voltage side of PacifiCorp's Jordan Point substation, which is currently located on the planned South Dunes Power Plant site but is planned to be relocated to a position adjacent to the Jordan Cove meter station. The PacifiCorp 115-kV feed would be transformed to 13.8-kV distribution to provide basic "house power" to the terminal and power generation sites. The South Dunes 230-kV substation would collect power from the site generators and distribute power to the Jordan Cove Project's 230-kV substation. Each 230-kV substation would have a 13.8-kV area distribution for lower utilization voltages and power distribution within the two process areas.

The total maximum operating load of the LNG terminal would be approximately 310 MW. This electrical load would be experienced during warm weather operations when LNG compression is required and LNG vessels are being loaded. Most of the facility's electrical load is comprised of

motors, with the largest motors (the four liquefaction loop compressor drivers) rated at approximately 65,000 hp each.

Lighting System

Only lighting required for operation and maintenance, safety, security, and meeting FAA requirements would be used on the LNG storage tanks. The light would be localized to minimize offsite effects. The lighting levels would be based on American Petroleum Institute (API) standards. Lighting around equipment and facilities where routine maintenance activities could occur on a 24-hour basis would range from 1 to 20 foot-candles, with 20 foot-candle lighting levels within the compressor enclosures. General process area lighting would be kept to a minimum, on the order of 2 foot-candles. LNG terminal access/utility corridor lighting would be 0.4 foot-candle. Perimeter security would be on the order of 1.3 foot-candles, using evenly spaced 400 watt floodlights. As a point of reference, 20 foot-candles is close to the indoor lighting in a typical home, two foot-candles is typical of that found in a store parking lot, and 0.4 foot-candle is typical of residential street lighting. The lighting plan would use high pressure sodium (HPS) light fixtures during construction and final plant. The final lighting plan would be developed during detailed design.

Fuel Gas System

During normal operation, fuel gas would comprise compressed BOG siphoned off from an LNG vessel during loading, or the LNG storage tanks. After the BOG is compressed, a slip stream would be sent to fuel the incinerator, while the remaining would be combined with the Amine Flash Gas and sent to the South Dunes Power Plant to run its GTG turbines. In the event that the amount of BOG is insufficient for all terminal needs, it would be supplemented by dry fuel gas from the feed gas system. For plant commissioning and start up, fuel gas would be supplied from the local distribution company's existing (Northwest Natural) 12-inch-diameter natural gas pipeline on the North Spit, located adjacent to the Trans-Pacific Parkway. After the terminal is fully operational, the Northwest Natural interconnection would be used solely for facility space heating requirements.

Water Systems

After construction, about 34 acres at Jordan Cove's proposed LNG terminal would be covered by impervious surface materials, such as concrete and asphalt. Jordan Cove would design and construct a stormwater management system to gather runoff from impervious surfaces within the terminal, and direct the flow to designated areas for disposal. Stormwater drainage and collection would be accomplished by a system of ditches and swales. Stormwater collected in areas that have no potential for contamination would be allowed to flow or be pumped to ditches that ultimately drain to the slip. Stormwater collected in areas that are potentially contaminated with oil or grease would be pumped or would flow to the oily water collection sumps. Collected stormwater from these sumps would flow to the oily water separator packages before discharging to the industrial wastewater pipeline. No untreated stormwater would be allowed to enter federal or state waters.

Sanitary waste from the LNG loading berth building would be directed to a holding tank. A sanitary waste contractor would remove the contents of the tank as necessary and dispose of the contents at authorized disposal sites through the contractor's permits. Sanitary waste from the remainder of buildings would be directed to on-site septic systems.

The Coos Bay-North Bend Water Board (CBNBWB), which is the local water utility district, has an existing industrial wastewater pipeline that runs through the proposed Jordan Cove terminal tract. The line connects to an existing permitted ocean discharge that is owned by the Port. It was originally constructed to handle wastewater emitted from the now dismantled Weyerhaeuser mill, and at its peak it took in up to 3.5 million gallons per day (mg/d) of water. The only flow currently through the industrial wastewater line is about 500,000 gallons per day purchased by Weyerhaeuser from CBNBWB that is passed through to keep the ocean diffusers operational. The industrial pipeline transports wastewater discharged from the two treatment basins at the former Weyerhaeuser linerboard mill site (future location of the South Dunes Power Plant). This treatment system has been approved for closure by the ODEQ, and the basins would be filled during construction of the South Dunes Power Plant.

During construction of the Jordan Cove terminal, the CBNBWB industrial wastewater pipeline would be put out-of-service for about one week while it is relocated. The portions of the existing pipeline within Jordan Cove property at the South Dunes Power Plant and Ingram Yard would be removed during site preparation, and the portions within the Roseburg Forest Products property and Henderson Marsh would be abandoned in place. The new replacement pipeline would consist of 16-inch-diameter slip joint PVC. It would run for about two miles from the South Dunes Power Plant along the shoulder of the Trans-Pacific Parkway within an easement owned by the Port to connect with the existing outfall pipe west of the Weyerhaeuser lagoon on the North Spit (see figure 2.1-10). Jordan Cove proposes to use the new industrial wastewater line to discharge water used to hydrostatically test the LNG storage tanks during construction of the terminal. The Port has no other users of this line, therefore it should have sufficient capacity for the 1.8 mg/d flow from the release of Jordan Cove's hydrostatic test water.

The CBNBWB obtains water from groundwater wells on the North Spit, in addition to storing water at two reservoirs (Upper Pony Creek and Joe Ney). It has two raw water lines on the North Spit. One of the raw water lines begins at the well field north of the planned South Dunes Power Plant site (see figure 2.1-11), and was once the source of water for the Menasha-Weyerhaeuser mill. The second raw water line extends from a well field west of the proposed terminal and north of the Trans-Pacific Parkway to a water treatment plant. This 12-inch-diameter mainline adjacent to the highway has a normal static pressure of 40 psig. Jordan Cove proposed to install two taps on this line, one dedicated to replenish the fire water ponds, and the other to provide water for portable and utility requirements once the terminal is in operation.

Jordan Cove would pay for the design and construction of the tap meters and an 8-inch-diameter water pipeline extending about 4,900 feet from the Trans-Pacific Parkway to the terminal. After construction, the CBNBWB would own and operate that line. In addition, Jordan Cove proposed to install a tap and hydrant along the Trans-Pacific Highway mainline at the northwest corner of the terminal tract to supply water for the concrete batch plant, site grading activities, dust suppression, and other construction-related activities.

During construction of the terminal, Jordan Cove would use a total of approximately 1.7 billion gallons of water for various activities, including hydrostatic testing. During terminal operations, about 184 million gallons of water would be consumed annually. Water usage and impacts are more fully discussed in section 4.4 of this EIS.

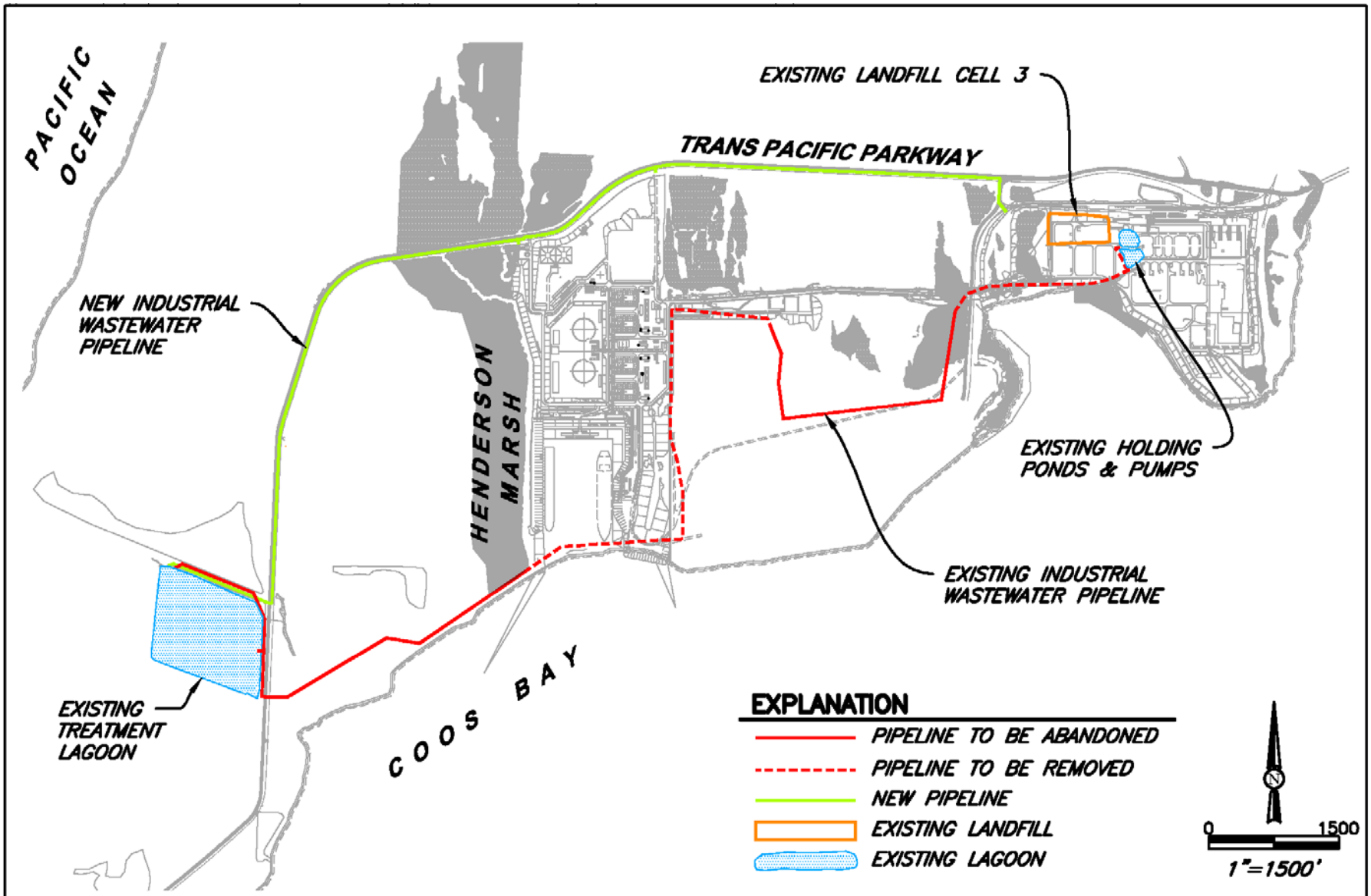


Figure 2.1-10
Pipeline Removal & Abandonment

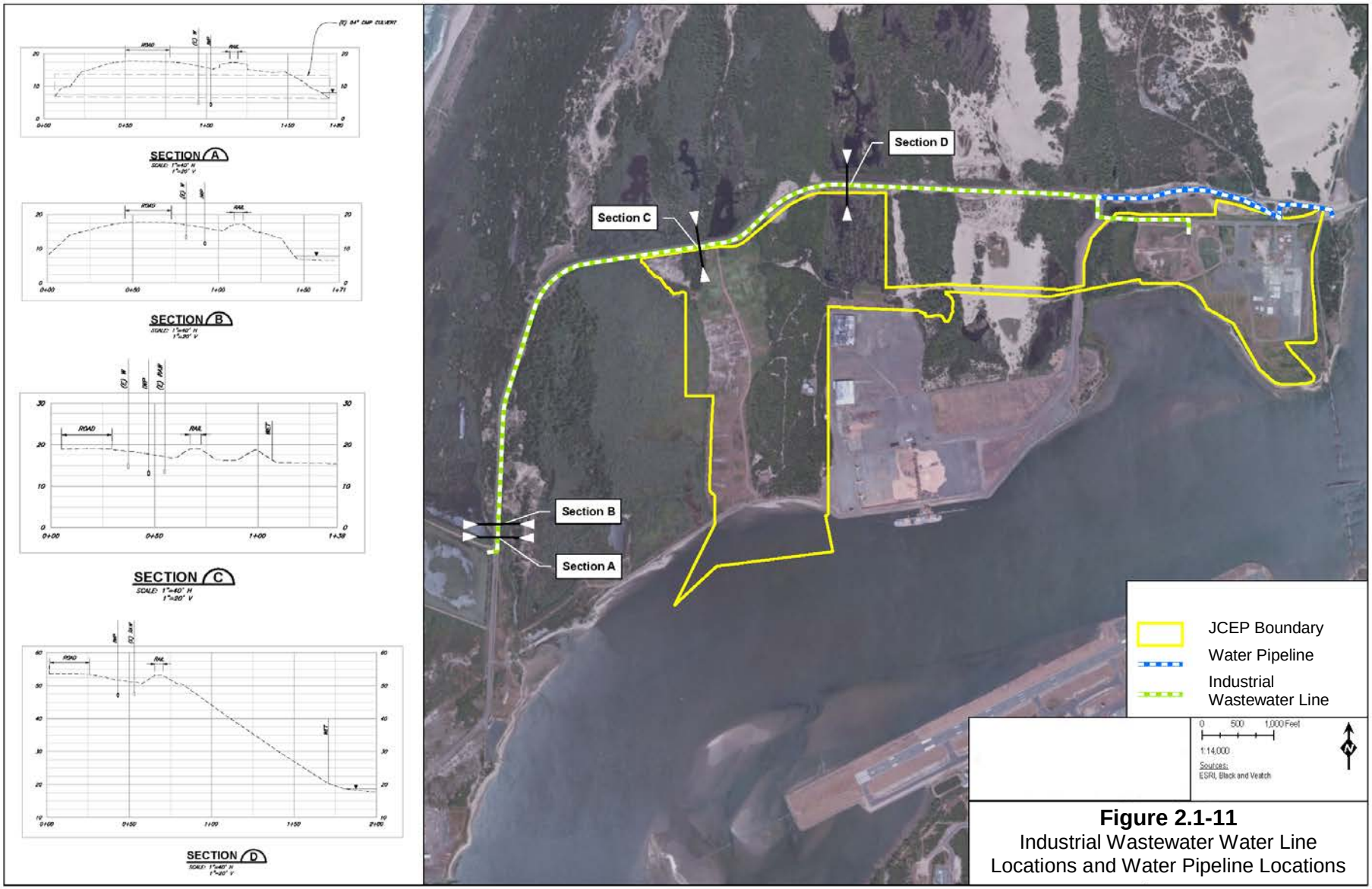


Figure 2.1-11
Industrial Wastewater Water Line Locations and Water Pipeline Locations

At the liquefaction terminal, the fire water pond would be located within a roughly 4 acre area at the northwest corner of the tract, on the south side of the Trans-Pacific Highway (see figure 2.1-2). The pond would be divided into two parts: one for primary water supply, and the second as a backup. Each pond section could hold a minimum of 2,641,000 gallons, for a total capacity of at least 5,282,000 gallons. This would supply approximately 4 hours of fire-fighting water. The liquefaction terminal would include fire water loop mains encompassing the main process area, refrigerant area, LNG storage tanks, and LNG vessel berth.

There are two existing one-million-gallon capacity water tanks on the dune on the west side of the Roseburg Forest Products tract. Both of these tanks are obsolete and would be decommissioned once the Jordan Cove LNG terminal is built. Roseburg Forest Products would then obtain its fire water from the new 12-inch-diameter CBNBWB raw water line extension that would be paid for by Jordan Cove, as mentioned above.

Support Buildings

Jordan Cove plans to construct a non-jurisdictional multi-organizational office complex (SORSC) to provide additional security, safety, and fire-fighting capabilities. That building would house a fire station, offices for the Coos County Sheriff, Coast Guard, and the Port, and a training center for the sheriff and Southwestern Oregon Community College. Jordan Cove has an agreement with the Coos County Sheriff that would allow the company to pay for on-site security personnel.

Table 2.1.1.10-1 lists the proposed support buildings for Jordan Cove's LNG terminal and the South Dunes Power Plant. The South Dunes administration building would be located at the northwest corner of the power plant. Continuing west from the South Dunes administration building along the south side of the power plant access road, there would be an operations building, guard building, and firewater pump house. The hazardous material storage building would be on the south side of the firewater pump building. The SORSC would occupy about 8 acres on the east side of Jordan Cove Road, south of the Trans-Pacific Parkway and north of the Roseburg Forest Products facility.

TABLE 2.1.1.10-1

Support Buildings at the Jordan Cove LNG Terminal and Power Plant Complex

Building	Location	Dimensions	Materials	Other Elements
South Dunes Administration Building	Northwest of the South Dunes Power Plant	Two-story, with 8,500 square feet per floor	Steel exterior frame, masonry or pre-case/pre-stressed wall panels	Building would include vestibule, offices, conference rooms, restrooms, shower-locker room, kitchen, first aid/nurse, file and storage area, and mechanical room

TABLE 2.1.1.10-1

Support Buildings at the Jordan Cove LNG Terminal and Power Plant Complex

Building	Location	Dimensions	Materials	Other Elements
South Dunes Operations Building	West side of Administration Building , east of the South Dunes Guard Building, and north of the South Dunes Control Building	240 feet x 140 feet, two story design with varied eve heights	Pre-engineered structural steel metal roof and siding with sloped roof	Building would include a secured receiving area, warehouse inventory storage, additional storage area, offices, janitorial area and restroom facility in the Warehouse/Receiving. The Operations portions of the building side would contain the offices, conference rooms, men and women's locker facilities, mechanical/electrical rooms, cafeteria and food service, janitorial, and a plant first aid facility. The building would include all interior finishes, HVAC, lighting, building electrical, fire/smoke detection/protection, and plumbing.
South Dunes Control Building	West of the South Dunes Power Plant and south of the Operations Building	104 feet x123 feet x 15 feet high	Reinforced masonry	Building would include control room, offices, conference room, storage, equipment room, break room, lab facility, and battery room
South Dunes Hazardous Material Storage Building	West of the Control Building and South of the Firewater Pump Building	33 feet square x 25 feet high	Pre-engineered structural steel structure, with metal roof and siding	Storage facility with air exchange handling units and sprinkler system to store hazardous materials such as paints, oil, and grease
South Dunes Guard Building	West of South Dunes Operations Building and east of the Firewater Pump Building	To be determined at final design	Pre-engineered structural steel structure, with metal roof and siding	Office for security personnel, storage room, and electrical cabinet
Southwest Oregon Resource Security Center	East side of Jordan Cove Road, south of the Trans-Pacific Parkway	To be determined at final design	To be determined at final design	Fire station, Sheriff office, Southwest Oregon Community College training space, Coast Guard office, and Port office
South Dunes Firewater Pump Shelter	West side of the South Dunes Guard Building	40 feet x 20 feet x 15 feet high	Pre-engineered structural steel structure, with metal siding and roof	Shelter would contain one diesel-driven firewater pump, one electrical firewater pump, and one electrical firewater jockey pump.
South Dunes Electrical Powerhouses (3 total)	Within the gas conditioning processing area	To be determined at final design	Manufactured steel self-enclosed structures	Powerhouses to include switch and control panels, and separate room for batteries
Liquefaction Terminal Maintenance/Warehouse Building	South side of utility corridor, west of terminal process area	150 feet x 170 feet x 30 feet high	Pre-engineered steel frame with metal siding and roof	Building would include storage, offices, conference room, equipment rooms, break room, rest rooms, shop, and crane
Liquefaction Terminal Guard Building	Northwest corner of the terminal tract, south side of Trans-Pacific Parkway, west of the terminal fire water ponds	24 feet x 36 feet x 12 feet high	Pre-engineered structural steel structure, with metal roof and siding	Building would include public access area, office, safety training room, storage room, and rest rooms
Liquefaction Terminal Main Electrical Substation Building	On east side of the Liquefaction Trains process area	95 feet x 170 feet x 30 feet high	Pre-fabricated metal building with metal roof	Building would include GIS Bus and breakers, control and relay panels, 125kV station service battery system

TABLE 2.1.1.10-1

Support Buildings at the Jordan Cove LNG Terminal and Power Plant Complex

Building	Location	Dimensions	Materials	Other Elements
Liquefaction Firewater Pump Building	Northwest corner of the terminal tract, south of the fire water ponds	40 feet x 102 feet x 15 feet high	Pre-engineered steel frame structure with metal siding and roof	Shelter would contain four diesel driven firewater pumps, one electrical firewater pump, and one electrical firewater jockey pump
Tug Boat Operator and Crew Building	North of the tug boat dock, on the northwest corner of the marine slip	45 feet x 60 feet x 15 feet high	Pre-engineered structural steel building with metal siding and roof	Building would include operator area, MCC room, crew berth, and rest rooms
Liquefaction Terminal Compressor Shelters	Within the Liquefaction Trains process area, east of the LNG Storage Tanks	Four Refrigerant Shelters each 65 feet x 110 feet x 72 feet high; one BOG Shelter 80 feet x 135 feet x 72 feet high	Pre-engineered structural steel structures with metal roofing	The buildings provide shelter for refrigerant and BOG compressors, lube oil consoles, and maintenance cranes
Liquefaction Terminal Electrical Powerhouses	Five total, within the terminal liquefaction process area	To be determined at final design	Manufactured steel self-enclosed electrical powerhouses (5 total)	Powerhouses to include switch and control panels, and separate room for batteries

Along the south side of terminal utility corridor, west of Jordan Cove Road and east of the liquefaction process area, would be the terminal warehouse and maintenance building, and control building. The marine control building would be south of the transfer pipeline and LNG vessel berth, on the east side of the slip. The tug boat operations and crew building would be on the north side of the slip, north of the tug dock. The terminal guard building would be at the northwest corner of the property, on the south side of the Trans-Pacific Parkway.

2.1.1.11 Dredged and Excavated Material Disposal

Impacts associated with excavation and dredging activities during construction of Jordan Cove's LNG terminal, and maintenance dredging of the access channel and marine slip during terminal operations are more fully described in section 4.3.1 of this EIS.

Construction of the Marine Facilities

Construction of the access channel and slip for Jordan Cove's terminal would generate about 5.6 mcy of dredged and excavated material (see table 2.1.1.11-1). Of this, about 2.3 mcy would be dry excavated in the proposed slip area north of and behind the earthen berm that would remain in place to separate work in the upland from the bay during Phase 1 of the marine slip construction (see section 2.4.1.5 below). Also in the upland area north of the berth, during "Fresh Water" Phase 2 construction of the slip, up to about 1.5 mcy of material would be dredged in the pocket behind the berm. About 0.5 mcy of material would be dredged during removal of the berm, during the "Salt Water" Phase 3 construction of the slip. Lastly, about 1.3 mcy of material would be dredged from the bay during construction of the access channel between the current Coos Bay navigation channel and the proposed Jordan Cove terminal marine slip.

TABLE 2.1.1.11-1

Materials Excavated and Dredged During Construction of Terminal Marine Facilities

Area	Construction Phase	Activity	Volumes (mcy)
Slip	Upland – Phase 1	Land-based excavation	2.3
Slip	Fresh Water – Phase 2	Dredging in pocket behind berm	Up to 1.5
Slip	Salt Water – Phase 3	Dredging to remove berm	0.5
Access Channel	Salt Water – Phase 3	Dredging in bay	1.3
		Total:	**5.6**

Most of the 5.6 mcy of material excavated and dredged from the slip and access channel would be used to raise the elevation of the proposed terminal facilities above the tsunami inundation zone. A total of about 1.9 mcy would be placed on the LNG terminal upland process area. About 0.5 mcy of material from the removal of the berm between the northern portion of the slip and Coos Bay would be used for restoration of the dune on the east side of the slip area. The remaining materials (about 3.2 mcy) would be deposited at the former Weyerhaeuser linerboard site, which is the proposed location for the pipeline gas treatment facility and South Dunes Power Plant. The elevation of the base of the proposed LNG storage tanks would be raised to +30 feet, while the elevation of the process area at the terminal would be raised to about +46 feet. The elevation of the planned South Dunes Power Plant area would also be raised to about +46 feet.

The excavated materials from the upland portion of the slip would be conveyed to the terminal process area and former linerboard mill site by trucks. The route for trucks hauling excavated materials from the slip to the planned South Dunes Power Plant area would be along the new Jordan Cove–owned road and utility corridor on the north side of the Roseburg Forest Products tract (see figure 2.1-9).

The materials dredged from the proposed terminal slip and access channel would be conveyed to the former Weyerhaeuser linerboard mill site through a slurry pipeline, approximately 8,650 feet long. This slurry pipeline would follow the shoreline of Coos Bay, through the Roseburg Forest Product tract (see figure 2.1-9). This would be a 20-inch-diameter polypropylene seamless pipeline placed directly on the ground; laying on top of the rip-rap along the shore of the Roseburg Forest Products tract. The return water from the planned South Dunes Power Plant would be carried back to the slip through a parallel decant pipeline laid adjacent to the slurry line. After the dredging of the slip and access channel is completed, these temporary slurry and decant pipelines would be dismantled and removed.

Operational Maintenance Dredging

Jordan Cove had Coast and Harbor Engineering (CHE) conduct a study of sedimentation over time in the access channel and slip and come up with estimates for the amount of material that would need to be dredged in the future to maintain the depth of the access channel and slip (CHE 2011a). CHE estimated that the access channel would accumulate about 0.56 feet of sediment per year, equivalent to about 29,200 cubic yards (cy) of material, while the terminal slip would accumulate about 0.16 feet per year of sediment, equivalent to about 8,500 cy of material. Approximately a total of 37,700 cy of material could be dredged for maintenance of the access channel and slip combined in year one of operation of the terminal, and 34,600 cy in year 10. In the first 10 years of operation of the terminal, about 360,000 cy of material would need to be removed to maintain the proper depth of the access channel and slip, while in the next 10 years about 330,000 cy would need to be removed. CHE recommended that the access channel and slip should have maintenance

dredging conducted about every 3 years with about 115,000 cy of material removed for the first 12 years of operation, and after that maintenance dredging could be done about every 5 years with up to 160,000 cy of materials removed. Jordan Cove had a consultant (Moffat & Nichol) prepare a *Slip and Access Channel Excavated & Dredged Material Management Plan* in 2013 that it submitted to the COE.[3]

Disposal of Maintenance Dredging

Site F is located in the Pacific Ocean, about a half mile offshore and 1,000 feet north of the north jetty at the mouth of Coos Bay (figure 2.1-12). The site is owned by the State of Oregon out to the 3-mile territorial limit, and the remainder by the COE. This is an existing EPA-designated offshore placement site, used by the COE since 1986 to disposal of materials dredged during maintenance of the Coos Bay navigation channel. The site was expanded in 1989, 1995, and 2006 (when the current extent of Site F was designated), so that it now encompasses about 3,075 acres, with water depths ranging from 20 to 160 feet.

Jordan Cove would have to obtain a permit from the COE for ocean disposal at Site F of operational maintenance dredged materials from the LNG terminal slip and access channel. As explained in section 1.5.1.4 of this EIS, in accordance with section 103 of the MPRSA, the COE would have to use EPA's criteria when making its decision whether to issue such a permit, and that decision would be subject to EPA's concurrence. The COE has indicated that in order to utilize Site F, Jordan Cove will be required to conduct a capacity analysis of the site. Since 2006, the site has received a substantial volume of dredged material, and the ability of Site F to hold 690,000 cy of material over the next 20 years from Jordan Cove is not clear. In addition, the EPA has indicated that the use of Site F is also dependent on the grain size of the maintenance dredged material. If proposed dredged material is predominantly fine sand, silt, or clay, it would need to be disposed of at Site H (a separate EPA-designated offshore disposal site). Similar to Site F, Site H has received substantial volumes of material in recent years and may not have the capacity for Project material. Depending on the outcome of both grain size evaluation and a capacity analysis of Site H, Jordan Cove may need to work with EPA to designate a new ocean dredged material disposal site for finer-grained material. EPA's designation process is outlined in 40 CFR Part 228. Alternatively, Jordan Cove may seek to dispose of material at an upland site that would be evaluated and permitted separately. However, current analysis of grain size suggests that the sediment to be dredged both for the access channel and slip would be suitable for Site F.

[3] A copy of the dredging plan was filed with the FERC as Appendix H.7 in Resource Report 7 included as part of Jordan Cove's May 2013 application.

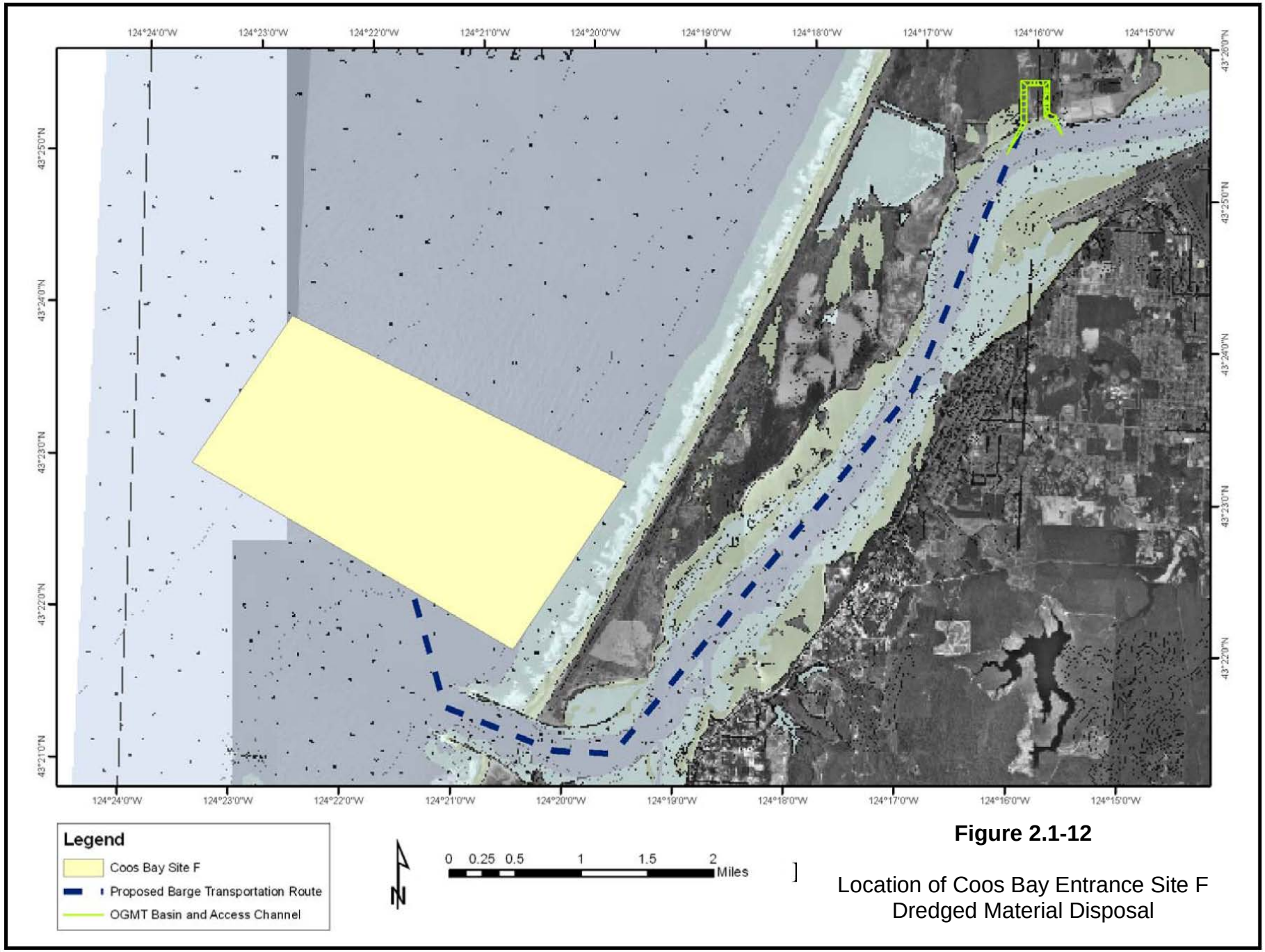


Figure 2.1-12

Location of Coos Bay Entrance Site F Dredged Material Disposal

Suitable disposal sites for large-scale placement of dredged material within the Coos Bay area are limited. The currently approved offshore ocean dredged material disposal sites may be operating near capacity. EPA and the COE are uncertain if disposal Sites F and H can accommodate materials dredged from the Jordan Cove terminal during maintenance operations over the next 20 years. Therefore, **we recommend that:**

- **<u>Prior to construction</u>, Jordan Cove should file with the Secretary a revised *Dredged Material Management Plan*, and documentation that the revised plan was developed in consultation with the EPA and COE. The revised plan should include an analysis of alternative dredged material disposal sites in the region in the event that Sites F and H possess insufficient capacity for materials dredged during Jordan Cove's future operational maintenance activities.**

2.1.1.12 Wetland Avoidance and Mitigation Areas

There are a number of wetlands identified adjacent and within the tract of land owned by Jordan Cove at the location of its proposed LNG terminal and the planned South Dunes Power Plant. In most cases, those wetlands would be avoided by construction activities. The largest wetland adjacent to the terminal, on its west side, is Henderson Marsh. Jordan Cove would maintain a 50-foot buffer between development activities and Henderson Marsh. About 10.9 acres of Henderson Marsh within the Ingram Yard property owned by Jordan Cove would be avoided (Area E3 on figure 2.1-2). No construction activities would take place in Henderson Marsh. There is a 27.6-acre wetland parcel on land owned by Jordan Cove on the north side of the proposed utility corridor, at the northeast corner of the terminal tract, which would also be avoided(Area E1 on figure 2.1-2). Lastly, on the east side of Jordan Cove Road, between the planned SORSC and the pipeline gas treatment plant, there is a 6.9-acre wetland on Jordan Cove property that would be avoided (Area E5 on figure 2.1-2).

Jordan Cove has proposed mitigating the loss of aquatic vegetation by funding an eelgrass restoration program in Coos Bay, near the Southwest Oregon Regional Airport in North Bend, including establishing a minimum of 7.5 acres of eelgrass beds. In addition, on the north side of Coos Bay at Kentuck Slough, about 3 miles northeast of its LNG terminal tract, Jordan Cove proposed to use about 43.6 acres of the former Kentuck golf course which it has acquired as an estuarine wetland mitigation area. Also, as part of its freshwater wetland mitigation proposal, Jordan Cove would include about 2.9 acres of wetlands at the West Jordan Cove mitigation site and about 1.6 acres of wetlands and the West Bridge Site, both located on the east side of the Roseburg Forest Products property.[4] Additional information about wetland impacts and mitigation is presented in section 4.4.3.

2.1.1.13 Upland Preservation Areas

During construction and operation of its proposed LNG terminal, Jordan Cove would avoid about 6.5 acres of sand dunes within land owned by Jordan Cove at the north side of the terminal tract, south of the Trans-Pacific Parkway and north of the liquefaction process area (Area E2 on figure 2.1-2). A forested dune between the proposed marine slip and the Roseburg Forest Products property would be affected by removal of the Roseburg Forest Products water tanks, and

[4] See *Jordan Cove Energy Project Compensatory Wetland Mitigation Plan* filed with the FERC in April 2014, revising their original filing from the May 2013 application.

construction of the barge dock and a temporary haul road between the dock and the planned South Dunes Power Plant (Area E-4 on figure 2.1-2). After terminal construction, about 15 acres of the LNG vessel berth dune would be restored. About 7 acres in the northwest corner of the terminal tract, on the south side of the Trans-Pacific Parkway would be used as a fill area, but Jordan Cove has not identified any facilities that would be placed in that location (Area 4F on figure 2.1-2). Existing upland habitats within the LNG terminal tract are discussed in section 4.5.1 of this EIS.

Landfill Cell #3, comprising debris from the demolition of the former Weyerhaeuser liner board mill, currently occupies about 6 acres northwest of the planned South Dunes Power Plant. Jordan Cove indicated it would relocate materials from this landfill, and fill in all but 2 acres. Land use for the Jordan Cove property is discussed in section 4.1.1. Potentially contaminated sediments and landfills at the former Menasha-Weyerhaeuser mill property is discussed in section 4.3.1.

2.1.1.14 Temporary Construction Use Areas

During construction of the South Dunes Power Plant, a number of temporary laydown areas would be utilized, over which permanent facilities would later be built. One construction laydown area of approximately 4 acres would be located west of the gas processing plant (Area 10 on figure 2.1-2). Another construction laydown area of 11 acres would be located south of the power plant, and later replaced by the stormwater pond during operation of the plant (Area 11 on figure 2.1-2). Table 2.3.1-1 in section 2.3 below details the land requirements for the Jordan Cove LNG terminal in acres affected during construction and operation.

Some of the temporary construction areas within the proposed LNG terminal tract process area would also later be replaced by permanent facilities. For example, construction trailers and the tank staging area would be located within the LNG storage tank area. The concrete batch plant would be where the terminal firewater pond would be located. The tank roof assembly area and process staging area used during construction would later be replaced by the liquefaction trains process area. At the north side of the LNG terminal tract, north of the liquefaction process area, Jordan Cove would use about 21 acres for a construction laydown area.

A temporary construction haul road would be built between the construction barge dock and the South Dunes Power Plant area, covering about 8 acres, through the Roseburg Forest Products property. Also, during construction of the terminal marine slip and access channel, a slurry pipeline and return water pipeline would be laid across the Roseburg Forest Products tract to the South Dunes Power Plant parcel, affecting about 1 acre. Jordan Cove would lease about 40 acres from Roseburg Forest Products for temporary construction areas, including offices, craft areas, warehouses and storage, fabrication, laydown, parking lots, and open areas. After construction, these areas would be restored to their previous condition and use.

In addition, Jordan Cove proposes to construct a temporary workers housing facility, the NPWHC, north of the City of North Bend, on the south side of the McCullough Bridge. After the terminal is completed, that facility would be disassembled and removed, and the area restored to its previous condition and use. Section 2.4.1.1 discusses the NPWHC in more detail.

Also during Project construction, Jordan Cove would use two separate off-site temporary lots for construction worker car parking. One lot would be at the Mill Casino in the city of Coos Bay. The other lot would at the vacated Myrtlewood RV park near the community of Hauser. Jordan Cove

would bus commuting employees from the lots to the terminal. After construction of the terminal is completed, the lots would be restored to their former condition and use.

2.1.2 Pacific Connector Pipeline and Associated Aboveground Facilities

Pacific Connector proposes to construct and operate a high-pressure underground welded steel natural gas pipeline, and associated aboveground facilities. All facilities would be designed, constructed, tested, operated, and maintained to conform with or exceed DOT requirements found in 49 CFR Part 192, *Transportation of Natural and Other Gas by Pipeline: Minimum Safety Standards*; the FERC requirements at 18 CFR 380.15, *Site and Maintenance Requirements*; and other applicable federal and state regulations. The location of the proposed pipeline project facilities are shown on detailed maps included in appendix C and described below.

2.1.2.1 Pipeline

Pacific Connector's proposed 36-inch-diameter natural gas pipeline would extend for about 232 miles between interconnections with GTN and Ruby pipelines near Malin and the Jordan Cove LNG terminal at Coos Bay. The pipeline would cross portions of Klamath, Jackson, Douglas, and Coos Counties, Oregon. For about 41 percent of its route (95.3 miles), the pipeline would be adjacent to existing powerlines, roads, and other pipelines with the remaining distance being newly created "green-field" right-of-way. Table D-1 in appendix D lists locations where the Pacific Connector pipeline would be adjacent to existing rights-of-way.

The pipeline would have a design capacity of 1.07 Bcf/d of natural gas, assuming a receipt pressure of about 900 psig at the supply interconnections near Malin, and a delivery pressure of 850 psig at the proposed Jordan Cove LNG terminal at Coos Bay. The maximum allowable operating pressure (MAOP) of the pipeline would be 1,480 psig.

The pipeline would be designed to flow natural gas from east to west, from its beginning point near Malin to the Jordan Cove LNG terminal. However, because the pipeline was originally planned and sited to support an LNG import terminal and flow gas west to east, milepost and station numbers are assigned from west to east. There are numerous years of data collected and review and resource analyses based on the original west to east MPs. For the majority of this EIS, we describe the pipeline, and resources crossed by the pipeline in a west to east direction.

2.1.2.2 Aboveground Facilities

The new aboveground facilities proposed by Pacific Connector include 1 compressor station, 4 meter stations (2 co-located at one site), 5 pig launcher/receiver assemblies (all co-located with other aboveground facilities), 17 MLVs (3 co-located at proposed meter stations), and 11 communication towers (3 co-located at proposed meter stations) (table 2.1.2.2-1).

TABLE 2.1.2.2-1

Pacific Connector's Proposed Aboveground Facilities

Facility	MP	Operational Acres a/	County	Ownership/ Jurisdiction
Jordan Cove Meter Station, MLV #1, Receiver, and Communication Tower	1.5R	0.9	Coos	Private
MLV #2 (Boone Creek Road)	15.5	0.1	Coos	Private
MLV #3 (Myrtle Point Stikum Road)	29.5	0.1	Coos	Private
MLV #4 (Deep Creek Spur)	48.4	0.1	Douglas	BLM
MLV #5 (South of Olalla Creek)	59.6	0.1	Douglas	Private
Clarks Branch Meter Station, MLV #6, Launcher/Receiver, and Communication Tower	71.5	1.0	Douglas	Private
MLV #7 (Pack Saddle Road)	80.0	0.1	Douglas	BLM
MLV #8 (Highway 227)	94.7	0.1	Douglas	Private
MLV #9 (BLM Road 33-2-12)	113.7	0.1	Jackson	Private
MLV #10 (Shady Cove)	122.2	0.1	Jackson	Private
MLV #11 and Launcher/Receiver (Butte Falls)	132.5	0.4	Jackson	Private
MLV #12 (Heppsie Mountain Quarry Spur)	150.7	0.1	Jackson	BLM
MLV #13 (Clover Creek Road)	169.5	0.1	Klamath	Private
MLV #14 and Launcher/Receiver	187.4	0.4	Klamath	Private
MLV #15 (Klamath River)	196.5	0.1	Klamath	Private
MLV #16 (Hill Road)	214.3	0.1	Klamath	Private
Klamath Compressor Station, Klamath-Beaver and Klamath-Eagle Meter Stations, MLV #17, Launcher, and Communications Tower	228.1	30.9	Klamath	Private
Blue Ridge Communication Tower	NA	0.2	Coos	BLM
Signal Tree Communication Tower	NA	0.2	Coos	BLM
Harness Mountain Communication Tower	NA	0.2	Douglas	Private
Winston Communication Tower	NA	0.2	Douglas	Private
Starveout Creek Communication Tower	NA	0.2	Jackson	Private
Flounce Rock Communication Tower	NA	0.2	Jackson	BLM
Robinson Butte Communication Tower	NA	0.2	Jackson	Forest Service
Stukel Mountain Communication Tower b/	NA	0.2	Klamath	BLM

a/ Values are rounded to the nearest tenth of an acre.
b/ Assumes that existing BLM communication Site Plan is sufficient. If not, supplemental environmental compliance may be required.

Jordan Cove Meter Station

Natural gas would be delivered to the proposed Jordan Cove LNG terminal via the newly proposed Jordan Cove Meter Station located at the western end of the Pacific Connector pipeline, at MP 1.5R, in Coos County. The meter station would be within Jordan Cove's property on the North Spit, adjacent to the planned South Dunes Power Plant, on the southeast side of geographic Jordan Cove on the northern shore of Coos Bay. The new meter station would occupy about 1 acre of industrial land, at the former location of the Weyerhaeuser linerboard mill. Access to the meter station would be from the existing Jordan Cove Road.

One building within the meter station would house the gas chromatographs, moister analyzer, communication equipment, and flow computer. Another building would house the control valves and ultrasonic meters. The station would include an MLV, a pig receiver, and a 140-foot-high communication tower. The station would be enclosed by a 7-foot-high chainlink fence, and the interior of the yard would be graveled.

Clarks Branch Meter Station

The newly proposed Clarks Branch Meter Station would be at MP 71.5 along the Pacific Connector pipeline, in Douglas County. At this location, Pacific Connector would interconnect to the existing

Northwest Pipeline's Grants Pass Lateral. The meter station would cover about 1 acre of privately owned land that is currently used for agricultural purposes as cropland and pasture. The new meter station would be about 600 feet east of the western crossing of the South Umpqua River, with access from Dole Road (via permanent access road [PAR] 71.46).

One building would house a gas chromatograph, communications equipment, and flow computer. Another building would house the control valves and ultrasonic meters. Odorizing facilities, a MLV, and a pig/receiver would be located at the meter station. A 26-foot-high communication tower would also be installed. The station would be equipped with outside lighting; but the lights would only be utilized at night when people are working there. During normal operations, night-time work would not usually be scheduled. The station would be surrounded by a 7-foot-high chainlink fence, and the interior of the yard would be graveled.

Klamath-Beaver and Klamath-Eagle Meter Stations

Co-located within the boundaries of the 31-acre Klamath Compressor Station, in Klamath County, would be two newly proposed meter stations: the Klamath-Beaver Meter Station and the Klamath-Eagle Meter Station. The new Klamath-Beaver Meter Station would include an interconnection with the existing GTN pipeline system; while the new Klamath-Eagle Meter Station would serve as the interconnect with the existing Ruby pipeline system. GTN and Ruby would be the main sources of supply for the Pacific Connector pipeline.

Klamath Compressor Station

The newly proposed Klamath Compressor Station would be located approximately 1.8 miles northeast of the town of Malin, at the eastern beginning of the Pacific Connector pipeline, at MP 228.1. The new station site would accessible on the south from Malin Loop Road and on the west from Morelock Road. It would be adjacent to the existing GTN Malin/Tuscarora Meter Station and the Ruby Turquoise Flats facility. The Klamath Compressor Station would occupy a tract of about 31 acres that would also include the proposed Klamath-Eagle Meter Station and Klamath-Beaver Meter Station. The site is on private land that was used for agricultural purposes, as winter pasture. The parcel is relatively flat, and is covered by grasses and sage, with a few scattered juniper trees.

The nearest residence would be within 1,000 feet of the center of the site. Two other residences would be within 1,500 feet of the center of the site. The compressor station would be secured by a 7-foot-high chainlink fence. To minimize visual intrusions on nearby residences, the security fence would have screening slates, and landscaping would be installed along appropriate sides of the station.

Pacific Connector would install 41,000 ISO hp of new compression at the Klamath Falls Compressor Station. Pacific Connector would also install an additional 20,500 ISO hp standby compressor unit at the station. These would be turbine-driven, natural gas fired centrifugal compressor units. We analyze the possibility of using electric compressor units as an alternative in section 3.4.5.3 of this EIS.

The compression units would be installed in a new compressor building. Other facilities would include an inlet filter/separator, lube oil cooler, inlet air silencer/cleaner, and exhaust system. The compressor building would include skid-mounted fuel gas conditioning, measuring, and regulation

equipment. Related suction and discharge headers and piping would be installed between the pipeline and the compressor units. Other buildings inside the station would include a control room/ancillary equipment building, unit valve skid buildings, and an office. The ancillary equipment building would include an air compressor system, hot water boiler, and back-up generator. The office building would include telephone and computer access. The station would also contain aboveground pig launcher equipment, a MLV, and a 26-foot-high communication tower.

Oil storage tanks at the facility would be constructed with appropriately sized secondary containment. Oil-filled operational equipment would be addressed in a manner consistent with the requirements of 40 CFR 112. All compressor station technicians would be trained for proper handling, storage, disposal, and spill response of hazardous fluids, and Pacific Connector would develop a *Spill Prevention, Containment, and Countermeasures Plan* (SPCCP). No process or non-process wastewater is expected from operations, nor stormwater exposed to industrial activity.

The Klamath Compressor Station would be utilized as a maintenance base for operation of the pipeline facilities. The station would not be manned 24 hours per day, but would have emergency pipe, spare parts, portable equipment such as blow-down silencers, and small hand tools stored on site. The facility would be equipped with outside lighting to support night work activities; however, those lights would only be utilized when operations personnel are working after dark at the station, most likely to occur for short periods periodically during the winter.

Mainline Block Valves

Pacific Connector proposes to install 17 MLV along its pipeline route, spaced according to DOT requirements (CFR 192.179) (see table 2.1.2.2-1). Three of the MLVs would be co-located within proposed meter stations (at the Klamath Compressor Station, Clarks Branch Meter Station, and Jordan Cove Meter Station). MLVs would be equipped with actuators and control equipment as necessary to allow operations consistent with any applicable guidelines or rules promulgated by PHMSA for such facilities. Except for the MLVs located within meter stations, the compressor stations, and the two MLVs that also have pig launcher/receivers, each of the other MLVs would individually occupy a site 50 by 50 feet (less than one-tenth of an acre) and would be enclosed by a 7-foot-high chainlink fence. The two MLVs (#11 and #14) that include pig launchers and receivers would each individually occupy an area 95 feet by 200 feet, or less than half an acre. The MLVs would be within the construction and operational right-of-way for the Pacific Connector pipeline, except for the MLVs at meter stations, the compressor station, and that include pig launchers and receivers. Pacific Connector attempted to locate MLVs adjacent to existing roads to allow reliable all-weather access and minimize the length of new PARs. Pacific Connector would paint the aboveground piping in the MLV locations green, unless otherwise dictated by permit conditions.

Pig Launchers/Receivers

Pig launchers and receivers would allow Pacific Connector to maintain the interior of its pipeline using remotely operated pipe inspection and cleaning tools (known as “pigs”). A pig launcher would be within the proposed Klamath Compressor Station, and a pig receiver would be installed at the proposed Jordan Cove Meter Station. There would also be pig launcher and receivers at the proposed Clarks Branch Meter Station and MLVs #11 and #14. At these two MLVs, the pig

launcher and receivers would occupy an area 95 feet by 200 feet, or less than half an acre. The pig launcher and receiver facilities would be located inside the fenced areas at all locations.

Gas Control Communications

The meter stations and compressor station would require a communications link with Williams Pacific Operator's gas control monitoring system in Salt Lake City, Utah. Therefore, new radio towers are proposed at each meter station and the compressor station. Pacific Connector has conducted initial communications studies and determined that in addition to the proposed towers at the meter stations and compressor station, leased space on existing communication towers would be needed for the Pacific Connector Pipeline Project. In addition to the communication facilities at the proposed meter stations and compressor station, Pacific Connector proposes to install communication facilities at eight existing towers (see table 2.1.2.2-2 and figure 2.1-13).

TABLE 2.1.2.2-2

Proposed and Existing Gas Control Communication Towers

Facility	County	Landowner	Tower Height	Operational Acres a/
Proposed New Towers				
Jordan Cove Meter Station b/	Coos	Private (Pacific Connector)	New tower 140-feet-high	<1 c/
Clarks Branch Meter Station	Douglas	Private (Pacific Connector)	New tower 26-feet-high	1
Klamath Compressor Station	Klamath	Private (Pacific Connector)	New tower 26-feet-high	31
Existing Communication Tower Sites				
Blue Ridge	Coos	BLM (Coos District)	Existing American Tower 161-feet-high	<1
Signal Tree	Coos	BLM (Coos District)	Existing American Tower 71-feet-high	<1
Winston	Douglas	Private	Existing tower 250-feet-high	<1
Harness Mountain	Douglas	Private (Northwest Pipeline)	Existing tower 150-feet-high	<1
Starveout Creek	Jackson	Private	Existing tower 60-feet-high	<1
Flounce Rock	Jackson	BLM (Medford District)	New tower 140-feet-high	<1
Robinson Butte	Jackson	Forest Service (Rogue River National Forest)	New tower 140-feet- high	<1
Stukel Mountain	Klamath	BLM (Lakeview District)	New tower 100-feet-high	<1

a/ Acreages are rounded to the nearest whole acre. If less than 1 acre, reported as "<1".
b/ A tower at this site would only be necessary if Pacific Connector is unable to mount an antenna on one of the structures within the LNG terminal site.
c/ The towers at meter or compressor stations would be within the operational easement of the stations.

Pacific Connector prefers to co-locate with existing facilities when possible and would do so if leased space is available within existing facility sites at the time of construction. If leased space is not available on existing facilities and construction of new facilities is required, Pacific Connector would seek to obtain an approximately 100-foot by 100-foot (about one-quarter acre) area for each of the new facility installations in the immediate vicinity of the existing communication tower facilities. The new towers and communication buildings would be enclosed within a 50-foot by 50-foot (less than one-tenth an acre) fenced footprint located within the larger 100 foot by 100 foot area.

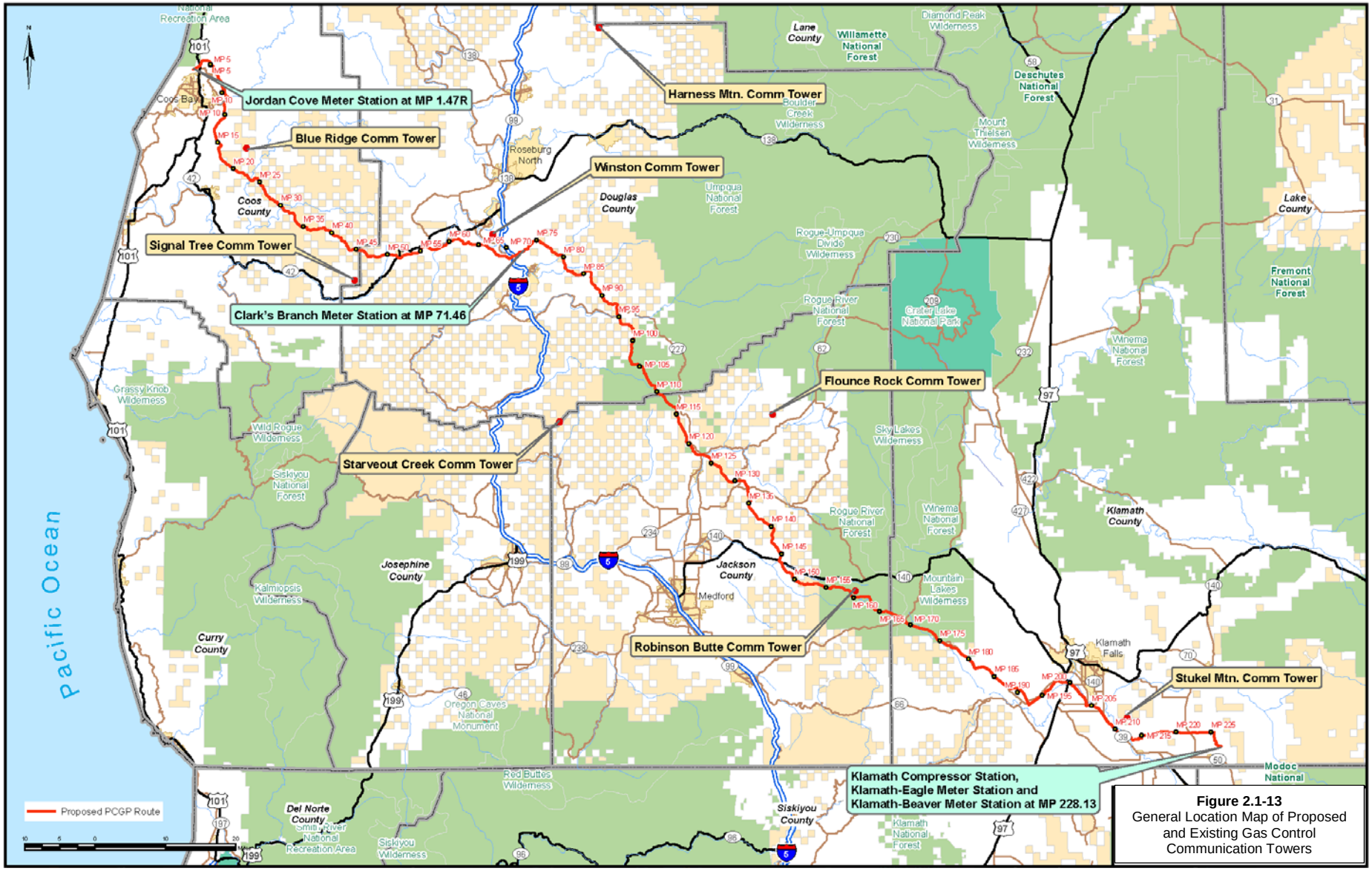


Figure 2.1-13
General Location Map of Proposed and Existing Gas Control Communication Towers

Of the eight existing communication towers, three are on privately owned land, and five are on federal lands. Williams, the managing partner of Pacific Connector, owns the tower at Harness Mountain, in Douglas County, which is currently used for Northwest Pipeline's existing Grants Pass Lateral.

For the five locations on federal lands, Pacific Connector prepared a *Communication Facilities Plan* (dated January 2013) as part of its POD.[5] There are three existing towers on BLM land at Blue Ridge, and Pacific Connector indicated that the tower operated by American Tower has space available and is suitable for co-location. At Signal Tree, on BLM land, there are 14 existing facilities inside the boundary of this communication site. Pacific Connector indicated it may co-locate its new communication facilities at the existing tower of American Tower. There are eight existing communication facilities on BLM land at Flounce Rock. Pacific Connector is investigating co-location on the Telava tower. However, if Pacific Connector is unable to utilize the Telava tower, it would construct a new building and 140-foot-high tower within the boundary of the Flounce Rock communication site. There are two existing towers on Forest Service land at Robinson Butte. However, neither tower is suitable for Pacific Connector, so it proposes to construct a new 140-foot-tower at this location. There are three existing communication facilities on BLM land at Stukel Mountain, but none are suitable for co-locating new Pacific Connector equipment. Therefore, Pacific Connector proposes to build a new 100-foot-high tower at this site, within the boundaries of BLM's site plan for this facility.

2.1.3 BLM and Forest Service Land Management Plan Amendment Actions

Approximately 40 miles of the proposed Pacific Connector pipeline route would cross federal land administered by BLM Coos Bay, Roseburg, Medford Districts and the Klamath Falls Resource Area of the Lakeview District. Approximately 31 miles of the proposed Pacific Connector pipeline route would cross NFS lands administered by the Umpqua, Rogue River, and Winema National Forests. BLM and NFS lands are managed according to current LMPs. The Pacific Connector pipeline route would also cross less than one mile of Reclamation land, and a number of easements and 31 features related to the operation of the Klamath Project administered by the Mid-Pacific Region's Klamath Basin Area Office.

Similar to a county zoning ordinance, projects or activities that occur on BLM or NFS lands must be consistent with the respective LMP where the project or activity occurs. As proposed, the Pacific Connector Pipeline Project would not be consistent with certain elements of the affected BLM and Forest Service LMPs. Before the BLM can consider the Right-of-Way Grant application, the BLM and Forest Service must amend the affected LMPs to make provisions for the Pacific Connector Project. Table 2.1.3-1 describes the amendments to the respective LMPs that would be required to make provision for the Pacific Connector Project. With the exception of amendments to reallocate Matrix lands to LSR, the LMP amendments described in the table below are specific to the Pacific Connector Pipeline Project. The project-specific amendments would not change LMP requirements for other projects or authorize any other actions. With these amendments, the Pacific Connector Project would be a conforming use of the affected BLM Districts and National Forests.

[5] This plan was filed as a stand-alone document with Pacific Connector's June 2013 application to the FERC, as Appendix D of the POD.

TABLE 2.1.3-1

BLM and Forest Service LMP Amendments Associated with the Pacific Connector Pipeline Project

Amendment #	Amendment	Description
BLM/FS-1	Site-Specific Waiver of Management Recommendations for Survey and Manage Species in the BLM Coos Bay District, Roseburg District, Medford District, and Klamath Falls Resource Area of the Lakeview District RMPs, and the Umpqua National Forest, Rogue River National Forest, and Winema National Forest LRMPs	Applicable BLM district RMPs and National Forest LRMPs would be amended to exempt certain known sites within the area of the proposed Pacific Connector Right-of-Way Grant from the Management Recommendations required by the 2001 *Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines* (Forest Service and BLM 2001). For known sites within the proposed right-of-way that cannot be avoided, the 2001 Management Recommendations for protection of known sites of Survey and Manage species would not apply. For known sites located outside the proposed right-of-way but with an overlapping protection buffer only that portion of the buffer within the right-of-way would be exempt from the protection requirements of the Management Recommendations. Those Management Recommendations would remain in effect for that portion of the protection buffer that is outside of the right-of-way.
BLM-1	Site-Specific Exemption of Requirement to Protect Marbled Murrelet (MAMU) Habitat on the BLM Coos Bay District and Roseburg District.	The Coos Bay District RMP and Roseburg District RMP would be amended to waive the requirements to protect contiguous existing and recruitment habitat for MAMU within the Pacific Connector right-of-way that is within 0.5 mile of occupied MAMU sites, as mapped by the BLM. This would be a site-specific amendment applicable to the Pacific Connector pipeline right-of-way on the Coos Bay and Roseburg Districts, and would not affect or otherwise authorize any other project.
BLM-2	Site Specific Exemption of Requirement to Retain Habitat in Known Owl Activity Centers (KOAC) on the BLM Roseburg District	The Roseburg District RMP would be amended to exempt the Pacific Connector pipeline project from the requirement to retain habitat in KOAC at three locations. This would be a site-specific amendment applicable to the pipeline right-of-way, and would not affect or otherwise authorize any other project.
BLM-3	Reallocation of Matrix Lands to Late Successional Reserves (LSR) on the BLM Roseburg District	The Roseburg District RMP would be amended to change the designation of approximately 409 acres from the Matrix land allocations to the LSR land allocation in Sections 32 and 34, Township (T.) 29 ½ South (S.), Range (R.) 7 West (W.); and Section 1, T.30S., R.7W., Willamette Meridian (W.M.), Oregon. This change in land allocation is proposed to mitigate the potential adverse impact of the Pacific Connector pipeline project on LSRs in the Roseburg District. The amendment would change future management direction for the lands reallocated from matrix lands to LSR.
BLM-4	Reallocation of Matrix Lands to LSR on the BLM Coos Bay District	The Coos Bay District RMP would be amended to change the designation of approximately 387 acres from the Matrix land allocations to the LSR land allocation in Sections 19 and 29 of T.28S., R.10W., W.M., Oregon. This change in land allocation is proposed to mitigate the potential adverse impact of the Pacific Connector pipeline project on LSRs in the Coos Bay District. The amendment would change future management direction for the lands reallocated from matrix lands to LSR.
UNF-1	Site-Specific Amendment to Allow Removal of Effective Shade on Perennial Streams	The Umpqua National Forest LRMP would be amended to change the Standards and Guidelines for Fisheries (Umpqua National Forest LRMP, page IV-33, Forest-Wide) to allow the removal of effective shading vegetation where perennial streams are crossed by the Pacific Connector right-of-way. This change would potentially affect an estimated total of 3 acres of effective shading vegetation at approximately four perennial stream crossings in the East Fork of Cow Creek sub-watershed from pipeline MPs 109 to 110, in Sections 16 and 21, T.32S., R.2W., W.M., Oregon.
UNF-2	Site-Specific Amendment to Allow Utility Corridors in Riparian Areas	The Umpqua National Forest LRMP would be amended to change prescriptions C2-II (LRMP IV-173) and C2-IV (LRMP IV-177) to allow the Pacific Connector pipeline route to run parallel to the East Fork of Cow Creek for approximately 0.1 mile between about pipeline MPs 109.7 and 109.8, in Section 21, T.32S., R.2W., W. M., Oregon. This change would potentially affect approximately 1 acre of riparian vegetation along the East Fork of Cow Creek.
UNF-3	Site-Specific Amendment to Waive Limitations on Detrimental Soil Conditions within the Pacific Connector Right-of-Way in All Management Areas	The Umpqua National Forest LRMP would be amended to waive limitations on the area affected by detrimental soil conditions from displacement and compaction within the Pacific Connector right-of-way. Standards and Guidelines for Soils (LRMP page IV-67) requires that not more than 20 percent of the project area have detrimental compaction, displacement, or puddling after completion of a project.

TABLE 2.1.3-1

BLM and Forest Service LMP Amendments Associated with the Pacific Connector Pipeline Project

Amendment #	Amendment	Description
UNF-4	Reallocation of Matrix Lands to LSR	The Umpqua National Forest LRMP would be amended to change the designation of approximately 588 acres from the Matrix land allocation to the LSR land allocation in Sections 7, 18, and 19, T.32S., R.2W., W.M., Oregon; and Sections 13 and 24, T.32S., R.3W., W.M., Oregon. This change in land allocation is proposed to partially mitigate the potential adverse impact of the Pacific Connector Pipeline Project on LSR 223 on the Umpqua National Forest. This amendment would change future management direction for the lands reallocated from matrix to LSR.
RRNF-2	Site-Specific Amendment of Visual Quality Objectives (VQO) on the Big Elk Road	The Rogue River National Forest LRMP would be amended to change the VQO where the Pacific Connector pipeline route crosses the Big Elk Road at about pipeline MP 161.4 in Section 16, T.37S., R.4E., W.M., Oregon, from Foreground Retention (Management Strategy 6, LRMP page 4-72) to Foreground Partial Retention (Management Strategy 7, LRMP page 4-86) and allow 10-15 years for amended visual quality objectives to be attained. The existing Standards and Guidelines for VQO in Foreground Retention where the Pacific Connector pipeline route crosses the Big Elk Road require that VQOs be met within one year of completion of the project and that management activities not be visually evident.
RRNF-3	Site-Specific Amendment of VQO on the Pacific Crest Trail (PCT)	The Rogue River National Forest LRMP would be amended to change the VQO where the Pacific Connector pipeline route crosses the PCT at about MP 168 in Section 32, T.37S., R.5E., W.M., Oregon, from Foreground Partial Retention (Management Strategy 7, LRMP page 4-86) to Modification (USDA Forest Service Agricultural Handbook 478) and to allow 5 years for amended VQOs to be attained. The existing Standards and Guidelines for VQOs in Foreground Partial Retention in the area where the Pacific Connector pipeline route crosses the PCT require that visual mitigation measures meet the stated VQO within three years of the completion of the project and that management activities be visually subordinate to the landscape.
RRNF-4	Site-Specific Amendment of VQO Adjacent to Highway 140	The Rogue River National Forest LRMP would be amended to allow 10-15 years to meet the VQO of Middleground Partial Retention between Pacific Connector pipeline MPs 156.3 to 156.8 and 157.2 to 157.5 in Sections 11 and 12, T.37S., R.3E., W.M., Oregon. Standards and Guidelines for Middleground Partial Retention (Management Strategy 9, LRMP page 4-112) require that VQOs for a given location be achieved within three years of completion of the project. Approximately 0.8 miles or 9 acres of the Pacific Connector right-of-way in the Middleground Partial Retention VQO visible at distances of about 0.8 to 5 miles from State Highway 140 would be affected by this amendment.
RRNF-5	Site-Specific Amendment to Allow Utility Transmission Corridors in Management Strategy 26, Restricted Riparian Areas	The Rogue River National Forest LRMP would be amended to allow the Pacific Connector right-of-way to cross the Restricted Riparian land allocation. This would potentially affect approximately 2.5 acres of the Restricted Riparian Management Strategy at one perennial stream crossing on the South Fork of Little Butte Creek at about pipeline MP 162.45 in Section 15, T.37S., R.4E., W.M., Oregon. Standards and Guidelines for the Restricted Riparian land allocation prescribe locating transmission corridors outside of this land allocation (Management Strategy 26, LRMP page 4-308).
RRNF-6	Site-Specific Amendment to Waive Limitations on Detrimental Soil Conditions within the Pacific Connector Right-of-Way in All Management Areas	The Rogue River National Forest LRMP would be amended to waive limitations on areas affected by detrimental soil conditions from displacement and compaction within the Pacific Connector right-of-way in all affected Management Strategies. Standards and Guidelines for detrimental soil impacts in affected Management Strategies require that no more than 10 percent of an activity area should be compacted, puddled, or displaced upon completion of project (not including permanent roads or landings). No more than 20 percent of the area should be displaced or compacted under circumstances resulting from previous management practices including roads and landings. Permanent recreation facilities or other permanent facilities are exempt (RRNF LRMP 4-41, 4-83, 4-97, 4-123, 4-177, 4-307).
RRNF-7	Reallocation of Matrix Lands to LSR	The Rogue River National Forest LRMP would be amended to change the designation of approximately 512 acres from the Matrix land allocation to the LSR land allocation in Section 32, T.36S., R.4E. W.M., Oregon. This change in land allocation is proposed to partially mitigate the potential adverse impact of the Pacific Connector pipeline project on LSR 227 on the Rogue River National Forest. This amendment would change future management direction for the lands reallocated from Matrix to LSR.

TABLE 2.1.3-1

BLM and Forest Service LMP Amendments Associated with the Pacific Connector Pipeline Project

Amendment #	Amendment	Description
WNF-1	Site-Specific Amendment to Allow Utility Corridors in Management Area 3	The Winema National Forest LRMP would be amended to change the Standards and Guidelines for Management Area 3 (MA-3) (LRMP page 4-103-4, Lands) to allow the Pacific Connector pipeline corridor in MA-3 from the Forest Boundary in Section 32, T.37S., R.5E., W.M., Oregon, to the Clover Creek Road corridor in Section 4, T.38S, R.5E., W.M., Oregon. Standards and Guidelines for MA-3 state that the area is currently an avoidance area for new utility corridors. This proposed new utility corridor is approximately 1.5 miles long and occupies approximately 17 acres.
WNF-2	Site-Specific Amendment of VQO on the Dead Indian Memorial Highway	The Winema National Forest LRMP would be amended to allow 10-15 years to achieve the VQO of Foreground Retention where the Pacific Connector right-of-way crosses the Dead Indian Memorial Highway at approximately pipeline MP 168.8 in Section 33, T.37S., R.5E., W. M., Oregon. Standards and Guidelines for Scenic Management, Foreground Retention (LRMP 4-103, MA 3A, Foreground Retention) requires VQOs for a given location be achieved within one year of completion of the project. The Forest Service proposes to allow 10-15 years to meet the specified VQO at this location.
WNF-3	Site-Specific Amendment of VQO Adjacent to the Clover Creek Road	The Winema National Forest LRMP would be amended to allow 10-15 years to meet the VQO for Scenic Management, Foreground Partial Retention, where the Pacific Connector right-of-way is adjacent to the Clover Creek Road from approximately pipeline MPs 170 to 175 in Sections 2, 3, 4, 11, and 12, T.38S., R.5E., W.M., Oregon, and Sections 7 and 18, T.38S., R.6E., W.M., Oregon. This change would potentially affect approximately 50 acres. Standards and Guidelines for Foreground Partial Retention (LRMP, page 4-107, MA 3B) require that VQOs be met within 3 years of completion of a project.
WNF-4	Site-Specific Amendment to Waive Limitations on Detrimental Soil Conditions within the Pacific Connector Right-of-Way in All Management Areas	The Winema National Forest LRMP would be amended to waive restrictions on detrimental soil conditions from displacement and compaction within the Pacific Connector right-of-way in all affected management areas. Standards and Guidelines for detrimental soil impacts in all affected management areas require that no more than 20 percent of the activity area be detrimentally compacted, puddled, or displaced upon completion of a project (LRMP page 4-73, 12-5).
WNF-5	Site-Specific Amendment to Waive Limitations on Detrimental Soil Conditions within the Pacific Connector Right-of-Way in Management Area 8 (Riparian Area MA-8)	The Winema National Forest LRMP would be amended to waive restrictions on detrimental soil conditions from displacement and compaction within the Pacific Connector right-of-way within the Management Area 8 (MA-8), Riparian Area. This change would potentially affect approximately 0.5 mile or an estimated 9.6 acres of MA-8. Standards and Guidelines for Soil and Water, MA-8 require that not more than 10 percent of the total riparian zone in an activity area be in a detrimental soil condition upon the completion of a project (LRMP page 4-137, 2).

2.1.3.1 Proposed Amendments of the BLM Coos Bay District RMP

The BLM proposes to amend the Coos Bay RMP as follows:

BLM/FS-1: Site-Specific Waiver of Management Recommendations for Survey and Manage Species on the BLM Coos Bay District

Current Resource Management Plan: Management direction for S&M species in the Coos Bay RMP (page 33) as amended by Management Recommendations (S&G, Section V) of the 2001 *Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines*, require protection of known S&M species sites.

Proposed Amendment: This proposal would amend the Coos Bay District RMP to exempt S&M species sites within the area of the proposed right-of-way for the Pacific Connector pipeline from the management direction for S&M species, as amended, in the Coos Bay District RMP by adding by the following text to page 33:

The Management Recommendations to protect Survey and Manage species sites (S&G, Section V of the 2001 "Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines,") are waived for the lands occupied as authorized under a right-of-way for the Pacific Connector Gas Pipeline on the Coos Bay District. For known sites within the proposed right-of-way that cannot be avoided, the Management Recommendations would not apply. For known sites located outside the proposed right-of-way but with an overlapping protection buffer, only that portion of the buffer within the right-of-way would be exempt from the protection requirements. These Management Recommendations would remain in effect for that portion of the protection buffer that is outside of the right-of-way. This waiver of Management Recommendations does not exempt the BLM from the requirements of the 2001 Survey and Manage Record of Decision to maintain species persistence for affected Survey and Manage species within the range of the northern spotted owl. This is a site-specific amendment applicable to the lands occupied as authorized under a right-of-way for the Pacific Connector Gas Pipeline on the Coos Bay District of BLM and would not affect or otherwise authorize any other project.

BLM-1: Site-Specific Exemption of Requirement to Protect MAMU Habitat on the BLM Coos Bay District

Current Resource Management Plan: The Coos Bay District RMP requires protection of contiguous existing and recruitment habitat for MAMU that is within 0.5 mile of occupied MAMU sites, as mapped by the BLM (page 36).

Proposed Amendment: This proposal would amend the Coos Bay District RMP management direction for MAMU (page 36) by adding the following text to page 36:

The requirement to protect contiguous existing and recruitment habitat for marbled murrelets that is within the Pacific Connector right-of-way is waived for the Pacific Connector Gas Pipeline Project. This is a site-specific amendment applicable to the lands occupied as authorized under a right-of-way for the Pacific Connector Gas Pipeline on the Coos Bay District of BLM and would not affect or otherwise authorize any other project.

BLM-4: Reallocation of Matrix Lands to LSRs on the Coos Bay District

Current Resource Management Plan: Standards and Guidelines for Developments in LSRs on the Coos Bay District require that new developments that may adversely affect LSRs be minimized or mitigated (page 20). This change in land allocation is proposed to mitigate the potential adverse impact of the Pacific Connector pipeline on LSRs on the Coos Bay District.

Proposed Amendment: The proposal would amend the Coos Bay RMP as follows**:**

The Coos Bay District RMP and District Strategy Map (Map 3) are amended to change the designation of approximately 387 acres from the Matrix land allocations to the LSR land allocation in Sections 19 and 29 of T. 28 S., R. 10 W., W. M., Oregon. The amendment would change future management direction for the lands reallocated from Matrix lands to LSR.

2.1.3.2 Proposed Amendments of the BLM Roseburg District RMP

The BLM proposes to amend the Roseburg District RMP as follows:

BLM/FS-1: Site-Specific Waiver of Management Recommendations for Survey and Manage Species on the BLM Roseburg District

Current Resource Management Plan: Management direction for S&M species in the Roseburg District RMP (page 23) as amended by Management Recommendations (S&G, Section V) of the 2001 *Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines*, require protection of known S&M species sites.

Proposed Amendment: This proposal would amend the Roseburg District RMP to exempt S&M species sites within the area of the proposed right-of-way for the Pacific Connector pipeline from the management direction for S&M species in the Roseburg District RMP by adding by the following text to page 23:

> *The Management Recommendations to protect Survey and Manage species sites (S&G, Section V of the 2001 "Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines,") are waived for the lands occupied as authorized under a right-of-way for the Pacific Connector Gas Pipeline on the Roseburg District. For known sites within the proposed right-of-way that cannot be avoided, the Management Recommendations would not apply. For known sites located outside the proposed right-of-way but with an overlapping protection buffer, only that portion of the buffer within the right-of-way would be exempt from the protection requirements. These Management Recommendations would remain in effect for that portion of the protection buffer that is outside of the right-of-way. This waiver of Management Recommendations does not exempt the BLM from the requirements of the 2001 Survey and Manage Record of Decision to maintain species persistence for affected Survey and Manage species within the range of the northern spotted owl. This is a site-specific amendment applicable to the lands occupied as authorized under a right-of-way for the Pacific Connector Gas Pipeline on the Roseburg District of BLM and would not affect or otherwise authorize any other project.*

BLM-1: Site-Specific Exemption of Requirement to Protect MAMU Habitat on the BLM Roseburg District

Current Forest Plan: The Roseburg District RMP requires protection of contiguous existing and recruitment habitat for MAMU that is within 0.5 mile of occupied MAMU sites, as mapped by the BLM (page 48).

Proposed Amendment: This proposal would amend the Roseburg District RMP management direction for MAMU (page 48) by adding the following:

> *This requirement to protect marbled murrelet habitat is waived for the Pacific Connector Gas Pipeline. This would be a site-specific amendment applicable to the lands occupied as authorized under a right-of-way for the Pacific Connector Gas Pipeline on the Roseburg District of BLM and would not affect or otherwise authorize any other project.*

BLM-2: Site Specific Exemption of Requirement to Retain Habitat in KOAC on the BLM Roseburg District

Current Resource Management Plan: The Roseburg District RMP requires retention of habitat in KOAC (page 48).

Proposed Amendment: This proposal would waive management direction in the Roseburg District RMP to protect habitat in KOAC for the NSO (page 48) by adding the following text:

This requirement to retain habitat in Known Owl Activity Centers is waived for the Pacific Connector Gas Pipeline. This is a site-specific amendment applicable to the lands occupied as authorized under a right-of-way for the Pacific Connector Pipeline on the Roseburg District of BLM and would not affect or otherwise authorize any other project.

BLM-3: Reallocation of Matrix Lands to LSR on the BLM Roseburg District

Current Resource Management Plan: Standards and Guidelines for Developments in LSRs on the Roseburg District require that new developments that may adversely affect LSRs be minimized or mitigated (page 30). This change in land allocation is proposed to partially mitigate the potential adverse impact of the Pacific Connector pipeline on LSRs on the Roseburg District.

Proposed Amendment: The proposal would amend the Roseburg RMP as follows**:**

The Roseburg District RMP District Strategy Map is amended to change the designation of approximately 409 acres from the Matrix land allocations to the LSR land allocation in Sections 32 and 34, T. 29 S., R. 7 W.; and Section 1, T. 30 S., R. 7 W., W.M., Oregon. The amendment would change future management direction for the lands reallocated from Matrix lands to LSR.

2.1.3.3 Proposed Amendments of the BLM Medford District RMP

The BLM proposes to amend the Medford District RMP as follows:

BLM/FS-1: Site-Specific Waiver of Management Recommendations for Survey and Manage Species in the BLM Medford District

Current Resource Management Plan: Management direction for S&M species (page 25) as amended by Management Recommendations (S&G, Section V) of the 2001 *Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines*, require protection of known S&M species sites.

Proposed Amendment: This proposal would amend the Medford District RMP to exempt S&M species sites within the area of the proposed right-of-way for the Pacific Connector pipeline from the management direction for S&M species in the Medford District RMP by adding by the following text to page 25:

The Management Recommendations to protect Survey and Manage species sites (S&G, Section V of the 2001 "Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines,") are waived for the lands occupied as authorized under a right-of-way

for the Pacific Connector Gas Pipeline on the Medford District. For known sites within the proposed right-of-way that cannot be avoided, the Management Recommendations would not apply. For known sites located outside the proposed right-of-way but with an overlapping protection buffer, only that portion of the buffer within the right-of-way would be exempt from the protection requirements. These Management Recommendations would remain in effect for that portion of the protection buffer that is outside of the right-of-way. This waiver of Management Recommendations does not exempt the BLM from the requirements of the 2001 Survey and Manage Record of Decision to maintain species persistence for affected Survey and Manage species within the range of the northern spotted owl. This is a site-specific amendment applicable to the lands occupied as authorized under a right-of-way for the Pacific Connector Gas Pipeline on the Medford District of BLM and would not affect or otherwise authorize any other project.

2.1.3.4 Proposed Amendment of the BLM Klamath Falls Resource Area RMP

The BLM proposes to amend the Klamath Falls Resource Area of the Lakeview District RMP as follows:

BLM/FS-1: Site-Specific Waiver of Management Recommendations for Survey and Manage Species in the Klamath Falls Resource Area RMP

Current Resource Management Plan: Management direction for S&M species (page 11) as amended by Management Recommendations (S&G, Section V) of the 2001 *Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines*, require protection of known S&M species sites.

Proposed Amendment: This proposal would amend the Klamath Falls Resource Area RMP to exempt S&M species sites within the area of the proposed right-of-way for the Pacific Connector pipeline from the management direction for S&M species in the Klamath Falls Resource Area RMP by adding the following text to page 12:

The Management Recommendations to protect Survey and Manage species sites (S&G, Section V of the 2001 "Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines,") are waived for the lands occupied as authorized under a right-of-way for the Pacific Connector Gas Pipeline on the Klamath Falls Resource Area of the Lakeview District. For known sites within the proposed right-of-way that cannot be avoided, the Management Recommendations would not apply. For known sites located outside the proposed right-of-way but with an overlapping protection buffer, only that portion of the buffer within the right-of-way would be exempt from the protection requirements. These Management Recommendations would remain in effect for that portion of the protection buffer that is outside of the right-of-way. This waiver of Management Recommendations does not exempt the BLM from the requirements of the 2001 Survey and Manage Record of Decision to maintain species persistence for affected Survey and Manage species within the range of the northern spotted owl. This is a site-specific amendment applicable to the lands occupied as authorized under a right-of-way

for the Pacific Connector Gas Pipeline and would not affect or otherwise authorize any other project.

2.1.3.5 Proposed Amendments of the Umpqua National Forest LRMP

The Forest Service proposes to amend the Umpqua National Forest LRMP as follows:

BLM/FS-1: Site-Specific Waiver of Management Recommendations for Survey and Manage Species in the Umpqua National Forest LRMP

Current Land and Resource Management Plan: Management Recommendations (S&G, Section V) of the 2001 *Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines*, amended the Umpqua National Forest LRMP to require protection of known S&M species sites.

Proposed Amendment: This proposal would amend the Umpqua National Forest LRMP to exempt S&M species sites within the area of the proposed right-of-way for the Pacific Connector pipeline from the management direction for S&M species by adding the following text to the Umpqua National Forest LRMP, page IV-3, Standards and Guidelines:

The Management Recommendations to protect Survey and Manage species sites (S&G, Section V of the 2001 "Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines,") are waived for the lands occupied as authorized under a right-of-way for the Pacific Connector Gas Pipeline on the Umpqua National Forest. For known sites within the proposed right-of-way that cannot be avoided, the Management Recommendations would not apply. For known sites located outside the proposed right-of-way but with an overlapping protection buffer, only that portion of the buffer within the right-of-way would be exempt from the protection requirements. These Management Recommendations would remain in effect for that portion of the protection buffer that is outside of the right-of-way. This waiver of Management Recommendations does not exempt the Forest Service from the requirements of the 2001 Survey and Manage Record of Decision to maintain species persistence for affected Survey and Manage species within the range of the northern spotted owl. This is a site-specific amendment applicable to the lands occupied as authorized under a right-of-way for the Pacific Connector Gas Pipeline on the Umpqua National Forest and would not affect or otherwise authorize any other project.

UNF-1: Site-Specific Amendment To Allow Removal of Effective Shade on Perennial Streams

Current Land and Resource Management Plan: The Pacific Connector pipeline would cross four perennial streams on the Umpqua National Forest. Forest wide Standards and Guidelines for Fisheries prohibit removal of effective shading vegetation on perennial streams (LRMP, page IV-33 S&G #1). Forest-wide Standards and Guidelines for water quality require retention of shade unless a site-specific assessment shows that shade removal would not result in an increase in water temperature (LRMP, page IV-60, S&G #1).

Proposed Amendment: The proposed amendment would change Forest Wide Standards and Guidelines for Fisheries, S&G #1 on page IV-33 and Standards and Guidelines for Water Quality, S&G #1 on page IV-60 by adding the following text:

> *Removal of effective shade is permitted where the Pacific Connector Gas Pipeline corridor crosses perennial streams. This amendment applies only to the corridor of the Pacific Connector Gas Pipeline where it crosses perennial streams on the Umpqua National Forest. It does not affect any other project, or establish future management direction.*

UNF-2: Site-Specific Amendment To Allow Utility Corridors in Riparian Areas

Current Land and Resource Management Plan: Facilities prescriptions C2-II on page IV-173 and C2-IV on page IV-177 restrict utility corridors from running parallel to Class II streams.

Proposed Amendment: This amendment would add the following language to Facilities prescriptions C2-II on page IV-173 and C2-IV on page IV-177 by adding the following text:

> *The Pacific Connector Gas Pipeline corridor would parallel a Class II stream in the East Fork of Cow Creek for approximately 0.1 mile. This amendment applies only to the project area of the Pacific Connector Gas Pipeline and does not change future management direction.*

UNF-3: Site-Specific Amendment To Waive Limitations on Detrimental Soil Conditions within the Pacific Connector Right-of-Way in All Management Areas

Current Land and Resource Management Plan: Forest Wide Standards and Guidelines for Soils (Umpqua NF LRMP, page IV-67, S&G #1) requires that not more than 20 percent of the project area should have detrimental compaction, displacement or puddling after completion of the project.

Proposed Amendment: This amendment would change Soils Forest Wide Standards and Guideline #1 on Page IV-67 by adding the following text:

> *The Pacific Connector Gas Pipeline may exceed the restriction on detrimental soil conditions. This amendment applies only to the right-of-way and associated work areas of the Pacific Connector Gas Pipeline. It does not affect other projects, or change any future management direction.*

UNF-4: Reallocation of Matrix Lands to LSRs on the Umpqua National Forest

Current Land and Resource Management Plan: Standards and Guidelines for Developments in LSRs require that new developments that may adversely affect LSRs be minimized or mitigated (see *Standards and Guidelines for Management of Habitat for Late-Successional and Old-Growth Related Species Within the Range of the Northern Spotted Owl*, Page C-17). This change in land allocation is proposed to partially mitigate the potential adverse impact of the PCGP on LSR 223 on the Umpqua National Forest.

Proposed Amendment: The proposal would amend the Umpqua Forest LRMP as follows**:**

The Umpqua National Forest LRMP is amended to change the designation of approximately 588 acres from Matrix land allocations to the LSR land allocation in Sections 7, 18, and 19, T.32S., R.2W., and Sections 13 and 24, T.32S., R.3W., W.M., OR.

2.1.3.6 Proposed Amendments of the Rogue River National Forest LRMP

The Forest Service proposes to amend the Rogue River National Forest LRMP as follows[6]:

BLM/FS-1: Site-Specific Waiver of Management Recommendations for Survey and Manage Species in the Rogue River National Forest LRMP

Current Land and Resource Management Plan: Management Recommendations (S&G, Section V) of the 2001 *Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines*, amended the Rogue River National Forest LRMP to require protection of known S&M species sites.

Proposed Amendment: This proposal would amend the Rogue River National Forest LRMP to exempt S&M species sites within the area of the proposed right-of-way for the Pacific Connector pipeline from the management direction for S&M species by adding the following text to the Rogue River National Forest LRMP on page 4-31 – Standards and Guidelines:

The Management Recommendations to protect Survey and Manage species sites (S&G, Section V of the 2001 "Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines,") are waived for the lands occupied as authorized under a right-of-way for the Pacific Connector Gas Pipeline on the Rogue River National Forest. For known sites within the proposed right-of-way that cannot be avoided, the Management Recommendations would not apply. For known sites located outside the proposed right-of-way but with an overlapping protection buffer, only that portion of the buffer within the right-of-way would be exempt from the protection requirements. These Management Recommendations would remain in effect for that portion of the protection buffer that is outside of the right-of-way. This waiver of Management Recommendations does not exempt the Forest Service from the requirements of the 2001 Survey and Manage Record of Decision to maintain species persistence for affected Survey and Manage species within the range of the northern spotted owl. This is a site-specific amendment applicable to the lands occupied as authorized under a right-of-way for the Pacific Connector Gas Pipeline on the Rogue River National Forest and would not affect or otherwise authorize any other project.

RRNF-2: Site-Specific Amendment of VQO on the Big Elk Road

Current Land and Resource Management Plan: The location where the Pacific Connector pipeline intersects the Big Elk Road is in Management Strategy 6, where the VQO is Foreground

[6] RRNF-1 to establish a goal for energy transmission related to the Pacific Connector pipeline was included in the NOI for this project. The Forest Supervisor of the Rogue River National Forest has determined this amendment was not necessary.

Retention. This VQO must be met within one year of completion of the Pacific Connector Pipeline Project and management activities must not be visually evident (Rogue River National Forest LRMP, Page 4-72).

Proposed Amendment: This amendment proposes to change the VQO for Management Strategy 6 on page 4-72 of the Rogue River National Forest LRMP (Description) and to allow additional time to meet the VQO, as follows:

> *In the vicinity where the Pacific Connector Gas Pipeline right-of-way crosses the Big Elk Road, the Visual Quality Objective is amended from Foreground Retention to Foreground Partial Retention and 10 to 15 years will be allowed for the amended Visual Quality Objectives to be attained. This amendment applies only to the right-of-way of the Pacific Connector Gas Pipeline in the vicinity of the Big Elk Road and does not change future management direction for any other project.*

RRNF-3: Site-Specific Amendment of VQO on the PCT

Current Land and Resource Management Plan: The location where the Pacific Connector pipeline crosses the PCT is in Management Strategy 7, where the VQO is Foreground Partial Retention. VQOs must be met within three years of completion of an activity, and the management activity should be visually subordinate to the landscape.

Proposed Amendment: This amendment proposes to change the VQO for Management Strategy 7 on page 4-86 of the Rogue River National Forest LRMP (Description) to read as follows:

> *In the vicinity where the Pacific Connector Gas Pipeline right-of-way crosses the Pacific Crest Trail (PCT) the VQO is amended from Foreground Partial Retention to Modification and up to five years will be allowed for VQOs to be attained. This amendment applies only to the right-of-way of the Pacific Connector Gas Pipeline in the vicinity of the Pacific Crest Trail and does not change future management direction.* [7]

RRNF-4: Site-Specific Amendment of VQO Adjacent to Highway 140

Current Land and Resource Management Plan: The ridgetop where the Pacific Connector pipeline runs adjacent to Highway 140 is in Management Strategy 9, where the VQO is Middleground Partial Retention. Management activities may be evident but visually subordinate to the natural landscape and VQOs must be met within three years of completion of an activity.

Proposed Amendment: This amendment proposes to change the VQO for Management Strategy 9 on page 4-112 of the Rogue River National Forest LRMP (Description) to read as follows:

> *In the vicinity where the Pacific Connector Gas Pipeline right-of-way runs along Highway 140, 10 to 15 years will be allowed for VQOs to be attained. This amendment applies only to the right-of-way of the Pacific Connector Gas Pipeline in the vicinity of Highway 140 and does not change future management direction.*

[7] This amendment has been revised to address comments provided on the DEIS with respect to timeframe to achieve VQOs.

RRNF-5: Site-Specific Amendment to Allow Utility Transmission Corridors in Management Strategy 26, Restricted Riparian Areas

Current Land and Resource Management Plan: Restricted Riparian, Management Strategy 26, extends at least 100 feet or to the extent of the riparian vegetation on each side of perennial streams. The Pacific Connector pipeline route crosses Management Strategy 26 lands at the South Fork of Little Butte Creek. Standards and Guidelines for the Restricted Riparian Management Strategy (Rogue River National Forest LRMP, page 4-308) states that transmission corridors should be located outside of this management strategy.

Proposed Amendment: This amendment proposes to change Standards and Guidelines for MA 26 on page 4-308 by adding the following text:

> *The Pacific Connector Gas Pipeline corridor is allowed to cross the Restricted Riparian land allocation at the South Fork of Little Butte Creek. This amendment applies only to the right-of-way and associated work areas of the Pacific Connector Gas Pipeline where they cross the Restricted Riparian land allocation. It does not affect any other project or establish future management direction.*

RRNF-6: Site-Specific Amendment To Waive Limitations on Detrimental Soil Conditions Within the Pacific Connector Right-of-Way in All Management Areas

Current Land and Resource Management Plan: Standards and Guidelines for soils in all Management Areas require that no more than 10 percent of the activity area be detrimentally compacted, puddled or displaced upon completion of a project or activity.

Proposed Amendment: This amendment proposes allow the Pacific Connector Pipeline Project to exceed restrictions on detrimental soil conditions. The following language would amend existing LRMP direction for soils in all Management Areas:

> *Standards and Guidelines for detrimental soil conditions may be exceeded in all management areas crossed by the Pacific Connector Gas Pipeline. This amendment applies only to the right-of-way and associated work areas of the Pacific Connector Gas Pipeline. It does not affect other projects, or change any future management direction.*

RRNF-7: Reallocation of Matrix Lands to LSR

Current Land and Resource Management Plan: Standards and Guidelines for Developments in LSRs require that new developments that may adversely affect LSRs be minimized or mitigated (see *Standards and Guidelines for Management of Habitat for Late-Successional and Old-Growth Related Species Within the Range of the Northern Spotted Owl*, Page C-17). This change in land allocation is proposed to partially mitigate the potential adverse impact of the Pacific Connector Project on LSR 227 on the Rogue River National Forest.

Proposed Amendment: The proposal would amend the Rogue River National Forest LRMP as follows**:**

> *The Rogue River National Forest LRMP is amended to change the designation of approximately 512 acres from Matrix land allocations to the LSR land allocation in Section 32, T.36S., R.4E. W.M., OR.*

2.1.3.7 Proposed Amendments of the Winema National Forest LRMP

The Forest Service proposes to amend the Winema National Forest LMRP as follows:

BLM/FS-1: Site-Specific Waiver of Management Recommendations for Survey and Manage Species in the Winema National Forest LRMP

Current Land and Resource Management Plan: Management Recommendations (S&G, Section V) of the 2001 *Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines*, amended the Winema National Forest LRMP to require protection of known S&M species sites.

Proposed Amendment: This proposal would amend the Winema National Forest LRMP to exempt S&M species sites within the area of the proposed right-of-way for the Pacific Connector pipeline from the management direction for S&M species by adding the following text to the Winema National Forest LRMP on page 4-38, Forestwide Standards and Guidelines:

The Management Recommendations to protect Survey and Manage species sites (S&G, Section V of the 2001 "Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines,") are waived for the lands occupied as authorized under a right-of-way for the Pacific Connector Gas Pipeline on the Winema National Forest. For known sites within the proposed right-of-way that cannot be avoided, the Management Recommendations would not apply. For known sites located outside the proposed right-of-way but with an overlapping protection buffer, only that portion of the buffer within the right-of-way would be exempt from the protection requirements. These Management Recommendations would remain in effect for that portion of the protection buffer that is outside of the right-of-way. This waiver of Management Recommendations does not exempt the Forest Service from the requirements of the 2001 Survey and Manage Record of Decision to maintain species persistence for affected Survey and Manage species within the range of the northern spotted owl. This is a site-specific amendment applicable to the lands occupied as authorized under a right-of-way for the Pacific Connector Gas Pipeline on the Winema National Forest and would not affect or otherwise authorize any other project.

WNF-1: Site-Specific Amendment To Allow Utility Corridors in Management Area (MA) 3

Current Land and Resource Management Plan: The Pacific Connector pipeline route crosses MA 3 – Scenic Management between the Forest Boundary with the Rogue River and the Clover Creek Road. Standards and Guidelines for Lands in MA 3 on page LRMP pages 4-103 and 4-104, Lands state that MA 3 is an avoidance area for new utility corridors.

Proposed Amendment: This amendment would add the following text to MA 3 under Lands on pages 4-103 and 4-104:

The Pacific Connector Gas Pipeline may create a corridor in MA 3 from the Forest Boundary to the Clover Creek Road. This amendment applies only to the project area of the Pacific Connector Gas Pipeline and does not change future management direction.

WNF-2: Site-Specific Amendment of VQO on the Dead Indian Memorial Highway

Current Land and Resource Management Plan: At the location where the Pacific Connector pipeline route crosses the Dead Indian Memorial Highway the VQO is Foreground Retention. Standards and Guidelines for Scenic Management, Foreground Retention (Management Area 3A, LRMP page 4-104) require VQO for a given location to be achieved within one year of completion of the Pacific Connector Pipeline Project.

Proposed Amendment: The Forest Service proposes to allow a longer time frame to meet the specified VQO where the Pacific Connector pipeline route crosses the Dead Indian Memorial Highway. The following language would be added under MA 3A Standards and Guideline Scenic 1 Page 4-104, item 2:

> *In the vicinity of the 75 foot wide Pacific Connector Gas Pipeline corridor crossing of the Dead Indian Memorial Highway, 10 to 15 years will be allowed for VQOs to be attained. This amendment applies only to the project area of the Pacific Connector Gas Pipeline and does not change any future management direction.*

WNF-3: Site-Specific Amendment of VQO Adjacent to the Clover Creek Road:

Current Land and Resource Management Plan: Where the Pacific Connector pipeline is adjacent to the Clover Creek Road, the VQO is Foreground Partial Retention. Standards and Guidelines for Scenic Management, Foreground Partial Retention (Management Area 3B, Scenic Standard & Guideline 1, page 4-107) requires that visual quality objectives be met within three years of completion of the Pacific Connector pipeline.

Proposed Amendment: The Forest Service proposes to allow a longer time frame to meet the amended VQO where the Pacific Connector pipeline is adjacent to the Clover Creek Road. The following text would be added under MA 3B Standard and Guideline Scenic 1 Page 4-107, item 2:

> *In the vicinity where the Pacific Connector Gas Pipeline corridor runs adjacent to Clover Creek Road, ten to fifteen years will be allowed for VQOs to be attained. This amendment applies only to the project area of the Pacific Connector Gas Pipeline in the vicinity of the Clover Creek Road and does not change future management direction.*

WNF-4: Site-Specific Amendment To Waive Limitations on Detrimental Soil Conditions within the Pacific Connector Right-of-Way in All Management Areas

Current Land and Resource Management Plan: Standards and Guidelines for Detrimental Soil Conditions (LRMP, page 4-73, 12-5) in all affected management areas require that no more than 20 percent of the activity area be detrimentally compacted, puddled, or displaced upon completion of a project.

Proposed Amendment: This amendment would change Standard and Guideline 12-5 on page 4-73 by adding:

> *The Pacific Connector Gas Pipeline may exceed this restriction on detrimental soil conditions. This amendment applies only to construction clearing limits and work/storage areas within the project area of the Pacific Connector Gas Pipeline and does not change any future management direction.*

WNF-5: Site-Specific Amendment To Waive Limitations on Detrimental Soil Conditions within the Pacific Connector Right-of-Way in Management Area (MA) 8

Current Land and Resource Management Plan: Standards and Guidelines for Soil and Water 2 in MA 8 Riparian Area (LRMP, page 4-137) requires that detrimental soil condition not exceed 10 percent of the total riparian acreage within an activity area.

Proposed Amendment: This amendment would change Soil and Water Standard and Guideline 2 on page 4-137 by adding:

> *The Pacific Connector Gas Pipeline may exceed this restriction on detrimental soil conditions within the project right of way. This amendment applies only to the construction clearing limits of the Pacific Connector Gas Pipeline and does not change future management direction.*

2.1.4 Mitigation Plan Specific to Federal Lands

Mitigation measures reduce or compensate for environmental consequences of an action. All relevant, reasonable mitigation measures are to be identified, even if they are outside of the jurisdiction of the lead agencies or cooperating agencies (CEQ 1981: 12-13). Table 2.1.4-1 summarizes the mitigation program by project types for both agencies. Table 2.1.4.3-1 lists the individual mitigation proposed for BLM and Forest Service.

Many of the individual projects listed in table 2.1.4.3-1 lack the site-specific surveys needed for implementation and, as a result, are not ripe for decision at this time. These mitigation projects are therefore being analyzed programmatically as a part of the Proposed Action in this EIS, and they would require a secondary site-specific project-level NEPA analysis prior to implementation. The CEQ regulations for NEPA specifically provide for the second phase of a project, such as mitigation, to tier to the EIS of a larger specific action when those subsequent actions are ripe for decision (40 CFR 1508.28). It is anticipated that the NEPA analysis for the proposed mitigation actions would tier to this EIS as site-specific assessments and final project designs are completed. The public would have opportunity to comment on specific project proposals at that time.

These mitigation programs would be required as a condition of the Right-of-Way Grant, if one were issued for this project. CEQ regulations require that a monitoring and enforcement program be adopted where applicable for any mitigation (40 CFR 1505.2(c)). Section 2.6 describes the monitoring and enforcement requirements associated with this mitigation program.

TABLE 2.1.4-1

Summary of BLM and Forest Service Mitigation Projects by Mitigation Group and Project Type

Mitigation Group	Project Type	Amount	Rationale	Environmental Consequences a/
Aquatic and Riparian Habitat			The Pacific Connector Pipeline Project would remove riparian vegetation and cross streams. Aquatic restorations are aimed accomplishing objectives of the Aquatic Conservation Strategy (ACS) and offsetting project impacts at the watershed scale. Proposed mitigation projects are located in the fifth-field watersheds that would be crossed by the pipeline; however, feasible projects may not be located in the same sub-watersheds as the pipeline project.	
	Large Woody Debris (LWD) In-stream	28.2 Miles	Placement of LWD in streams adds structural complexity to aquatic systems by creating pools and riffles, trapping fine sediments and can contribute to reductions in stream temperatures over time (Tippery et al. 2010). This is responsive to Aquatic Conservation Strategy (ACS) objectives 2, 3, 4, and 5.	**Short-term adverse effects**: LWD in-stream refers to logs (typically greater than 20 inches in diameter), limbs, or root wads that intrude into a stream channel. Placing this material in-stream can be accomplished with ground equipment such as excavators and/or helicopters. These activities have the potential to increase suspended sediment in streams and impact riparian vegetation as a result of heavy equipment use or the dragging of materials (e.g. logs) in the stream channel. Short-term impacts to water quality would occur in the form of suspended sediment and turbidity increases during in-stream implementation. However, no lasting measureable effect to water quality would occur as any sediment plume created, would quickly dissipate as soon as in-stream activities stop. In-stream work is done during summer low flow periods when turbidity plumes are an infrequently occurring event. Project design features (PDF) would include Best Management Practices (BMP) that would prevent any indirect effects to salmonids and other stream fish from project related sediment. The placement of LWD materials in the stream by using cable systems, excavators, or helicopters would create noise that could disturb both NSO and MAMU. The PDFs would focus disturbance outside the critical nesting period and beyond critical distances for both NSO and MAMU. These PDFs would reduce impacts from noise to acceptable levels. **Long-term beneficial effects**: Placing LWD in streams affects channel morphology, the routing and storage of water and sediment, and provides structure and complexity to stream systems. Complex pools and side channels created by instream wood provide overwintering habitat to stream salmonids and other aquatic organisms (Solazzi 2000). They also provide cover from predators during summer low flow periods when predation is at its highest. Providing more stream channel structure results in better over wintering habitat, improved summer pool habitat, and more abundant spawning gravels.

TABLE 2.1.4-1

Summary of BLM and Forest Service Mitigation Projects by Mitigation Group and Project Type

Mitigation Group	Project Type	Amount	Rationale	Environmental Consequences a/
	Fish Passage	13 sites	Old culverts may block fish passage either by poor design or by failure over time. Removing these blockages and replacing them with fish-friendly designs can allow fish and other aquatic organisms to access previously unavailable habitat. This is responsive to ACS Objectives 1, 2, 3, and 9 (see appendix J).	**Short-term adverse effects:** Removing old culverts and restoring stream/road crossings would result in short-term adverse effects similar to the effects described for LWD above since both involve the use of heavy equipment in and around the stream channel. Similarly the work would be done during low summer flow periods to minimize impacts to aquatic species and PDFs would be designed to minimize disturbance for Northern Spotted Owl (NSO) and Marbled Murrelet (MAMU).
	Stream / Road Crossings	58 Sites	Restoring stream crossings reconnects aquatic habitats by allowing the passage of aquatic biota and restoring riparian vegetation. Over time, these actions reduce sediment and restore shade. Restoration of these crossings includes riparian planting as a mitigation which would help offset the impact of shade removal at pipeline crossings. This work is typically accomplished in association with road improvement and decommissioning efforts.	**Long-term beneficial effects:** Stream crossing replacement would directly improve stream connectivity and habitat for aquatic species by immediately restoring access to formerly inaccessible habitats. Indirectly, these projects would reduce potential sediment levels in the long term by decreasing the potential for road failure. Stream crossing projects also reduce stream velocities by increasing stream crossing sizes, eliminating flow restrictions and allowing passage to additional reaches of habitat by removing barriers to aquatic species which improves access to spawning and rearing habitat and allows unrestricted movement throughout stream reaches during seasonal changes in water levels (Hoffman 2007).
	Riparian Planting	0.5 Miles	Riparian planting reestablishes willows and other riparian vegetation in areas where prior land use has removed existing vegetation. Riparian plantings reestablish shade, increase bank stability and, over time, contribute to restored riparian plan plant communities.	**Short-term adverse effects:** Riparian planting and fencing are typically done by hand and as such would not measurably impact stream sedimentation of erosion, riparian vegetation, water quality, aquatic habitats or any T&E species. Riparian fencing may require vegetation removal along the fence line but would not adversely affect water

TABLE 2.1.4-1

Summary of BLM and Forest Service Mitigation Projects by Mitigation Group and Project Type

Mitigation Group	Project Type	Amount	Rationale	Environmental Consequences a/
	Fencing	6.4 Miles	Fencing restricts cattle grazing in sensitive riparian ecosystems. This allows riparian vegetation to be reestablished and eliminates hoof damage to stream banks.	quality, channel substrate or bank conditions. **Long-term beneficial effects:** These projects directly affect riparian vegetation and would increase the health of riparian areas by promoting species diversity. Planting riparian vegetation decreases areas of bare soil and provides a sediment filtering buffer. A diverse native riparian plant community consisting of annuals, perennials, woody shrubs, and trees, provides a large variety of habitat features including food sources, shade, and large wood, and rooting depths which provide stream bank stability. Diverse, healthy vegetation has a major influence on stream channel shape and size; well-vegetated streams tend to be narrow and deep due to the binding nature of plants and their root systems (Comfort 2005). Excluding livestock access from the stream channel and riparian area would improve ecological conditions within the riparian areas. Livestock tend to congregate in riparian areas due to the presence of water and green vegetation and cooler temperatures throughout the drier months. Livestock trample and graze riparian vegetation, resulting in stream bank erosion and loss of biological diversity (Belsky 1999). Excluding livestock from the riparian area would allow vegetation to reestablish and increase the likelihood of success of native shrub and tree plantings (Sarr 2002).
Road Sediment Reduction			The pipeline project may cause sediment transport from construction clearing and use of roads by the project. Road sediment reduction projects are aimed at reducing the chronic contributions of fine-grained sediment from road surfaces and fill failures to stream systems.	
	Road Decommissioning b/	85.2 Miles	Decommissioning roads can substantially reduce sediment delivery to streams (Madej 2000; Keppeler et al. 2007). Proposed road decommissioning would increase infiltration of precipitation, reduce surface runoff, and reduce sediment production from road-related surface erosion in the watershed where the impacts from the Project occur. This mitigation is responsive to ACS objectives 2, 3, 4, and 5 and Standards and Guidelines for Key Watersheds (Forest Service and BLM 1994b: p. B-11, C-7).	**Short-term adverse effects:** Road decommissioning methods generally include actions utilizing mechanized construction equipment to physically stabilize the road prism, restore natural drainage patterns, and allow for revegetation of the roadbed. Mechanized construction equipment might include excavators, backhoes and truck mounted loaders. Road closure is a method of preventing access to a road so that regular maintenance is no longer needed and future erosion is largely prevented by restoring drainage patterns if necessary and eliminating road traffic.

TABLE 2.1.4-1

Summary of BLM and Forest Service Mitigation Projects by Mitigation Group and Project Type

Mitigation Group	Project Type	Amount	Rationale	Environmental Consequences a/
	Road Closure	6.0 Miles	Road closure reduces fine grained sediments by eliminating traffic impacts.	Road decommissioning has the potential to cause short-term degradation of water quality by increasing sediment delivery to streams as roads are de-compacted by heavy equipment, culverts and cross drains are removed, and other restoration activities are implemented. The use of heavy mechanized equipment near streams could disturb the stream influence zone, deliver sediment, create turbidity, and cause stream bank erosion. There is also the potential of an accidental fuel/oil spill. These projects may cause a short-term degradation of water quality due to sediment input and chemical contamination. Stream bank condition and habitat substrate may also be adversely affected in the short term. However with careful project design and seasonal timing, these affects are expected to be of a limited extent and duration. Road decommissioning would create noise from heavy equipment that could disturb both NSO and MAMU. The potential for disturbance is mainly associated with breeding behavior at active nest sites. The PDFs would focus disturbance outside the critical nesting period and beyond critical distances for both NSO and MAMU. These PDFs would reduce impacts from noise to acceptable levels. **Long-term beneficial effects:** Proposed road decommissioning would increase infiltration of precipitation, reduce surface runoff, and reduce sediment production from road-related surface erosion in the watershed where the impacts from the Project would occur. Decommissioning roads would restore natural drainage patterns and thereby avoid large volumes of added sediment to the stream network that would be likely to eventually occur. In addition limited road maintenance dollars could be focused on the remaining road systems resulting in more maintenance of culverts and ditchlines resulting in less potential for catastrophic failure. Madej (2001) concluded that by eliminating the risk of stream diversions and culvert failures, road removal treatments significantly reduce long-term sediment production from retired logging roads. Beneficial effects to fisheries include long-term improvements to fish habitat and riparian areas, restored fish passage for all life histories of threatened and proposed species, re-established connectivity of fish populations above and below man-made barriers, restoration of hydrologic function, more natural routing of wood and sediment through stream systems. Road decommissioning would also benefit many species of wildlife including the NSO and MAMU thru reduced disturbance from the elimination of road traffic and long-term benefits as decommissioned roads become reforested reducing fragmentation of habitat.

TABLE 2.1.4-1

Summary of BLM and Forest Service Mitigation Projects by Mitigation Group and Project Type

Mitigation Group	Project Type	Amount	Rationale	Environmental Consequences a/
	Road Surfacing and Drainage Improvement	60.9 Miles	Road surfacing reduces sediment by capping existing fine textured sediments in the running surface of a gravel road with coarser rock or by paving. Paving all but eliminates traffic-generated sediments. Drainage repair reestablishes out-sloping, cross-drains and in some cases ditchlines to ditch-relief culverts. These actions have the effect of getting water off the road before it can enter stream courses. This mitigation is responsive to ACS objectives 2, 3, 4 and 5 and Standards and Guidelines for Key Watersheds (Forest Service and BLM 1994b: p. B-11, C-7).	**Short-term adverse effects:** Road improvements including surfacing, drainage repair, storm proofing, stabilization, and culvert replacement may result in short-term, construction-related increases in sediment. Sediment is expected to be of limited extent and duration and can be minimized or eliminated through the application of PDFs and BMPs. Road improvements would create noise from heavy equipment that could disturb both NSO and MAMU. The potential for disturbance is mainly associated with breeding behavior at active nest sites. The PDFs would focus disturbance outside the critical nesting period and beyond critical distances for both NSO and MAMU. These PDFs would reduce impacts from noise to acceptable levels. **Long-term beneficial effects:** Road improvement projects reduce erosion from existing road surfaces, cut banks and fill slopes, and reduce the probability of failure through improvement of road surface stability and drainage. In the long term, road improvements reduce both chronic and episodic erosion and sedimentation. Drainage improvements, such as out-sloping, reduce or eliminate chronic sources of road erosion and fine sediment delivery resulting in long-term improvements in water quality and aquatic habitat.
	Storm-proofing	13.8 Miles	Storm-proofing reduces sediment from roads by increasing the resistance of a road to failure during high intensity rainfall events. Storm-proofing strategies include improving drainage, reducing diversion potential at culverts, outsloping road surfaces, and replacing culverts with hardened low water fords.	
	Stabilization and Culvert Replacement	5 sites	Road stabilization and culvert replacement reduce road-related sediment by stabilizing or removing failing cut and fill slopes. Culvert replacement reduces sediment by replacing undersized or failing culverts with culverts that are appropriate to pass debris at higher flows. This reduces the probability of fill failure associated with plugged culverts.	

TABLE 2.1.4-1

Summary of BLM and Forest Service Mitigation Projects by Mitigation Group and Project Type

Mitigation Group	Project Type	Amount	Rationale	Environmental Consequences a/
Fire Suppression	Suppression Capacity	15 Sites	The pipeline project would create fire suppression complexity by creation of a continuous corridor of early seral plant communities. High intensity stand-replacement fire has been identified as the single largest factor causing the loss of LSOG forests in the first 15 years of implementation of the Northwest Forest Plan (NWFP; Moeur et al. 2011). These projects include heli-ponds (3) and pumper access / dry hydrant pumper connections at water sources. High intensity fire has been identified as the single factor most impacting LSOG forest habitats on federal lands in the area of the NWFP. Fire control is necessary to protect LSRs and endangered species habitat should a wildfire occur. Construction of the pipeline and associated activities would remove both mature and developing stands and would increase fire suppression complexity however the corridor also provides a fuel break. Quick response time is imperative for successful control in wildfire situations during initial attack. Pump chance developments and helicopter dipping ponds provide readily available water sources to support fire suppression efforts.	**Short-term adverse effects:** Fire suppression capacity projects include the use of heavy equipment especially for the construction of heli-ponds which may be as large as 500,000 gallons. Soil erosion risk would increase with the proposed activities because bare soil would be exposed during implementation. Impacts caused by heavy equipment would increase the amount of detrimental soil damage within the treatment areas. By employing appropriate BMPs and PDFs, the risk of erosion, sediment delivery, and detrimental soil damage within the treatment areas is expected to be minimal and within LMP standards and guidelines. Fire suppression capacity projects would create noise from heavy equipment that could disturb both NSO and MAMU. The potential for disturbance is mainly associated with breeding behavior at active nest sites. The PDFs would focus disturbance outside the critical nesting period and beyond critical distances for both NSO and MAMU. These PDFs would reduce impacts from noise to acceptable levels. **Long-term beneficial effects:** Pump chance developments and helicopter dipping ponds provide readily available water sources to support fire suppression efforts. These projects would help to reduce the threat of losing late-successional habitat to stand-replacement fire.

TABLE 2.1.4-1

Summary of BLM and Forest Service Mitigation Projects by Mitigation Group and Project Type

Mitigation Group	Project Type	Amount	Rationale	Environmental Consequences a/
Stand Density and Fuels Reduction and Fuel Break			The pipeline project would create fire suppression complexity by creation of a continuous corridor of early seral plant communities. The pipeline project would also remove LSOG stands in the corridor construction areas and indirectly affect LSOG habitat in stands adjacent to the pipeline. Both mature stands and developing stands would be removed during pipeline construction. Density management integrated with fuels reduction would increase longevity of existing mature stands by reducing losses from disease, insects, and fire. Density management in younger stands would accelerate development of LSOG habitat. Associated fuel reductions would reduce risk of loss to fire and reduce potential fire size and intensity. Impacts to mature and developing stands would exceed the life of this project by many decades. LSR Assessments have identified the importance of density management to control losses to stand replacing fire. The proposed route of the pipeline project intersects an area that has had reoccurring lighting strikes and has potential for stand replacement fires. These mitigation projects would assist in protection and restoration of the late-seral forest values. These mitigation projects would provide multiple resources values for the LSR, Forest, adjacent private landowners, and public.	

TABLE 2.1.4-1

Summary of BLM and Forest Service Mitigation Projects by Mitigation Group and Project Type

Mitigation Group	Project Type	Amount	Rationale	Environmental Consequences a/
	Integrated Stand Density and Fuels Reduction	5,994 Acres	Watershed assessments and LSR assessments in Southwest Oregon have noted shifts from forests dominated by fire-resistant LSOG stands to fire-prone early and mid-seral forests (Forest Service, BLM et al. 1998; Forest Service and BLM 1998, 1999). Use of fuels reduction and stand density management are appropriate tools to reduce the risk of high intensity stand replacement fires in these forests (Forest Service and BLM 1994b). Management activities that reduce the risk of natural disturbance adjacent to Known Owl Activity Centers (KOAC) are also appropriate (Forest Service and BLM 1994b: p. C-11). Stand density reductions in riparian zones have the dual benefit of reducing the risk of stand-replacing fire, while also accelerating the development of late successional stand conditions by accelerating growth of remaining trees. This project would create a fuel break on federal lands that stretches from Milo to Shady Cove.	**Short-term adverse effects:** Integrated stand density and fuels reduction activities include the use of heavy equipment for cutting, skidding, slash piling, under-burning and hauling forest vegetation. Soil erosion risk would increase with the proposed activities because bare soil would be exposed during implementation. As the amount of bare/compacted soil increases, so does the risk of soil movement. Impacts caused by heavy equipment would increase the amount of detrimental soil damage within the treatment areas. By maintaining proper amounts of protective groundcover along with appropriate BMPs and PDFs, the risk of erosion, sediment delivery, and detrimental soil damage within the treatment areas is expected to be minimal and within LMP standards and guidelines. Stand density fuels reduction treatments would not be expected to adversely affect nesting habitat for the NSO since the treatments would not remove constituent elements of their nesting habitat. The proposed treatments could temporarily impact acres of dispersal habitat. This habitat would be impacted by reduction of canopy cover as well as the loss of some down wood, shrubs and snags, which provide habitat for prey species. Although the dispersal habitat within these treatment areas would be reduced in quality, the projects would be designed so that the areas would still function as dispersal habitat. Integrated stand density treatments would create noise from heavy equipment that could disturb the NSO. The potential for disturbance is mainly associated with breeding behavior at active nest sites. The PDFs would focus disturbance outside the critical nesting period and beyond critical distances for NSO. These PDFs would reduce impacts from noise to acceptable levels. Under-burning and burning of slash piles can impact air and visual quality during burning activities. All burning would be scheduled in conjunction with the State of Oregon to comply with the Oregon Smoke Implementation Plan and to minimize any adverse effects on air quality. Burning prescriptions would be developed to minimize the potential for adverse effects. Implementation of these measures would ensure compliance with the Clean Air Act. **Long-term beneficial effects:** By creating less dense stands with less tree competition, residual trees would benefit from the increased availability of sunlight, nutrients, and water. With the increase of available nutrients, trees should be more vigorous and less susceptible to large scale insect/disease outbreaks. The proposed treatments would move the vegetation towards conditions that would have occurred under a natural disturbance regime. This would lower flame lengths, reduce fire spread and lower the probability of tree mortality in the event of a wildfire, leading to more successful suppression efforts. Aerial delivered retardant or water would be more effective in lighter fuels and a more open canopy, making it safer for firefighters to successfully anchor and contain wildfires. These actions would reduce the threat of losing late-successional habitat to fire.
	Under-burning	2,035 Acres	Under-burning is a component of the integrated stand density reduction. This provides a mechanism to maintain shaded fuel breaks created by mechanically thinning stands. It also reintroduces fire on selected landscapes as recommended in various watershed and LSR assessments.	
	Pre-commercial Thinning	1,039 Acres	Pre-commercial thinning reduces stand density in overstocked young stands. This reduces the risk of stand replacing fire, increases the resilience of remaining trees to low intensity fire and accelerates the development of late successional stand characteristics.	
	Riparian Vegetation Fuels Reduction	70 Acres/ 6 Miles	Fuels reduction in riparian areas reduces the risk of stand replacement fire and accelerates the development of late successional stand characteristics.	

TABLE 2.1.4-1

Summary of BLM and Forest Service Mitigation Projects by Mitigation Group and Project Type

Mitigation Group	Project Type	Amount	Rationale	Environmental Consequences a/
Terrestrial / Upland Habitat Improvement			The Pacific Connector Pipeline Project would remove snags and LSOG upland habitats, and would create a vector for noxious weeds. Terrestrial mitigations are intended to offset the loss of snags, future recruitment of LWD and eradicate noxious weed populations.	
	Habitat Planting	620 Acres	The Dead Indian Plateau region is one of four known sites for Mardon Skipper butterflies in the world: southern Oregon Cascades, northern California/Southern Oregon coast, southern Washington Cascades, and Puget Trough on Joint Base Lewis-McChord. It is also adjacent to a known site for Short-horned Grasshoppers. Both species are on the Regional Forester's Sensitive Species list. As a long-term opening, the pipeline corridor would provide a unique opportunity to develop habitat for these two species. Planting the corridor with plants preferred by these species has the potential to increase the habitat and local range for both species. This action would provide both short-term and long-term habitat for the local population of Mardon skipper butterflies and short-horned grasshoppers since it would be in the 30-year maintenance corridor. The pipeline project may also impact habitat of *Fritillaria gentneri,* which is listed as Endangered under the federal Endangered Species Act. Out-planting to suitable habitat locations is recommended in the recovery plan for *Fritillaria gentneri*.	**Short-term adverse effects:** This activity would take place within the Pacific Connector pipeline corridor and would not result in any additional adverse impacts. **Long-term beneficial effects:** Beneficial impacts include helping to re-vegetate and stabilize the pipeline corridor and improving habitat for several listed or sensitive insect species.

TABLE 2.1.4-1

Summary of BLM and Forest Service Mitigation Projects by Mitigation Group and Project Type

Mitigation Group	Project Type	Amount	Rationale	Environmental Consequences a/
	LWD Upland Placement	470 Acres	These projects are intended to mitigate for the loss of recruitment of LWD to adjacent stands and within the construction clearing zone. The pipeline project would forgo the development of LWD for the life of the project and for decades after. LWD is a constituent element of habitat for NSO and is a significant component of LSOG habitat. Replacement of LWD would partially mitigate for the barrier effect of the corridor by creating structure across the corridor for use by various wildlife species. Placement in wood deficient areas adjacent to the corridor allows for scattering of stockpiled wood, reducing localized fuel loads while improving habitat in deficient stands. Larger logs maintain moisture longer and are less likely to be fully consumed by fire. Managing for the proposed levels provide for a greater assurance of species abundance (DecAID snag model). This type of project is consistent with NWFP Standards and Guidelines page C-11 (Forest Service and BLM 1994b). Acres that can be treated are necessarily limited by material available from the corridor.	**Short-term adverse effects:** Placement of LWD within and adjacent to the pipeline corridor would typically be done with heavy equipment that would drag the material into place. Heavy equipment use would increase the amount of detrimental soil damage within the treatment areas. By maintaining proper amounts of protective groundcover along with appropriate BMPs and PDFs, the risk of erosion, sediment delivery, and detrimental soil damage within the treatment areas is expected to be minimal and within LMP standards and guidelines. LWD placement would create noise from heavy equipment that could disturb the NSO. The potential for disturbance is mainly associated with breeding behavior at active nest sites. The PDFs would focus disturbance outside the critical nesting period and beyond critical distances for NSO. These PDFs would reduce impacts from noise to acceptable levels. **Long-term beneficial effects:** Beneficial effects include improving habitat for late-successional and other species and providing for long-term soil productivity.

TABLE 2.1.4-1

Summary of BLM and Forest Service Mitigation Projects by Mitigation Group and Project Type

Mitigation Group	Project Type	Amount	Rationale	Environmental Consequences a/
	Snag Creation	963 Acres	The creation of snags is intended to mitigate the loss of snag habitats within, and adjacent to the pipeline corridor. The pipeline project would prevent development of large snags during the life of the project and for decades after. Corridor construction would result in loss of snag habitat on approximately 1,074 acres associated with corridor construction. Various watershed analyses and LSR assessments indicate many areas traversed by the pipeline project are well below historic levels of snag habitat due to past management actions. The pipeline project would add to those cumulative impacts. As snags are a critical component of LSRs, replacement is needed. Snag requirements are specifically outlined in the BLM and Forests Service LMPs. Replacement would be immediate, though there would be a 10 year delay as snag decay occurs. Snag management is discussed in the NWFP for LSRs on pages C-14 and 15 (Forest Service and BLM 1994b). Snag management levels incorporated into these projects are based on the Forest's Plant Association Guidelines. The function and benefits of snags are also discussed in the South Cascades LSR Assessment (Forest Service, BLM et al. 1998: Chapter 3).	**Short-term adverse effects:** Snag creation typically employs the use of chainsaws or inoculum to kill live trees. As such there is little if any ground disturbance and only minimal noise disturbance. The potential for noise disturbance is mainly associated with breeding behavior at active NSO nest sites. The PDFs would focus disturbance outside the critical nesting period and beyond critical distances for NSO. These PDFs would reduce impacts from noise to acceptable levels. Any adverse environmental impacts would be de minimus and very short term. **Long-term beneficial effects:** Beneficial impacts include the improvement of habitat for snag dependent species and in particular those species dependent on LSOG forests. Long-term benefits would also accrue as the created snags decay over time and eventually provide for LWD on the forest floor improving habitat for many other species and contributing to long-term soil productivity.
	Noxious Weed Treatments	6 Road Miles, 127 Acres	The construction and operation of the pipeline project has the potential to create vectors for noxious weeds. These treatments are intended to reduce populations of noxious weeds that are in close proximity to the pipeline project right-of-way, as well as restore meadow habitats in the fifth-field watersheds that are currently impacted by noxious weeds.	**Short-term adverse effects:** Treatments typically involve the cutting, pulling or spraying of noxious weeds. Since the work is typically done by hand there is minimal if any ground or noise disturbance. All activities would be conducted consistent with the most recent direction and plans for weed management and integrated vegetation management on BLM and Forest Service lands to minimize adverse impacts to plant and animal communities as well as water quality and aquatic habitats. **Long-term beneficial effects:** Long-term benefits would include the restoring of native plant populations and species diversity. Restoring native plant communities and increasing vegetation diversity generally contributes to restoring habitat for a broad group of animal species.

TABLE 2.1.4-1

Summary of BLM and Forest Service Mitigation Projects by Mitigation Group and Project Type

Mitigation Group	Project Type	Amount	Rationale	Environmental Consequences a/
Visual Impacts on the Clover Creek Road		113 Acres	The pipeline project would create a hard visual line along the timbered edge of the corridor that does not fit with the agency's visual objectives for the Clover Creek Road or the Dead Indian Memorial Highway. Thinning and fuels treatments would be used to soften the edge to a more natural appearing texture by restoring stand density to more natural levels and creating small openings that are consistent with landscape.	**Short-term adverse effects:** The thinning and fuels treatment activities and resulting short-term adverse impacts would be similar to the impacts of the integrated stand density treatments described above. **Long-term beneficial effects:** The proposed activity would help mitigate the adverse visual impacts of the Pacific Connector pipeline along these road segments and would also create a fuel break and defensible space that could be used in helping to suppress high intensity wildfires.
Reallocation of Matrix Lands to Late Successional Reserves		1,896 Acres	This mitigation group contributes to the "neutral to beneficial" standard for new developments in mapped and unmapped LSRs by adding acres to the LSR land allocation to offset the long-term loss of habitat due to the construction and operation of the pipeline project. It also compensates for the removal of occupied MAMU habitat and suitable roosting, nesting and foraging NSO habitat. In addition, the selected parcels reduce the potential edge effects caused by management of matrix lands adjacent to occupied MAMU sites by reallocating the entire parcel to LSR. Reallocation of matrix lands to LSR also contributes to ACS objectives and may benefit Survey and Manage species by providing additional habitat that is managed to create LSOG stand conditions over time. Since the land reallocated to LSR on BLM-managed land comes out of the matrix, there is a need to replace those lands with other timber-producing lands to ensure that BLM continues to comply with requirements related to management of either Coos Bay Wagon Road or Oregon & California Railroad (O&C) lands. It is expected these lands would be acquired by the applicant and conveyed to the BLM to be managed as part of the matrix as either Coos Bay Wagon Road or O&C lands.	**Short-term adverse effects:** The reallocation of matrix lands to LSR is an administrative action that would not have any immediate environmental consequences on the ground. **Long-term beneficial effects:** The proposed reallocation would change the management direction of approximately 1,896 acres from one of multiple uses with an emphasis on timber management to a management emphasis focusing on the creation and maintenance of late-successional forest habitat. Over time, this reallocation would benefit species dependent on late-successional forests through management actions that would be designed to improve or maintain late-successional habitat conditions.

a/ For all project types additional field surveys for T&E species, Special Status species, and Heritage Resources would be completed where necessary before implementation. In addition, consultations with the FWS and NMFS as necessary would also be completed prior to implementation. All future decision making under NEPA for these projects would be completed consistent with the CEQ Regulations (40 CFR 1500-1508) and would tier to this EIS.

b/ The Northwest Forest Plan defines decommissioning as "To remove those elements of a road that reroute hillslope drainage and present slope stability hazards." Decommissioning generally restores natural drainage, removes unstable fill material, and establishes vegetation cover on the road surface to reduce erosion.

c/ The BLM and Forest Service use the term "project design features" or "project requirements" rather than "mitigation" to describe elements of a plan that occur within a project area and are standard requirements of a project. The BLM and Forest Service reserve the term "mitigation" to describe measures taken to reduce or compensate for otherwise unavoidable impacts.

2.1.4.1 Mitigation Specific to BLM and Forest Service

An extensive off-site mitigation program on BLM and NFS lands is included in the Proposed Action to ensure that the objectives of the affected LMPs are achieved. Appendix F of this FEIS has been revised and updated to provide an assessment of off-site mitigation actions on BLM and NFS lands.

2.1.4.2 Commercial Logging on Federal Lands

We received comments during scoping and on the DEIS requesting that commercial logging, which would generate income, or replanting, law enforcement, and other projects that would be funded without this project, not be used as mitigation. In addition, a comment letter received on the DEIS expressed a concern that commercial logging has been proposed as mitigation for take of NSOs and MAMUs, and that between 7,560 and 9,649 acres would be commercially logged. The commenter also expressed a concern about whether receipts from commercial timber sales would be used to reduce Pacific Connector's expenses, requested clarification of the NEPA pathway for these projects, and questioned the applicability of fuels reductions in native, mature, or old-growth forests. We are addressing these comments here to clarify possible misunderstandings.

Commercial logging is not being used as mitigation for take of NSOs and MAMUs. Commercial logging is one tool that may be used to remove commercial-sized material to accomplish fuels reduction objectives, intended to mitigate the Project impacts to LSOG forests by reducing the risk of stand-replacing fires in LSOG forests.

NSO are dependent on LSOG forests. Monitoring of the NWFP for the past 15 years has shown that the largest single factor contributing to the loss of LSOG forests (and hence NSO habitat) has been high-intensity stand replacement fire (Moeur et al. 2011). The NWFP anticipated the need to reduce fuels to reduce the risk of stand replacement fire in LSOG forests, particularly in the Klamath Province (Forest Service and BLM 1994b: C-12). The Recovery Plan for the NSO also recognized the need for fuels reduction in dry forest habitats of the Klamath Province (FWS 2011a: III-20). Late Successional Reserve Assessments for LSR 223 and 261 have also documented the need for fuels reduction to reduce the risk of stand replacement fire in LSOG forests in the Klamath Province of southwest Oregon (Forest Service et al. 1998; BLM and Forest Service 1998).

The Pacific Connector Project would remove approximately 188 acres[8] of LSOG forest on BLM and Forest Service lands in the Klamath and Western Cascade Provinces. Additional acres would be directly impacted from the use of UCSA and indirectly affected by edge effects and fragmentation. As a partial mitigation for this impact, the BLM and Forest Service propose to accomplish approximately 6,000 acres (table 2.1.4-1) of integrated fuels reduction in overstocked stands along the Pacific Connector corridor on ridge top locations between the community of Milo on the South Umpqua River and the community of Trail on the Rogue River. The primary purpose of these fuels reduction projects is not to have commercial timber sales; it is to reduce the risk of stand-replacement fire and possible losses of LSOG forest / NSO habitat in an area that has a history of lightning fires. No estimate has been made of the total acres of fuels reduction projects that may involve commercial timber removal. Subsequent site-specific environmental analysis

[8] GNN data set clipped to the Pacific Connector Right of Way in the Klamath and Western Oregon Cascades Provinces.

would further define the details of these proposed projects. Amendments to the LMPs have not been proposed for the mitigation actions outlined in section 2.1.4 of the DEIS. The mitigation actions are being designed to be consistent with the LMPs as well as the recommendations in watershed assessments and the LSR assessments. With the proposed amendments, the Project would not violate the LMPs.

Several comments were received on the DEIS questioning the efficacy of the proposed fuel treatments and suggested the treatments were not necessary and would be detrimental to LSOG habitat. In one comment letter two recent studies were mentioned in support of their comments. One study titled *Historical Northern spotted owl habitat and old-growth dry forests maintained by mixed-severity wildfires* was authored by William L. Baker (2015) and looked at the importance of mixed severity fires to NSO habitat in the Eastern Oregon Province. The author concluded that efforts to reduce fuels and to prevent these fires in all areas will likely reduce future NSO habitat. It should be noted that the NWFP and the LSR assessments also recognized the importance of fire and other natural disturbances in shaping habitat for LSOG-dependent species. The proposed fuel treatments are strategically located in a limited area and are not designed to remove all fire. The treatments are focused on reducing the risk of high intensity stand replacement fire. In the study the author also stated that to maintain NSO habitat likely first requires restoration of historical fuels. The proposed fuel treatments are in areas that have high fuel loadings above historical levels due to fire suppression activities over the last century. The treatments are designed to bring fuel levels closer to historic levels and in some of the area fire would be re-introduced through proposed underburning.

The other recent study that was mentioned is titled *Effects of Fire and Commercial Thinning on Future Habitat of the Northern Spotted Owl* by Dennis Odion and others (2014). This study assessed whether the beneficial effects of commercial thinning from reduced fire risk outweighed the adverse effects of the thinning on NSO habitat. The authors concluded the long-term benefits of commercial thinning would not outweigh the adverse impacts on NSO habitat. This study, however, was looking at commercial thinning prescriptions that reduced the basal area of dense late successional forest by nearly half and mostly well below the minimum level known to function as nesting and roosting habitat for the NSO. The fuel treatments that have been proposed are focused on reducing fuels and would remove primarily smaller trees and shrubs.

A number of comments on the DEIS suggested that it did not account for the receipts from commercial timber sales that may occur in conjunction with off-site mitigation measures. The purpose of the proposed mitigation is to reduce the risk of stand-replacing fires and to enhance the development of LSRs. Projects proposed to meet these objectives could result in commercial size trees being removed. This removal of commercial size trees would be incidental to achieving these objectives. This is discussed in the DEIS on pages 2-51 through 2-54. Pacific Connector would not perform the compensatory mitigation actions and would not receive any receipts from this work. All of the off-site mitigation measures incorporated into the proposed action would have costs that the agencies do not otherwise have funding for. The BLM and Forest Service would plan these activities consistent with the standards in the current LRMPs. Any timber sale receipts from these projects would be subject to the normal contract payment provisions and timber sale receipt regulations of the BLM and Forest Service.

2.1.4.3 Specific Off-Site Mitigation Projects on BLM and NFS Lands

Table 2.1.4.3-1 describes the individual mitigation projects related to LMP objectives on BLM and NFS lands that are included in the proposed action. These projects would be implemented by the BLM and Forest Service as a subsequent phase of the Pacific Connector Pipeline Project with funding provided by the applicant. The applicant is also responsible for providing funding to BLM and the Forest Service for planning efforts related to these mitigation actions.

TABLE 2.1.4.3-1

Mitigation Projects to Address LMP Amendments on BLM and NFS Lands

Unit	Watershed	Mitigation Group	Project Type	Project Name	Quantity a/	Unit
Coos Bay BLM	East Fork Coquille River	Reallocation of Matrix Lands to LSR and Acquisition	Land Re-Allocation from Matrix to LSR, Non-Federal Land Acquisition	RMP Amendment BLM – 4, LSR Reallocation and Land Acquisition	180	acres
		Aquatic and Riparian Habitat	LWD instream	Yankee Run In-stream Large Wood Placement	2.8	miles
		Fire suppression	Fire Suppression	Heli-Pond Construction	2	ea.
		Road Sediment Reduction	Road Surfacing	Road Surfacing –Yankee Run Spurs	0.9	miles
		Road Sediment Reduction	Road Surfacing	Road Surfacing –South Fork Elk Creek	2.6	miles
		Road Sediment Reduction	Road Surfacing	Road Surfacing –Yankee Run Mainline	2.0	miles
	Middle Fork Coquille River	Reallocation of Matrix Lands to LSR and Acquisition	Land Re-Allocation from Matrix to LSR, Non-Federal Land Acquisition	RMP Amendment BLM -4, LSR Reallocation and Land Acquisition	207	acres
		Aquatic and Riparian Habitat	LWD in-stream	Upper Rock Creek Instream LWD	2.1	miles
		Fire suppression	Fire Suppression	Heli-Pond Construction	1	ea.
		Road Sediment Reduction	Road Surfacing	Road Surfacing –Fall Creek System	0.9	miles
		Road Sediment Reduction	Road Surfacing	Bridge Approach paving –Sandy & Jones Creek Roads	2	ea.
	North Fork Coquille River	Aquatic and Riparian Habitat	LWD in-stream	Steinnon Creek In-stream LWD	1.5	miles
		Aquatic and Riparian Habitat	LWD in-stream	Upper North Fork Coquille In-stream LWD	2.2	miles
		Road Sediment Reduction	Road Surfacing	Bridge Approach paving – Woodward & Alder Creek Roads	2	ea.
Roseburg BLM	Clarks Branch South Umpqua	Aquatic and Riparian Habitat	Fish Passage	Rice Creek Culvert Replacements	2	sites
		Road Sediment Reduction	Road Drainage – Culvert Replacement	East Fork Willis Creek Tributary Culvert Replacement	1	project
		Road Sediment Reduction	Road Drainage – Culvert Replacement	Judd Creek Culvert Removal	1	project
	Days Creek - South Umpqua	Aquatic and Riparian Habitat	Fish Passage	Beal Creek Culvert Replacement	2	sites
		Aquatic and Riparian Habitat	LWD in-stream	West Fork Canyon Creek In-stream LWD	0.8	miles
		Road Sediment Reduction	Road storm-proofing	31-4-3.2 Road Storm-proofing	1	project
		Road Sediment Reduction	Road Drainage and Surface Enhancement	South Umpqua Road Drainage and Surface Enhancement	10.0	miles
		Stand Density Fuel Break	Fuels Reduction	Days Creek- South Umpqua Hazardous Fuel Reduction	1,000	acres

TABLE 2.1.4.3-1

Mitigation Projects to Address LMP Amendments on BLM and NFS Lands

Unit	Watershed	Mitigation Group	Project Type	Project Name	Quantity a/	Unit
	Days Creek - South Umpqua (1710030205), Myrtle Creek (1710030211), and Clarks Branch - South Umpqua (1710030210)	Fire Suppression	Suppression Capacity	Dry Hydrants	6	sites
	Middle Fork Coquille River	Road Sediment Reduction	Road Surfacing and Cross Drain Replacement	Dice, Boulder, and Twelvemile Creek road systems	11	miles
		Aquatic and Riparian Habitat	LWD in-stream	Middle Fork Coquille In-stream LWD Placement	0.6	miles
		Aquatic and Riparian Habitat	LWD in-stream	Twelvemile Creek Instream LWD	2.0	miles
		Road Sediment Reduction	Road Drainage and Surface Enhancement	Camas Mountain Road Drainage and Surface Enhancement	3.5	miles
	Myrtle Creek	Aquatic and Riparian Habitat	Fish Passage	Slide Creek Culvert Replacement	1	project
		Road Sediment Reduction	Road Drainage and Surface Enhancement	Slide Creek Road Drainage and Surface Enhancement	1.0	miles
		Road Sediment Reduction	Road Stabilization	South Myrtle Hill Slide Repair	1	project
	Olalla-Looking Glass	Acquisition	Land Re-Allocation from Matrix to LSR, Non-Federal Land Acquisition	RMP Amendment BLM-3, LSR Reallocation and Land Acquisition	409	acres
		Road Sediment Reduction	Culvert Replacement	Unnamed Tributary to Lower Olalla Creek	1	project
		Road Sediment Reduction	Road Stabilization	Olalla Tie Road Renovation	1	project
Medford BLM	Big Butte Creek	Fire suppression	Fire Suppression	Big Butte Creek Pump Chance	1	sites
		Road Sediment Reduction	Road storm-proofing	Big Butte Creek Road Storm-proofing	6.4	miles
		Terrestrial Habitat Improvement	Habitat Planting	Big Butte Creek Fritillaria Habitat	600	acres
	Little Butte Creek	Aquatic and Riparian Habitat	Fish Passage	Little Butte Creek Fish Screen	1	site
		Aquatic and Riparian Habitat	LWD in-stream	Lost Creek In-stream LWD	8.6	miles
		Fire suppression	Fire Suppression	Little Butte Creek Pump Chance	2	sites
		Road Sediment Reduction	Road Drainage and Surface Enhancement	Little Butte Creek Road Improvement	3.5	miles
		Road Sediment Reduction	Road Decommissioning	Little Butte Creek Road Decommissioning - Butte Falls RA	2.4	miles
		Road Sediment Reduction	Road Surfacing	Little Butte Creek Road Resurfacing - Ashland Resource Area	9.0	miles
	Shady Cove–Rogue River	Aquatic and Riparian Habitat	LWD in-stream	Shady Cove LWD	2.5	miles
		Road Sediment Reduction	Road Drainage and Surface Enhancement	Shady Cove Road Improvement	1.3	mile
		Road Sediment Reduction	Road Surfacing	Shady Cove Road Resurface	1.5	miles
		Stand Density Fuel Break	Fuels Reduction	Shady Cove Fuel Hazard Reduction	866	acres
		Stand Density Fuel Break	Fuels Reduction	Shady Cove Fuel Hazard Maintenance	866	acres
	Trail Creek	Aquatic and Riparian Habitat	LWD in-stream	Trail Creek LWD	2.6	miles
		Fire suppression	Suppression Capacity	Trail Creek Pump Chance	3	sites

TABLE 2.1.4.3-1

Mitigation Projects to Address LMP Amendments on BLM and NFS Lands

Unit	Watershed	Mitigation Group	Project Type	Project Name	Quantity a/	Unit
		Road Sediment Reduction	Road storm-proofing	Trail Creek Road Storm-proofing	4.3	miles
		Road Sediment Reduction	Road Surfacing	Trail Creek Road Resurface	16.3	miles
		Stand Density Fuel Break	Fuels Reduction	Trail Creek Fuel Hazard Reduction	687	acres
		Stand Density Fuel Break	Fuels Reduction	Trail Creek Fuels Hazard Maintenance	687	acres
Lakeview BLM	Spencer Creek	Riparian Stand Density	Riparian Vegetation	Upper Spencer Creek LSR/Riparian treatment	3.0	miles
		Riparian Stand Density	Riparian Vegetation	Miners Creek LSR, Riparian Treatment	3.0	miles
		Road Sediment Reduction	Road Drainage – Culvert Replacement	Keno Access Road Repair and Culvert Replacement	1	site
		Road Sediment Reduction	Road Drainage	Spencer Creek Drainage Improvements and Sediment Trap Removal	15	sites
		Road Sediment Reduction	Road Closure	Spencer Creek Repair Existing Road Closure	12	sites
Umpqua National Forest	Days Creek - South Umpqua	Road sediment reduction	Road Closure	Days Creek -South Umpqua Road Closure	0.5	miles
		Stand Density Fuel Break	Fuels Reduction	Days Creek - South Umpqua Matrix Integrated Fuels Reduction	150	acres
		Stand Density Fuel Break	Fuels Reduction	Days Creek - South Umpqua LSR Integrated Fuels Reduction	232	acres
		Stand Density Fuel Break	Pre-commercial Thinning	Days Creek - South Umpqua. LSR Pre-commercial Thinning	53	acres
		Stand Density Fuel Break	Under-burn	Days Creek - South Umpqua LSR Under-burn	125	Acres
		Stand Density Fuel Break	Under-burn	Days Creek - South Umpqua Matrix Under-burn	102	acres
		Terrestrial Habitat Improvement	Snag Creation	Days Creek - South Umpqua LSR Snag Creation	32	acres
		Terrestrial Habitat Improvement	Snag Creation	Days Creek - South Umpqua Snag Creation	16	acres
	Elk Creek - South Umpqua	Aquatic and Riparian Habitat	Fish Passage	Elk Creek Fish Passage Culverts	3	sites
		Road sediment reduction	Road Storm-proofing	Elk Creek Road Storm-proofing	1.6	miles
		Road sediment reduction	Road Closure	Elk Creek Road Closure	2.8	miles
		Road sediment reduction	Road Decommissioning	Elk Cr. Road Decommissioning	2.8	miles
		Stand Density Fuel Break	Fuels Reduction	Elk Creek LSR Integrated fuels	897	acres
		Stand Density Fuel Break	Fuels Reduction	Elk Creek Matrix Integrated Fuels Reduction	170	acres
		Stand Density Fuel Break	Pre-commercial Thinning	Elk Creek LSR Pre-commercial thinning	368	acres
		Stand Density Fuel Break	Under-burn	Elk Creek LSR Under-burn	472	acres
		Stand Density Fuel Break	Under-burn	Elk Creek Matrix Under-burn	115	acres
		Terrestrial Habitat Improvement	LWD Upland Placement	Elk Creek LSR LWD Placement	103	acres
		Terrestrial Habitat Improvement	Meadow Restoration	Elk Creek Meadow Restoration	106	acres
		Terrestrial Habitat Improvement	Noxious Weed Treatment	Elk Creek Roadside Noxious Weeds	6.7	miles
		Terrestrial Habitat Improvement	Snag Creation	Elk Creek LSR Snag Creation	66	acres
		Terrestrial Habitat Improvement	Snag Creation	Elk Creek Matrix Snag Creation	13	acres

TABLE 2.1.4.3-1

Mitigation Projects to Address LMP Amendments on BLM and NFS Lands

Unit	Watershed	Mitigation Group	Project Type	Project Name	Quantity a/	Unit
	Trail Creek	Road sediment reduction	Road Decommissioning	Trail Creek Road Decommissioning	1.1	miles
		Road sediment reduction	Road Storm-proofing	Trail Creek Storm-proofing	0.5	miles
		Stand Density Fuel Break	Fuels Reduction	Trail Creek Matrix Integrated Fuels Reduction	414	acres
		Stand Density Fuel Break	Under-burn	Trail Creek Matrix Under-burn	280	acres
		Terrestrial Habitat Improvement	Snag Creation	Trail Creek Matrix Snag Creation	109	acres
	Upper Cow Creek	Aquatic and Riparian Habitat	Fish Passage	Upper Cow Creek Fish Passage Culverts	4	sites
		Road sediment reduction	Road Closure	Upper Cow Creek Road Closure	2.6	miles
		Road sediment reduction	Road Decommissioning	Upper Cow Creek Road Decommissioning	4.3	miles
		Stand Density Fuel Break	Fuels Reduction	Upper Cow Creek LSR Integrated Fuels Reduction	972	acres
		Stand Density Fuel Break	Fuels Reduction	Upper Cow Creek Matrix Integrated Fuels Reduction	606	acres
		Stand Density Fuel Break	Under-burn	Upper Cow Creek LSR Under-burn	531	acres
		Stand Density Fuel Break	Under-burn	Upper Cow Creek Matrix Under-burn	410	acres
		Terrestrial Habitat Improvement	LWD Upland Placement	Upper Cow Creek LSR LWD Placement	62	acres
		Terrestrial Habitat Improvement	Noxious Weed Treatment	Upper Cow Creek Meadow Noxious Weeds	21	acres
		Terrestrial Habitat Improvement	Snag Creation	Upper Cow Creek LSR Snag Creation	91	acres
		Terrestrial Habitat Improvement	Snag Creation	Upper Cow Creek Matrix Snag Creation	14	acres
		Reallocation of Matrix Lands to LSR	Land Re-Allocation from Matrix to LSR	LRMP Amendment UNF -4, LSR 223 Reallocation	588	acres
Rogue River National Forest	Little Butte Creek	Aquatic and Riparian Habitat	LWD In-stream	South Fork Little Butte Creek. LWD	1.5	mile
		Aquatic and Riparian Habitat	Stream Crossing Repair	Little Butte Creek Stream Crossing Decommissioning	32	sites
		Road sediment reduction	Road Decommissioning	Little Butte Creek Road Decommissioning	53.2	miles
		Stand Density Fuel Break	Pre-commercial Thinning	Little Butte Creek LSR Pre-commercial Thin	618	acres
		Terrestrial Habitat Improvement	Habitat Planting	Little Butte Creek Mardon Skipper Butterfly	20	acres
		Terrestrial Habitat Improvement	LWD Upland Placement	Little Butte Creek LSR LWD Placement	306	acres
		Terrestrial Habitat Improvement	Snag Creation	Little Butte Creek LSR Snag Creation	622	acres
		Reallocation of Matrix Lands to LSR	Land Reallocation from Matrix to LSR	LRMP Amendment RRNF 7, LSR 227 Reallocation	12	acres
	Big Butte Creek	Reallocation of Matrix Lands to LSR	Land Reallocation from Matrix to LSR	LRMP Amendment RRNF 7, LSR 227 Reallocation	500	acres
Winema National Forest	Spencer Creek	Aquatic and Riparian Habitat	Riparian Planting	Spencer Creek Riparian Planting	0.5	miles
		Aquatic and Riparian Habitat	Fencing	Spencer Creek Fencing	6.4	miles
		Aquatic and Riparian Habitat	LWD In-stream	Spencer Creek In-stream LWD	1.0	miles
		Aquatic and Riparian Habitat	Stream Crossing Repair	Spencer Creek Ford Hardening and Interpretive Sign	1	sites

TABLE 2.1.4.3-1

Mitigation Projects to Address LMP Amendments on BLM and NFS Lands

Unit	Watershed	Mitigation Group	Project Type	Project Name	Quantity a/	Unit
		Aquatic and Riparian Habitat	Stream Crossing Repair	Spencer Creek Stream Crossing Decommissioning	25	sites
		Road sediment reduction	Road Decommissioning	Spencer Creek Road Decommissioning	21.4	miles
		Visuals	Stand Density Reduction	Clover Creek Visual Management.	114	acres

a/ Acres are rounded to the nearest whole acre and miles to the nearest tenth of a mile.

2.1.5 Specific Off-site Mitigation Projects for Reclamation

Off-site mitigation on Reclamation lands may be included in the Proposed Action to ensure that the objectives of the Klamath Project are achieved and as necessary for Reclamation to consider concurrence in the BLM Right-of-Way, if authorized.

2.1.6 Right-of-Way Grant to Cross Federal Lands

Pursuant to the Mineral Leasing Act of 1920 and in accordance with federal regulation 43 CFR Part 2880, the Pacific Connector Pipeline Project must secure a Right-of-Way Grant from the BLM to cross BLM, NFS, and Reclamation lands. Pacific Connector has applied to the BLM for a Right-of-Way Grant to cross federal lands. The BLM proposes to consider issuance of a Right-of-Way Grant that provides terms and conditions for construction and operation of the Pacific Connector Pipeline Project on federal lands in response to the proponent's application. Issuance of the Right-of-Way Grant must be in accordance with 43 CFR Parts 2800 and 2880 and relevant BLM manual and handbook direction. In making this decision, BLM would consider several factors including conformance with LMPs and impacts on resources and programs. Following adoption of this EIS and receipt of concurrence from the Forest Service and Reclamation, the BLM would issue a ROD that documents the decision whether to issue the Right-of-Way Grant.

This Right-of-Way Grant would be in addition to any authorization for the Project issued by the FERC. The Right-of-Way Grant, if approved, would be authorized by issuance of a Temporary Use Permit for up to three years for the pipeline clearing and construction, which would terminate upon completion of construction, and issuance of a Right-of-Way Grant for ongoing pipeline operations and maintenance for a 30-year term. The Temporary Use Permit contains the specific temporary construction and work areas necessary to build the Project. Once the Pacific Connector pipeline is constructed and in operation, the Right-of-Way Grant would be modified to reflect the final location of the project and the associated 50-foot-wide maintenance corridor[9] plus any roads on federal lands or under federal easements that are necessary for operations.

2.1.6.1 Implementation and Monitoring of the BLM Right-of-Way Grant on Federal Lands

Monitoring is an essential element of project implementation (CEQ 2011). If the BLM issues a Temporary Use Permit and a Right-of-Way Grant for the Pacific Connector Pipeline Project, those

[9] In this EIS, the 50-foot wide corridor may be referred to as the "operational maintenance corridor", "permanent maintenance corridor", "permanent pipeline easement", "permanent pipeline right-of-way" or similar, depending on the resource discussion and context. To be clear, on all federal lands, the 50-foot wide corridor would be based on a 30-year Right-of-Way that would be neither permanent nor an easement on federal lands.

authorizations would provide the terms and conditions for construction, operation, maintenance, and eventual termination of the facility on federal public lands. As cooperating agencies with jurisdiction by law for activities that occur on lands they administer, the BLM, Forest Service, and Reclamation have a responsibility to monitor implementation of the Pacific Connector Pipeline Project to assure that the terms and conditions of the Right-of-Way Grant are carried out (40 CFR 1505.3).

CEQ Regulations for NEPA (40 CFR 1505.2(c)) also require that a monitoring and enforcement program should be adopted for any mitigation measures adopted as part of the decision to implement the Project. Many of the requirements of the POD that are a part of the BLM Right-of-Way Grant on federal lands are project design measures that reduce the environmental consequences of the Project on-site. The BLM and Forest Service have also proposed an extensive off-site mitigation program. In addition to monitoring implementation of the Temporary Use Permit and the Right-of-Way Grant, the BLM, Forest Service, and Reclamation also have a responsibility to monitor authorized actions, whether they are PDFs described in the POD or off-site mitigation measures included in BLM, Forest Service, and Reclamation mitigation programs.

There are two types of monitoring that would be associated with administering the Right-of-Way Grant. "Implementation monitoring" seeks to verify that the project was implemented according to the terms of the Right-of-Way Grant. Implementation monitoring is typically a checklist exercise to verify that a project is implemented as planned and that requirements, terms, and conditions associated with the project are met. Many of these elements would be addressed by FERC in the construction inspection process. As needed, agency representatives of the BLM, Forest Service, and Reclamation would participate in this process to assure that agency priorities are accomplished and agency obligations are fulfilled. Reclamation agency representatives would be on-site during all crossings of Reclamation facilities. Reclamation would require a minimum 48-hour notice for each crossing to ensure that Reclamation agency representatives are able to be on-site during the crossing installations.

"Effectiveness monitoring" is the second type of monitoring. Effectiveness monitoring seeks to verify that the specific requirements in the POD and in the off-site mitigation plans accomplished the desired objective. While virtually every important aspect of the project is subject to implementation monitoring, effectiveness monitoring is typically done on a smaller subset of actions. Where the outcomes of an action are well known and likely to be accomplished merely through implementation, effectiveness monitoring may not be needed, or may only be done on a sample basis. For example, the effects of surfacing roads are well known and not in question, so little if any effectiveness monitoring would be required for this activity. Conversely, some POD requirements or mitigation projects may have less certain outcomes or may be associated with thresholds such as water temperature. In those cases, effectiveness monitoring would be appropriate to ensure that the desired outcome is achieved. For example, in the East Fork of Cow Creek, the State of Oregon has established a threshold for water temperature impacts from management activities. Placing logs in and adjacent to perennial streams and planting shading vegetation is proposed to replace shade lost during construction clearing so that stream temperatures do not increase beyond established thresholds. Effectiveness monitoring would be appropriate in this circumstance to verify that stream temperatures in fact are not increased beyond the threshold. This also provides a trigger for adaptive management if the proposed mitigation is not entirely effective. Effectiveness monitoring requires interpretation of land management plan direction and objectives. Therefore, most effectiveness monitoring on federal lands would be accomplished by the agency having jurisdiction over the land being monitored.

Public comments received in response to the DEIS were used to focus monitoring efforts. The BLM, Forest Service, and Reclamation are developing a monitoring plan based on the "implementation" and "effectiveness" framework. Work on the monitoring plan is ongoing. Key items that require specific monitoring include LMP elements for:

- LSRs;
- Riparian Reserves;
- Matrix Lands;
- Key Watersheds;
- specific elements of National Forest LRMPs that may be more restrictive than the requirements of the NWFP; and
- specific recommendations of watershed analyses and LSR assessments.

The specifications of the POD were developed in part to ensure that the standards and guidelines of the agencies' LMPs, as amended, would be met. Implementation monitoring of the POD would be evidence of compliance with these respective LMPs. For example, implementation monitoring would show that:

- measures specified in the POD to reestablish effective ground cover were accomplished and that additional steps were taken if the agencies' standards were not met;
- measures in the POD for wetland and water body crossings designed to protect the aquatic environment, such as maintaining sediment barriers at stream crossings, were taken;
- de-compaction measures in the POD designed to avoid or mitigate detrimental soil compaction, were undertaken; and
- the BLM and Forest Service off-site mitigation programs associated with the Pacific Connector Pipeline Project were accomplished as planned.

Effectiveness monitoring focuses on key resources and evaluates whether measures taken to protect the resource in question accomplished the desired objective. Implicit in effectiveness monitoring is a framework of adaptive management to ensure that objectives are achieved. Following are three examples.

- Sediment barriers would be required at stream crossings. If sediment barriers are installed, but effectiveness monitoring shows that the sediment barrier used did not work as planned, then additional measures would need to be taken to keep sediment from reaching stream channels.
- Application of spatial buffer and timing restrictions for NSO nest sites. Effectiveness monitoring would be used to determine if that nest site was disturbed and/or reproductive success occurred.
- Measures to reestablish shade would be required at selected stream crossings where the analysis shows temperature is a potential issue. If the measures proposed are implemented, but prove to be ineffective, then additional actions to establish effective shade would be required.

Reporting results is a key element of a monitoring plan. The monitoring plan developed by the BLM, Forest Service, and Reclamation will include a reporting schedule and detailed criteria for judging completion and success of the actions being monitored. Implementation monitoring would typically be deemed complete when the action being monitored has been completely implemented.

Effectiveness monitoring would not be complete until the project objectives have been accomplished.

2.1.7 Plan of Development on Federal Lands

Pacific Connector's right-of-way application to the BLM included a POD. The POD is a detailed description of the proposed action on federally administered lands and facilities and would be made a part of the Right-of-Way Grant. The POD includes 29 attachments that were developed in cooperation with the BLM, Forest Service, and Reclamation. Twenty-eight of these attachments are individual plans detailing the Pacific Connector's proposed method for construction and operation of the proposed pipeline on federal lands (table 2.1.7-1). The POD also contains two unique agreements in principle for comprehensive mitigation plans developed collaboratively between the BLM and the Forest Service and Pacific Connector. Wherever applicable, Pacific Connector has committed to following the BMPs and PDFs outlined in the POD on non-federal lands as well.

Table 2.1.7-1 lists the POD attachments. The draft POD was filed as a stand-alone document with Pacific Connector's application to the FERC, and is available for public review.

TABLE 2.1.7-1

Pacific Connector's POD Attachments

Attachment #	Attachment Title	FERC Stand-Alone Document Appendix Letter a/
1	Aesthetics Management Plan for Federal Lands	A
2	Air, Noise and Fugitive Dust Control Plan	B
3	Blasting Plan	C
4	Communication Facilities Plan	D
5	Contaminated Substances Discovery Plan	E
6	Corrosion Control Plan	F
7	Emergency Response Plan	G
8	Environmental Briefings Plan	H
9	Erosion Control and Revegetation Plan	I
10	Federally-listed Plant Conservation Plan	J
11	Fire Prevention and Suppression Plan	K
12	Fish Salvage Plan	L
13	Hydrostatic Test Plan	M
14	Integrated Pest Management Plan	N
15	Klamath Project Facilities Crossing Plan	O
16	Leave Tree Protection Plan	P
17	Overburden and Excess Material Disposal Plan	Q
18	Prescribed Burning Plan	R
19	Recreation Management Plan	S
20	Right-of-Way Clearing Plan for Federal Lands	T
21	Right-of-Way Marking Plan	U
22	Safety & Security Plan	V
23	Sanitation and Waste Management Plan	W
24	Spill Prevention, Containment and Countermeasures Plan	X
25	Transportation Management Plan	Y
26	Unanticipated Discovery Plan	Z
27	Upper Rock Creek ACEC	AA
28	Wetland and Waterbody Crossing Plan	BB
29	Compensatory Mitigation Plan b/	CC
	Environmental Alignment Sheets	DD

a/ Pacific Connector included the POD Attachments in its application to the FERC by these letters.
b/ The measures outlines in the applicant's Compensatory Mitigation Plan would be implemented on private and state lands; however, the BLM/Forest-Service mitigation measures outlined in appendix F of this EIS would be implemented on federally-managed lands. The federal land-management agencies and the applicants will continue to work together to revise the CMP to include all mitigation measures that would be implemented by the Project on private, state, and federal lands.

2.1.8 Mitigation on Non-Federal Lands

Both Jordan Cove and Pacific Connector have developed mitigation plans for environmental impacts occurring on non-federal lands as part of their proposed action (table 2.1.8-1). In addition, unless otherwise stated, most of the POD attachments apply to non-federal lands as well. Mitigation and BMPs are discussed in conjunction with the respective affected resources in chapter 4 of this EIS.

TABLE 2.1.8-1

Proposed Mitigation Plans

Mitigation Plan	EIS Section(s)	Description	Reference
Jordan Cove LNG Terminal and Pacific Connector Pipeline			
Compensatory Mitigation Plan (CMP), Jordan Cove LNG Terminal, Marine Facilities, and Pacific Pipeline Project	Sections 2.1.6, 4.6.1, 4.6.2	Developed to compensate for impacts of the Jordan Cove Liquefaction and Pacific Connector Pipeline Project that cannot be avoided, further minimized, or otherwise mitigated, in conjunction with the other avoidance and mitigation strategies and commitments that are currently embedded in the Proposed Action.	Appendix CC to Pacific Connector's POD; updated version included as Appendix O of the applicant-prepared BA filed with FERC on April 16, 2014
Migratory Bird Conservation Plan	Section 4.6.1	Addresses requirements of the MBTA, the BGEPA, and EO 13186 to avoid and minimize adverse effects to birds and habitats, and propose compensatory measures to conserve and enhance migratory birds and habitats.	Filed draft plan on February 13, 2015.
Jordan Cove LNG Terminal			
Wildlife Habitat Mitigation Plan	Section 4.6.1, appendix S	Developed to comply with the ODFW Fish and Wildlife Habitat Mitigation Policy under OAR 635-415-000 to 00025. Provides for long-term preservation of habitat off-site from the Project.	Filed with FERC t on May 22, 2014.
Compensatory Wetland Mitigation Plan	Section 4.4.3	To offset unavoidable impacts to wetland habitats as required by CWA Sections 401 and 404.	Attached as Appendix M.2 of Resource Report 2, included in Jordan Cove's May 2013 application; updated version filed with FERC on April 17, 2015 and supplemented February 13, 2015
Pacific Connector Pipeline			
Mitigation Plan for Federal Lands	Section 2.1.4, appendix F	Identifies extensive off-site mitigation program on BLM and NFS lands. These projects are included as part of the Proposed Action to ensure that the objectives of the affected BLM and Forest Service land management plans are achieved.	Attached as appendix F to this EIS
Olympia Oyster Mitigation Plan	Section 4.6.2	Describes the Pacific Pipeline Project's opportunity to protect existing populations of Olympia oysters and to have a net benefit to Olympia oysters within Coos Bay.	Within CMP in Appendix O, Attachment 8 of the FERC's February 24, 2015 BA
Groundwater Supply Monitoring and Mitigation Plan	Section 4.4.1	Includes a discussion of identification of groundwater resources, determination of susceptibility to impacts and monitoring and mitigation if required for the protection of groundwater supply wells and springs and seeps.	Appendix 2F of Resource Report 2 of Pacific Connector's June 2013 application
Site-Specific Residential Mitigation Plans	Section 4.1.2 and appendix I	For the residences within 50 feet of construction work areas, Pacific Connector has developed site-specific drawings depicting the temporary and operational rights-of-way and has noted special construction techniques and mitigation measures	Appendix 8F of Resource Report 8 of Pacific Connector's June 2013 application
Compensatory Wetland Mitigation Plan	Section 4.4.3	To offset unavoidable impacts to wetland habitats as required by Section 401 and 404 of the CWA.	Within CMP in Appendix O, Attachment 9 of the FERC's BA
Estuarine Wetland Mitigation Plan	Section 4.4.3	To offset unavoidable impacts to estuarine wetland habitats.	Attachment 7 of the FERC's BA
Large Woody Debris Plan	Sections 4.6.2 and 4.7.1	Specifies placement of LWD within the construction right-of-way at stream crossings or in riparian zones within ranges of the SONCC and Oregon Coast coho ESUs	Within CMP in Appendix O, Attachment 6 of the FERC's BA
Federally-Listed Plant Conservation Plan	Section 4.7.1	Includes botanical mitigation plans for: Applegate's milk-vetch, Gentner's fritillary, Kincaid's lupine, and Cox's mariposa-lily.	Within CMP in Appendix O, Attachment 5 of the FERC's BA
Wildlife Habitat Mitigation Plan	Section 4.6.1	Developed to comply with the ODFW Fish and Wildlife Habitat Mitigation Policy under OAR 635-415-000 to 00025. Provides for long-term preservation of habitat off-site from the Project.	February 13, 2015, filed draft plan

TABLE 2.1.8-1

Proposed Mitigation Plans

Mitigation Plan	EIS Section(s)	Description	Reference
Historic Properties Management Plan (HPMP)	Section 4.11.1	Specifies measures to be implemented to evaluate sites for the NRHP, avoid historic properties, or treat historic properties that would be affected. Final HPMP required by MOA executed August 2011.	A draft HPMP was filed in 2010 under Docket No. CP07-441-000. A final HPMP would be filed with the FERC prior to any Project-related construction.

2.2 NON-JURISDICTIONAL FACILITIES

In addition to the facilities discussed in section 2.1, the JCE & PCGP Project would require construction of facilities that do not fall under the Commission's jurisdiction. These include a power plant associated with the proposed LNG terminal, the SORSC, facilities constructed to provide utility service to various jurisdictional meter stations and a compressor station, and activities conducted by the Port. Because the non-jurisdictional power plant, SORSC, and utility services to Pacific Connector meter stations are directly related to the Project, we will analyze the environmental impacts of their construction and operation throughout chapter 4 of this EIS. The Port activities are not fully developed and are not related to the Project, and therefore will only be discussed in the Cumulative Impacts section (4.14) of this EIS.

2.2.1 LNG Vessels

LNG to be exported from the Jordan Cove terminal to overseas markets would be transported in vessels specially designed and built for that task. Jordan Cove expects that its terminal would be visited by about 90 LNG vessels per year. These vessels would be loaded with LNG at the terminal and deliver the cargo to customers, most likely around the Pacific Rim. LNG vessels would be under the ownership and control of third-parties, not Jordan Cove, and would not be regulated by the FERC. The third-party owners and operators of the LNG vessels would have agreements with Jordan Cove for the transportation of the LNG to designated ports or customers. We do not have any information about the exact vessels that would be used to transport the LNG from the terminal. However, the Coast Guard WSR and LOR limit the size of LNG vessels that would call at the Jordan Cove terminal to not larger than 148,000 m^3 in capacity. Neither do we know the exact destinations for the LNG cargo, nor the specific routes across the Pacific Ocean to customers that would be taken by LNG vessels, outside of the waterway within 12 miles of the Oregon Coast. Therefore, LNG vessel design and ocean transportation routes outside of the waterway close to shore will not be further analyzed in this EIS.

2.2.2 South Dunes Power Plant

To provide power to the LNG terminal, Jordan Cove would construct and operate the South Dunes Power Plant. As discussed in section 1.5.4.2 of this EIS, the South Dunes Power Plant would be authorized by the ODOE-EFSC. Jordan Cove filed its final application for a site certificate for the power plant with EFSC on December 29, 2014. The ODOE-EFSC issued a Draft Proposed Order on the application on May 27, 2015, which recommends EFSC approve the application and grant a Site Certificate, subject to conditions listed in the order. The power plant would still need a Final Order and Site Certificate to proceed.[10]

[10] More information about the EFSC process and status for the South Dunes Power Plant is available on the ODOE website: http://www.oregon.gov/energy/Siting/Pages/SDP.aspx.

This new power plant would be located on about 58 acres on the northeast side of geographic Jordan Cove, at the former site of the Menasha-Weyerhaeuser linerboard mill, closed in 2003 and since demolished. The site is currently clear of any standing structures, with the exception of a water tank and the PacifiCorp Jordan Point electric substation. The substation would be relocated after construction of the new power plant.

The South Dunes Power Plant would produce a nominal 420 MW of electrical power and process steam for gas conditioning prior to delivery to the terminal liquefaction trains. The electric line between the power plant and the LNG terminal would be located within Jordan Cove's utility corridor.

The power plant would consist of two 210-MW blocks of high efficiency combined cycle combustion turbine generation. Three combustion turbine generators (CTG), three heat recovery steam generators (HRSG), and one steam turbine generator (STG), would collectively compose each power block. Each CTG would produce electricity, with the exhaust gases from the CTGs supplying heat to the HRSGs. Steam produced in the HRSGs would be used to power the STGs to produce additional electricity and process steam. Duct burners fueled by natural gas in the HRSGs would allow for production of additional steam and additional electricity from the STGs when needed. Steam exhausted from the STGs would be condensed in air-cooled condensers, with the resultant condensate returned to the HRSGs to remake steam.

The CTGs, HRSGs, and STGs would be outdoor units, given the relatively moderate ambient conditions of the area. The HRSGs would be the tallest structures on the South Dunes Power Plant site at approximately 100 feet tall. A control and administrative building would provide space for plant controls and offices for plant personnel (these buildings are listed on table 2.1.1.10-1 above).

Fuel would be supplied primarily in the form of BOG from the LNG terminal, conveyed by a 10-inch-diameter pipeline. Some additional natural gas would be supplied from the Pacific Connector pipeline, which would connect to a metering station to be located in the southern portion of the South Dunes Power Plant site. Jordan Cove's pipeline natural gas conditional facility would be situated on the west side of the power plant.

Raw water would be supplied to the power plant by the CBNBWB through an existing pipeline (as discussed above in section 2.1.1.10). A separate water treatment area would provide a location for the equipment necessary to purify the raw water, producing demineralized water for use in the power plant steam cycle and amine solution for CO_2 removal.

A fire protection system would be provided and designed to meet the requirements of the Oregon Structural Specialty Code, Oregon Fire Code, and all other applicable fire protection codes and standards in effect at the time of construction. The system would include, among other elements, building smoke detection, a manual alarm, sprinkler systems, fire water system, carbon dioxide extinguishing system, portable fire extinguishers within all buildings and at key outdoor locations, and a smoke detection system. Road access at the site would include sufficient turning radius for firefighting equipment.

Other related facilities at the power plant complex would include:

- relocated Pacific Power electric substation at the southeast portion of the site, which would provide an alternate source for power on-site;

- 115-kV, AC, open-air switchyard serving both power blocks, including a small building to provide a controlled environment for the protective relaying and communication equipment;
- one-mile, double-circuit, 115-kV power line connecting the switchyard to the gas-insulated substation at the LNG terminal, and a second 115-kV transmission line 2,024 feet in length that would connect the switchyard to the relocated Pacific Power substation;
- double-walled steel 5,000-gallon aboveground diesel fuel storage tank to be used for refueling site vehicles and emergency equipment;
- wastewater treatment plant for treating domestic sewage generated at the power plant;
- stormwater and fire water ponds; and
- security, administration, control, and operation buildings (see table 2.1.1.10-1), and related roads and parking lots.

2.2.3 Southwest Oregon Regional Safety Center

The SORSC would occupy approximately 8 acres on the east side of Jordan Cove Road, between the Trans-Pacific Parkway and the Roseburg Forest Products property, west of the South Dunes Power Plant. The building would house the Jordan Cove Fire Company, offices for the Coos County Sherriff, Coast Guard, and the Port, and a training facility for the Southwestern Oregon Community College. Although this building does not come under the jurisdiction of the FERC, this EIS analyzes impacts resulting from its construction.

2.2.4 Utility Connections

Electrical power and telephone service would be required for each of the meter and compressor stations. Installation of the utility connections is not regulated by the FERC. Pacific Connector stated that no permits are required for the purchase of power or telephone service to the compressor station and meter stations.

Both electric power and telephone infrastructure currently exist along Malin Loop Road and More Lock Road, to the south and west of the proposed Klamath Compressor Station and its associated meter stations. Pacific Connector could purchase electricity from Pacific Power, which would have to install a standard single phase 400 amp meter base for the service drop from the existing distribution line. For telephone service, a standard telephone service pedestal would have to be installed by Cal-Ore Telecommunications (figure 2.2-1).

There is existing electric power available on the west side of the newly proposed location for the Clarks Branch Meter Station. Power would be purchased from Pacific Power, which would need to install a standard single phase 200 amp meter base to tie-into the distribution line. A new telephone cable would have to be installed by Qwest from its existing line along Dole Road up the newly proposed PAR 71.46 to the meter station (figure 2.2-2).

Electric power and telephone service would be available to Pacific Connector's proposed new Jordan Cove Meter Station from facilities already in place within the Jordan Cove terminal. The Pacific Power substation would be relocated by Jordan Cove east of the proposed meter station, and a service drop would consist of a standard single phase 200 amp meter base. Jordan Cove would provide voice and data communications directly to the meter station (figure 2.2-3).

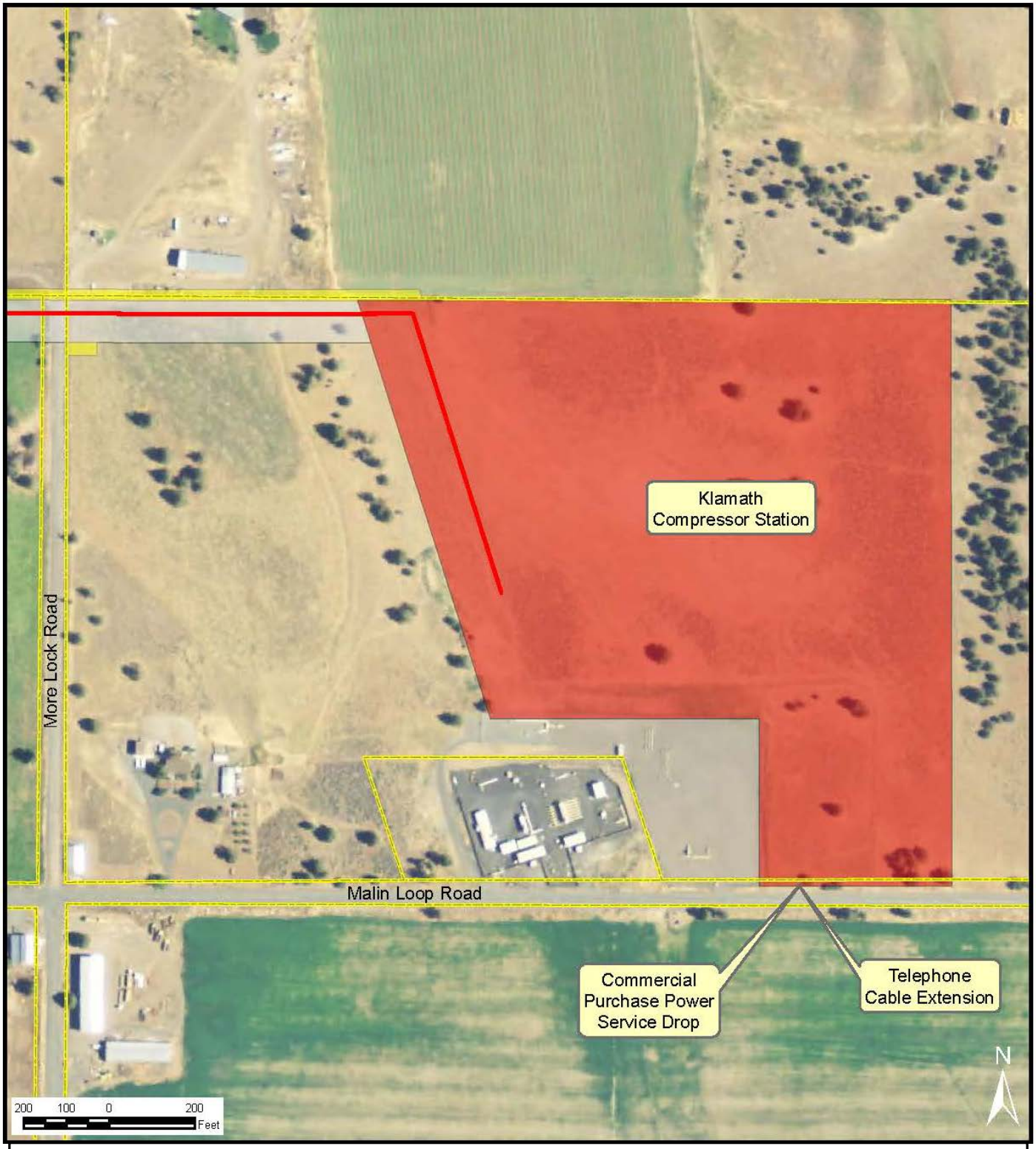


Figure 2.2-1
Non-jurisdictional Facilities Associated with Klamath Compressor Station T.41S., R.12W, Section 11

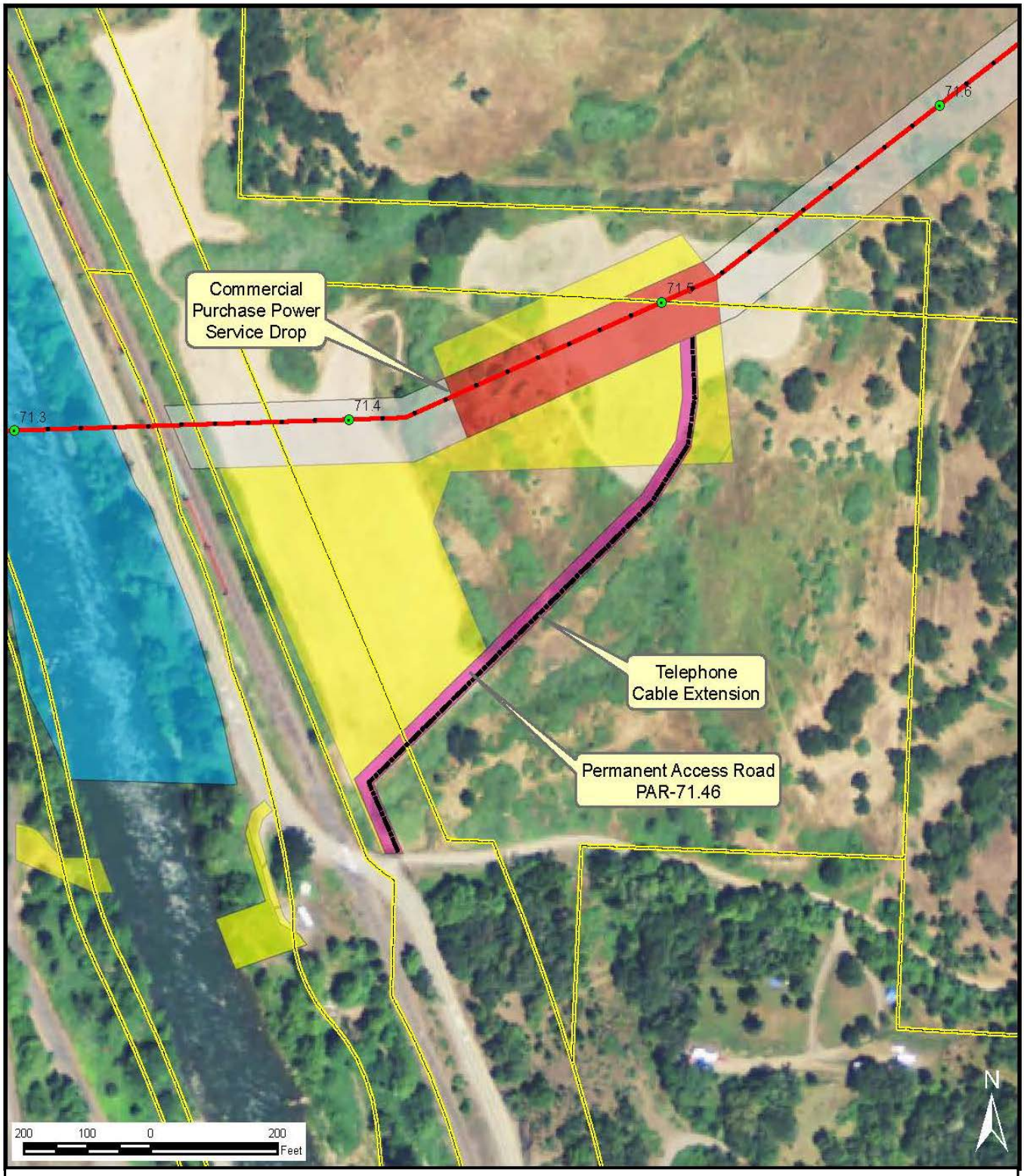


Figure 2.2-2
Non-jurisdictional Facilities Associated with Clarks Branch Meter Station T.29S., R.6W., Section 2

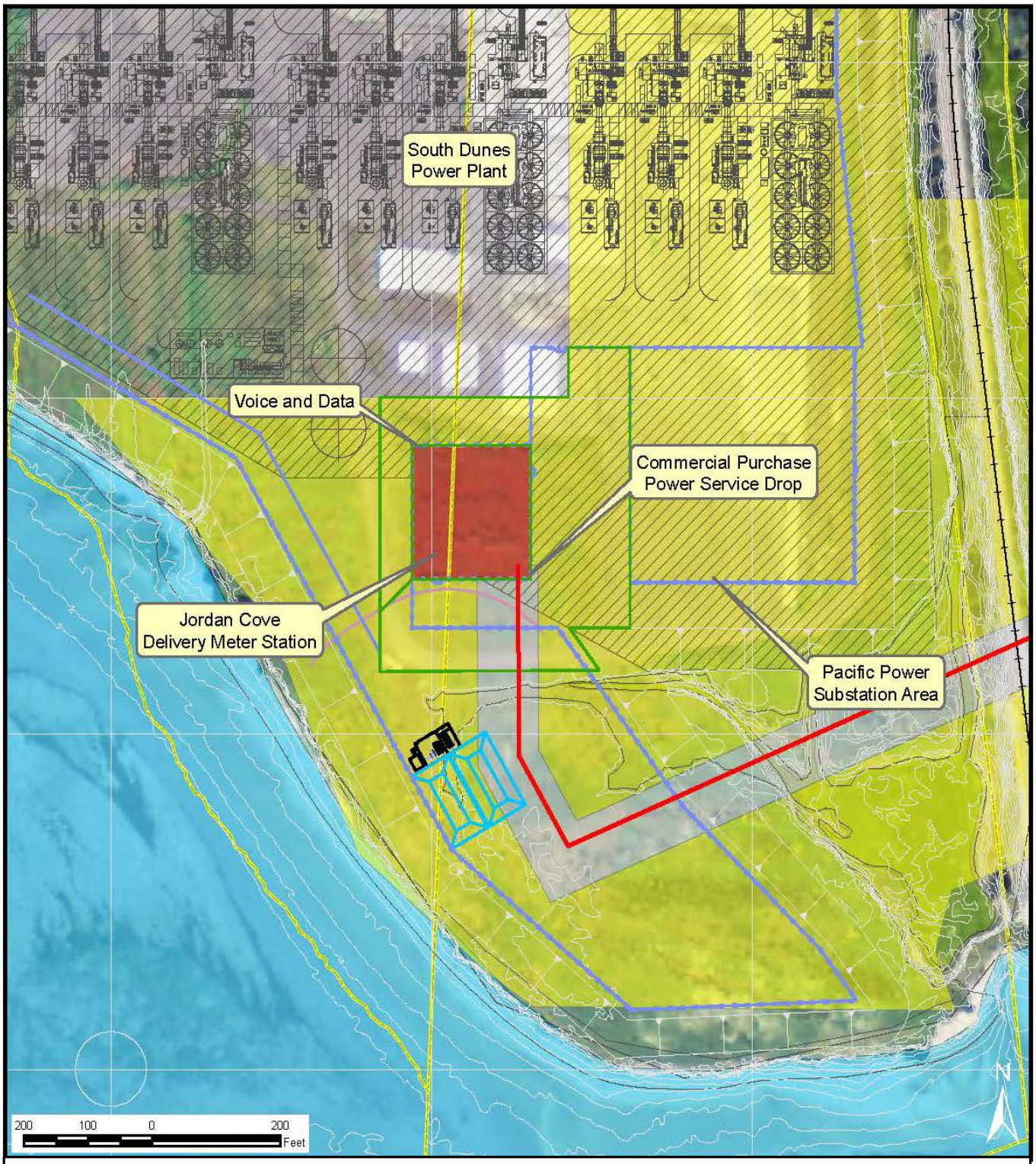


Figure 2.2-3
Non-jurisdictional Facilities Associated with Jordan Cove Meter Station T.25S., R.13W., Section 3

2.2.5 Port Activities

The Port is pursuing multiple different future marine terminal development projects within Coos Bay. One of those projects is called the "Oregon Gateway Marine Terminal Complex." At one time, the Port considered using the west side of the Jordan Cove marine slip as an unspecified commercial berth. The Port indicated that it would use the west berth for a dry bulk terminal for silo-storage cargos (i.e., grain, soy beans, etc.). The Port's conceptual drawing on its webpage of this dry bulk cargo terminal on the west side of the Jordan Cove marine slip shows it overlapping Henderson Marsh. However, Jordan Cove is now proposing a single-user slip, with no commercial berth on the west side. Also, Jordan Cove would construct a tsunami berm on the west side of the slip between the terminal and Henderson Marsh, which may preclude future commercial development in this area.

The Port also proposed an intermodal container terminal complex, to cover about 293 acres at Henderson Marsh, on the east side of the Jordan Cove LNG terminal. The conceptual drawing of the container terminal, posted on the Port webpage, shows a ship berth within Coos Bay, on the north side of the existing navigation channel, east of Jordan Cove's marine slip. In 2011, the Port entered into an exclusive arrangement with unnamed partners to export coal brought by train to Coos Bay. However, in May 2013 those partners backed out of the agreement. D.B. Western is still pursuing the concept of establishing a coal shipping terminal adjacent to its facility on the North Spit (as later discussed in section 3.3.1.2 of this EIS).

In January 2008, the Port entered into a MOA with the COE for guidance related to analyzing channel improvements in Coos Bay under Section 203 of the Water Resources and Development Act. In January 2014, the Port informed the COE of its intent to convert the project into an evaluation under Section 204 of the Water Resources and Development Act, and began negotiating a new MOA. At this time, neither the Port nor the COE have produced an environmental analysis of the future channel expansion project.[11]

In March 2012, the Port signed an agreement with Principal Power to use the west side of the Jordan Cove slip, including a portion of Henderson Marsh, for the on-site manufacture and assembly of five semi-submersible wind platforms, that would then be towed to sea. As discussed in section 3.3.2.2, Principal Power was awarded a grant for a pilot study of the potential to anchor five 6 MW wind turbines about 3 miles off the Oregon coast opposite Coos Bay. The Principal Power proposal is one of seven DOE grants, and it is not yet clear if it would be selected for full project funding.

There is no direct relationship between the Port's planned channel improvement project and the Jordan Cove LNG Project. The LNG vessels that would use the Coos Bay waterway to Jordan Cove's terminal are limited by the Coast Guard to under 148,000 m^3 in capacity, and those vessels can transit through the existing Coos Bay navigation channel without it being made any deeper or wider. However, the Port's proposed future activities are further considered in this EIS under Cumulative Impacts in section 4.14.

[11] Under Section 204 of the Water Resources and Development Act, a non-federal sponsor can fund the project. In June 2014, the Port indicated that it would have a consultant produce an Administrative Draft EIS for the channel improvement project in 2016.

2.3 LAND REQUIREMENTS

Tables 2.3.1-1 and 2.3.2-1 summarize the land requirements for the facilities proposed as part of the JCE & PCGP Project. Land requirements for each component of the Project are described below. Land use is further discussed in section 4.1.

2.3.1 Jordan Cove Liquefaction Project Facilities

The upland facilities of Jordan Cove's liquefaction and LNG export terminal, excluding the access channel and marine slip, eastern utility corridor, gas processing and South Dunes Power Plant area, the relocated industrial and raw water pipelines, and avoided wetlands and sand dunes, would occupy about 89 acres of open grasslands and brush and forested dunes west of the existing Roseburg Forest Products property, east of Henderson Marsh, and south of the Trans-Pacific Parkway. This area, when owned by Weyerhaeuser, was called the Ingram Yard, but was once historically part of what was known as the Henderson Ranch. In addition, the Jordan Cove terminal would include support buildings and a utility corridor totaling about 19 acres on the north side of the Roseburg Forest Products tract. On the northern and eastern shore of geographic Jordan Cove, east of the Roseburg Forest Products tract, about 79 acres would be used for the Jordan Cove natural gas processing area, and its non-jurisdictional South Dunes Power Plant and associated facilities, including the SORSC, excluding avoided wetlands. This area was once historically part of what was known as the Jordan Ranch. Between 1961 and 2003, it was the location of the Menesha-Weyerhaeuser linerboard mill, which has since been demolished.

During construction of the combined Jordan Cove liquefaction and LNG export terminal, and related power plant complex, about 397 acres would be disturbed. An additional 49.3 acres would be disturbed as part of wetland mitigation activities. About 251 acres would be retained for operational facilities. Jordan Cove owns about 295 acres at the terminal and power plant complex, with additional temporary construction areas leased from other private landowners. Table 2.3.1-1 lists the land requirements for the Jordan Cove Liquefaction Project.

TABLE 2.3.1-1

Land Requirements for the Jordan Cove Liquefaction Project

Facilities	Land Area (acres) a/	Acres Affected During Construction	Acres Affected During Operation
JURISDICTIONAL FACILITIES			
Access Channel and Marine Slip	66	66	66
LNG Loading Berth/Platform and Transfer Line	9	9	9
LNG Storage Tank Area	27	27	27
Liquefaction Process Area	20	20	20
Refrigerant Storage Area	2	2	2
Ground Flare	1	1	1
Terminal Fire Water Ponds	4	4	4
Terminal Site Access	4	4	4
Barge Berth	3	3	3
Terminal Operator Building and Warehouse	8	8	8
Utility Corridor and East Access Road	11	11	11
Gas Treatment Plant	13	13	13
Stormwater Pond	11	11	11
Jordan Cove Meter Station b/	0	0	--
Industrial Wastewater Pipeline Relocation	13	13	5
Raw Water Pipeline Extension	3	3	1
North Point Workforce Housing Complex Bridge	<1	<1	<1
Total Acres for Terminal Facilities	**195**	**195**	**185**
NON-JURISDICTIONAL FACILITIES			
South Dunes Power Plant	58	58	58
Southwest Oregon Regional Safety Center	8	8	8

TABLE 2.3.1-1

Land Requirements for the Jordan Cove Liquefaction Project

Facilities	Land Area (acres) a/	Acres Affected During Construction	Acres Affected During Operation
Total Acres for Non-Jurisdictional Facilities	**66**	**66**	**66**
TEMPORARY CONSTRUCTION AREAS			
Heavy Equipment Haul Road at Roseburg Forest Products Property	8	8	0
Slurry and Return Water Pipelines at Roseburg Property	1	1	0
Terminal Construction Trailers c/	0	0	0
Tank Staging Area **c/**	0	0	0
Concrete Batch Plant Area d/	0	0	0
Tank Roof Fabrication Area e/	0	0	0
Process Staging Area e/	0	0	0
Construction Offices at Roseburg Property	1	1	0
Laydown Area at Roseburg Property	13	13	0
Open Areas	11	11	0
Parking at Roseburg Property	<1	<1	0
Craft Areas at Roseburg Property	<1	<1	0
Warehouse/Storage at Roseburg Property	1	1	0
Fabrication Areas at Roseburg Property	4	4	0
LNG Vessel Berth Dune Area f/	15	15	0
Northern Terminal Sand Dune Area	7	7	0
Laydown Area	21	21	0
Gas Processing Plant Laydown Area	4	4	0
North Point Workforce Housing Complex g/	48	48	0
Total Acres for Temporary Construction Areas	**136**	**136**	0
AVOIDED WETLAND AREAS			
Eastern Henderson Marsh	11	0	0
Northeastern Terminal Wetlands Area	28	0	0
Western South Dunes Power Plant Wetlands Area	7	0	0
Total Acres for Avoided Wetland Areas	**45**	**0**	**0**
MITIGATION SITES h/			
West Jordan Cove Wetland Mitigation Site i/	3.7	3.7	0.0
West Bridge Wetland Mitigation Site i/	2.0	2.0	0.0
Kentuck Slough Mitigation Site	43.6	43.6	0.0
Wildlife Habitat Mitigation Areas j/	259.4	0.0	0.0
Total Acres for Wetland Mitigation Sites	**308.7**	**49.3**	**0.0**
GRAND TOTAL	**706**	**446**	**251**

a/ Acres rounded to the nearest whole acre, except for mitigation sites. If acreage is less than 1 acre, reported as "<1". Columns may not sum correctly due to rounding.
b/ Acres impacted by the Jordan Cove Meter Station are accounted for by the Pacific Connector pipeline and associated aboveground facilities in section 2.3.2.
c/ Within LNG Storage Tanks Area
d/ Within Terminal Firewater Pond Area
e/ Within Liquefaction Trains Process Area
f/ Includes 1.5 acres for removal of the existing Roseburg Water Tanks
g/ Jordan Cove indicated that 2 additional acres of construction impact may occur to areas classified as "industrial" for the NPWHC. Jordan Cove would also use existing offsite lots for parking for commuting construction workers at Mill Casino (approx. 15 acres) and Myrtlewood RV park (approx. 6 acres)
h/ Acreages here rounded to nearest tenth of an acre.
i/ Acreage greater than total compensatory mitigation acreage due to additional land disturbance.
j/ Jordan Cove is acquiring a total of 581 acres at three off-terminal locations; however, only 259.4 acres are planned for mitigation use.

2.3.2 Pacific Connector Pipeline and Associated Aboveground Facilities

Pacific Connector would use about 5,565 acres to construct its proposed project, and about 1,438 acres would be retained for the operational corridor. Table 2.3.2-1 lists the land requirements for the proposed Pacific Connector Pipeline Project.

TABLE 2.3.2-1

Land Requirements for the Pacific Connector Pipeline Project

Project Component	Length (miles) or Number of Sites a/	Land Affected During Construction (acres)	Land Affected During Operation (acres)
Pipeline Right-of-Way	232 miles b/	2,694	1,404 c/
Temporary Extra Work Areas	1,693 sites	1,030	(88) d/
Uncleared Storage Areas	287 sites	676	0
Rock Source & Disposal Sites e/	42 sites e/	87	(87) e/
Contractor and Pipe Storage Yards h/	34 sites	1,024	0
Existing Roads/Sites Needing Improvements	73 roads	14	(14) f/
Temporary Access Roads	13 roads	5	0
Permanent Access Roads	15 roads	2	2
Aboveground Facilities	17 sites	32 g/	32 g/
Hydrostatic Discharge Locations Outside Right-of-Way	6	1	0
Totals	**–**	**5,565**	**1,438**

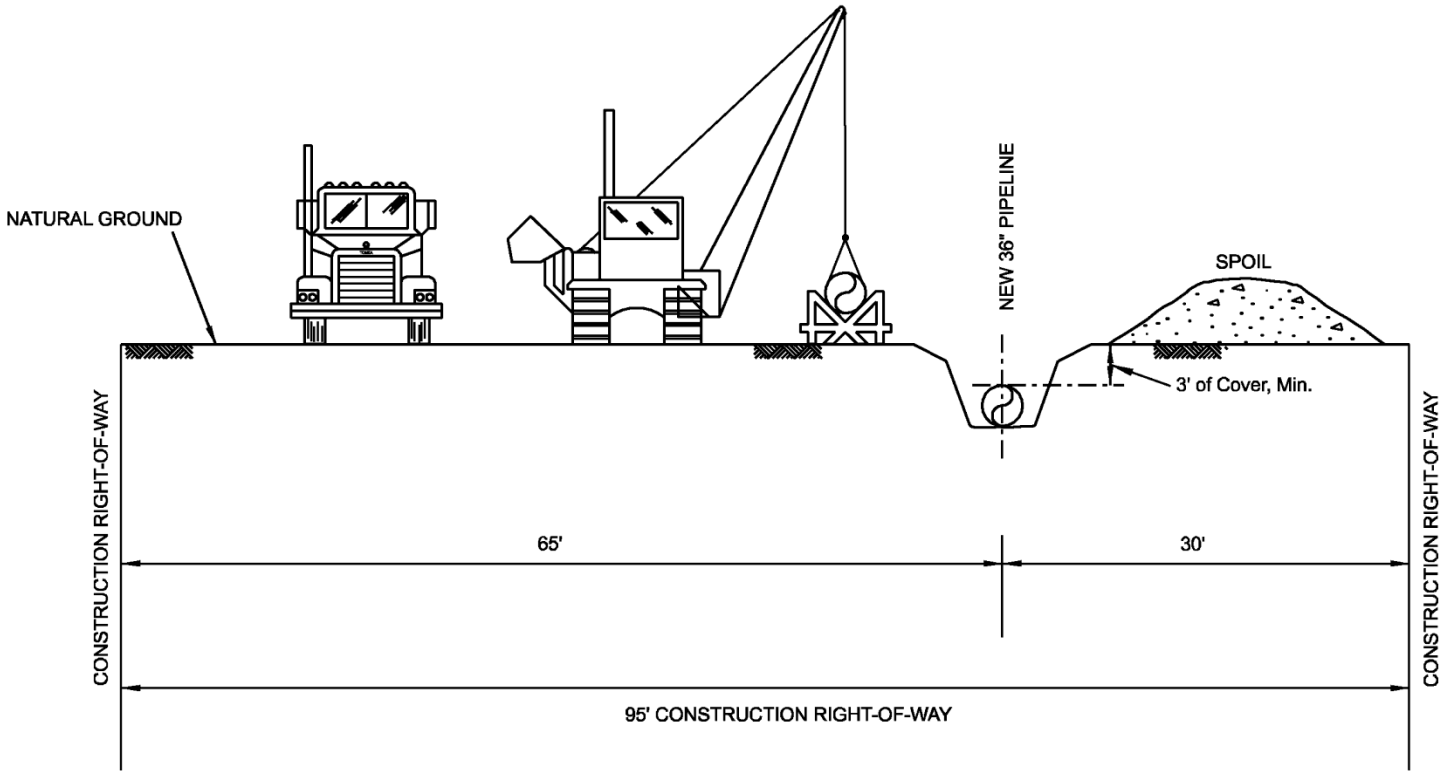
a/ All miles and acres are rounded up to a whole number.
b/ Because of realignments, the length of the pipeline is different from the MPs in the 2014 DEIS due to a number of route variations.
c/ 50-foot-wide permanent pipeline easement (on federal lands, 30-year maintenance corridor). (Approximately 6 acres of the 1,404 acres affected during operations would not be disturbed because of subsurface HDD and direct pipe procedures).
d/ Includes TEWAs, existing quarries, rock sources, and disposal areas that may be used as permanent storage areas. These areas would not be used during operation of the Project, and therefore are not included in the operational total.
e/ Rock Source and Disposal sites total 175 acres and are associated with 42 sites; 88 acres (22 sites) are associated with dual use TEWA and Rock Source and Disposal sites, and 87 acres (20 sites) are stand-alone Rock Source and Disposal sites. These areas would not be used during operation of the Project and therefore are not included in the operational total.
f/ While the improvements would not be reclaimed, these roads would not be used for operations and the acres are not included in the total operational acreage.
g/ Construction impacts associated with the aboveground facilities are included in the construction land requirement for the pipeline right-of-way and TEWAs except the potential communication tower sites and the Klamath Compressor station, which are included here (approximately 1 acre and 31 acres).
h/ There are a total of 34 yards: 31 yards (1,024 acres) are stand-alone yards and 3 yards (73 acres) are dual use TEWA/yards that are accounted for as TEWAs.

2.3.2.1 Pipeline

Construction Right-of-Way

Pacific Connector proposes to use a standard 95-foot-wide construction right-of-way to install the pipeline. This width for the construction right-of-way would be needed to accommodate clearing and grading activities, store spoil, and provide a passing lane for equipment. The right-of-way would be used as the primary transportation corridor during construction. A typical right-of-way cross section is shown in figure 2.3-1.

Where feasible (i.e., where topographic conditions allow) at wetland crossings, the construction right-of-way would be narrowed to 75 feet in width to reduce impacts. See additional discussion in section 4.4 of this EIS.



NOTE: 95' CONSTRUCTION RIGHT-OF-WAY
TYPICAL FOR LEVEL TERRAIN WITH NO
CONSTRUCTION OBSTACLES.

LOCATIONS REQUIRING ADDITIONAL WORK SPACE ARE
- TOP SOIL AREAS
- UNLEVEL TERRAIN
- ROAD AND STREAM CROSSINGS
- HORIZONTAL DRILLING

Figure 2.3-1

Typical Pipeline Right-of-Way
Cross Section

About 2,694 acres would be affected during construction of the pipeline, within the standard right-of-way. Temporary construction workspace outside of the 50-foot-wide operations and maintenance easement would be restored after construction to its original use. The restoration and revegetation of the temporary construction right-of-way would be done in accordance with Pacific Connector's *Erosion Control and Revegetation Plan* (ECRP).[12]

Temporary Extra Work Areas

In addition to the standard 95-foot-wide construction right-of-way, Pacific Connector would use TEWAs where site-specific characteristics would require additional space. Most TEWAs would be cleared of vegetation, and some would be graded as necessary to create safe work space for construction activities. Generally, TEWAs would be required for (but not limited to) the following:

- steep slopes and side sloping areas to accommodate cuts and spoil storage requirements;
- bore pits and spoil storage at road and railroad crossings;
- spoil storage, staging, and construction of specialized pipeline drag sections such as at wetland crossings, residential/industrial areas, and road crossings;
- waterbody and wetland crossings;
- road crossings;
- pipe and equipment staging;
- areas where tie-ins require additional trench widths to allow workers to enter the trench and perform welds and to ensure Occupational Safety and Health Administration (OSHA) trench safety requirements are met;
- sharp angles or points of intersection (PIs) where additional area is required to account for the wide turning radius of pipe stringing trucks (which are more than 100 feet in length);
- topsoil segregation areas to ensure stockpiled topsoil and subsoils are not mixed;
- off right-of-way dewatering areas; and
- timber staging/decking during right-of-way clearing.

About 1,693 TEWA sites, totaling approximately 1,030 acres, would be required to install the pipeline. All of these areas would be disturbed only temporarily during pipeline construction, and would be restored and revegetated afterwards, in accordance with Pacific Connector's ECRP.

Uncleared Storage Areas

During design of the construction area requirements for the pipeline, Pacific Connector identified the need for additional work areas in various locations such as forested areas; in areas of steep slopes; and in areas where the route follows narrow ridgelines. In an attempt to minimize forest clearing, especially in areas of older forest, Pacific Connector proposes to use some of these temporary work areas as uncleared storage areas (UCSA) rather than TEWAs. Unlike TEWAs, UCSAs would not be cleared of trees during construction. UCSAs would be used to store forest slash, stumps, dead and downed log materials that would be removed from the construction work area before construction, and then scattered back across the right-of-way after construction. Pacific Connector anticipates that the amount of this type of material encountered within the

[12] The ECRP was attached as Appendix 1B in Resource Report 1 of Pacific Connector's June 2013 application to the FERC, and included as Appendix I of Pacific Connector's POD.

construction right-of-way would be large enough to hinder construction activities if it were stored on the right-of-way.

In some locations, the UCSAs may be used to store spoil or to temporarily park equipment between the mature trees. However, storage and temporary parking of equipment/vehicles would not occur immediately adjacent to any trees so as to minimize impacts (soil compaction or tree damage). In extremely steep and side sloping topography, the UCSAs may be required as a contingency location to contain rock, which rolls beyond the construction limits. Along extremely steep and narrow ridgeline areas, logs, slash, and dead and downed material may be used as cribbing to contain excavated materials during construction (right-of-way grading and trenching activities). During restoration, some of the materials that are pulled out of the cribbing may roll beyond the construction limits. Where feasible, Pacific Connector would retrieve materials that have rolled downhill using cables and chokers attached to standard on-site restoration equipment (i.e., bulldozers and trackhoes) to winch the material back to the right-of-way. There may be some cases where retrieval of the lost cribbing material may cause more harm to resources than allowing it to remain where it settled. On federal lands, Pacific Connector would protect trees within the UCSAs in accordance with the procedures outlined in its *Leave Tree Protection Plan* (Appendix P of its POD).

Pacific Connector has identified 287 UCSA locations adjacent to the construction right-of-way, affecting a total of about 676 acres. The amount of spoil or woody debris that would be stored within UCSAs, or which pieces of equipment may be temporarily parked within UCSAs is not possible to estimate at this time, but would be determined as construction progresses. After construction, the UCSAs would be restored to their previous condition and use.

Hydrostatic Test Water Discharge Sites

Pacific Connector has identified 75 locations along the proposed route where hydrostatic test water would be released within the construction right-of-way during testing of the pipeline. At these locations, the hydrostatic test water would be discharged into temporary erosion control basins, typically constructed of hale bales and silt fence, in upland areas (see section 4.4.2 for a full discussion of hydrostatic testing).

Pacific Connector identified six hydrostatic test water discharge locations that would be outside of the construction right-of-way, TEWAs, or UCSAs. At those six locations, small brush or trees may be cleared by a rubber-tired rotary or flail motor (brush hog) or by hand with machetes or chainsaws. A rubber-tired or track hoe would be used to lay the discharge line and to remove the saturated hay bales or filter bags upon completion of hydrostatic discharge. About 1 acre would be affected by hydrostatic discharge outside of the right-of-way.

Operational Pipeline Right-of-Way

Pacific Connector would retain a 50-foot-wide permanent easement for the long-term operation and maintenance of the pipeline on non-federal lands. On federal lands, an operational right-of-way may be issued for a specific period of use, with potential for extension. This 50-foot-wide corridor equates to approximately 1,399 acres.

Existing Access Roads

About 709 existing roads would be used for access to the pipeline right-of-way during construction. Existing roads that would be used for construction access are listed in table D-2 in appendix D of this EIS. Construction access roads are also shown on the pipeline facility maps in appendix C. The use and crossing of access roads are more fully discussed in section 4.10.

Pacific Connector would obtain the necessary permits or approvals from appropriate federal, state, and county government agencies prior to use of the roads, and would obtain landowner permission for the use of existing private roads. As part of its application to the FERC, Pacific Connector filed a *Transportation Management Plan* (TMP) for federal lands as Appendix Y of its POD, and as Appendix 8H to Resource Report 8 for non-federal lands. The TMPs detail the measures, standards, and stipulations to be employed in the construction, use, improvement, and maintenance of roads.

Pacific Connector may need to widen or improve portions of some existing access roads to accommodate construction equipment. Pacific Connector has estimated that modifications of 60 miles of existing access roads may be required outside of the existing road bed (e.g., widening corners to allow for the longer turning radius of larger vehicles), resulting in about 22 acres of disturbance.

During use of existing roads for construction, paved surfaces would be kept clear of large accumulations of mud and other debris. Dirt roads may be maintained by grading, or covered by aggregate. Appropriate sediment and erosion control devices would be installed along dirt roads used during wet weather or the rainy season to contain potential impacts to the road surface.

New Temporary Access Roads

Pacific Connector has identified 13 locations where it would be necessary to construct new temporary access roads (TARs), totaling approximately 2.2 miles in length. Construction of the new TARs would impact a total of about 5 acres. Following construction, TARs would be removed and the affected areas restored to pre-construction conditions.

New Permanent Access Roads

Pacific Connector proposes to construct 15 new PARs for access to the pipeline right-of-way and aboveground facilities. These roads, totaling about 0.6 mile, would provide access during construction as well as during operations and maintenance activities. Most of the new PARs would be within Pacific Connector's operational pipeline easement. Construction and operation of the PARs would impact a total of about 2 acres.

Contractor and Pipe Storage Yards

Pacific Connector has identified 34 potential sites for yards and rail ports that may be used during construction to off-load and store pipe and stage contractor equipment in the pipeline project area (see table D-9 in appendix D). These sites are generally not along or immediately adjacent to the proposed pipeline. Criteria for identification of potential contractor and pipe yards were existing industrial sites that have been previously graded and graveled, are near the proposed pipeline, and which have rail service to the yard. All of the sites are privately owned. Pacific Connector would secure the pipe storage yards and rail ports that would be used for construction during the easement

acquisition phase. Use of all of the identified sites would affect an estimated 1,024 acres. Actual use of the potential sites would depend on the availability of these sites at the time of easement negotiations.

Rock Source and Permanent Disposal Sites

Pacific Connector has identified 42 potential rock source/disposal sites, which total approximately 175 acres. These sites are indicated on the Mapping Supplement included as appendix C of this EIS. Of these locations, 26 sites are existing quarries/gravel pits or abandoned quarries/gravel pits. Although some of the existing/abandoned sites appear to have land use types other than quarries/gravel pits, Pacific Connector would not expand these sites beyond the existing or previously disturbed footprints.

Cathodic Protection System

Pacific Connector would protect its pipeline from corrosion over time through a cathodic protection (CP) system. The CP system would consist of a number of sites where below ground rectifier/anode beds would be installed that input a low voltage electrical charge into the pipeline. These rectifier/anode beds would typically be spaced about 15 to 20 miles apart, usually installed within the previously disturbed pipeline construction right-of-way. Each CP site would use electric power from a nearby local utility source. If a deep well would be installed, it would require a truck-mounted drill rig to drill up to 300 feet deep within a 10-inch diameter area. A horizontal anode bed would require the use of a standard backhoe for installation within an area up to 500 feet long by 15 feet wide and 5 feet deep. The CP system would be installed about one year after the pipeline would be constructed, to allow the trench to stabilize and for collection of post-construction data on electro-conductivity soil potentials, which is required before the system can be designed and installed. Pacific Connector would consult with appropriate federal, state, and local regulatory agencies after pipeline construction to determine the level of environmental compliance and agency authorizations necessary for the installation and maintenance of the CP system. On federal lands, any ground-disturbing construction and installation work to install the CP system will require separate authorization and environmental review.

2.3.2.2 Aboveground Facilities

Land required for construction and operation of the proposed aboveground facilities is listed in table 2.3.2-1 above. Operation of the aboveground facilities would require about 35 acres.

2.3.2.3 Pipeline Facilities on Federal Lands

Tables 2.3.2.3-1, 2.3.2.3-2, and 2.3.2.3-3 list land requirements for those portions of the Pacific Connector pipeline and associated facilities that would be within or would affect lands administered by the BLM, Forest Service, and Reclamation, respectively. The land requirements are based on an overall width of 50 feet for the operational and maintenance right-of-way, and within that width, a 30-foot-wide corridor of controlled vegetation subject to inspection.

TABLE 2.3.2.3-1

Land Administered by the BLM Affected by the Pacific Connector Pipeline Project

Facilities	Length or Number of Sites	Land Affected During Construction (acres) a/	Land Affected During Operation (acres)
Pipeline right-of-way	40.3 miles	460	244/147 b/
Hydrostatic test water discharge locations outside the right-of-way	1	<1	0
TEWAs	319	161	0
UCSAs	110	173	0
Rock source and disposal sites	5	7	0
Existing roads sites needing improvements in limited locations	15	2	0
Temporary access roads (TARs)	1	<1	0
Permanent access roads (PARs)	3	<1	<1
MLVs	3	<1	<1
Communication Sites	4	<1	<1
Total	**—**	**803**	**244**

a/ Acreages are rounded to nearest whole acre. If acreage is less than 1 acre, reported as "<1." Columns may not sum correctly due to rounding.
b/ The first value is the area within the operational right-of-way. The second value is the area that would be affected by the 30-foot corridor where brush control would be performed during operation of the pipeline.

TABLE 2.3.2.3-2

Land Administered by the Forest Service Affected by the Pacific Connector Pipeline Project

Facilities	Length or Number of Sites	Land Affected During Construction (acres) a/	Land Affected During Operation (acres)
Pipeline right-of-way	30.6 miles	350	185/111 b/
Hydrostatic discharge locations outside the right-of-way	0	0	0
TEWAs	206	103	0
UCSAs	68	124	0
Rock source and disposal sites	3	9	0
Existing roads needing improvements in limited locations	7	1	0
Temporary access roads (TARs)	0	0	0
Permanent access roads (PARs) c/	0	0	0
MLVs c/	0	0	0
Communication Sites	1	<1	<1
Total	**—**	**587**	**186**

a/ Acreages are rounded to nearest whole acre. If acreage is less than 1 acre, reported as "<1." Columns may not sum correctly due to rounding.
b/ The first value is area within the operational right-of-way. The second value is area that would be affected by the 30-foot corridor where brush control would be performed during operation of the pipeline.
c/ Pacific Connector has agreed to move MLV #9 off of Forest Service land and therefore the associated PAR is no longer needed.

TABLE 2.3.2.3-3

Land Administered by Reclamation Affected by the Pacific Connector Pipeline Project

Facilities	Length or Number of Sites	Land Affected During Construction (acres) a/	Land Affected During Operation (acres)
Pipeline right-of-way	1 mile	4	2/1 b/
Hydrostatic discharge locations outside the right-of-way	0	0	0
TEWAs	0	<1	0
UCSAs	0	0	0
Rock source and disposal sites	0	0	0
Existing roads needing improvements in limited locations	0	0	0
Temporary access roads (TARs)	0	0	0
Permanent access roads (PARs)	0	0	0
MLVs	0	0	0
Communication Sites	0	0	0
Total	**—**	**4**	**2**

a/ Acreages are rounded to nearest whole acre. If acreage is less than 1 acre, reported as "<1." Columns may not sum correctly due to rounding.
b/ The first figure is the area within the operational right-of-way. The second figure is the area that would be affected by the 30-foot corridor where brush control would be performed during operation of the pipeline.

Pacific Connector Pipeline

The Pacific Connector pipeline would cross about 40 miles of BLM lands, 31 miles of NFS lands, and about 1 mile of land administered by Reclamation. However, between MPs 200.5 and 214.2 the pipeline would cross 26 irrigation facilities under Reclamation's jurisdiction. We estimate that the nominal pipeline construction right-of-way of 95 feet would affect about 460 acres of BLM lands, 350 acres of NFS lands, and 4 acres of Reclamation lands, not including Reclamation's Klamath Project irrigation facilities. The 50-foot operational right-of-way would affect about 244 acres of BLM lands, 185 acres of NFS lands, and 2 acres of Reclamation lands.

We identified 319 TEWAs on BLM lands, affecting a total of about 161 acres, and 206 TEWAs on NFS lands, affecting about 103 acres. We counted 110 UCSAs located on BLM lands, affecting about 173 acres, and 68 UCSAs on NFS lands, affecting about 124 acres. No TEWAs or UCSAs would be located on Reclamation lands.

Nineteen of the discharge locations for hydrostatic test water within the pipeline construction right-of-way would be on BLM land, and 7 would be on NFS lands. Of the hydrostatic test water release areas outside of the pipeline construction right-of-way, one location would be on BLM land affecting less than one-tenth of an acre.

All or portions of 138 existing roads that would be used to access the pipeline right-of-way are on BLM lands, 58 access roads are on NFS lands, and 11 roads under Reclamation jurisdiction. Pacific Connector would make modifications to 15 existing roads on BLM lands, affecting about 2 acres, and disturb an acre along 7 existing roads crossing NFS lands. See additional discussion of access roads in section 4.10.

Pacific Connector proposes to construct one new TAR across BLM lands affecting about less than 1 acre. Three new PARs would be constructed across BLM lands, permanently affecting about one-quarter of an acre. There would be no new PARs on Forest Service land.

Five of the rock source or disposal areas outside of identified TEWAs proposed for use by Pacific Connector during pipeline construction are located on BLM land, covering a total of about 7 acres.

There are three rock source or disposal location on NFS lands outside of identified TEWAs, totaling about 9 acres.

Aboveground Facilities

Three MLVs would be on BLM lands, affecting a total of about 0.3 acre. These include MLV #4 and MLV #7 within the Roseburg District, and MLV #12 within the Medford District. Four of the communication tower sites (Blue Ridge, Signal Tree, Flounce Rock, and Stukel Mountain) are on BLM lands, affecting a total of about 0.8 acre. Blue Ridge and Signal Tree are managed by the Roseburg District, Flounce Rock by the Medford District, and Stukel Mountain by the Lakeview District. One communication tower site (Robinson Butte), affecting about a quarter acre, would be within the Rogue River National Forest.

2.4 CONSTRUCTION PROCEDURES

This section describes the general procedures proposed by Jordan Cove and Pacific Connector for construction of the LNG terminal and pipeline facilities. Refer to section 4 of this EIS for more detailed discussions of proposed construction and restoration procedures as well as measures that we are recommending to mitigate environmental impacts.

Under the provisions of the Natural Gas Pipeline Safety Act of 1968, as amended, Jordan Cove would design, construct, operate, and maintain the LNG terminal facilities in accordance with the DOT's Liquefied Natural Gas Facilities: Federal Safety Standards (49 CFR 193). The loading facilities and any appurtenances located between the LNG vessels and the last valve immediately before the LNG storage tank would be required to comply with applicable sections of the Coast Guard regulations in Waterfront Facilities Handling Liquefied Natural Gas (33 CFR 127).

The proposed pipeline facilities would be designed, constructed, operated, and maintained in accordance with DOT regulations in Transportation of Natural and Other Gas by Pipeline: Minimum Federal Safety Standards (49 CFR 192). Among other design standards, these regulations specify pipeline material selection; minimum design requirements; protection from internal, external, and atmospheric corrosion; and qualification procedures for welders and operations personnel. In addition, Pacific Connector would comply with the siting and maintenance requirements of the FERC's regulations at 18 CFR 380.15, and other applicable federal and state regulations.

Jordan Cove would construct the terminal facilities in accordance with its project-specific *Erosion and Sediment Control Plan* (ESCP), its *Upland Erosion Control, Revegetation, and Maintenance Plan* (Jordan Cove's *Plan*) and its *Wetland and Waterbody Construction and Mitigation Procedures* (Jordan Cove's *Procedures*).[13] Jordan Cove adopted the FERC's *Plan* and *Procedures* (May 2013 versions) into its *Plan* and *Procedures* in their entirety; therefore, there are no

[13] Jordan Cove's ESCP was attached as Appendix B.7 in Resource Report 7 and Jordan Cove's *Procedures* attached as Appendix C.2 in Resource Report 2, as part of the Environmental Report included with Jordan Cove's application to the FERC filed May 21, 2013.

differences between Jordan Cove's and FERC's *Plan* and *Procedures*. In addition, Jordan Cove has prepared a Construction Spill Plan and operations SPCCP.[14]

Pacific Connector would construct its facilities in accordance with the FERC's *Plan* and *Procedures* except where they have requested site-specific modifications. The locations for which Pacific Connector is requesting modifications are listed in appendix P of this EIS. Pursuant to the FERC's *Procedures*, Pacific Connector prepared an SPCCP.[15] Also in accordance with the FERC's *Procedures*, Pacific Connector would apply for an individual National Pollutant Discharge Elimination System (NPDES) permit from ODEQ. In conjunction with the NPDES application, Pacific Connector would prepare an *Erosion and Sediment Control Plan* (ESCP). That permit application would be made one year prior to scheduled pipeline construction; therefore, Pacific Connector has not yet provided a draft for our review.

Jordan Cove's proposed LNG terminal and Pacific Connector's proposed pipeline and associated aboveground facilities would be constructed in various phases. A description of the primary construction phases is provided below.

2.4.1 Jordan Cove's LNG Terminal

2.4.1.1 North Point Workforce Housing Complex

Prior to construction of any terminal facilities, Jordan Cove would construct a temporary workers camp in North Bend, at the south side of the McCullough Bridge, referred to as the NPWHC (figure 2.4-1). Jordan Cove would lease this property. The land is currently owned by Al Pierce Lumber Company, zoned for heavy industrial use, and used for staging piles of logs prior to further transport. In the 1960s, dredged materials were deposited to a depth of 25 feet on tidal mud flats at this location, resulting in the creation of the two current adjacent fill islands. In 2014, Jordan Cove obtained conditional use permits and amendments to land use zoning from the City of North Bend for the housing complex, as listed on table 1.4.1-1.

Jordan Cove would make improvements to the site such as a connection to the City of North Bend sanitary sewer and road work, including a bridge to connect one part of the property to another across a small creek. The parking area would be developed at the existing elevation of +22 to +30 feet, while the housing area would be graded from the current range of +28 to +40 feet to a more even +32 to +35 feet.

Development of the NPWHC would occur in two phases. Phase 1 would develop the east side of the property including the roadway, access improvements, utility corridor, and bridge crossing to the west side. Phase 2 would involve the installation of the housing units and support facilities on the west side, as well as parking on the east side.

[14] Filed with the FERC on July 14, 2015.

[15] Pacific Connector attached its SPCCP as Appendix 2B to Resource Report 2 in its June 2013 application to the FERC. Pursuant to FERC's recommendation in the DEIS, Pacific Connector updated its SPCCP and filed the revised version on February 13, 2015.

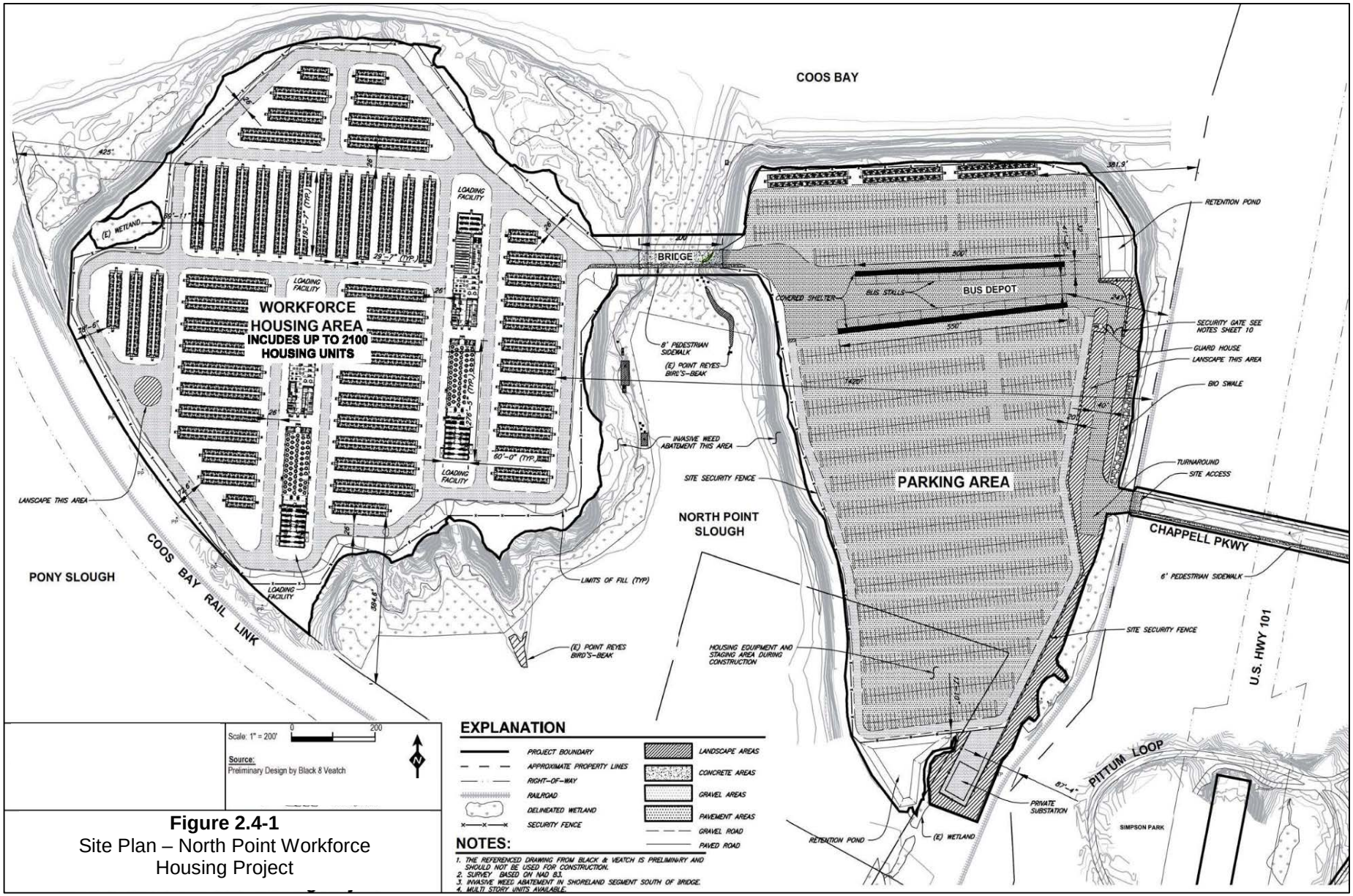


Figure 2.4-1
Site Plan – North Point Workforce Housing Project

The NPWHC would start with approximately 100 living units and the common facilities. Additional living units would be assembled as required to accommodate the growth of the work force. As the workforce declines, housing sections would vacate and the units would be moved out. Housing units and central accommodation facilities would be constructed similar to modular housing using conventional wood framing construction methods. Modules would be pre-manufactured off-site and delivered to the site via truck.

The camp would be designed to accommodate approximately 2,100 workers during peak construction months (300 more than the peak estimate of non-local workers, see section 4.9). Jordan Cove estimates an average construction workforce of almost 800 workers over the life of the construction phase (42 months), with an average of 40 to 50 lodging staff needed on the site during the same time period. All non-local workers would be offered housing at the NPWHC as an included benefit of employment on the Project; however, it would not be a requirement. No families or guests would be allowed in the NPWHC. Security would be provided by a private security force hired by Jordan Cove, further discussed in section 4.9.

Daily functions at the NPWHC will include operating and maintaining a dining hall, recreation facility, laundry facilities, bussing areas, landscaping, and parking areas. Housekeeping for the entire facility is also included in normal operations. On-site utilities for the workforce housing would include a potable water system, firewater and hydrant loop system, wastewater collection and pumping system, and electrical service for power. The parking lot on the east side of the NPWHC would cover about 17 acres, and this area would also include a bus depot. Workers staying at the NPWHC could park their personal vehicles at the lot, but Jordan Cove would provide buses to transport employees to the terminal location.

Stormwater BMPs for the NPWHC would incorporate percolation for treatment and disposal of stormwater. Parking surfaces would be constructed with permeable asphaltic pavement to let stormwater percolate through the surface into a gravel base thereunder and then into the sandy substrate. Surfacing for the bus depot area will receive a more durable but less permeable AC surface treatment. Consequently, the bus depot area would be equipped with a storm system designed to capture runoff and treat the two year storm event before being discharged to the environment. The bus depot storm system would incorporate oil water separators in catch basins and a stormwater detention pond to capture and retain the 2 year rainfall event. Larger storm events would be detained and slowly released via percolation and overflow to the existing north point bioswale/drainage system. With the exception of the bus depot, all other roadways for the NPWHC would be constructed to accommodate local fire vehicles (and food service truck deliveries, etc.) using an open graded durable rock surfacing that infiltrates all incipient rainfall into the sandy substrate. Housing units would utilize “on-site infiltration sumps” installed alongside each housing unit to percolate downspout drainage. Sump installations would follow local standards of practice and will accommodate the 10-year storm event before allowing drainage into retention ponds installed by Jordan Cove on the property. All NPWHC onsite improvements would maintain a 50-foot separation from the estuary with a vegetated buffer for any runoff not captured by onsite stormwater facilities.

Prior to construction, an appropriate stormwater control plan would be developed in coordination with ODEQ to support 401 Water Quality Certification and would have to be in compliance with Clean Water Act Section 401 and 404 and NPDES requirements. An easement from the ODSL would be required for proposed bridge as it crosses state-owned tidal channels. For state-owned

materials on site, a sand and gravel lease/license would be required. The City of North Bend issued a conditional use permit and variance permits for the NPWHC on April 21, 2014.

Upon completion of Project construction, all NPWHC housing facilities and buildings would be dismantled and removed. The underground utilities including fire hydrants would remain in place along with the roads, parking areas and bridge. Any bare ground would be seeded with a plant mix appropriate for the sandy soils typical of the local dune environment.

2.4.1.2 Other Pre-Construction Activities and Temporary Construction Facilities

Jordan Cove would have to establish some temporary construction facilities at the terminal site prior to constructing the terminal facilities. A concrete batch plant would be situated on the south side of the Trans-Pacific Parkway, north of where the LNG storage tanks would be located. Field supervision trailers would be set up south of the location of the LNG storage tanks and north of the proposed marine slip. On land leased temporarily from Roseburg Forest Project, Jordan Cove would erect field construction management offices, subcontractor staff offices, warehouse and storage buildings, craft trailers, and craft breakroom.

Off-Site Temporary Construction Parking Lots

For its employees who would not be residing at the NPWHC, Jordan Cove would establish two temporary off-site parking lots. Workers could park their personal vehicles at those lots and take buses to the terminal. One parking lot would be located at the Mill Casino in the city of Coos Bay (approximately 15 acres). The other parking lot would be at the abandoned Myrtlewood Recreation Vehicle Park on the west side of Highway 101 south of the community of Hauser (approximately 6 acres). After the terminal is constructed, the lots would be restored to their former condition and use.

2.4.1.3 Materials and Equipment Deliveries

Transportation issues are discussed in more detail in section 4.10.1 of this EIS. Below, we summarize how materials and equipment would be transported to the LNG terminal and power plant. Jordan Cove would deliver materials and equipment by truck, rail, or marine transport.

A *Transportation Impact Analysis* produced for Jordan Cove studied the impacts on local roads and other travelers resulting from worker, material, and equipment transit to the terminal.[16] Trucks would likely travel on I-5 to Highway 42 to reach Coos Bay. Roads to the Jordan Cove LNG terminal include U.S. Highway 101 and the Trans-Pacific Parkway. Jordan Cove acknowledged that the intersection of Highway 101 and the Trans-Pacific Parkway would need to be improved to handle additional construction traffic and equipment deliveries by truck. The Trans-Pacific Parkway would be widened for approximately 900 feet to provide a left-turn lane onto northbound Highway 101. Riprap would be extended approximately 40 feet north into the bay from the existing riprap toe of slope, but would not increase the length of riprap shoreline in Coos Bay.

[16] The transportation study was attached as Appendix B.5 of Resource Report 5 in Jordan Cove's May 2013 application to the FERC. The study was revised in a memo filed April 22, 2015.

It is expected that most normal shipments of materials, whether structural steel, piping spools, and smaller equipment would be shipped to the site via truck. The types of equipment that can be transported by truck to the terminal include[17]:

- regeneration gas cooler;
- refrigerant compressor interstage cooler;
- refrigerant condenser;
- BOG compressor interstage cooler;
- amine flash gas compressor interstage cooler;
- amine flash gas compressor discharge cooler;
- amine reboiler;
- LNG loading arms;
- stripper reflux condenser;
- amine cooler;
- lube oil console;
- condensate cooler; and
- BOG compressor discharge cooler.

Jordan Cove originally estimated there would be an average of about 21 material delivery truck trips to and from the terminal per day, with a peak of 40 deliveries per day. However, in a filing on May 1, 2015, Jordan Cove revised its estimate of deliveries by truck. Shipments would number 1,600 in construction year one; 12,900 in year two; 67,900 in year three; and 128,600 in year four.

There is an existing railroad to the terminal, known as the Coos Bay Rail Link (CBRL), that is owned and operated by the Port. Jordan Cove may bring in materials and equipment to the terminal on this railroad. At this time, the only material planned to come to the project site by rail would be sheet pile, which would be delivered by approximately 25 railcars. Rail shipments may be off-loaded at an existing rail spur at the Roseburg Forest Products yard, which runs into the construction laydown area. Minor improvements may occur at this existing facility. No new rail construction is anticipated for the purpose of transporting materials and equipment to the site.

Larger equipment and materials could also be brought to the terminal by marine transport, via ocean-going break bulk cargo ships or coastal barges, using the existing Coos Bay navigation channel. The large drums, towers, dehydration vessels, and the cold boxes are too large to be shipped via road to the site. Pipe rack modules and equipment modules are assumed to come from across the Pacific Ocean by way of break bulk cargo vessels directly to the terminal dock. For items that are manufactured overseas there is the possibility for large ships to off-load at an interim port, such as Stockton or Portland. Barges are likely to be coming from either the north (Portland) or south (San Francisco) to the Jordan Cove terminal. Some of the large equipment that would come in via marine transport includes:

- refrigerant suction drum;
- refrigerant compressor skid;
- BOG compressor;

[17] See Black and Veatch, 7 January 2014, *Equipment and Transportation Study*, filed with the FERC by Jordan Cove on May 1, 2015.

- refrigerant discharge drum;
- refrigerant exchanger;
- amine contactor;
- steam turbines; and
- HRSG sections.

Jordan Cove expects deliveries from about 82 break bulk cargo ships and 18 barges over a two-year period during terminal construction. Barges and cargo vessels would be in at the dock only long enough to unload cargo and depart as soon as practical; it is not anticipated that barges would be moored for extended periods.

2.4.1.4 Industrial Wastewater and Raw Water Lines

Prior to any other construction work on the upland portion of the slip, Jordan Cove would locate, excavate, and remove the existing CBNBWB industrial wastewater pipeline that currently runs through the terminal property across the planned access channel and then generally along the same route proposed for the gas pipeline. A new industrial wastewater pipeline would then be installed running parallel to the Trans-Pacific Parkway (figure 2.1-11). Water discharged through this pipeline would be temporarily halted for about a week during the relocation. Relocation of the industrial wastewater pipeline would affect about 13 acres (see table 2.3.1-1).

Roseburg Forest Products currently uses two 1 million gallon water tanks located on the forested dune on the west side of its property. Jordan Cove proposes to remove those water tanks. Roseburg Forest Products would then tap into the new 12-inch-diameter CBNBWB raw water pipeline on the North Spit for its water supply needs. However, if an analysis proves that the new CBNBWB water line cannot sufficiently supply the needs of Roseburg Forest Products, Jordan Cove may decide to leave the two existing water tanks in place.

2.4.1.5 Access Channel and Slip

Jordan Cove proposes to construct the terminal marine slip and access channel in three phases, to reduce turbidity and impacts on aquatic resources in Coos Bay. The first phase would be the dry excavation of the upper level of the upland portion of the proposed marine berth, above the underground water table. The second phase, known as the "fresh water" phase, would be the dredging of the lower level of the upland portion of the marine slip, below the underground water table, north of a berm retained to separate the upland from the bay. The third phase, known as the "salt water" phase, would include the removal of the berm, and the dredging of the far southern portion of the slip and the entire access channel in the bay.

Phase 1 – Dry Excavation of the Slip

Clearing and Grubbing

The upland portion of the proposed terminal marine slip currently consists of two types of topography: (1) natural forested sand dunes on the east; and (2) a level area on the west, created from materials dredged from Coos Bay and placed on the site by the COE during the early 1970s, covered with low scrubs and grasses. The merchantable timber from the portions of the forested dunes to be removed would be salvage logged and sold, while the unmerchantable timber, timber slash and brush would be pulverized in a tub grinder and stockpiled as mulch. The mulch would be saved for future erosion control of recontoured sand dunes created during the construction

process. Only surfaces that need to be recontoured to accommodate the slip or supporting structures would be grubbed and cleared.

Dry Excavation

The existing ground surface in the flat area is at an elevation of approximately +20 feet NAVD88. The water table across the proposed slip occurs at an elevation of approximately +10 feet NAVD88. All excavated material above an elevation of approximately +10 feet NAVD88 would be removed by conventional earthmoving equipment such as scrapers, bulldozers, and front-end loaders. A berm would be maintained on the south side of the slip area, as a barrier to the bay during this construction phase. Contouring of the slip perimeter above +10 feet NAVD88 would be performed during this step. Side slopes of 3 feet horizontal to 1 foot vertical (3H:1V) would be maintained around the perimeter of the slip to maintain slope stability; except where the LNG berth sheet pile would be installed. The materials stockpiled for future mulching operations would be applied as ground cover to the newly exposed sandy slopes to prevent erosion upon completion of the site contouring of elevations above +10 feet NAVD88.

The excavated material would be transported by trucks to the process area on the north side of the terminal parcel and to the South Dunes Power Plant area, to raise the elevations of these areas. The trucks to the South Dunes Power Plant area would use the proposed haul road across the Roseburg Forest Products tract (see figure 2.1-9).

Phase 2 – Fresh Water Dredging of the Slip

Excavation of Dredge Launch Pond

Several wide-tread excavators would be used to remove material down to elevation 0.0 feet NAVD88, thereby creating a 300-foot-long by 200-foot-wide by 10-foot-deep launch pond. The launch pond would be located near the slip perimeter and road access. The material would be moved to the upland disposal sites by trucks as described above. The launch pond would receive the equipment that would be used to complete the dredging of the upland portion or slip.

Dredging the Upland Portion of the Slip North of the Berm

One or more disassembled hydraulic dredge plants would be transported to the terminal slip area by truck. The hydraulic dredge plants may be in the 18-inch to 24-inch size range, since this is the maximum size range for transportability and the minimum size range capable of dredging to an elevation of -45 feet NAVD88. The plants would be assembled on-site and lifted by crane into the dredge launch pond.

The hydraulic dredges would create an ever increasing deep prism that would, in the end, fully define the dimensions of the slip north of the berm. The slip would be dredged to its final depth of -45 feet NAVD88[18], with side slopes at a ratio of 3H:1V. Dredging of the slip north of the berm could be done any time of the year, with no effects on the bay and its resources.

A total of about 1.5 mcy of material would be dredged from the upland portion of the slip north of the berm (see table 2.1.1.11-1). The hydraulic dredges are capable of generating a slurry of 30 percent solids by weight at a flow rate of 6,000 gpm or greater. All the material dredged below

[18] Jordan Cove's proposed action includes dredging the slip and access channel to -45 feet NAVD88 with a 2-foot overdredge allowance.

the water table north of the berm would be hydraulically transported to the South Dunes Power Plant area through a 20-inch-diameter fused polypropylene (seamless) slurry pipeline. The slurry pipeline would be about 8,650 feet in length, and would be laid on the ground surface, on top of the rip-rap along the southern shore across the Roseburg Forest Products tract.

The dredged material would be deposited at the former Weyerhaeuser linerboard mill site, to raise the elevation for the proposed Jordan Cove facilities at that location, including the gas treatment plant and the South Dunes Power Plant. Once the slurry has settled, decant water would be removed and transported back to the terminal slip via a 20-inch-diameter fused polypropylene (seamless) pipeline. The decant water pipeline would be placed on the ground adjacent to the slurry pipeline. Together installation of the slurry and decant water pipelines would affect about 1 acre.

Driving Piles for Slip Structures

The LNG vessel berth would include four breasting structures and six mooring structures. All of the mooring dolphins for the LNG vessel berth would be constructed "in-the-dry" and as such, piles would be driven prior to or concurrent with the dredging of the slip, while the berm is still in place. Land based mobile cranes with pile driving equipment would be located on the land-side of the LNG vessel berth sheet pile walls.

In addition, the loading platform above the LNG vessel berth would require thirty-two 24-inch-diameter piles. All platform piles would be installed on the land side of the berth, while the marine slip is still isolated from the bay by a berm.

Construction of the tug boat dock and floating boat house would require 98 piles. These would be driven in while the marine slip is still isolated from the bay.

Slope Armoring

The northern slip face would be armored after the slip is dredged but before the berm is removed. The south slip would remain unarmored because the berm would be removed during Phase 3 of slip construction.

Phase 3 – Salt Water Dredging for the Slip and Access Channel

Breaching and Removing the Berm

After the Fresh Water Phase of dredging the upland portion of the slip is completed, the berm separating the northern portion of the slip from the bay would be breached and removed. Dredging to remove the berm may be done from both the northern side of the slip and the bay side. In total, about 500,000 cy of material would be dredged during removal of the berm. That material would be used to rebuild the dune on the eastern side of the LNG vessel berth (area E4 on figure 2.1-2).

Final Contouring and Slope Armoring

Final contouring and armoring of the remaining slip side slopes would be completed after the berm is removed. In-water work would be performed during the ODFW's allowable construction window in Coos Bay between October 1 and February 15. The marine slip would be protected from wave action and wind erosion by the installation of stone or articulated block reinforcement (permanent riprap). The north and east sides of the slip would be protected from the toe trench to above the waterline. Portions of the slip not expected to be subject to water or wind erosion, above about +25 feet NAVD88, would be protected by other means, including concrete cellular

mattresses, grout injected geotextile fabric mattresses, and geotextile reinforced vegetative plantings.

Dredging the Access Channel

The access channel between the Jordan Cove LNG terminal proposed marine slip and the existing Coos Bay navigation channel would be dredged either before or after the berm is removed. Work in the bay south of the slip would be done during the ODFW's allowable construction window between October 1 and February 15. It is estimated that dredging of the access channel would remove about 1.3 mcy of material, which would be conveyed through the slurry pipeline to the South Dunes Power Plant area. Site investigation suggests that certain portions of the near-shore access channel may require use of a clamshell dredging operation due to buried woody debris, which precludes the use of the preferred hydraulic dredge operation. Potential effects related to both forms of dredging operation are assessed in sections 4.4 and 4.6.

Restoration

Following the dredging activities, the slurry and decant water pipelines would be dismantled and removed, and all disturbed areas along the right-of-way for those lines would be restored to their previous condition and use. In addition, part of the dune on the east side of the marine slip, west of the Roseburg Forest Products tract, would be reconstructed.

2.4.1.6 Barge Berth

Jordan Cove would install a barge berth on 3 acres at the southeast corner of the marine slip. The barge berth at the terminal could accommodate large break bulk ships (with self- loading and unloading cranes) as well as barges to off-load equipment at the site. The barge berth would be designed for roll-on and roll-off barge capabilities.[19]

2.4.1.7 LNG Vessel Berth and Tugboat Berth

On the east side of the marine slip, Jordan Cove would install a berth that can dock a single LNG vessel at a time. The open cell sheet pile structure is designed to uniformly deform into a scalloped face as the land side static loads are applied. The sheet piles, including the tie-back walls, are driven in first, then materials would be excavated from the water side. When the sheets are driven in, the wall would initially be straight. After the removal of the water side materials, the shore side load would stretch the piled walls, locking them in place.

On the north side of the marine slip, Jordan Cove would construct a berth that could accommodate three tugboats and three escort boats. The berth would be supported by 98 piles, driven while the slip is being excavated and still separated from the bay by the earthen berm, as described in section 2.4.1.5 above. Associated with the tug berth would be two boat houses.[20]

2.4.1.8 LNG Loading Platform and Facilities

The LNG vessel loading facilities would be constructed once the eastern side of the slip is formed. All of the loading facilities would be on the shore side of the slip, with no facilities located in the

[19] A drawing of a cargo ship at the barge berth was filed on May 1, 2015, as part of the Black and Veatch *Equipment and Transportation Study* from January 2014.

[20] The tug berth plan view and cross section drawings were filed by Jordan Cove on August 29, 2013.

water of the slip. The platform with the loading arms (inclusive of the loading and vapor return arms) would be constructed on a concrete pad located at the edge of the slip. The loading arm platform would be constructed on columns raised from the concrete pad and accessed through stairways to the ground surface. The foundation of the pad would contain a number of piles that would be tied into the concrete pad to provide a stable foundation for the breasting dolphins and the loading arm platform. Separate piles would be driven for the breasting dolphin and the loading arm platform.

The LNG vessel loading facilities would be constructed using land-based equipment to install the required structural elements for the loading platform and mooring dolphin. Actual installation of berth piping and equipment, and hookup and commissioning of the loading system and utilities would follow.

2.4.1.9 LNG Transfer Pipeline

The LNG transfer pipeline would be a 36-inch-diameter stainless steel aboveground pipeline between the LNG storage tanks and the vessel loading platform. It would be insulated, and supported on steel sleeper-style structures. Beneath the pipeline would be a 3-foot-wide reinforced concrete trench with metal grating cover.

2.4.1.10 LNG Storage, Liquefaction, and Support Facilities

Site Preparation

Construction site preparation would require clearing, filling, and grading of the site to an approximate elevation of +30 feet NAVD88 for the base of the LNG storage tank area and approximately +46 feet NAVD88 for the process areas. Temporary ditches, sediment fences, and silt traps would be installed as necessary. Individual excavations would then be made for equipment foundations. Following completion of foundations, the site would be brought up to final grade. Final grading and landscaping would consist of gravel surfaced areas, asphalt surfaced areas, concrete paved surfaces, grass areas, and construction of the storm surge barrier.

Grading the terminal process areas would entail approximately 2.5 million cy of cut and fill. Any material remaining from that work, including final grading and landscaping, would be used to raise the South Dunes Power Plant site and raise the access/utility corridor. Approximately 3.5 million cy of material would be available for the South Dunes Power Plant and access/utility corridor to raise the existing elevation to approximately +46 NAVD88. The material available to raise the elevation of these areas would come from the excavation and dredging of the slip and access channel.

LNG Storage Tank Construction

Construction of the LNG storage tanks would be the most time-consuming element in the development of the LNG terminal. General steps taken during construction of each LNG storage tank would include installation of the foundations and tank bottom slab, construction of the outer concrete container wall, insertion of the bottom carbon steel vapor liner, construction of the steel dome roof and suspended deck, installation of the 9 percent nickel steel inner tank, installation of the internal tank accessories (pump columns, instrumentation, and piping), installation of external tank accessories, installation of insulation, and installation of LNG pumps. Following a successful inner container hydrotest (see below), the tank would be washed down and cleaned. After installation of the LNG pumps, the tank would be closed and purged with nitrogen to a positive

gauge pressure. At this point in the construction process, the tank would be ready for cooldown with LNG.

Support Facilities

Construction of foundations for buildings and installation of major mechanical equipment would occur once LNG storage tank construction is underway. Large equipment items would be set on their foundations upon delivery. After the pipe racks are completed, work would commence on the installation of the process and utility piping. The installation of mechanical equipment would be followed by electrical and instrumentation installation. Once the piping is completed and tested, piping insulation would be installed. As the construction of the process portion of the LNG terminal progresses, work would commence on the pre-commissioning activities, so that these activities would be completed concurrently with the completion of the LNG storage tanks and be ready for nitrogen purging.

2.4.1.11 South Dunes Power Plant

The location of the South Dunes Power Plant was formerly the Weyerhaeuser mill, which has been removed. Outside of some foundations and asphalt pavement, the only major aboveground structures still extant at this location includes a water tank and the PacifiCorp electric substation. The substation would be relocated. The elevation of this site would be raised to a final grade of about +46 feet, using material excavated and dredged from the Jordan Cove marine slip and access channel. Spread footings and slab on grade foundations would be used to support plant buildings and equipment.

2.4.1.12 Testing

Jordan Cove would conduct testing of the LNG storage tanks and other terminal facilities in accordance with applicable codes and requirements. The storage tanks would be tested in accordance with API 620, while piping would be tested in accordance with the ASME B31.3. Some of the tests to be carried out are described below.

Testing of the LNG Storage Tanks

The inner container of each LNG storage tank would be hydraulically tested by filling the tank with water, and then pressurizing the tank. Jordan Cove would obtain the water for the hydrostatic test of the storage tanks from three sources: the firewater pond, raw water line, and potable water line. Water withdrawn from the CBNBWB lines would be limited to 1,000 gpm to reduce stress on the lines. It would take approximately 10 days to fill one tank with the 28 million gallons necessary for testing. No biocides or chemicals would be added to the test water; however, water from the CBNBWB system contains residual chlorine.

To minimize water usage, the two tanks would be hydrotested with the same water by transferring the water at the conclusion of the hydrotesting of one tank to the other tank. Due to the inability to transfer residual water from the heel of the first tank, about 0.25 million gallons of additional water would be added during the test of the second tank. Therefore, for both tanks combined, about 28.25 million gallons would be used during hydrostatic testing. Water would be introduced into the inner tank container through a manhole in the outer container's concrete roof. The duration that the water remains in the tanks would be strictly controlled; therefore, it is not expected that any contamination or discoloration would be present on discharge, even after being passed through

both LNG storage tanks. However, the water would be tested to confirm composition prior to the water being transferred between each individual tank and before the water is discharged from the last tank. Jordan Cove estimated the total duration of the hydrotest of the first tank from start of filling to emptying would be approximately 34 days, with the second tank taking approximately 21 days. The CBNBWB informed Jordan Cove that the existing 12-inch-diameter main raw water line has the necessary pressure and capacity to supply 20 million gallons over 2 weeks during a low demand period (September to May), and the same quantity could be obtained during 3 weeks during the high demand period (May to September).

On completion of hydrotesting the final tank, the water would be pumped from the tank to the firewater pond. The rate of discharge is expected to be approximately 1.8 mg/d for the bulk pumping operation with substantially lower rates being achieved when removing the final amounts of water from the tank bottom. From the firewater pond, the hydrotest water would be discharged into the industrial wastewater pipeline via an overflow, which connects to a previously existing, permitted ocean discharge. Water would be sampled and tested for suitability prior to discharge. If treatment is found to be required, treatment procedures would be developed prior to discharge. Jordan Cove would retain about 5 million gallons in the firewater pond to support operation of the terminal facilities. Therefore, about 23.25 million gallons would be discharged through the industrial wastewater pipeline after the hydrostatic testing of the two LNG storage tanks.

Jordan Cove would use a pneumatic test on the outer container for each LNG storage tank. During that test, the outer container would be held at 1.25 times design pressure for one hour.

Testing of Pipework

Piping within the LNG terminal facility would be tested using hydrostatic or pneumatic methods. In general, cryogenic piping (piping that would transfer LNG) would be pneumatically tested with dry air or nitrogen at 1.1 times design pressure. Non-cryogenic piping (e.g., piping that would transfer natural gas) would be hydrotested using clean water at 1.5 times design pressure.

2.4.2 Pacific Connector Pipeline and Associated Aboveground Facilities

Construction of the proposed pipeline would primarily involve standard cross-country pipeline construction techniques as described in section 2.4.2.1. Special construction techniques would also be used when constructing the pipelines across wetlands; waterbodies; roads, railroads, and other utilities; agricultural and residential areas; and areas of rugged terrain. These special construction techniques are described in section 2.4.2.2. Construction of the aboveground facilities is discussed in section 2.4.2.3.

2.4.2.1 General Pipeline Construction Techniques

Figure 2.4-2 shows the typical steps of cross-country pipeline construction. Standard pipeline construction proceeds in the manner of an outdoor assembly line composed of specific activities that make up the linear construction sequence. These operations collectively include survey and staking of the right-of-way, clearing and grading, trenching, pipe stringing and bending, welding and coating pipe, lowering-in pipe and backfilling, hydrostatic testing, right-of-way cleanup, and restoration.

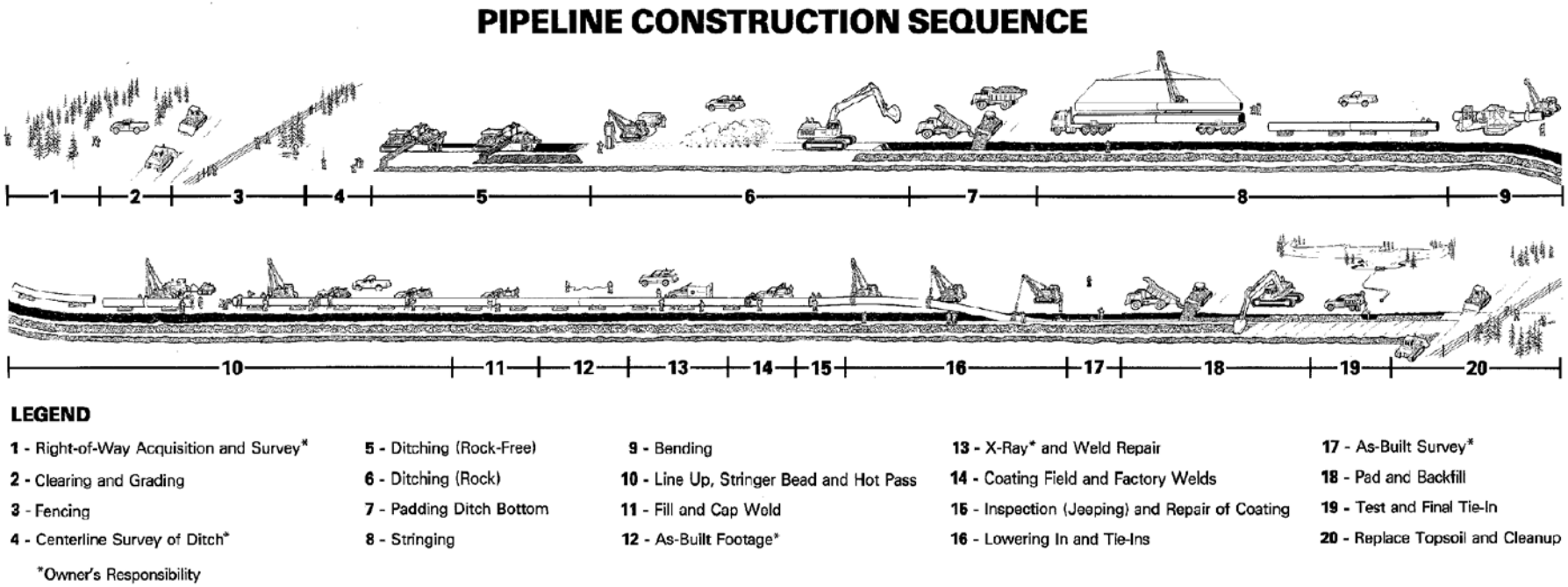


Figure 2.4-2

Typical Pipeline Construction Sequence

Pacific Connector has determined that to efficiently construct the pipeline, construction would be divided into at least five separate construction spreads. Each spread would consist of all construction activities necessary to construct the pipeline in the area designated for that spread.

Preliminary locations of construction spreads identified by Pacific Connector include the following:

- Spread 1 – MPs 1.5R-49.7;
- Spread 2 – MPs 49.7-94.7;
- Spread 3 – MPs 94.7-132.1;
- Spread 4 – MPs 132.1-188.0; and
- Spread 5 – MPs 188.0-228.1.

The subbasins and fifth-field watersheds directly crossed by the proposed pipeline centerline, and the associated construction spread, are listed in table 2.4.2.1-1. Five additional watersheds would be impacted by the pipeyard storage areas; however, these watersheds would not be crossed by the project's centerline. The watersheds include the Deer Creek–South Umpqua River, Gold Hill-Rogue River, Lower Cow Creek, Lower North Umpqua River, and Middle Cow Creek watersheds. Impacts to all watersheds affected by the pipeline project are assessed in section 4.4 of this EIS.

TABLE 2.4.2.1-1

Subbasins and Fifth-Field Watershed Crossed by the Pacific Connector Pipeline Project

	Fifth Field Watershed			
Subbasin	**Name**	**HUC**	**Miles Crossed**	**Construction Spread**
Coos	Coos Bay-Frontal Pacific Ocean	1710030403	20.6	1
Coquille	Coquille (Middle Main) River	1710030505	2.0	1
	North Fork Coquille River	1710030504	8.3	1
	East Fork Coquille River	1710030503	9.7	1
	Middle Fork Coquille River	1710030501	15.8	1,2
South Umpqua	Olalla Creek-Lookingglass Creek	1710030212	8.8	2
	Clark Branch–South Umpqua River	1710030211	13.5	2
	Myrtle Creek	1710030210	8.7	2
	Days Creek–South Umpqua River	1710030205	19.8	2,3
	Elk Creek	1710030204	3.3	3
	Upper Cow Creek	1710030206	5.3	3
Upper Rogue	Trail Creek	1710030706	10.7	3
	Shady Cove–Rogue River	1710030707	8.1	3
	Big Butte Creek	1710030704	5.1	3,4
	Little Butte Creek	1710030708	32.9	4
Upper Klamath	Spencer Creek	1801020601	15.1	4,5
	John C. Boyle Reservoir–Klamath River	1801020602 a/	5.4	5
Lost River	Lake Ewauna–Upper Klamath River	1801020412	16.1	5
	Mills Creek–Lost River	1801020409	22.6	5
Total b/			**231.8**	

Note: Miles are rounded to the nearest tenth of a mile. Column may not sum correctly due to rounding.
a/ There are no waterbodies crossed in the Klamath River-John C. Boyle Reservoir Fifth Field Watershed.
b/ Five additional watersheds would be affected by the pipeline project (e.g., access road), but not directly crossed by the centerline: Deer Creek–South Umpqua River, Gold Hill–Rogue River, Lower Cow Creek, Lower North Umpqua River, and Middle Cow Creek watersheds.

Surveying and Staking

Prior to the start of construction, the exterior limits of the approved construction right-of-way and boundaries of TEWAs would be civil surveyed and clearly staked and signed. Civil survey is generally performed on foot or using all-terrain vehicles (ATV) or off-highway vehicles (OHV) from existing access points to the pipeline right-of-way. All work would be performed by professional land surveyors licensed in the State of Oregon and which hold a valid and current Certified Federal Surveyor certificate.

The survey stakes would be maintained throughout construction, and monitored by Pacific Connector's environmental inspectors (EI). Any pre-existing property line or survey monuments that occur within the construction right-of-way would be protected where possible, and if damage occurs during construction, these monuments would be replaced according to state and federal standards. Civil surveys on federal lands would adhere to guidelines established by the BLM, Forest Service, and Reclamation that were provided to Pacific Connector during the pre-filing review period. Pacific Connector produced a *Right-of-Way Marking Plan*, included as Appendix T of its POD.

Fences would not be used to mark the right-of-way; however, some fencing may be used as requested or approved by landowners to reduce damage to property and resources (e.g., to prevent unauthorized access by OHVs). The limits of the right-of-way and TEWAs would be marked by wooden stakes and flagging. Approved access roads would be signed. Also signed would be sensitive environmental areas that would be off-limits to construction crews.

Access to the Construction Right-of-Way

Roads that would be used for access to the right-of-way during construction are more fully discussed in section 4.10 (Transportation) of this EIS. There are three types of roads that would be utilized for this Project: 1) existing roads; 2) new TARs; and 3) new PARs.

Equipment involved in pipeline construction would be moved onto the right-of-way using approved access roads, and would then generally proceed down the right-of-way performing their job tasks. Part of the construction right-of-way would include a travel lane for construction equipment and related Project vehicles, accommodated within the standard 95-foot-wide construction right-of-way. Pacific Connector would place mats over wetlands and bridges over waterbodies along the travel lane, in accordance with the FERC's *Plan* and *Procedures*, including modifications, and install temporary erosion control devices in accordance with its ERCP. After the pipeline is installed, the right-of-way would be restored and revegetated, including the removal of the travel lane and TARs.

Typical pipeline construction equipment that would travel down the right-of-way include pipe trucks, flat-bed trucks, mowers, bulldozers, graders, front-end loaders, backhoes, trenching machines, bending machines, side-booms, welding machines, fork lifts, rock hammer machines, padding machines, winch trucks, water trucks, dump trucks, pick-up trucks, and other miscellaneous equipment. A list of typical pipeline construction equipment and noise levels can be found in table 4.12.2.4-5 in section 4.12, Air Quality and Noise. Pacific Connector has produced a TMP for federal lands as Appendix Y of its POD, and included a TMP for non-federal lands as Appendix 8H in Resource Report 8 of its June 2013 application to the FERC.

Clearing and Grading

The construction right-of-way and TEWAs would be cleared of brush and trees. Pacific Connector has produced a *Right-of-Way Clearing Plan for Federal Lands* as Appendix T of its POD. The general clearing procedures outlined in that plan would also apply to non-federal lands. During clearing operations, existing fences crossed by the pipeline route would be cut and braced, and temporary gates installed to control livestock and limit public access to the right-of-way. Temporary erosion control devices would be installed at the end of clearing activities. Details about erosion control devices can be found in Pacific Connector's project-specific ECRP, in the FERC's *Plan*, and the POD. Erosion control is more fully discussed in section 4.3.1.3 of this EIS.

Hayfields, pastures, and grassy areas would not be cleared except in areas directly over the trench or where grading would be required to create a level working surface. Tall shrubs, such as sagebrush, would be mowed or scalped off with a motor-grader or a bulldozer. Cleared grasses and brush would be stockpiled along the edge of the right-of-way or within TEWAs or UCSAs, then mulched and spread back over disturbed areas during final cleanup and restoration.

In forested areas, timber would be cut and cleared from the right-of-way and TEWAs using standard logging techniques, in accordance with landowner requirements including time-of-year restrictions. Through consultation with FWS, BLM, and the Forest Service, as well as timber clearing and construction contractors, Pacific Connector has developed seasonal timing restrictions for timber felling, logging, clearing and construction activities to minimize and avoid potential effects to the various bird species in the Project area. These seasonal timing restrictions are further discussed in section 4.6 (Wildlife and Aquatic Resources). Merchantable timber would be removed and/or sold according to landowner stipulations. Pacific Connector indicated that specific logging methods may not be fully determined until a contractor has been selected for construction of its pipeline. In general, ground-based skidding and cable (where feasible) logging methods would likely be the standard method; however, in some isolated rugged topographic areas with poor access, helicopter logging may be used. Impacts on timber are more fully discussed in section 4.5.2 of this EIS.

Following clearing, the right-of-way would be graded where necessary to create a reasonably level working surface to allow safe passage of construction equipment and materials. During grading activities, topsoils would be separated from subsoils, and each would be stored in segregated piles within the construction right-of-way and TEWAs. The FERC's *Plan* requires topsoil segregation in residential areas, crop lands, pastures and hayfields, and in other areas as required by the landowner. The topsoil should be stripped either across the entire construction right-of-way, or over the trench line and soil storage areas. In wetlands, the FERC's *Procedures* require that the top foot of soil over the trench line be salvaged, except in areas of standing water or saturated soils. Where topsoil would be segregated on non-federal lands, Pacific Connector has requested 10 additional feet of TEWA in addition to its nominal 95-foot-wide construction right-of-way in uplands.

The BLM and Forest Service have stipulated that topsoil should be salvaged where the pipeline route would cross BLM and NFS lands. However, Pacific Connector has requested a modification from the FERC staff's *Plan* and does not want to segregate topsoil on BLM and NFS lands to avoid additional TEWAs in LSRs. This issue is further discussed under section 4.3.2.1.

Trenching

A rotary trenching machine, rock trencher, track-mounted backhoe, or similar equipment would be used to excavate a trench for the pipeline. Spoil excavated during trenching would be temporarily stockpiled to one side of the right-of-way adjacent to the trench.

The depth of the trench would vary according to site-specific conditions. According to the DOT requirements in 49 CFR 192.327, the minimum depth of cover for a buried natural gas transportation pipeline must be:

- 30 inches in normal soil and 18 inches in consolidated (solid) rock for Class 1 locations; and
- 36 inches in normal soil and 24 inches in consolidated rock for Class 2, 3, and 4 locations, and under drainage ditches, public roads, and railroad crossings.

Pacific Connector intends to exceed DOT requirements where possible, and bury its pipeline up to 36 inches deep in Class 1 areas with normal soils and 24 inches deep in Class 1 areas with consolidated rock. The trench may be deeper at stream crossings with scour concerns, or areas with geological hazards. Pacific Connector committed to burying the pipeline below the estimated 100-year scour depth or into competent bedrock, whichever is shallower. Pacific Connector's geological consultant estimated depth to bedrock at the crossing of Middle (Park) Creek to be about 7 feet, and about 9 feet at the eastern crossing of the South Umpqua River. At South Fork Elk Creek, Olalla Creek, and North Myrtle Creek, 100-year scour depths were estimated between 6 and 11 feet. Pacific Connector committed to complying with Reclamation's Engineering and O&M Guidelines for Crossings – Bureau of Reclamation Water Conveyance Facilities (Canals, Pipelines, and Similar Facilities) unless otherwise described in the *Klamath Project Facilities Crossing Plan* (Appendix O of its POD). All crossings would require Professional Engineer stamped design drawings approved by Reclamation prior to installation.

In areas where bedrock is found close to the surface within the proposed trench depth, Pacific Connector would first attempt to dig the trench with specialized equipment, such as rock saws, or ripping using hydraulic hammers. However, if these methods are ineffective, blasting may be necessary to achieve the required trench depth. Pacific Connector prepared a *Geologic Hazards and Mineral Resources Report*, filed as part of its application to the FERC, which classifies blasting potential along the route based on existing soil and bedrock data. Blasting potential was classified as high for about 100 miles of the proposed pipeline route. All blasting would be done by licensed contractors under the terms of applicable regulatory requirements. Pacific Connector produced a *Blasting Plan* as Appendix C of its POD. Blasting is further discussed in section 4.2.2 of this EIS.

Stringing, Bending, and Welding

After trenching, pipe sections would be trucked to the right-of-way, and strung along the route, using side-booms to unload the joints from the flatbed trucks. A hydraulic bending machine would bend some pipe joints to fit the contour of the trench bottom (where there are changes in the natural ground contours or where the pipeline changes direction). In other situations, pipe sections would be factory bent, or special pre-fabricated pieces would be used.

The pipe joints would be welded together by a separate trained crew of welders, and placed on wooden skids adjacent to the trench. All welds would be visually inspected, nondestructively tested (using radiographic or equivalent methods), and repaired, if necessary. Line pipe, normally mill-coated prior to stringing, would require field applied coating at the welded joints prior to final inspection. The entire pipeline coating would be inspected and tested to locate and repair any flaws or voids.

Lowering-in and Backfilling

After welding and coating are completed, the pipe would be lowered into the trench by side-boom tractors and excavators. Before lowering the pipe, the trench would be inspected to ensure that it is free of rocks and other debris that could damage the pipe or the coating. In addition, the pipe and trench would be inspected to ensure that the configurations of the pipe and trench configurations are compatible. Padding, sometimes sandbags, would be placed at the bottom of the trench, with the pipe put on top of the padding.

To prevent water from the trench from entering wetlands or waterbodies, Pacific Connector would install permanent trench plugs, consisting of sandbags, foam, or bentonite, at the base of slopes adjacent to wetlands and waterbodies, in accordance with its ECRP, and consistent with the requirements of the FERC's *Plan*. In accordance with the FERC's *Procedures*, the trench would be dewatered in a manner that does not cause erosion and does not allow silt-laden water to flow into any adjacent wetland or waterbody.

Bladed equipment or a backfilling machine would be used to backfill the trench. No foreign substance, including skids, welding rods, containers, brush, trees, or refuse of any kind, would be permitted in the backfill. Segregated topsoil, where applicable, would be replaced after backfilling the trench with subsoil. Following backfilling, a small crown of material would be left to account for any future soil settling that might occur.

Hydrostatic Testing

After backfilling, the pipeline would be hydrostatically tested in accordance with DOT regulations to ensure that is capable of operating at the MAOP. During the test, sections of the pipeline would be filled with water and pressurized to 550 psig. Should a leak or break occur during testing, the line would be repaired and retested until the specifications are achieved. Pacific Connector produced a *Hydrostatic Testing Plan* as Appendix M of its POD.

The pipeline would be tested in approximately 75 sections, each with varying lengths and water volume requirements. Approximately 62 million gallons of water would be required to test the pipeline. Water for hydrostatic testing would be obtained from commercial or municipal sources or from surface water right owners. If water for hydrostatic testing is acquired from surface water sources, Pacific Connector would obtain all necessary appropriations and withdrawal permits prior to construction, including permits through the Oregon Water Resources Department (OWRD). As part of this process, OWRD would have the applications reviewed by ODEQ and ODFW to determine if there are concerns about the impact water withdrawals may have on water quality, and fish and wildlife and their habitats. Pacific Connector would negotiate water appropriations with private owners in the year prior to construction.

Pumps used to withdraw surface water would be screened according to ODFW and NMFS standards to prevent entrainment of aquatic species. In addition, Pacific Connector included BMPs in its *Hydrostatic Testing Plan* to avoid the potential spread of aquatic invasive species and pathogens of concern. BMPs were developed in consultation with the BLM, Forest Service, Reclamation, and the Center for Lakes and Reservoirs and Aquatic Bioinvasion Research and Policy Institute.

Permission to discharge the hydrostatic test water would be applied for concurrently with the request for coverage under the ODEQ General Stormwater Discharge Permit and permitted through a separate letter of approval. Hydrostatic test water would be discharged in upland settings, into erosion control devises, to minimize the potential for scour, erosion, and sedimentation into nearby wetlands and waterbodies, in accordance with Pacific Connector's ECRP and the POD. Water discharged during testing would not be used to fill existing or proposed fire suppression sources (e.g., heli-ponds). Straw bale barriers and silt fence would typically be used to retain sediment and reduce velocity. Additional discussion of hydrostatic testing discharges can be found in section 4.4.2 of this EIS.

Dust Control

Fugitive dust may be created by pipeline construction activities. To control dust, Pacific Connector would use water trucks to spray the right-of-way. Water for dust control purposes would be obtained from commercial or municipal sources, and all appropriate approvals and/or permits would need to be obtained prior to withdrawal. Pacific Connector produced an *Air, Noise, and Fugitive Dust Control Plan* as Appendix B to its POD. The amount and sources of water for dust control are discussed in section 4.4.2 of this EIS. Section 4.12.1.2 discusses impacts and mitigation measures to reduce fugitive dust.

Cleanup and Permanent Erosion Control Devices

After the pipeline is installed in the trench and backfilled, Pacific Connector would complete final grading, returning the right-of-way to its previous contours. Drain tiles crossed by the pipeline would be checked, and if damaged, they would be repaired before backfilling. During final cleanup and initial restoration, fences, gates, drainage ditches, culverts, and other structures that may have been temporarily removed or damaged during construction would be permanently repaired, returned to their pre-construction condition, or replaced. All construction debris, including excess rock, would be removed from the right-of-way and placed in authorized disposal locations. On federal lands, site-specific crossing restoration plans would be implemented for perennial stream crossings (e.g., Middle Creek, East Fork Cow Creek). Streambanks would be stabilized, and permanent erosion control devices would be installed. The right-of-way would be mulched, seeded, and revegetated in accordance with Pacific Connector's ECRP.

Pacific Connector would install permanent erosion control devices consistent with the requirements of Section V.B. of FERC's *Plan* and as described in its ECRP. The permanent erosion control measures include trench breakers, slope breakers, and revegetation to stabilize disturbed areas. Pacific Connector would consult with the BLM, Forest Service, and Reclamation regarding the installation of permanent erosion control structures on federal lands, and with the NRCS regarding such structures on non-federal lands. The permanent erosion control measures developed by Pacific Connector in its ECRP are generalized to be consistent with different agency

requirements based on slope and soil types crossed by the proposed pipeline. Table 2.4.2.1-2 lists specifics from Pacific Connector's ECRP for the installation of slope breakers.

TABLE 2.4.2.1-2

Permanent Slope Breaker Spacing From Pacific Connector's ECRP a/

Slope	Highly Erosive Granitic Soils b/	Soils With Moderate or Low Potential for Erosion
0 to 5 percent	None required	None required
5 to 15 percent	100 feet	200 to 300 feet
15 to 30 percent	50 to 75 feet	75 to 100 feet
Greater than 30 percent	50 feet	50 feet

a/ Actual spacing would be determined at the time of installation based on site-specific topographic conditions on the right-of-way to ensure proper slope breaker construction and proper drainage to stable off-site areas. On the Umpqua National Forest between about MPs 109 and 110, where the alignment would cross the historic Thomason cinnabar claim group, waterbars would be installed at 50-foot intervals as recommended by the Forest Service.

b/ Granitic formations would be crossed by the pipeline between: MPs 79.1 to 80.5; MPs 81.6 to 82.2; MPs 87 to 88.8; MPs 97 to 101.2; MPs 103 to 105.4; and MPs 114.8 to 115.

Revegetation

All areas disturbed by construction, including the construction right-of-way, TEWAs, UCSAs, and contractor yards as necessary, would be restored and revegetated in accordance with Pacific Connector's ECRP. The right-of-way would be regraded and topographic contours and drainage patterns returned to as close as preconstruction conditions as possible. Erosion control fabric would be used on streambanks.

Segregated topsoil would be spread over the right-of-way where it was salvaged. A seedbed would be established to a depth of up to four inches where necessary. In most areas, typical regrading and contouring would create a suitable rough, yet firm, seedbed, conducive to capturing seeds when broadcast and retaining soil moisture. Consistent with the FERC's *Plan*, if final grading occurs more than 20 days after pipe installation and backfilling, Pacific Connector would apply mulch on all disturbed areas prior to seeding.

Based on Oregon State University Extension Service recommendations for fertilization rates for nitrogen fertilizer on new pasture seedlings, Pacific Connector intends to use a standard fertilization rate of 200 pounds per acre bulk triple-16 fertilizer on disturbed areas to be seeded. The NRCS did not recommend the addition of lime or other soil pH modifiers. Fertilizer would not be used in wetlands, unless required by the land-managing agencies, and would not be applied within at least 100 feet of streams. The fertilizer would be stored outside of riparian reserves and away from streams, and would not be applied during heavy rains or high wind conditions. It could be either broadcast, or incorporated in the slurry for hydroseeding.

It is expected that seeding would be timed to begin in August and could extend into the winter months at lower elevations. Disturbed areas would be seeded within six working days of final grading, weather and soil conditions permitting. Seeding may be done by broadcast methods, drilling, or hydroseeding. Broadcast seeding, using a mechanical broadcaster seeder, is the preferred method of seeding on steep slopes. After broadcast, the seedbed would be lightly dragged by chains or other appropriate harrows to cover the seeds thinly with soil. Hydroseeding would be done in accessible upland areas. Hydroseeding equipment would include tanks, pumps, nozzles, and other devises for mixing the seed hydraulically with wood fiber mulch and tackifier.

A built-in agitator would keep the seed, mulch, tackifier, and water mixed together homogeneously until pumped from the tank. A drill seeder pulled by a plow may be used as an alternative to broadcast seeding in gently sloping areas.

Seed mixtures were determined in consultations with land-managing agencies and the NRCS. The seed mixtures were listed in Pacific Connector's ECRP, and are further discussed in section 4.5.1 of this EIS. There are special seed mixes for areas that contain federally-listed threatened or endangered plant species, including Kincaid's lupine, Applegate's milk-vetch, Gentner's fritillary, and Cox's mariposa lily; those seed mixes were listed in Pacific Connector's *Federally-Listed Plant Conservation Plan* (Appendix J of the POD). Seeding rates are based on Pure Live Seed.[21] The mixture would be free of noxious weed seeds. During right-of-way easement negotiations, private landowners may select their own seed mixtures other than those proposed for elsewhere along the pipeline route. The seed mixtures on BLM land were developed based on BLM Instruction Memo-2001-014, which specifies the use of native species, if possible. Pacific Connector's ECRP stated that native seeds would be collected during a two-year period prior to construction, and local vendors have indicated they could supply the necessary seeds during that period. The POD has additional requirements for revegetation on federal lands.

Mulch would be applied on slopes were necessary to stabilize the right-of-way after seeding. Mulch would consist of native wood, straw, or hydromulch, and certified weed-free straw. It is anticipated that native wood mulch and manufactured wood fiber mulch would be the major sources of mulch applied. In non-forested areas, straw mulch would be spread at 2 tons/acre, except on slopes within 100 feet of waterbodies and wetlands where application rates would be increased to 3 tons/acre. During hydroseeding, manufactured wood fiber mulch would be applied at 2,000 pounds per acre. On slopes greater than 2.5 to 1 (i.e., 40 percent grade), Pacific Connector would use a bonded fiber matrix for mulch. In forested areas, native wood mulch would consist of slash, brush, chips, and non-merchantable timber cleared from the right-of-way and stored in TEWAs and UCSAs. The BLM and Forest Service have established ground cover standards and fuel loading requirements that are further discussed in section 4.5.1 of this EIS.

In forested lands, Pacific Connector would replant vegetation according to state and federal reforestation requirements. Reforestation efforts would occur in any given area the first winter/spring (between December and April) after the pipeline is installed in that area. Trees would be replanted across the construction right-of-way up to 15 feet from either side of the pipeline centerline. In riparian areas, shrubs and trees would be replanted across the right-of-way for a width of 25 feet from the waterbody bank. Within Riparian Reserves, Pacific Connector would replant shrubs and trees to within 100 feet of the ordinary high water mark (OHWM). A list of species to be replanted was included in Pacific Connector's ECRP, and revegetation is further discussed in section 4.5.1 of this EIS.

2.4.2.2 Special Pipeline Construction Techniques

Construction in rugged topography; across wetlands and waterbodies; through agricultural, residential, commercial, and industrial areas; at road and railroad crossings, and across foreign

[21] In addition to the live seed from the desired plant species, bulk seed contains dust, chaff, and dead seed, and may contain seeds from other plant species. Pure Live Seed refers to the amount of live seed of the desired species in a lot of bulk seed.

pipelines and other utilities may require special construction techniques. Special techniques would also be used if blasting is required. These techniques are described below.

Rugged Topography

The Pacific Connector pipeline route would cross several mountain ranges, with steep and rugged topography. Through those mountains, the pipeline route would utilize ridgelines, where feasible, to minimize the amount of cut and fill, and to avoid steep slopes, geologic hazards, and waterbody crossings, and to reduce erosion potential. In areas of steep slopes, two-tone construction techniques may be necessary, creating two step-wise level surfaces within the construction right-of-way (see Drawing #3430.34-X-0019 in Attachment C of Pacific Connector's ECRP, included with Resource Report 1). In addition, Pacific Connector's *Geological Hazards and Mineral Resources Report* identified geological hazards along the pipeline route. Site-specific mitigation measures for the crossing of some of these hazards are discussed in more detail in section 4.2.2.

During construction through rugged topography, Pacific Connector would consider the following factors:

- design adequate construction work spaces;
- provide a safe working grade;
- utilize appropriate construction techniques for site-specific situations;
- construct during the dry season as much as possible;
- install temporary erosion control devices during construction;
- install trench breakers, as appropriate, on slopes and near waterbody and road crossings;
- backfill the trench immediately after pipe installation;
- install permanent erosion controls soon after completing rough grading; and
- revegetate slopes with quick germinating seed mixtures.

Additionally, Pacific Connector's ECRP outlines procedures for fill on slopes exceeding a gradient of 3H:1V, including fill materials, slope preparation, and fill placement and compaction. The POD includes additional factors that would be considered on federal lands.

Waterbody Crossings

Construction of the proposed Pacific Connector pipeline would affect 400 waterbodies (including ditches, canals, drains, and other water conveyance features). Waterbodies would be crossed in accordance with the FERC's *Procedures* and applicable permits or approvals from other agencies. Pacific Connector filed a *Wetland and Waterbody Crossing Plan* as Appendix BB of its POD. Crossings of perennial streams on BLM and NFS lands would be subject to site-specific plans that include construction restoration and monitoring requirements to ensure consistency with the Aquatic Conservation Strategy (ACS). A more detailed discussion of impacts on waterbodies is provided in section 4.4.2 of this EIS.

TEWAs would be located more than 50 feet away from the edge of waterbodies where possible, and Pacific Connector has identified locations where site-specific conditions or other constraints prevent a 50-foot setback. Hazardous materials, chemicals, fuels, and oils would be stored at least 100 feet from the edge of waterbodies and wetlands (150 feet on federal lands).

Construction equipment would cross waterbodies on temporary bridges. The bridges would be designed to span the entire OHWM of the waterbody, wherever possible. Soil would not be used to stabilize bridges. On BLM and NFS lands, all streams, whether wet or dry, would be crossed with (1) a bridge, (2) a temporary culvert, or (3) a low water ford with a rock mat.

Pipeline crossings of perennial waterbodies would be made perpendicular to the axis of the waterbody channel, where feasible. The pipeline route would avoid paralleling a waterbody within 15 feet or less, where feasible.

All waterbodies would be crossed during the in-water work window recommended by the ODFW. Pacific Connector would attempt to cross intermittent flowing streams, and irrigation canals and ditches when they are dry, using standard upland, cross-country pipeline construction methods. The standard depth of cover would be 5 feet below intermittent flowing streams and ditches.

Pacific Connector would use the following methods to cross flowing streams: wet open cut, diverted open cut, dry open cut, convention boring, DP technique, and HDD. These are briefly described below.

Wet Open Cut

Pacific Connector proposes to use wet open cut pipeline construction methods within the Coos Bay estuary, from about MPs 1.7R to 4.1R. The plan for crossing Haynes Inlet was included with the JPA stand-alone document filed with Pacific Connector's application to the FERC (JPA-9). Water depth along this route is shallow, varying from 3 to 10 feet. During ebb tide, marsh excavators with tracks around pontoons would dig the pre-lay trench. A bucket dredge may be used where greater water depth allow. The spoil would be set aside next to the trench, and turbidity curtains may be deployed. Concrete coated pipe would be placed on lay barges, from which 40-foot-long joints would be installed in the trench by the push-pull method. Welding would occur on the barges. Backfilling would allow for 5 feet of cover over the pipe. Construction in Coos Bay would occur between October 1 and February 15.

Diverted Open Cut Crossing

Pacific Connector would use a diverted open cut for the eastern crossing of the South Umpqua River at about MP 94.7, because the river is too wide for a typical dry crossing using either dam and pump or flume methods, and geotechnical studies indicated that subsurface conditions are not suitable for an HDD or conventional boring. At MP 94.7, the South Umpqua River channel is sufficiently flat, wide (175 feet bank to bank), and shallow (varying from a few inches to 15 feet deep), with flow slow enough to allow water to be diverted to one side while work is conducted on the opposite bank. A site-specific plan for the eastern crossing of the South Umpqua River at MP 94.7 was included in Appendix 2E of Resource Report 2 of Pacific Connector's application to the FERC.

A temporary diversion structure, comprised of porta dams, aqua dams, steel plates, plastic sheeting, sandbags, or similar devices would be placed in the river upstream of the crossing. It may be necessary for equipment to work in the river to install the diversion structure. Once the work area is isolated, fish would be salvaged by an ODFW-approved biological contractor, and the area dewatered using discharge pumps. The trench would be excavated and spoil stored adjacent; behind the diversion structure or other sediment control devices. Bedrock may be encountered between 0.7 and 8.7 feet below the channel floor, and the top of the pipe would be

buried at least 24 inches below the top of bedrock. The pipe string would be installed in the trench and backfilled. A bell hole would be left open at the end of the first section to allow a tie-in to the second section. After the installation of the first section of pipe, the diversion structure would be moved to the opposite side of the river. Water would be diverted to the first section, while the second section would be installed. The crossing would be completed over a 14-day period between July 1 and August 31, which coincides with both the ODFW preferred in-water work window and the lowest season groundwater levels.

Dry Open Cut

Flume

The flume method would be used to cross streams less than 100 feet across. Water would be diverted across the work area through one or more flume pipes. No equipment would be placed in the stream, with flumes installed by hand or using equipment from the upland banks. Sandbag and plastic sheeting would be used to support and seal the ends of the flume and to direct stream flow into the flume and over the construction area. Temporary dams at both the upstream (inlet) and downstream (outlet) sections of the flume would create a containment area in between where turbid water would be confined. After fish are salvaged from the confined area between the dams, water would be pumped out, through an upland dewatering structure, to create a dry work area for pipeline installation. Spoil from trenching would be stored in TEWAs located at least 10 feet away from the stream banks; with piles surrounded by silt fence. All in-stream work (trenching, pipeline installation, and backfilling) would be conducted while the flume is in place, and the flume would be removed immediately after backfilling and bottom recontouring is completed. Appropriate-sized gravel would be placed in the streambed, and stream banks would be re-established to pre-construction conditions, and stabilized using the erosion control measures outlined in Pacific Connector's ECRP or those outlined in site-specific plans for perennial crossings on BLM and NFS lands. Details about stream fluming procedures were attached as Appendix 2C in Resource Report 2 of Pacific Connector's application to the FERC.

Dam-and-Pump

The dam-and-pump method is an alternative dry construction technique that can be used to cross small or intermediate width waterbodies that are classified as coldwater fisheries. This method is preferred where the stream bottom is bedrock, and blasting may be necessary during trench excavation. Two temporary in-stream dams would be installed, with sandbags with plastic liner or other structures such as steel plates or water bladders. Stream flow would be diverted around the work area by pumping water through hoses. Intakes would be screened to prevent the entrainment of aquatic species. An energy-dissipation device would be used to prevent scouring of the streambed at the discharge location. The area between the dams would be dewatered, and the trench then excavated by trackhoes or draglines. Spoil would be stored in TEWAs located at least 10 feet from the banks; surrounded by silt fence. After pipeline installation and backfilling, the dams would be removed and stream banks restored and stabilized. Pacific Connector would cross streams using the dam and pump method during the ODFW recommended in-water work windows. Details about dam and pump procedures were attached as Appendix 2D in Resource Report 2 of Pacific Connector's application to the FERC.

Conventional Boring

Pacific Connector intends to cross three waterbodies (Kentuck Slough at MP 6.3R, Catching Slough at MP 11.1, and Medford Aqueduct at MP 133.4) using conventional bore methods. There

are different kinds of boring methods, including jack and bore, slick bore, and hammer bore. The type of method to be used at these specific locations has not yet been determined by Pacific Connector. During a standard boring operation, pits are excavated on both ends, with spoil from the bore passed into the pit and removed by trackhoe. The walls of the bore pits may have to be supported by trench boxes or metal sheet piling. If groundwater seeps in to the bore or bore pits, a dewatering system would need to be used. Pipe would be welded in the pit, and passed through the bore hole.

Horizontal Directional Drilling

Pacific Connector proposes to cross three major waterbodies (Coos River, MP 11.1R; Rogue River, MP 122.7; and Klamath River, MP 199.4) using the HDD construction method. This technique involves drilling a pilot hole, then enlarging that hole through successive reaming. High pressure drilling fluids, usually consisting of a slurry made of bentonite clay mixed with water would be jetted at the drill head to advance the hole. Pipe sections long enough to span the entire crossing would be staged and welded along the construction work area on the opposite side of the waterbody, hydrostatically tested, and then pulled through the drilled hole. The right-of-way between the entry and exit hole of an HDD would generally not need to be cleared or graded, except for the area of the guide wires, and direct impacts on the waterbody, adjacent riparian vegetation, and associated aquatic resources would be avoided through an HDD.

Pacific Connector included an HDD Feasibility Analysis in Appendix 2G of Resource Report 2 in its application to the FERC. That study showed that the HDD under the Coos River would be about 1,602 feet long with a maximum depth of -65 feet; while the HDD under the Rogue River would be about 3,050 feet long with a maximum depth of -76 feet; and the HDD under the Klamath River would be about 2,309 feet long with a maximum depth of -71 feet. In case of an HDD failure, or the unanticipated release of drilling mud, Pacific Connector prepared a contingency plan attached as Appendix 2H to Resource Report 2 of its application to the FERC.

Direct Pipe Technology

Direct pipe (DP) technology is a trenchless construction method that can be used to install pipelines underneath rivers or roads without surface impacts. It is a combination of a micro-tunneling process and HDD. DPs are completed using an articulated, steerable micro-tunnel boring machine (MTBM) mounted on the leading end of the product pipe or casing which is jacked into position with a pipe thrusting machine mounted at or near the ground surface. Soil and rock are excavated by the cutting head on the MTBM and removed through pressurized slurry pipes to the launching pit. Bentonite slurry is used to increase lubrication and advance the MTBM. Overcutting is employed to create a space between the pipe and the soil. The pipeline is pre-fabricated and welded in sections to the back of subsequent sections as the MTBM advances.

Pacific Connector proposes to use DP technology to install its pipeline under the western crossing of the South Umpqua River at about MP 71.3 and the associated crossings under I-5, Dole Road, and the Central Oregon & Pacific Railroad. This DP crossing would be about 1,680 feet long, with a maximum depth of -90 feet. Pacific Connector attached its I-5/South Umpqua River Direct Pipe Feasibility Evaluation as Appendix 2I to Resource Report 2 of its application to the FERC.

Wetland Crossings

The proposed pipeline route and associated facilities and construction areas would cross about 11.6 miles of wetlands. Pacific Connector would construct its pipeline across wetlands in accordance with the FERC's *Procedures*. In general, the construction right-of-way through wetlands would be limited to 75 feet or less, where possible. TEWAs would be located at least 50 feet away from wetlands, except where topographic constraints prevent this. Grading and stump removal in wetlands would only occur over the trench. Silt fence and straw bales would be installed at the edges of the construction right-of-way through wetlands. Trench plugs would be put in where the pipeline enters and exits wetlands.

In saturated wetlands, Pacific Connector may use low ground weight equipment operating off of pre-fabricated wooden mats. It may not be possible to segregate topsoil under saturated conditions. Pipe stringing in saturated wetlands may be done next to the trench or in adjacent TEWAs. If the wetland is flooded, Pacific Connector may use "push-pull" or "float" techniques. Pipeline installation through wetlands is further discussed in section 4.4.2.3 of this EIS.

Agricultural and Residential Areas

Pacific Connector estimated that the pipeline would cross about 37.2 miles of agricultural land, and 0.2 mile of residential land. The FERC's *Plan* requires topsoil segregation in all residential areas, annually cultivated or rotated agricultural lands, pasture, and hayfields, or where requested by landowners. In these areas, topsoil should be stripped and segregated from either the full construction right-of-way, or over the trench line and subsoil storage area. Pacific Connector identified about 70 places, in addition to most wetlands, where it intends to salvage and segregate topsoil along the pipeline route (see table D-4 in appendix D). Along the alignment where topsoil segregation is proposed, Pacific Connector has requested 10 feet of TEWA in addition to the 95-foot construction right-of-way, to stockpile segregated soils.

Another requirement of the FERC's *Plan* is that excess rock should be removed from at least the top foot of soil in all actively cultivated or rotated cropland, pasture, hayfields, and agricultural lands. Pacific Connector would use rock pickers where necessary to remove excess rocks from these areas during cleanup. Rocks would be removed consistent with the size, density, and distribution found in areas adjacent to the right-of-way. Excess rocks would be distributed along the construction right-of-way or disposed of in existing rock quarries and permanent disposal sites (see table D-7 in appendix D). Pacific Connector also attached an *Overburden and Excess Material Disposal Plan* as Appendix Q to its POD. Some excess rocks may be used to create OHV barriers or special habitat features.

The FERC's *Plan* requires that soils in agricultural and residential areas be tested for compaction after construction, and any compaction should be alleviated. According to Pacific Connector's ECRP, during restoration activities soil compaction would be relieved by regrading and scarifying. This may include ripping and chisel plowing up to 18 inches deep.

Pacific Connector would work with individual landowners in agricultural areas to determine how the right-of-way would be restored where the pipeline would cross cropland, orchards, nurseries, or vineyards. Usually, in agricultural areas, the landowner determines whether or not Pacific Connector would be responsible for seeding. In some situations, the owner of agricultural land may do the final restoration and seeding and Pacific Connector would compensate the landowner

for those efforts. In residential areas, Pacific Connector would restore disturbed lawns, ornamental shrubs, gardens, and other landscape features in accordance with their agreement with the landowner. The restoration work in residential areas would be done by a contractor familiar with local horticultural or landscape practices, or Pacific Connector may choose to compensate a landowner to restore their property.

Pacific Connector has developed site-specific construction mitigation plans for the residences within 50 feet of work areas. Some of the typical measures to be taken in residential areas include notification of landowners, limiting hours of construction, dust control, maintaining access, fencing, reducing the width of the right-of-way to increase the buffer to the pipeline, and replacing landscaping (see section 4.1.2.3).

Road, Railroad, and Utility Crossings

The proposed route of the Pacific Connector pipeline would include about 630 road crossings and 6 railroad crossings. Conventional bores are typically used to cross under railroads, with DP and HDD technology proposed for one crossing each (see table D-2 in appendix D). Roads would either be bored or open cut. At least 5 feet of cover would be maintained over pipeline crossings of paved county, city, and state roads, as well as railroad crossings.

Pacific Connector would obtain all necessary permits from applicable county, state, or federal land-managing agencies for public roads to be crossed, and permission to cross private roads from the landowners. Pacific Connector produced a TMP for federal lands as Appendix Y to the POD, and a TMP for non-federal lands was attached as Appendix 8H in Resource Report 8 of Pacific Connector's application to the FERC. Transportation management is discussed in more detail in section 4.10 of this EIS.

Pacific Connector would endeavor to notify agencies and private landowners at least seven days in advance of any road work or closures caused by pipeline construction activities. During an open cut crossing, Pacific Connector would try to keep one lane of the road open for traffic, with detours around construction, plating over the open trench, or other methods. However, in some situations the road may have to be closed for a day when the pipeline would be installed across it. Where road closures occur, Pacific Connector would provide access around the construction site for local residents and emergency vehicles. Advanced signage would be used to provide notice of construction activities. In addition, Pacific Connector would utilize traffic control measures, such as signs, lights, barriers, and flaggers to ensure public safety and provide for efficient movement of traffic through or around the construction area, and to protect workers.

Pacific Connector's proposed pipeline route would cross numerous existing utilities, including other pipelines, powerlines, and cables. Prior to construction, Pacific Connector would contact the local "One Call" or "Call Before You Dig" system to determine the location of utilities to be crossed. These utility crossings would then be marked in the field during pre-construction surveys. Pacific Connector would coordinate with each utility owner/operator to design crossings. In most instances, the new pipeline would have to be installed beneath the existing buried utility to maintain the necessary depth of cover.

2.4.2.3 Aboveground Facility Construction

Aboveground sites would be cleared and graded as applicable to accommodate the planned facilities. Excavation would be performed as necessary to accommodate the new reinforced concrete foundations for meter and compressor station equipment. Forms would be set, rebar installed, and the concrete poured, finished, and cured in accordance with applicable standards. Concrete pours would be randomly sampled to verify compliance with minimum strength requirements. Backfill would be compacted in place, and excess soil would be used elsewhere or distributed around the site.

The meter and compressor station equipment would be shipped to the site by truck. The equipment would be off-loaded using booms, lifts, or cranes. The equipment would then be positioned on the foundation, leveled, grouted (if necessary), and secured with anchor bolts.

All non-screwed piping associated with the meter and compressor stations would be welded, except where connected to flanged components. All welds in high-pressure gas piping systems would be visually inspected and radiographically tested (or other non-destructive testing method) to ensure compliance with code requirements.

All components in high-pressure natural gas service would be strength tested prior to placing in service. Before being placed in service, all controls and safety equipment and systems would be checked and tested.

In all cases, MLVs would be installed within Pacific Connector's operational easement. The installation of the MLVs would meet the same standards and requirements established for pipeline construction.

2.5 ENVIRONMENTAL COMPLIANCE AND MONITORING

2.5.1 FERC Environmental Compliance Monitoring

In preparing construction drawings and specifications for the Project, Jordan Cove and Pacific Connector would incorporate proposed mitigation measures identified in their applications, as specified in the Commission Order, and requirements of other federal, state, and local agencies. Jordan Cove's and Pacific Connector's construction contractors would also be provided copies of applicable environmental permits. Jordan Cove and Pacific Connector would conduct training for construction personnel regarding implementation of environmental permit requirements, and measures of specific mitigation plans. Environmental training would be conducted before and during construction.

During pipeline construction, Pacific Connector would be represented on each pipeline spread by a Chief Inspector, who would be responsible for quality assurance and compliance with mitigation measures, other applicable regulatory requirements, and company specifications. In accordance with the FERC's *Plan*, the Chief Inspector would be assisted by at least one full-time EI per construction spread. The EI would report directly to the Chief Inspector and would have stop-work authority. The EI's responsibilities would include:

- identifying, documenting, and overseeing corrective actions, as necessary to bring an activity back into compliance;

- ensuring compliance with the requirements of the FERC's *Plan* and *Procedures* (including modifications), the environmental conditions of the section 3 and Certificate authorization, the mitigation measures proposed by the applicant (as approved and/or modified by FERC's authorization), other environmental permits and approvals, and environmental requirements in landowner easement agreements;
- verifying that the limits of authorized construction work areas and locations of access roads are properly marked before clearing;
- verifying the location of signs and highly visible flagging marking the boundaries of sensitive resource areas, waterbodies, wetlands, or areas with special requirements along the construction work area;
- identifying erosion/sediment control and soil stabilization needs in all areas;
- ensuring that the location of dewatering structures and slope breakers would not direct water into known cultural resources sites or locations of sensitive species;
- verifying that trench dewatering activities do not result in the deposition of sand, silt, and/or sediment near the point of discharge into a wetland or waterbody. If such deposition is occurring, the dewatering activity would be stopped and the design of the discharge would be changed to prevent reoccurrence;
- ensuring that subsoil and topsoil are tested in agricultural and residential areas to measure compaction and determine the need for corrective action;
- advising the Chief Inspector when conditions (such as wet weather) make it advisable to restrict construction activities to avoid excessive rutting;
- ensuring restoration of contours and topsoil;
- verifying that the soils imported for agricultural or residential use have been certified as free of noxious weeds and soil pests, unless otherwise approved by the landowner;
- approving straw bales for use in dewatering structures, mulch, and/or erosion control and verifying that the straw is certified free of noxious weeds and soil pests;
- determining the need for and ensuring that erosion controls are properly installed, as necessary, to prevent sediment flow into wetlands, waterbodies, sensitive areas, and onto roads;
- inspecting and ensuring the maintenance of temporary erosion control measures at least:
  - on a daily basis in areas of active construction or equipment operation;
  - on a weekly basis in areas with no construction or equipment operation; and
  - within 24 hours of each 0.5 inch of rainfall;
- ensuring the repair of all ineffective temporary erosion control measures within 24 hours of identification;
- keeping records of compliance with the environmental conditions of the FERC Certificate, and the mitigation measures proposed by the Project sponsor in the application submitted to the FERC, and other federal or state environmental permits during active construction and restoration;
- identifying areas that should be given special attention to ensure stabilization; and
- completing restoration after the construction phase.

In addition, the FERC staff would conduct inspections to monitor the Project for compliance with the Commission's environmental conditions and Project mitigation measures proposed by Jordan Cove and Pacific Connector, or required by regulatory and land management agencies. Pacific

Connector has agreed to fund third-party environmental monitors to the extent determined necessary by FERC staff and the federal land-managing agencies during Project construction. The third-party environmental monitors would report directly to the FERC staff, the BLM designated official, and the land-managing agency with jurisdictional interest. Environmental monitors would be available on site during all phases of construction. The details of the scope-of-work and selection of the third-party contractor would be finalized prior to the start of construction.

2.5.2 Monitoring by Land Managing Agencies on Federal Lands

The POD developed by Pacific Connector[22] is part of the Right-of-Way Grant application and includes extensive monitoring requirements to ensure that impacts from construction and operation of the Project are minimized and that objectives of the respective land management plans are accomplished. The requirements from the 2013 POD are summarized in table 2.5.2-1. Ongoing discussion between the applicant and agencies are expected to result in revisions to the POD. Because the proposed actions specific to federal lands include amendments to LMPs, the regular monitoring and reporting programs of the respective BLM and Forest Service LMPs would be used in addition to those identified in table 2.5.2-1.

[22] Filed as a stand-alone report with Pacific Connector's June 2013 application to the FERC.

TABLE 2.5.2-1

Monitoring Requirements Associated with Pacific Connector's Plan of Development

Appendix	Appendix Title	Appendix Section	Monitoring Requirement
A	Aesthetics Management Plan for Federal Lands	3.4.1 Key Observation Points (KOP)	These KOPs will provide a baseline from which to monitor mitigation implementation and success. Mitigation techniques may vary from what is listed below, depending on ongoing monitoring and consultation with agency land managers. Mitigation for KOPs would also include all general mitigation measures detailed in Sections 3.1 through 3.3 of POD Appendix A.
B	Air, Noise and Fugitive Dust Control Plan	—	No requirements except reference to federal and state regulations that could include such monitoring requirements.
C	Blasting Plan	3.6 Monitoring of Blasting During Pipeline Construction (See also Sec. 3.3, Federal, State, County and Local Regulations/Restrictions)	Drilling and blasting would be completed in presence of, and following approval by Company inspector(s) present. Seismograph equipment would be used to measure blast induced vibration (peak particle velocity or PPV) in the vertical, horizontal, and longitudinal directions. Seismic monitoring may be discontinued at Company's discretion if the blasting schedule and blasting performance consistently produce PPVs lower than the maximum allowable limit. PPV would be recorded at any adjacent utility, water wells, potable springs and any aboveground structure within 200 feet of the blasting. Pacific Connector may photograph structures or facilities near blasting locations to document pre-blast conditions. Similarly, Pacific Connector may video record blast events. When blasting is completed in noise sensitive areas, peak noise and overpressure would be monitored and recorded in compliance with the stipulations outlined in the FERC's BA. A blasting log would be recorded immediately after each blast. Ground-motion monitoring would comply with applicable federal, state, and local regulations and permit conditions. See Section 5.0 of POD Appendix C for monitoring requirements for third party blasting within 200 feet of operational pipeline.
D	Communication Facilities Plan	2.0 Purpose	Each meter station and the compressor station would require a communications link with Williams Pacific Operator's gas control monitoring system in Salt Lake City. Therefore, radio antennas and towers would be required at each meter station, the compressor station, and on existing mountain top radio communication sites as required to create a communication link with Salt Lake City.
E	Contaminated Substances Discovery Plan	Page 1, paragraph 5	In response to Forest Service concern for the potential for naturally occurring mercury to reach the aquatic environment during construction of the pipeline near the historic Thomason mining property (see Attachment 1 to POD Appendix E – Potential for natural-occurring mercury mineralization to enter the aquatic environment between M.P. 109 and East Fork Cow Creek), additional temporary or short-term erosion control measures would be conducted at these sites throughout the construction phase and routinely monitored by an environmental inspector (EI) or authorized Company representative. See Figure 5 of Attachment 1 to POD Appendix E to this plan for the location of hydrologic features G, J and K where erosion control measures would be in place before the fall rains and monitored for riling, gullying and other forms of erosion that may transport sediment into the aquatic environment (recommendations developed in consultation with ODEQ).
F	Corrosion Control Plan	2.1.3 Cathodic Protection Monitoring	The CP system would be tested and if necessary, adjusted at least once each calendar year, but not exceeding 15 months to ensure the CP system is providing acceptable levels of protection as outlined in DOT 49 CFR 192.465. Tests would be completed including Close Interval Survey (CIS) that measures pipe to soil potentials, electromagnetics, and guided wave ultrasonics. CP test stations would be located along the pipeline to allow Pacific Connector to routinely monitor voltage and current levels. See Attachment C to POD Appendix F for a sample test station drawing. See also POD Attachment 6, Sections. 2.2 (Atmospheric Corrosion), 2.3 (Internal Corrosion Control) and 2.4 (Inline Inspection) for additional pipeline corrosion inspection requirements, per DOT 49 CFR 192.

TABLE 2.5.2-1

Monitoring Requirements Associated with Pacific Connector's Plan of Development

Appendix	Appendix Title	Appendix Section	Monitoring Requirement
G	Emergency Response Plan	1.0 Introduction	No specific monitoring requirements are identified, but reference is made to DOT 49 CFR 192.615 and 192.617, which includes requirements to minimize the hazards during pipeline operation resulting from a gas pipeline emergency. The required Public Safety Response Manual, to be distributed to the appropriate agencies and local authorities includes information on how to identify a gas leak.
H	Environmental Briefings Plan	2.0 Pre-Construction Reporting	Within 60 days of the acceptance of the BLM Right-of-Way Grant and before construction begins, Pacific Connector would file an initial *Environmental Inspection, BMP and Construction Compliance Implementation Plan* with the federal land-managing agencies' Authorized Office for review and written approval in accordance with the POD stipulations. The Company would file revisions to the plan as schedules change. This plan would include the number of EIs per spread and training procedures to ensure non-compliance problems are identified in a timely manner.
		4.0 Post Construction Reporting	After restoration is completed and the pipeline is in-service, Pacific Connector would initiate monitoring and reporting to the federal land-managing agencies on a quarterly basis, and continue such activities until all disturbed areas have been successfully stabilized and restoration is complete.
I	Erosion Control and Revegetation Plan (excluding FERC Plans in Appendices A and B)	3.3.1 Preconstruction Survey	EIs would verify the limits of the staked construction areas.
		3.3.3 Clearing and Grading	The flagged limits of disturbance would be maintained throughout all construction phases and would be monitored by EIs so activities are restricted to certificated limits.
		3.3.4 Installation of Erosion Control BMPs	All erosion control devices would be routinely inspected and any damaged or temporarily removed structures would be replaced at the end of each working day.
		3.3.8 Welding and Coating Pipe	All welds would be visually and radiographically inspected and repaired, as necessary. Prior to the final installation, the entire pipeline coating would be inspected and tested to locate and repair any faults or voids.
		3.3.10 Hydrostatic Testing	Pacific Connector would follow the procedures outlined in the *Hydrostatic Testing Pla*n (see POD Appendix M) and POD Appendix BB, FERC's *Procedures,* to minimize potential effects from these activities (includes monitoring requirements).
		4.0 Best Management Practices	EIs would verify that turbid water does not reach a waters of the state and dewatering does not result in the deposition of sand, silt, and/or sediment. EIs would inspect and ensure the maintenance of temporary erosion control measures at least daily in areas of active construction or equipment operation, on a weekly basis in areas with no construction or equipment operation and within 24 hours of each 0.5 inch or greater rainfall. Inspections would be recorded and records maintained for review upon request.
		4.1.2 Sediment Barrier	The EI would inspect temporary erosion control structures at least on a daily basis in areas of active construction and equipment operation. In areas where active construction and equipment operation are not occurring, inspections would be made at least weekly. All structures would be inspected by the EI within 24 hours of 0.5 inch or greater of rainfall. The EI would be responsible for ensuring that ineffective temporary erosion control measures are repaired as soon as possible but no more than 24 hours after discovery. Whenever possible, the EI would inspect erosion control measures in advance of predicted storm events and take preventative measures to minimize the potential for off right-of-way sedimentation.
		4.1.5 Dust Control	The EI would direct watering along the right-of-way, as necessary and would determine if water needs to be sprayed to control dust during sweeping operations on paved roads.
		4.2.3 Soil Compaction	Pacific Connector would test for soil compaction in agricultural and residential areas and on Forest Service and BLM lands, as specified in FERC's *Plan*. The EI would also test for soil compaction on UCSAs on federal lands to determine appropriate measures necessary to mitigate compacted areas.
		5.0 Waterbody Crossings	Any equipment required to enter a waterbody would be inspected to ensure it is clean and free aquatic invasive species, noxious weeds, dirt or hydrocarbons.

TABLE 2.5.2-1

Monitoring Requirements Associated with Pacific Connector's Plan of Development

Appendix	Appendix Title	Appendix Section	Monitoring Requirement
I		6.0 Wetland Crossings	Sediment barriers would be properly maintained throughout construction and until effective ground cover is reestablished.
		7.0 Maintenance and Periodic Evaluation	The EI would inspect temporary erosion control structures at least daily in areas of active construction. In areas where active construction is not occurring, inspections would be made at least weekly. All structures would be inspected by the EI within 24 hours of 0.5 inch or greater of rainfall or as required by state and local jurisdictions. Whenever possible, the EI would evaluate erosion control measures prior to a predicted storm event and implement measures needed to prevent off right-of-way sedimentation. Inspections would be documented and available for agency review upon request.
		8.3 Water Discharge	EIs would visually monitor the release of hydrostatic test water and trench dewatering activities to ensure that no erosion or sedimentation occurs and that turbid water is not discharged to waters of the state. If an EI determines that a discharge is occurring from trench dewatering, the receiving water would be visually monitored for turbidity. Additionally, if a discharge to surface water occurs, the dewatering operations will be immediately adjusted/reinstalled/maintained to ensure that discharge is stopped and water quality standards are not exceeded.
		10.0 Restoration and Revegetation	Pacific Connector would use a qualified specialist to test tiles for damage and to conduct any necessary repairs.
		10.12 Supplemental Wetland and Riparian Plantings	The transplanted root-pruned trees would be monitored annually according to FERC's *Procedures*. If the success rate drops below 80 percent a Forest Service authorized representative would be informed and a plan would be developed between the Forest Service and Pacific Connector to restock these sites.
		10.13 Supplemental Forest Plantings, Table 10.13-1	On BLM Districts (other than Lakeview) seedling growth/survival must be monitored the first fall following planting. Replant/interplant areas where tree stocking falls below minimal acceptable levels (300 trees per acre). On Forest Service land, monitor seedling growth/survival the first fall and third growing seasons following construction to ensure target stocking of 100-150 trees per acre. Replant/interplant areas where tree stocking falls below minimal acceptable levels in accordance with Oregon Department of Agriculture (ODA) requirements (ODA 629-610-00200).
		10.15 Mulch, Straw Mulch	Only certified weed-free straw and mulch would be used. However, if the certification program is not in place at the time of construction, or if there are not sufficient quantities of certified weed free straw available for the Project, Pacific Connector would request review/inspection of the straw by the local soil and water conservation district, county agent, or other appropriate official or authorized agency representative on federal lands.
		11.0 Steep and Rugged Terrain	During construction of the Project across rugged topography, Pacific Connector would be responsible for monitoring and maintaining right-of-way as necessary to ensure stability.
		12.0 Noxious Weeds, Soil Pests, and Forest Pathogens Control Plan	The ODA, BLM, and Forest Service have recommended that reconnaissance surveys be conducted along the pipeline route to determine the presence of noxious weeds and forest pathogens so that appropriate BMPs can be developed and applied prior to and during construction to prevent the introduction, establishment, or spread of noxious weeds and forest pathogens. Additionally, these agencies have recommended that construction equipment and vehicles be cleaned prior to moving them onto the construction right-of-way to prevent the import and spread of weeds and that vegetation clearing and grading equipment be cleaned if they pass through known noxious weed infestations. The ROW would be monitored after construction, and any noxious weed infestations would be controlled in accordance with permit and landowner stipulations.
		12.3 Equipment Inspection	Prior to transporting construction equipment to the right-of-way, allowing project inspector and construction contractor vehicles on the ROW, or allowing maintenance equipment on the right-of-way on federal lands, the EI or Company authorized representative would perform inspections and register or tag the equipment to ensure that it is clean and free of potential weed seed or propagules (using POD Appendix N, Appendix 4 checklist). The EIs would also be responsible for random verification inspections during construction. To ensure the equipment is thoroughly inspected, the EI or authorized representative would use the inspection checklist provided in POD Appendix N, Attachment D (Equipment Cleaning).

TABLE 2.5.2-1

Monitoring Requirements Associated with Pacific Connector's Plan of Development

Appendix	Appendix Title	Appendix Section	Monitoring Requirement
		12.4 Clearing and Grading	Infested areas and cleaning station locations would be mapped to ensure that they are monitored during construction (and on federal lands post construction). The infested areas and cleaning station locations would be mapped for future monitoring efforts to determine if potential infestations occur at these sites and, if they do, to ensure that appropriate treatments are applied.
		12.5 Weed-free Materials	If this certification process is not formalized at the time of construction, the straw can be inspected by the county extension agent or qualified conservation district personnel. Where straw is to be used on federal lands, the BLM's or Forest Service's authorized officer may also inspect and approve straw materials to verify that the straw is weed-free.
		12.6 Weed Control	The applicator would ensure that the herbicides are used according to the labeling restrictions and according to all applicable laws and restrictions and according to the appropriate land managing agency decision documents.
		12.9 Monitoring (Noxious Weeds and Pathogens)	Pacific Connector would implement three to five years of post-construction monitoring in areas of federal land where noxious weeds were identified and mapped prior to construction, as well as at equipment cleaning stations and hydrostatic dewatering sites. Monitoring would also occur in areas where rock, soil and straw was used on NFS Lands. Monitoring other areas of the right-of-way where noxious weeds were not known to occur prior to construction would occur as an ongoing function of Pacific Connector's operational personnel during the life of the Project. Pacific Connector's operational staff would also investigate noxious weed issues raised by landowners during operation of the pipeline.
		13.0 Maintenance	Pacific Connector would conduct follow-up inspections of all disturbed areas after the first and second growing seasons to determine revegetation success (in upland areas, if upon visual survey the density and cover of non-nuisance vegetation are similar in to adjacent undisturbed lands). If revegetation is not successful or there are excessive weeds, a professional agronomist shall determine the need for additional restoration measures. In wetland areas, revegetation would be considered successful if the cover of herbaceous and/or woody species is at least 80 percent of the type, density, and distribution of the vegetation in adjacent undisturbed wetland areas. If revegetation is not successful at the end of three years, Pacific Connector would develop and implement (in consultation with a professional wetland ecologist) a remedial revegetation plan to actively revegetate the wetland and would continue revegetation efforts until wetland revegetation is successful. Pacific Connector would monitor crops for at least two years to determine the need for additional restoration and would monitor and correct problems with drainage and irrigation systems resulting from pipeline construction in active agricultural areas until restoration is deemed successful.
J	Federally-listed Plant Conservation Plan	3.0 (of Conservation Plan) Mitigation Plans for Federally-listed Plants	Pacific Connector would conduct environmental surveys of the pipeline right-way and authorized work areas in areas not previously surveyed where suitable habitat is present prior to construction once survey permission is granted. If populations of federally listed threatened or endangered species are identified, the EI would, where feasible, monitor the survey and flagging of the construction right-of-way and temporary extra work areas to clearly mark the limits of construction disturbance (i.e., clearing/grading), and would provide additional protective buffers or neck-downs to ensure protection of adjacent plant populations or provide additional avoidance. As applicable (for bulb salvaging), the EI would also monitor topsoil salvaging efforts during construction. Planting (reseeding) areas would be mapped (GPS) for subsequent monitoring purposes.

TABLE 2.5.2-1

Monitoring Requirements Associated with Pacific Connector's Plan of Development

Appendix	Appendix Title	Appendix Section	Monitoring Requirement
J		5.0 or 6.0 (of Mitigation Plans) Monitoring	Pacific Connector would monitor revegetation success in the areas of restored federally listed threatened or endangered species populations for three to five years after construction, depending on the species. Where applicable, this monitoring would also determine the need for additional monitoring. Monitoring would occur where salvaged plants are transplanted from nursery condition stock to assess the success of the transplanting efforts as well as where collected threatened or endangered species seed is replanted. Monitoring would also occur for noxious or invasive weed infestations within disturbed areas of the construction right-of-way that could hinder revegetation success and threatened or endangered species populations in the area, as well as on portions of the construction right-of-way that were formerly considered as suitable habitat and are returned to, and maintained as, suitable habitat through planting of associated compatible native species. An annual monitoring report would be submitted to FERC and FWS by the end of each monitoring year.
K	Fire Prevention and Suppression Plan	1.2.1 Agency and Pacific Connector Roles and Responsibilities	Pacific Connector would accompany agency representatives on fire tool and equipment inspections and take corrective action upon notification of any fire protection requirements that are not in compliance.
		3.2.1 FS IFPR	During fire season, all Pacific Connector contractors would have their fire equipment inspected by an authorized Forest Service representative prior to work on NFS lands. All fire equipment used on the Project would be inspected annually by an authorized Forest Service representative.
		3.2.13 Monitoring (Construction)	Pacific Connector inspectors would inspect the construction right-of-way and Contractor operations for compliance with all provisions of this plan. In addition, federal, state, and local fire control agencies may perform monitoring inspections in areas under their jurisdiction
		4.2.2 Communications (Emergency Coordination, Suppression)	Upon discovery or notification of a fire in the project area during construction, all aircraft pilots controlled by Pacific Connector or its Contractor would monitor VHF frequency 122.85 when within 5 miles of a fire and broadcast their intentions.
		4.3 Monitoring (Emergency Coordination)	Extinguished fire sites would be monitored for a minimum of 24 hours or as required by the appropriate agency.
L	Fish Salvage Plan	2.1 Fish Exclusion	Both upstream and downstream block nets would be monitored for accumulated litter and debris that would be removed during the entire waterbody construction operation.
		2.2 Dewatering and Fish Removal	During dewatering, the construction site would be monitored to prevent stranding organisms.
		2.3 Fish Handling, Holding and Release	Holding container temperature and well-being of specimens would be frequently monitored to assure that all specimens would be released unharmed.
M	Hydrostatic Test Plan	2.6 Dewatering	Where water is being discharged in an upland area, Pacific Connector's Contractor is responsible for taking water samples, if required, for analysis.
		3.0 Source Water	The targeted ramping rate would be managed such that there is no significant decrease of river flows.
		6.0 Test Failure	EIs would monitor the length of the test section if a failure occurs to ensure that water released does not create erosion or sedimentation into sensitive areas.
		7.2.5 Temperature and Flow Effects	Where water source locations are proposed to be withdrawn from waterbodies, Pacific Connector's EIs would monitor the streamflows prior to withdrawal to ensure that aquatic biota within the streams are not adversely affected.
		7.3 Water Discharge	Hydrostatic test water would not be allowed to discharge directly to wetlands or waterbodies. If an EI determines that a discharge to surface water is occurring the receiving water would be visually monitored for turbidity. Additionally, if a discharge to surface water occurs, the dewatering operations would be immediately adjusted/reinstalled/maintained to ensure that the discharge to surface water is stopped and water quality standards are not exceeded.

TABLE 2.5.2-1

Monitoring Requirements Associated with Pacific Connector's Plan of Development

Appendix	Appendix Title	Appendix Section	Monitoring Requirement
			EIs would monitor discharge activities (rate, and quality) and make appropriate adjustments to facilitate proper infiltration through the discharge structures to stay in compliance with permit conditions. EIs would also monitor the structures to prevent any potential failures or "break outs" from occurring to the structure. Pacific Connector's EIs would ensure all structures meet the performance standard of 100 percent. Pacific Connector's EIs would also ensure that all threaded valves and fittings that may be used on the hydrostatic test headers are cleaned of potential incidental oil and grease before the hydrostatic operations are conducted to minimize the potential for oil and grease contact from these potential incidental sources. If an EI determines that a discharge to a surface water is occurring, the receiving water would be visually monitored for turbidity.
		8.0 Monitoring	For a period of three to five years following completion of construction, operations personnel would inspect the right-of-way in areas where noxious weeds were identified and mapped prior to construction to ensure that potential infestations do not reestablish and spread. Monitoring would also occur in areas along the right-of-way where equipment cleaning stations and hydrostatic dewatering sites were located to ensure that infestations at these locations do not occur (see also POD Appendix M, Section 7.2.4, pp. 15 and 17).
N	Integrated Pest Management Plan	1.0 Introduction	All disturbed areas of the construction right-of-way would be monitored after construction, and any noxious weed infestations would be controlled in accordance with permit and landowner stipulations.
		2.3 Equipment Inspection	Prior to transporting construction equipment to the right-of-way, allowing project inspector and construction contractor vehicles on the right-of-way, or allowing maintenance equipment on the right-of-way on federal lands, the EI or Company authorized representative would perform inspections and register or tag the equipment to ensure that it is clean and free of potential weed seed or propagules (POD Appendix N, Appendix 4 checklist). The EIs would also be responsible for random verification inspections during construction.
		2.4 Clearing and Grading	Infested areas and cleaning station locations would be mapped to ensure that they are monitored during construction. These areas would also be mapped on federal lands post construction.
		During dewatering, the construction site would be monitored to prevent stranding organisms.	After construction and restoration, Pacific Connector would monitor (three to five years) all disturbed areas of the construction right-of-way for infestation of noxious and invasive weeds. Special attention would be given to areas where noxious weeds were identified and mapped prior to construction, as well to equipment cleaning stations and hydrostatic dewatering sites. Where treatment is required, monitoring would occur for three years following eradication. Monitoring report and agency siting forms (POD Appendix N4, Appendix 5) would be submitted to the appropriate federal land-managing agency annually. Pacific Connector may enter into cost-recovery agreements with federal land-managing agencies to conduct/participate in related monitoring efforts. Monitoring of all disturbed areas of the construction right-of-way where noxious weeds were not known to occur prior to construction would occur as an ongoing function of Pacific Connector's operational personnel during the life of the project. Pacific Connector's operational staff would also investigate noxious weed issues raised by landowners and land-managing agencies during operation of the pipeline. When landowners raise noxious weed issues, operational staff would conduct a site assessment (see POD Appendix N, Appendix 5) and provide a proposed treatment plan (to the landowner or land-managing agency), if necessary.
		Appendix 3 Pesticide – Use Proposal (FSM 2150)	This and similar forms (for BLM) are to be used on federal land when pesticides are proposed for weed control. POD Appendix N, Appendix 5) – Item 9e would be used to describe any monitoring of the operation.
		Appendix 5 Weed Monitoring Report Form	Used for annual monitoring at specific identified locations.
O	Klamath Project Facilities Crossing Plan		No requirements except reference to other plans that include monitoring requirements.

TABLE 2.5.2-1

Monitoring Requirements Associated with Pacific Connector's Plan of Development

Appendix	Appendix Title	Appendix Section	Monitoring Requirement
P	Leave Tree Protection Plan	4.0 Uncleared Storage Areas	Pacific Connector Els or Utility Inspectors would monitor the use of uncleared storage areas (USCAs) that are in a regenerating age class and which could be more susceptible to tree damage to ensure potential impacts from their use are minimized. Following completion of construction, Pacific Connector, BLM and Forest Service authorized representatives would assess tree damage (on their respective federal lands) within the UCSA's and other project areas for excessive live tree damage.
Q	Overburden and Excess Material Disposal Plan		No specific reference to monitoring.
R	Prescribed Burning Plan	3.1 Private Lands and BLM-Managed Lands	POD Appendix R, Item 4 is a specific reference to monitoring protocols for prescribed burning, which states: Before any prescribed burning is initiated burn bosses should have a well thought-out plan that takes into account "How weather would be monitored."
		Appendix H. Interagency Prescribed Fire Planning and Implementation Procedures Guide	Activity-specific Burn Plans are included as Appendix H to POD Appendix R (Prescribed Burning Plan). POD Appendix R references the Interagency Prescribed Fire Planning and Implementation Procedures Guide (USDA and USDI 2008). That document includes the following on monitoring on federal land: Fire Effects Monitor (FEMO): "The FEMO is responsible for collecting the onsite weather, fire behavior, and fire effects information needed to assess whether the fire is achieving established resource management objectives. The FEMO is responsible to: 1. Review the monitoring plan prior to implementation. 2. Monitor, obtain, and record weather data. 3. Monitor and record fire behavior data throughout the burn operations. 4. Recon the burn unit/area assigned. 5. Plot the burn area and perimeter on a map. 6. Monitor and record smoke management information. 7. Monitor first order fire effects. 8. Provide monitoring summary of the fire. 9. Provide fire behavior and weather information to burn personnel as appropriate." POD Appendix R, Element 20. Monitoring: "Prescribed fire monitoring is defined as the collection and analysis of repeated observations or measurements to evaluate changes in condition and progress toward meeting a management objective. Describe the monitoring that will be required to ensure that Prescribed Fire Plan objectives are met. For the prescribed fire, at a minimum specify the weather (forecast and observed), fire behavior and fuels information and smoke dispersal monitoring required during all phases of the project and the procedures for acquiring it, including who and when."
S	Recreation Management Plan	3.0 Mitigation	After construction, pipeline monitoring would be conducted. Monitoring-related impacts to recreation would be minimized by (1): conducting inspections of pipeline sections on foot instead of by vehicle, where steep pipeline corridor sections are visible from nearby roads; and (2) conduct vehicle monitoring only during dry conditions.
		3.1 Specific Mitigation for Recreation Sites/Types	OHV Control and right-of-way access: Following construction, the effectiveness of the site-specific measures would be assessed in consultation with the land management agencies, on a periodic basis. Generally, these assessments would be made in conjunction with revegetation monitoring and in response to identified problem areas. Pacific Connector would be responsible for monitoring and managing unauthorized OHV use during the life of the Project. Brown Mountain Multi-Use Trails: Pacific Connector would engage in ongoing consultation and monitoring with local recreation groups and land managers during the construction phases and, if necessary, following construction to assess and modify the mitigation (i.e., OHV and snowmobile control measures).

TABLE 2.5.2-1

Monitoring Requirements Associated with Pacific Connector's Plan of Development

Appendix	Appendix Title	Appendix Section	Monitoring Requirement
T	ROW Clearing Plan for Federal Lands	2.1 Roles and Responsibilities	The BLM and Forest Service would be responsible for monitoring payment, log accountability, and trespass.
		2.1.1 Timber Cruise and Valuation	Pacific Connector would complete a check cruise on the cruises and appraisals completed by the BLM and Forest Service.
		2.1.3 Hazard Trees	FERC Compliance monitors in the field would review and approve as appropriate requests to remove hazard trees outside the approved construction area.
		2.2 Felling and Yarding	The BLM would be responsible for monitoring logging activities on BLM lands. The Forest Service would be responsible for monitoring logging activities on NFS lands.
		2.6 Best Management Practices	Each construction spread would have one lead EI and several assistant EIs to ensure compliance with federal, state, and local regulations and permit requirements.
		2.7 Timing Restrictions for ROW Clearing	Prior to timber clearing, Pacific Connector would have (1) experienced MAMU biologists survey both the occupied and unoccupied suitable habitat stands in which habitat would be modified by Pacific Connector construction and mark trees that currently have nest platforms or potential for nests, and (2) experienced NSO biologists survey known and potential NSO nest sites to determine occupied nesting activity so that appropriate seasonal timing restrictions could be applied during Year 1 timber clearing activities.
U	ROW Marking Plan	3.9 Permanent Marking	Pipeline markers would be maintained by replacing damaged line markers during pipeline patrols and surveys, which shall be at intervals of at least once each calendar year, but not to exceed 15 months.
V	Safety and Security Plan	2.1 Pacific Connector (Responsibilities)	Pacific Connector would observe and monitor Contractor's practices and procedures and would inform the Contractor of violations to the aforementioned regulations. Pacific Connector's Inspection Staff would also be trained to identify and report security issues to the Federal, State, and local law enforcement agencies. The construction right-of-way would be closed to the general public and monitored by Pacific Connector on a regular basis during all construction activities. After the pipeline has been put in service, Pacific Connector would conduct routine inspections of the operation and maintenance corridor (aerial fly overs, on the ground visits, etc.) to identify and correct any security or safety concerns. All visitors, workers, or monitors to the project site during construction shall be required to attend safety training.
		2.4 Construction Inspectors (Responsibilities)	It is the Construction Inspectors' responsibility to be an attentive, willing and proactive monitor, and observer of the Contractor's work practices and to record, report and if necessary halt all seemingly unsafe work practices.
		3.8 Damaged Pipe	Any dents, gouges, scratches or other similar defects would be brought to the attention of Pacific Connector's EIs as soon as they are detected.

TABLE 2.5.2-1

Monitoring Requirements Associated with Pacific Connector's Plan of Development

Appendix	Appendix Title	Appendix Section	Monitoring Requirement
W	Sanitation and Waste Management Plan	3.1 Pacific Connector (Responsibilities)	Pacific Connector would be responsible for: • Ensuring that all company and Contractor management personnel understand and follow the sanitation and waste management requirements for the Project. • Ensuring that all wastes generated during the project are properly characterized/classified. • Ensuring that all waste and spills are handled in a manner consistent with the health and safety standards set by federal, state, and local waste regulations, and the Project's waste management requirements (see POD Appendix X, SPCC Plan).
		6.0 Trash, Food Wastes, and Other Construction Debris	Pacific Connector's EIs and Utility Inspectors would ensure that these daily "house-keeping" measures are being conducted.
		9.0 Hazardous Wastes	Pacific Connector's EI(s) would inspect these storage areas on a weekly basis to ensure that the waste materials are properly packaged, labeled, and stored according to federal, state, and local regulations. Pacific Connector would ensure that the Contractor(s) disposes of all hazardous waste materials in approved facilities according to applicable federal, state, and local hazardous waste regulations and the SPPC Plan. Pacific Connector would also ensure that the Contractor(s) transports all waste materials with the proper shipping papers, placards, labels, and manifests, as required by transportation regulations.
X	SPCC Plan	IV.A.3. Leaks in hoses or fittings on equipment.	a. The contractor would visually inspect all equipment for leaks and repair all leaks prior to moving the equipment onto the construction ROW.
		IV.A.5. Fuel storage tanks and hazardous materials containers 55-gallons or greater.	b. Prior to their use, the contractor would visually inspect each tank for cracks, excessive corrosion, or other flaws which may compromise the integrity of the tank. Hoses and valves would be similarly inspected. c. The contractor would inspect the integrity of all dikes and the liner at least daily and repair the dikes or replace the liner immediately if they become breached or torn.
		IV.B.1. Material locations:	Each work site would have on hand and maintain emergency response equipment. While construction activities are ongoing, all such equipment would be inspected daily for operability and accessibility.
		V.F Spill Response	Pacific Connector's Environmental Representative would conduct clean-up inspection if required.
		VI.4 Cleanup and Disposal of Spills	If necessary, the EI may require the contractor to collect samples of soil strata below the spill to assure that all contaminated soils have been removed from the site.
		VI.4 Cleanup and Disposal of Spills	All materials used to clean up the spill would be double bagged and inspected prior to removal from the spill site.
		VII. Response to Hydrostatic Test Failure	On federal lands, all hydrostatic test failure sites resulting in any breach shall be reviewed by a federal inspector in conjunction with EI.
Y	Transportation Management Plan	1.0 Introduction	A final TMP would be submitted by Pacific Connector to the Agencies for approval prior to issuance of the Grant. It includes a plan for monitoring roads and bridges.
		2.2.2 Straightening, Widening, Cut and Fill, Culverts and Bridges	Pacific Connector would be responsible for all expenses incurred in the use of existing roads and provide funding to reimburse the federal land managing agency for expenses incurred by the agency in required design reviews, monitoring, and approvals during project planning and construction. Pacific Connector's Contractors would conduct an assessment of major culverts crossed by Pacific Connector access roads to determine those that may require modifications or replacement for necessary equipment access.
		2.3 Wet Weather Access	To minimize the potential for both road-related and off-road resource damage, Pacific Connector would perform road surfacing structural capacity assessments and place additional road surfacing (aggregate or bituminous) as needed for the planned use. All work necessary to place the roads in a useable condition for wet weather traffic would be completed prior to use and monitored during use.

TABLE 2.5.2-1

Monitoring Requirements Associated with Pacific Connector's Plan of Development

Appendix	Appendix Title	Appendix Section	Monitoring Requirement
		2.4 Controlling Off-Highway Vehicle Use and the ROW	Pacific Connector would be responsible to monitor and control unauthorized OHV use during the life of the Grant and would implement additional measures as necessary to control OHV access.
		3.0 Transportation Management Practices	Such (noxious weed control) measures include requirements for equipment cleaning and inspections and the use of noxious weed free materials.
Z	Unanticipated Discovery Plan	2.0 Training	Training would occur as part of the preconstruction on-site training program for foremen, EIs, construction supervisors, and all other supervisory personnel who supervise any construction or inspection activities.
		3.0 Procedures for the Inadvertent Discovery of Human Skeletal Materials, Item # 8	If an avoidance technique is possible, construction shall resume and would be monitored by a professional archaeologist and the appropriate Tribe(s) if they request to do so.
		4.0 Procedures for the Inadvertent Discovery of Archaeological Materials, Item # 5	(a) If such a technique is possible, construction shall resume and would be monitored by a professional archaeologist and the appropriate Tribe(s) if they request to do so.
AA	Upper Rock Creek ACEC	Page 2, paragraph 2	To further minimize potential impacts to the ACEC and to ensure that effects to the values of the ACEC are avoided, the following construction and restoration measures would be implemented: • Prior to construction, Pacific Connector would survey and clearly mark the limits of the construction ROW, TEWAs, and USCAs to ensure all project disturbance is minimized and confined to the certificated working limits. • Pacific Connector would monitor restoration efforts after construction to ensure erosion control and revegetation efforts are successful and to treat any noxious weed infestation if necessary.
BB	Wetland and Waterbody Crossing Plan	2.0 Waterbody Crossings (page 14, last paragraph)	Any equipment required to enter a waterbody would be inspected to ensure it is clean and free of dirt or hydrocarbons.
		5.0 Monitoring	Consistent with FERC's *Procedures*, monitoring of restored wetlands would be conducted by a qualified biologist during the growing season annually for a minimum of three years following construction. Information on plant survival, percent vegetative cover, as well as hydrologic conditions would be collected. Vegetation cover would be estimated (ocular) within a 2.5-meter radius that is representative of the site. All species would be listed by stratum and percent cover for each species. Hydrologic indicators and conditions (i.e., water marks or drift lines, sediment deposits, evidence of ponding, etc.) would be visually monitored to determine if wetland hydrology has been reestablished. Photographs would be taken to support the monitoring efforts. Wetland revegetation shall be considered successful if the cover of herbaceous and/or woody species is at least 80 percent of the type, density, and distribution of the vegetation in adjacent undisturbed wetlands. If performance standards are not met in three years, additional monitoring and mitigation may be required (e.g., replanting, soil amendments, selection of alternative species, etc.). Annual reports would be prepared and submitted to the COE, ODSL, and the federal land managing agency by December 31.
		Attachments 2 / 3 1.0 Purpose of Flumed/Dam and Pump Stream Crossings	Flumes/dams require monitoring and occasional repair during the crossing period to ensure the integrity of the structure(s).
		4.0 Material Required to Install and Maintain a Flumed Stream Crossing	Before the flume pipe is installed in the stream, it would be inspected to assure that it is free of grease, oil or other pollutants. In addition, excessive dirt would be removed from the flume pipe. If oil or grease is present on the flume pipe, it would be steam-cleaned before the flume pipe is placed in the stream.
		6.0/5.0 Installation of the Flume Pipe/Dams	Turbidity sampling would be conducted during all flumed/dam and pump crossings in accordance with the Stormwater Pollution Prevention Plan.

TABLE 2.5.2-1

Monitoring Requirements Associated with Pacific Connector's Plan of Development

Appendix	Appendix Title	Appendix Section	Monitoring Requirement
CC	Wetland and Waterbody Crossing Plan	7.0/6.0 Maintenance of the Flume/Dam and Pumps During Construction	Flumed/dam-and-pump crossings require constant monitoring and occasional repair during the crossing process. While the flume/dam and pumps are in place, the contractor would provide a sufficient crew that would be responsible for maintaining the flume/dam and pump crossing.
		13.0/11.0 Dewatering the Construction Area	If the water level in the construction area exceeds the upstream or downstream level of the dams, the environmental inspectors would notice small amounts of turbid water escaping into the stream either upstream or downstream of the dams. The contractor would carefully inspect each pump prior to its delivery to the crossing site. In particular, any frayed hoses or apparent leaks would be repaired before the pumps are delivered to the crossing site. Pump heads and the hoses would be cleaned of any free hydraulic oil prior to placing the pump heads into the stream.
		14.0/13.0 Backfilling the Ditch	The contractor must carefully monitor the effectiveness of the pumps and control the rate of backfill to preclude bleeding through the downstream dam.

2.6 OPERATION AND MAINTENANCE PROCEDURES

2.6.1 LNG Terminal Facilities

Jordan Cove would operate and maintain its facilities in compliance with 49 CFR 193, 33 CFR 127, and other applicable federal and state regulations. Before commencing operation of the LNG terminal, Jordan Cove would prepare and submit for approval operation and maintenance manuals that address specific procedures for the safe operation and maintenance of the LNG storage and processing facilities. Jordan Cove would also prepare an operations manual that addresses specific procedures for the safe operation of the ship unloading facilities in accordance with 33 CFR 127.305. Operating procedures would address normal operations as well as safe startup, shutdown, and emergency conditions.

All operations and maintenance personnel at the terminal would be trained to properly and safely perform their jobs. The terminal operators would be trained in the potential hazards associated with LNG, cryogenic operations, and the proper operations of all the equipment. Jordan Cove states that the operators would meet all the training requirements of the Coast Guard, DOT, ODOE, Oregon State Fire Marshall, Coos Bay, Coos County Fire Department, and other regulatory entities. The SORSC would provide on-site resources and assets, including a Sherriff's office and fire department.

The LNG terminal and related facilities would be staffed with about 145 full-time employees working three shifts, so there would be coverage 24 hours a day, 365 days a year. The terminal's full-time staff would conduct routine maintenance and minor overhauls. Major overhauls and other major maintenance would be handled by bringing in maintenance personnel specifically trained to perform the maintenance. All scheduled and unscheduled maintenance would be entered into a computerized maintenance management system.

2.6.2 Pipeline and Associated Aboveground Facilities

Pacific Connector would test, operate, and maintain the proposed facilities in accordance with DOT regulations provided in 49 CFR Part 192; FERC's guidance at 18 CFR 380.15; rules and regulations promulgated by PHMSA; and maintenance provisions of FERC's *Plan* and *Procedures* (including modifications). The pipeline right-of-way would be clearly marked where it crosses public roads, waterbodies, fenced property lines, and other locations as necessary. All pipeline facilities would be marked and identified in accordance with applicable regulations.

The aboveground facilities would be inspected for the life of the pipeline at intervals that meet DOT requirements. Pipeline personnel would perform routine checks of the facilities, including calibration of equipment and instrumentation, inspection of critical components, and scheduled and routine maintenance of equipment. Safety equipment, such as pressure-relief devices, fire detection and suppression systems, and gas detection systems, would be tested for proper operation. Corrective actions would be taken for any identified problem. Vegetation at aboveground facilities would be periodically maintained using mowing, cutting, trimming and the selective use of herbicides.

To facilitate periodic pipeline corrosion/leak surveys, a corridor centered on the pipeline and up to 10 feet wide would be maintained in an herbaceous state, with no vegetation greater than 6 feet in

height. Trees that are located within 15 feet of the pipeline and that are greater than 15 feet in height would be cut and removed from the right-of-way. Vegetation within the permanent easement would be periodically maintained by mowing, cutting, and trimming (either by mechanical or hand methods). Maintenance activities are expected to occur approximately every three to five years depending on the growth rate. During maintenance, trimmed or cut vegetation would be across the operational easement to naturally decompose and to discourage OHV traffic. Occasionally, where site conditions allow, chipping of this material may also occur. Herbicides would not be used in or within 100 feet of a waterbody's mean high water mark. Vegetation at aboveground facilities would be periodically maintained using mowing, cutting, trimming, and herbicides (selectively).

Pacific Connector would employ a permanent staff of five employees. These permanent operational employees would be stationed and reside at different locations along the pipeline route, but would report to a main office in Eugene, Oregon. In addition, the pipeline and aboveground facilities would be monitored all the time using Pacific Connector's gas control communication system and radio towers reporting back to a command center at the Williams' office in Salt Lake City, Utah.

2.7 FUTURE PLANS AND ABANDONMENT

Jordan Cove has no current plans that would result in the future expansion of its proposed LNG export terminal. Jordan Cove has, however, retained the capability within the proposed design to add the equipment necessary for import of LNG should natural gas market conditions change in the future. In order to either expand the LNG terminal or convert it into an import facility, Jordan Cove would have to file a new and separate application with the FERC, and the proposal outlined in the application would be considered a new undertaking. That new, separate application would be subject to an independent environmental review by the FERC staff, with appropriate input from stakeholders, and the Commission would have to issue a new, separate Order providing authorization if it found the proposal acceptable. That Order may contain new and different environmental conditions.

Jordan Cove does not anticipate abandonment of the proposed LNG export terminal facility in the foreseeable future (more than 30 years). If at some point Jordan Cove did propose to abandon the LNG terminal, it would seek authorization from the FERC to do so. This would involve filing a new and separate application for abandonment under section 7b of the NGA. The FERC staff would then conduct a new environmental review, including input from stakeholders. Again, after the environment review is completed, the Commission would consider whether or not to grant abandonment through the issuance of a new Order.

In its June 10, 2014, MOU with the ODE, Jordan Cove committed to providing a retirement cost estimate and funding surety that is consistent with the EFSC Retirement and Financial Assurance Standard at OAR Chapter 345 Divisions 21 and 22. The MOU stipulates that Jordan Cove would do the following:

- before beginning construction of the LNG terminal, Jordan Cove would submit to the ODE a detailed engineering estimate of the cost to retire and restore the facility;
- before beginning construction, Jordan Cove would post with the ODE a bond or letter of credit to cover the amount in the estimate to retire the facility;

- two years prior to closure of the LNG terminal and the associated power plant, Jordan Cove would develop a final retirement plan, in consultation with Coos County, to be approved by the ODE; and
- Jordan Cove would retire the facility in a nonhazardous condition, so that the land could be restored to future productive use.

At this time, Pacific Connector has no foreseeable plans for future expansion of the facilities. The present design allows for significant future expansion by installation of additional compression only.

In the future, if Pacific Connector proposed to abandon the pipeline facilities, a new separate application would be made to the FERC, under Section 7(b) of the NGA. The application must contain a statement providing in detail the reasons for the abandonment and the impact to customers whose service would be terminated. The application would include an environmental report as specified by 18 CFR § 380.3(c)(2). The FERC staff would conduct an environmental review, including input from stakeholders, before the Commission would consider authorizing abandonment in an Order.

The federal land-managing agencies would need to evaluate any proposed abandonment under the terms of the Right-of-Way Grant. The BLM must consider the final disposition of the pipeline facilities in accordance with 43 CFR 2886, and would require Pacific Connector to address termination and restoration issues in its final POD.