Evaluation and Findings Report

Section 401 Water Quality Certification for the Jordan Cove Energy Project

May 2019

Water Quality Division
165 E. 7th Ave., Suite 700
Eugene, OR 97401
Phone: 503-229-5696
800-452-4011
Fax: 541-686-7551
Contact: Christopher Stine

www.oregon.gov/DEQ

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State of Oregon
Department of Environmental Quality

This report prepared by:

Oregon Department of Environmental Quality
165 E. 7th Ave. Suite 100
Eugene, OR 97401
1-800-452-4011
www.oregon.gov/deq

Contact:
Christopher Stine
541-686-7810

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1.0 Introduction

1.1 Background

On October 24, 2017, the U.S. Army Corps of Engineers (Corps) notified the Oregon Department of Environmental Quality (DEQ) that it had received an application from Jordan Cove LNG LLC and Pacific Connector Gas Pipeline LP, (herein referred to collectively as "JCEP" "Applicant" or "Jordan Cove")JCEP for Section 404 (Clean Water Act, or CWA) and Section 10 and 14 (Rivers and Harbors Act) permits related to construction and operation of LNG facilities and an associated pipeline (collectively, the "Project"). Consistent with its regulations, the Corps determined that the initial application of October 24, 2017, was incomplete on November 3, 2017. 33 CFRR 325.1. The Corps requested additional information from JCEP on November 2017 through May 2018.

JCEP submitted additional information to the Corps on May 8, 2018. Within 15 days of receiving such information from JCEP, the Corps determined it had received a complete application, and issued a public notice on May 22, 2018 (hereinafter referred to as "the Public Notice"). Per DEQ's usual procedure regarding Corps' permit applications, DEQ treated receipt of the Public Notice as receipt of a request for water quality certification under CWA Section 401 ("WQC") for the project pursuant to OAR 340-048-0032. The Public Notice included DEQ's notice of an application for WQC, and commenced the public comment period for the Corps' section 404/10-14 permits application and DEQ's WQC. Thus, DEQ's 401 WQC review process began on May 22, 2018. The Public Notice did not specify the applicable time period for DEQ's certification review; therefore, on June 22, 2018, DEQ sent a request to the Corps for additional time to complete its water quality certification review based upon the specific factual circumstances. 33 CFR 325.2(b)(1)(ii). The Corps responded to DEQ on July 3, 2018, and consistent with its regulations, indicated that DEQ had until May 7, 2019, to act on JCEP's certification request.[1]

1.2 Additional Information Requests

Pursuant to OAR 340-048-0032(2), DEQ made a number of formal additional information requests ("AIRs") to JCEP, see Attachment A. A brief chronology of DEQ requests and JCEP responses is described below, including the supplemental response to the 9/7/18 request that identifies where JCEP's responses were deemed insufficient.

AIR-1: September 7, 2018
Subject: Minimum 401 application and decision requirements per OAR 340-048-0020 & OAR 340-048-0042.

October 8, 2018: Jordan Cove files response.

December 20, 2018: DEQ files supplemental information request providing examples of deficiencies in October 8, 2018 response.

January 22, 2019: Jordan Cove asserted that DEQ's requests were overbroad and onerous, and requested meeting with senior management and legal representatives. During this meeting, DEQ explained that the

[1] Letter from Colonel Aaron Dorf, Corps, to Richard Whitman, DEQ (July 3, 2018). DEQ notes that it also communicated to JCEP its intent to deny water quality certification prior to October 22, 2018, due to the lack of reasonable assurance of the Project's compliance with water quality standards, noting deficiencies in the application and outstanding additional information requests. At that time, JCEP indicated that such responses were forthcoming and, of its own volition, withdrew its then pending request for 401 certification with DEQ on September 25, 2018, and resubmitted a new 401 certification request for the Corps permits that same day. See Letter from Tony Diocee, JCEP to Mary Camarata et. al, DEQ, at 1 (Sept. 25, 2018).

requested information is directly related to specific provisions of the agency's rules for water quality certifications, and that the requested information is consistent with information provided by other large pipeline developers including, most recently, the Ruby pipeline. OAR 340-048-0032, -0020. In many cases, the requested information is necessary for DEQ to determine whether proposed construction methods represent the highest and best practicable treatment and/or control of wastes, activities, and flows – a central narrative water quality criterion. In other cases, particularly where the affected waterbody is water quality limited, any new discharge may be allowed only if the proponent demonstrates that the discharge would not adversely affect the water quality impairment or is allowed under a TMDL implementation plan. This requires some level of site-specific evaluation corresponding to the specific activity proposed and the condition of the waterbody. The JCEP has continued to rely on standard FERC prescriptions and suggest that DEQ use its authority to condition a certification. The problem with this approach is that it presumes that conditions would always succeed in meeting standards. DEQ requires enough information to make an informed judgement before taking such a course JCEP.

February 20, 2019: Jordan Cove files partial response to September 7, 2018 request. Commits to filing remaining material within two months.

April 16, 2019: Jordan Cove files partial response to the December 20, 2018 request.

AIR-2: September 25, 2018
Subject: Post-construction stormwater plan for Jordan Cove Terminal.

October 25, 2018: Jordan Cove files partial response.

April 1, 2019: Jordan Cove files revised stormwater plan in response to September 25, 2018 information request.

AIR-3: March 11, 2019
Subject: Requests information on selection of particular waterbody crossing methods for particular crossings, and for baseline environmental conditions for site-specific stream restoration plans. The JCEP was not able to compile and submit the information requested in time for DEQ to evaluate it before making a 401 WQC decision.

AIR-4: **March 13, 2019**
Subject: Land Use Compatibility.

April 30, 2019: Jordan Cove files a response to prior DEQ requests for information. The JCEP did not submit the information requested with adequate time for DEQ to evaluate it before making a 401 WQC decision.

On March 29, 2019, DEQ reviewed the FAST-41 Coordinated Project Plan for the Project and notes that the Corps has indicated that JCEP has changed the project scope and that the Corps intends to revise the public notice once it receives information in sufficient detail. DEQ notes that if JCEP resubmits an application to DEQ for WQC, and the project scope has changed to include the Blue Ridge Variation,[2] it would need to provide the same information to DEQ for its review.

1.3 Public Comment Period

The Corps' and DEQ's public comment period for the Project were originally set to close on July 21, 2018. The agencies extended the public comment period with a new comment close date of August 20, 2018. DEQ

[2] The Blue Ridge Variation would increase the number of perennial waterbodies crossed by the pipeline by 27. FERC DEIS at 3-20.

received about 42,000 public comments electronically and by mail.

This Evaluation and Findings Report does not include responses to these public comments because DEQ is denying certification JCEP. Therefore, a response to public comments has not been prepared.

1.4 WQC Decision

DEQ has prepared this Evaluation and Findings Report supporting the attached 401 Water Quality Certification decision (the DEQ WQC Decision) for the Corps' issuance of CWA Section 404 and RHA Section 10 permits pursuant to Section 401 of the Clean Water Act (33 U.S.C. Section 1431), Oregon Revised Statutes (ORS) chapter 468B) and OAR 340 Division 48, other water quality related requirements of state law, and in consideration of all public comments received relevant to water quality and beneficial use concerns. As described in the DEQ WQC Decision, DEQ denies the requested certification because it does not have a reasonable assurance that the construction and operation of the Project would comply with applicable state water quality standards. DEQ's decision, however, is made without prejudice. Jordan Cove may reapply for 401 WQC for the Project, and DEQ would consider additional information that is responsive to the bases for denial in this decision.

DEQ notes that it has not received an application for WQC for issuance of a FERC permit or license associated with the Project. DEQ did receive information relevant to JCEP's applications to the Corps for Section 404/10 permits on February 6, 2018; May 21, 2018; November 21, 2018; March 19, 2019 and April 30, 2019. However, to the extent there was any ambiguity as to the nature of the materials received by DEQ on February 6, 2018 (specifically, whether that submittal constituted a separate request to DEQ for WQC for any FERC authorization or was a supplement to materials for the Corps' review) JCEP confirmed in correspondence on December 7, 2018, that the February 6, 2018 materials were supplements to its application to the Corps for Section 404 and Section 10 permits. Additionally, contrary to JCEP's assertion in its December 7, 2018, letter to DEQ that JCEP had submitted to DEQ a 401 WQC application on October 22, 2017, no record supports this assertion. The only materials DEQ received regarding the Project in October of 2017 were emailed notices from the Corps on October 23, 2017 and October 24, 2017 of the Corps' receipt of Section 404/10 permit application materials from JCEP. As described above, the Corps deemed that application incomplete (33 CFR 325.2(a)). As a result, in accordance with DEQ's rule (OAR 340-048-0032(1)) DEQ did not receive a 401 WQC application from JCEP for the Corps' permits until the Corps determined JCEP's application constituted a valid request for certification and issued the Public Notice on May 22, 2018, pursuant to Corps regulations. See 33 CFR 325.2(b)(1)(ii). In the event that JCEP resubmits an application to DEQ for certification, DEQ requests that JCEP expressly state whether the application is for certification for pending FERC authorizations under the Natural Gas Act as well as the pending Corps Section 404/10 permits.[3]

2.0 Summary of Application

Section 401(a) of the Clean Water Act, 33 U.S.C. § 1341(a), requires an applicant for "a Federal license or permit to conduct any activity which may result in a discharge into the navigable waters" to provide the federal licensing or permitting agency a certification from the relevant state that the discharge would comply with applicable provisions of sections 1311, 1312, 1313, 1316, and 1317 of the Clean Water Act.

[3] At this time, DEQ is not aware of any reason why review of a new certification request would require additional time as a result of including both the Corps permits and the proposed FERC authorizations.

2.1 Legal Name of Applicant

Jordan Cove LNG, LLC
Pacific Connector Gas Pipeline, LP
5615 Kirby, Suite 500
Houston, TX 77005

2.2 Description of Project Location

2.2.1 Jordan Cove LNG Export Terminal

The Jordan Cove LNG Export Terminal and associated facilities are proposed be located primarily on the bay side of the North Spit of Coos Bay in southwest Oregon in Section 5 of Township 25 South, Range 13 West at Latitude/Longitude: 43.432238°, -124.267136°. The primary site for the LNG Terminal is about 7.5 miles up the existing Coos Bay Federal Navigation Channel, approximately 1,000 feet north of the city limit of North Bend, in Coos County, Oregon, and more than one mile away from the nearest residence. Figure 1 presents a site plan of the proposed LNG Export Terminal.

2.2.2 Pacific Connector Gas Pipeline

The Pacific Connector gas pipeline would extend for about 229 miles across Klamath, Jackson, Douglas, and Coos Counties, Oregon and terminate at the proposed Jordan Cove LNG Export Terminal in Coos County. Figure 2illustrates the proposed alignment of the Pacific Connector gas pipeline. The pipeline would occupy 4,947.7 acres of land during construction and 1,398.57 acres of land as part of a permanent easement.

2.3 Adjacent Landowners

A list of landowners adjacent to the Jordan Cove LNG Export Facility is provided in Attachment K to the Section 404/10 application to the Corps and is incorporated here by reference.

Jordan Cove seeks to negotiate agreements with private, non-federal landowners to occupy lands necessary for temporary and permanent pipeline easements. Jordan Cove would also apply for Right-of-Way Grants with Federal land agencies to construct and operate the pipeline on federally owned lands.

2.4 Description of Activity

Jordan Cove Energy Project, LP is seeking to site, construct, and operate a natural gas liquefaction and liquefied natural gas export facility to be located on the bay side of the North Spit of Coos Bay, Oregon. To supply the LNG Terminal with natural gas, Pacific Connector Gas Pipeline, LP is proposing to construct and operate a new, approximately 229-mile-long natural gas transmission pipeline and compressor station from interconnections with the existing Ruby Pipeline LLC and Gas Transmission Northwest LLC (“GTN”) systems to the LNG Terminal.

The Project is described more fully in section three of this report, and in the Section 404/10 Application to the Army Corps of Engineers (NWP-2017-041), which is incorporated into this section by reference.

Figure 1: Jordan Cove LNG Export Facility

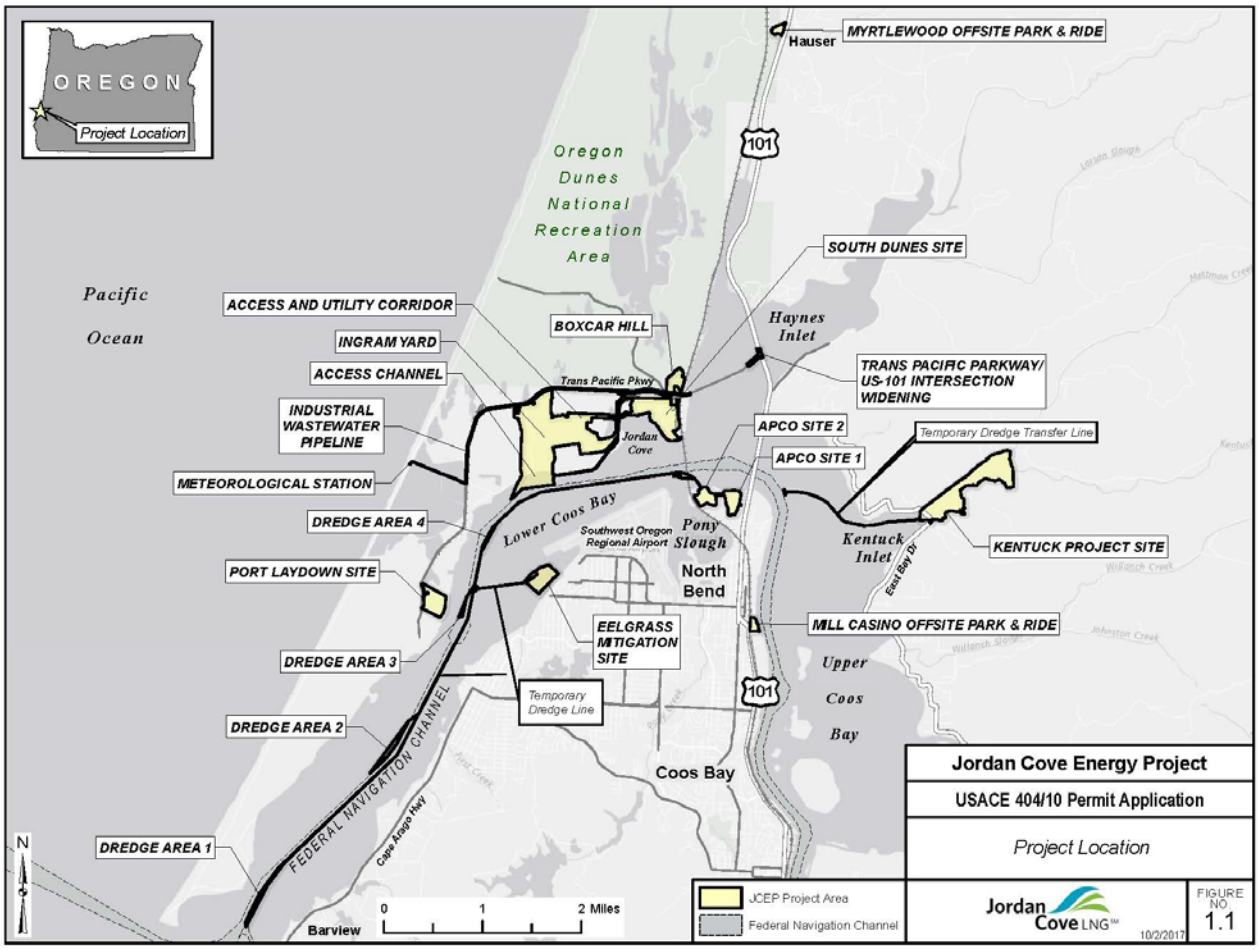
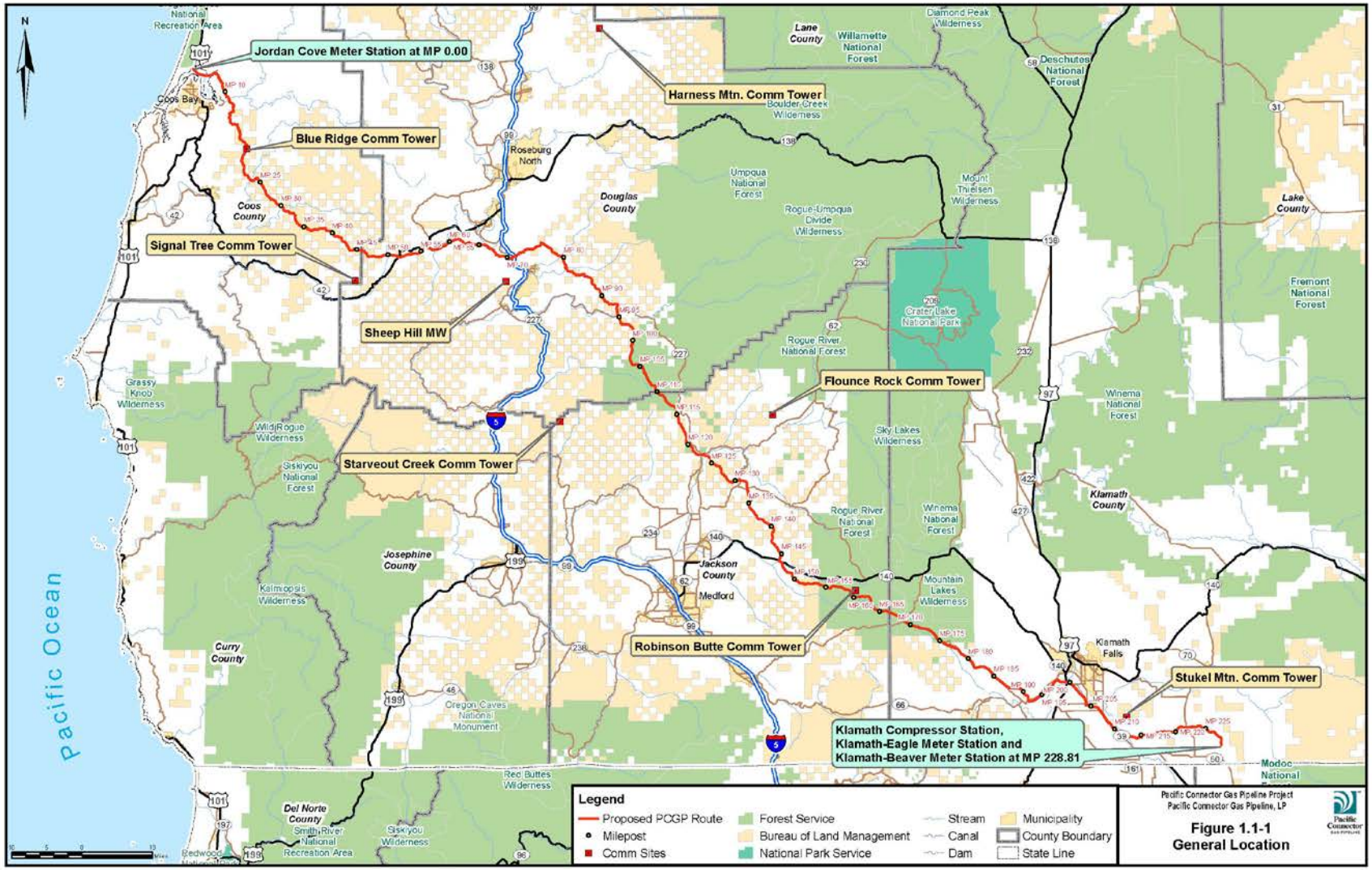


Figure 2: Pacific Connector Pipeline Alignment



2.5 Waters of the State Affected by the Project

2.5.1 Water Resources Affected by the Jordan Cove LNG Facility

Construction and operation of the Jordan Cove LNG Export Terminal would result in the temporary and permanent loss of estuarine and freshwater wetlands as well as alterations to those wetlands. In addition, the construction and operation of the Export Terminal would affect the Coos Bay estuary. A comprehensive accounting of wetland and water resources affected by the proposed action is presented in Section 6 of the Section 404/10 application to the US Army Corps of Engineers (NWP-2017-041).

2.5.2 Water Resources Affected by the Pacific Connector Gas Pipeline

Basins and watersheds affected by the proposed Pacific Connector gas pipeline are summarized in Table 1, below. The proposed pipeline would cross approximately 352 waterbodies (not including wetlands).

Table 1: Subbasins and Watersheds Crossed by the Proposed Gas Pipeline

Subbasins and Watersheds Crossed by Proposed Pacific Connector Pipeline

	Level 5 Watershed		
Subbasin	**Watershed Name**	**HUC a/**	**Miles Crossed b/**
Coos	Coos Bay- Frontal Pacific Ocean	1710030403	15.4
	South Fork Coos River c/	1710030401	2.0
Coquille	North Fork Coquille River	1710030504	11.5
	East Fork Coquille River	1710030503	9.7
	Middle Fork Coquille River	1710030501	15.8
South Umpqua	Olalla Creek-Lookingglass Creek	1710030212	8.8
	Clark Branch - South Umpqua River	1710030211	12.8
	Myrtle Creek	1710030210	8.9
	Days Creek - South Umpqua River	1710030205	19.2
	Elk Creek c/	1710030204	3.3
	Upper Cow Creek	1710030206	5.3
Upper Rogue	Trail Creek	1710030706	10.7
	Shady Cove - Rogue River	1710030707	8.1
	Big Butte Creek	1710030704	5.1
	Little Butte Creek	1710030708	32.9
Upper Klamath	Spencer Creek	1801020601	15.1
	John C. Boyle Reservoir - Klamath River-	1801020602	5.4
Lost River	Lake Ewauna-Upper Klamath River	1801020412	16.3
	Mills Creek - Lost River	1801020409	23.0
		Total	**229.1**

a/ Hydrologic Unit Code (USGS 1987).
b/ Total miles of watershed area crossed by the pipeline in each HUC, rounded to nearest tenth of a mile.
c/ There are no waterbodies crossed in these watersheds.

2.6 Documents Filed in Support of the JCEP Application

Jordan Cove submitted the following documents in support of their request for water quality certification:

May 22, 2018 – U.S. Army Corp Engineers Section 404/10 permit application (NWP-2017-014)

- US Army Corp Engineers Section 404/10 permit application materials (Oct. 23, 2017)
  - Additional Application Information to NWP-2017-041 (November 21, 2018)

- Section 401 Water Quality Package (February 6, 2018)
  Part 1: Jordan Cove Energy Project 401 Package
  Part 2: Pacific Connector Gas Pipeline 401 Package

- Additional Application Information to NWP-2017-041 (March 19, 2019).
- Responses to requests for additional information filed by DEQ on September 7, December 20, 2018, March 11 and March 13, 2019.

2.7 Public Notice(s) Issued by the Federal Licensing Authority

On May 22, 2018, the US Army Corps of Engineers publically noticed the receipt of a Section 404/10 application by the Jordan Cove LNG, LLC.[4] Corps' public notice also included a public notice of receipt of an application to DEQ for section 401 water quality certification pursuant to OAR 340-048-0032(1). The issuance date and public comment period for the applications were as follows:

Issue Date: May 22, 2018
Expiration Date: July 21, 2018
US Army Corps of Engineers No: NWP-2017-41

Following requests from the public, the Corps and DEQ extended the public comment period to August 20, 2019.

2.8 Land Use Determination by Local Planning Jurisdiction

An application for a 401 water quality certification is required to include land use compatibility findings for the activity prepared by the local planning jurisdiction (OAR 340-048-0020 (2)(i)(A)). The Project is located in the land use planning jurisdictions of Klamath County, Jackson County, Douglas County - noncoastal and coastal - sections, Coos County, City of Coos Bay, and the City of North Bend.

The JCEP supplied land use compatibility statements from Klamath County, Jackson County, Douglas County - coastal and non-coastal sections, Coos County, City of Coos Bay, and City of North Bend for the associated Pacific Connector pipeline and Jordan Cove Liquid Natural Gas Projects on January 28, 2019. DEQ found that the land use compatibility statements to be insufficient for various reasons (i.e., no determination of compatibility was made by the jurisdiction; land use approval had expired; and, in another case, an appeal was pending).

DEQ received additional information related to land use on April 30, 2019. This submission did not provide time for DEQ to evaluate it before making its 401 water quality certification decision.

Land use compatibility is addressed in more detail in Section 8 of this report.

2.9 Consistency with Other Requirements of State Law

Please refer to section 8 of this Evaluation and Findings Report.

[4] https://www.nwp.usace.army.mil/Missions/Regulatory/Notices/Article/1529167/nwp-2017-41/

3.0 Project Description

The Project consists of two distinct but interconnected parts: the Jordan Cove LNG Export Terminal, and the Pacific Connector Natural Gas Pipeline. Jordan Cove developed the Section 404/10 permit application in two sections to present each principle project component: Part 1 presents the Jordan Cove LNG Export Terminal; Part 2 presents the Pacific Connector Gas Pipeline. The following sections present descriptions of the proposed activities.

3.1 Jordan Cove LNG Export Terminal

The proposed Jordan Cove LNG export terminal would be located on the bay side of the North Spit of Coos Bay, Oregon. The export terminal and associated facilities (collectively, the "LNG Export Facilities") include the following components:

- LNG Export Terminal
- Slip and Access Channel
- Materials Offloading Facility
- Navigation Reliability Improvements
- Meteorological Station
- Industrial Wastewater Pipeline
- Trans Pacific Parkway / US 101 Widening
- APCO Sites 1 and 2
- Kentuck Site
- Eelgrass Mitigation Site
- Temporary Construction Areas

A complete description of the proposed action is presented in Section 6 of Part 1 of the Section 404/10 Permit Application filed by Jordan Cove with the Corps, and further described in Resource Report RR1 ("General Project Description") dated September 2017[5]. This report incorporates by reference the entirety of the proposed project as described in these documents and as summarized below:

LNG Terminal

The LNG Terminal includes all building infrastructure, machinery, utilities, and other project components associated with the receipt, liquefaction, storage, and loading of LNG onto ocean-going LNG carriers for export. The principle areas include the following:

- Ingram Yard – Includes LNG storage, loading, and export facilities.
- South Dunes Site – Includes temporary and permanent facilities including a Workforce Housing Facility, metering station, administrative building, and the Southwest Oregon Regional Safety Center.
- Access and Utility Corridor – A narrow corridor connects Ingram Yard with the Dunes site, which would provide temporary construction and permanent access roads and facilities, and would include the Fire Department Facility, underground utilities, and gas feed to the LNG Terminal.

Slip and Access Channel

Jordan Cove proposes a 38-acre marine slip for vessel loading. Jordan Cove proposes to excavate the marine slip from land that is currently upland area in the North Spit. To connect the Slip with the existing Coos Bay Federal Navigation Channel, Jordan Cove proposes to dredge about 22 acres of open water area. The Access Channel would be excavated to a depth of 45.21-feet MLLW with a 2-foot overdredge allowance and a 1.7-foot advance maintenance allowance (total depth of 48.91 feet MLLW, or 11.91-feet deeper than the authorized Federal

[5] Resource Report No. 1 General Project Description, Jordan Cove Energy Project September 2017. https://www.jordancovelng.com/pdf/FERC-Filing-Public-Only/JCEP/Volume-II-Public/RR1/2.1.1-JCEP-RR1.pdf

Navigational Channel depth at Channel Mile 7.3 near the proposed Project.[6]

Materials Off-Loading Facility
This area includes a permanent marine offloading facility for initial delivery of construction equipment, site construction, and future delivery of construction equipment related to facility maintenance.

Navigation Reliability Improvements
JCEP plans to excavate four submerged areas lying adjacent to the FNC to improve navigation efficiency and reliability for under broader weather conditions. The four NRI locations would require dredging approximately 700,000 cubic yards of sediment and the creation of disposal areas in the Coos Bay area.

Meteorological Station
Jordan Cove proposes to construct a new, permanent meteorological facility located on the west side of the lagoon on the North Spit. The facility would measure wind speed, direction, and other data to provide weather information to the LNG Terminal facility to support ship navigation.

Industrial Wastewater Pipeline
Relocation of an existing industrial wastewater discharge line near the Trans Pacific Parkway.

Trans Pacific Parkway and U.S. Highway 101Intersection Widening
Jordan Cove proposes to widen the intersection of the Trans Pacific Parkway and US-101 to provide safe ingress/egress during construction. The proposed widening would create a left-turn lane from Trans Pacific Parkway onto northbound US-101, and a right-turn lane from US-101 onto Trans Pacific Parkway.

APCO Sites 1 and 2
Jordan Cove proposes to utilize two land parcels on North Point, separated by a mudflat, for permanent placement of dredge material and temporary laydown of construction material.

Kentuck Project Mitigation Site
Jordan Cove proposes to mitigate for impacts to wetlands by restoring hydrologic and habitat function at the approximately 100-acre former golf course located adjacent to Kentuck Slough.

Eelgrass Mitigation Site
To mitigate for the permanent loss of eelgrass habitat due to dredging the Access Channel, Jordan Cove proposes to create a 9.3-acre eelgrass mitigation site near the offshore end of the North Bend Municipal Airport runway.

Temporary Construction Sites
Jordan Cove proposes to use additional sites outside of the immediate project construction footprint to provide space for construction staging, temporary equipment laydown, and employee park & rides. These areas include the Port Laydown site, Roseburg, Boxcar Hill, Myrtlewood and Ride and Mill Casino Park and Rides and APCO Site.

3.2 Pacific Connector Natural Gas Pipeline

Pacific Connector proposes to site, construct, and operate a 229-mile 36-inch diameter natural gas pipeline from interconnections with two existing interstate natural gas pipelines, the Ruby Pipeline and Gas Transmission Northwest LLC's GTN Pipeline, near Malin, Oregon, to the proposed Jordan Cove LNG Export Terminal near Coos Bay, Oregon. Part 2 of the Section 404/10 application filed with the Corps describes the proposed pipeline. The proposed action is further described in Resource Report RR1 ("General Project Description") provided as

[6] This depth would be consistent with the depth of the FNC that is proposed under the Port of Coos Bay Channel Modification, which is currently under consideration by the Corps. See, https://www.nwp.usace.army.mil/coast/coos-bay/channel-modification/ (last visited 5/3/2019).

Attachment A to the Corps' application. This report fully incorporates by reference the description of the proposed pipeline and associated facilities (collectively, the Applicant) presented in these two Corps' documents, which are briefly summarized below:

3.2.1 Pacific Connector Natural Gas Pipeline

Applicant is seeking to construct and operate a new 229-mile 36-inch diameter gas pipeline. The proposed pipeline would receive natural gas from interconnections near Malin, Oregon and deliver the gas to the Jordan Cove LNG Export Terminal near Coos Bay, Oregon. There, the natural gas would be liquefied, stored, and load onto vessels for transit to Pacific markets. The pipeline is expected to transport up to 1,200,000 decatherms per day (Dth/d) at 1600 psig and produce up to 7.8 million metric tons per annum (mtpa) LNG for export.

Over most of the alignment, the pipeline would occupy a 95-foot temporary easement during construction and a 50-foot permanent easement during operation. Applicant proposed exceptions to the width of both the operational and permanent easement to reduce impacts to areas such as wetlands and stream crossings. Applicant describes the proposed alignment of the Applicant gas pipeline in the Environmental Alignment Sheets, Appendix H.1 of Resource Report 1, which is incorporated herein by this reference.

3.2.2 Aboveground Facilities

Applicant proposes permanent infrastructure installations to support operation of the gas pipeline. Aboveground facilities proposed by Applicant are described in Section 1.1.2.3 of Resource Report 1, General Project Description, and summarized below.

Klamath Compressor Station

Applicant would locate the Klamath Compressor Station at MP 228.81 near the interconnection with the existing Ruby and Gas Transmission Northwest (GTN) pipelines. The compressor station includes two turbine-driven centrifugal compressor units providing 62,200 ISO[7] horsepower of compression and one similar 31,300 ISO horsepower compressor unit for backup compression operation.

Jordan Cove Meter Station

The Jordan Cove Meter Station would be located at the pipeline terminus on 1.72 acres of the Jordan Cove site adjacent to the LNG export terminal. A pig launcher/receiver and mainline block valve would be located within the meter station facility.

Launchers and Receivers

Pigging is the practice of using devices ("pigs") to conduct routing maintenance and inspection of pipeline interiors. Applicant would insert pigs at launching stations and transport these under pressure to a receiving station. Applicant proposes pig launching and receiving stations at each end of the pipeline. Applicant also proposes intermediate stations collocated with Block Valve Assemblies #6, #11 and #14 at MPs 71.51, 132.46 and 187.43.

Mainline Block-Valve Assemblies

Applicant proposes seven mainline block valves to isolate sections of the pipeline consistent with US Department of Transportation requirements and applicable guidance or rules by the Pipeline and Hazardous Materials Safety Administration. Applicant would automate five block-valves at intermediate locations along the alignment.

Communications Sites

Communications between the Klamath Compressor Station and the Jordan Cove Meter Station would require communication sites distributed along the pipeline alignment. Applicant expects fifteen communications locations are required including those located at the Klamath Compressor Station and the Jordan Cove Meter Station. Applicant is investigating leasing capacity from existing communications sites and building new facilities, as needed. Where feasible, new installations would be collocated with proposed aboveground facilities.

[7] International Organization for Standardization.

3.2.3 Land Requirements

Applicant describes the land required to construct and operate the proposed gas pipeline in Section 1.2 of Resource Report 1, General Project Description. DEQ incorporates this description by reference in this report. A summary of temporary and permanent land required for the project is presented in Table 2, below.

Table 2: Total Pipeline Land Requirements for Construction and Operation

Pipeline Component	Length (miles) or Number of Sites	Land Affected During Construction (acres)	Land Affected During Operation (acres)
Pipeline Facilities	229.09*	2,582.04	1,373.66[1] / 820.60
Temporary Extra Work Areas[2]	1,603	922.64	(44.80)[7]
Uncleared Storage Areas	320	676.44	0.00
Quarries & Disposal Sites	20	41.18	(41.18) [7]
Contractor and Pipe Storage Yards	36	674.17	0.00
Existing Roads Needing Improvements in Limited Locations [3]	32 Improvements (27 Roads)	22.52	(22.70)[9]
Temporary Access Roads	10	3.80	0.00
Permanent Access Roads	15	2.16[4]	2.16[4]
Aboveground Facilities	17	22.75[5]	22.75[6]
Total		**4,947.70**	**1,398.57[7, 8]**

* Because of changes in the centerline and associated MP equations, the ending MP no longer represents the actual centerline length.

[1] New permanent easement is 50-feet on private and federal lands.

[2] TEWAs are shown on the Environmental Alignment Sheets provided in Appendix H.1.

[3] Includes those existing roads requiring widening in specific locations; does not include limbing/brush clearing or blading/grading for potholes.

[4] Portions of the PARs are within the construction right-of-way and permanent easement.

[5] Construction impacts associated with the aboveground facilities are included in the construction impacts for the Pipeline facilities except the 8 potential communication tower sites and the Klamath Compressor Station, which are included here (1.61 acres and 17.14 acres, respectively).

[6] Portions of the operational impacts of the aboveground facilities are included within the permanent easement acreage.

[7] Represents TEWAs, existing quarries, and rock source and disposal sites provided in Table A.8-4 that may be used as permanent storage areas. The acreages are not included in the overall operational total because the storage areas will not be used during operation of the Pipeline.

[8] Although the improvements will not be reclaimed, these road improvements are not needed for operations, and the acres are not included in the total operational acreage.

Source: Pacific Connector Gas Pipeline Project, Resource Report 1

3.3 Port of Coos Bay Proposed Channel Deeping Project

The Oregon International Port of Coos Bay is proposing modifications to the lower Coos Bay Federal Navigation Channel to deepen, widen and lengthen the channel (the "Port Channel Deepening Project").[8] The Port Channel Deepening Project would expand the existing channel from -37' depth and 300' width to -45' depth and 450' width from the channel entrance to river mile 8.2, just beyond the Jordan Cove LNG Export Terminal. The Port Channel Deepening Project is not included in the activity under consideration for this 401 WQC sought by Jordan Cove. Jordan Cove did not request that DEQ consider the effects of the proposed deepening of the Federal Navigation Channel in the section 401 evaluation for the JCEP. According to Jordan Cove and the U.S. Coast Guard, the JCEP could function without the Port Channel Deepening Project, although the timing and (potentially) the overall volume of vessel traffic would likely be different.

[8] https://www.portofcoosbay.com/channel-deepening

Jordan Cove requires a depth of -45 feet to accommodate the expected class of LNG carriers with a minimum 10-percent under-keel clearance while ships are in dock. Because the draft of these vessels exceeds the present depth of the Federal Navigation Channel, these vessels cannot fully utilize the channel on all tides. Further, the Port Channel Deepening Project is largely dependent on JCEP as a source of financing for the proposed work. The Federal Energy Regulatory Commission is considering the cumulative effects of the Channel Deepening Project together with the effects of the proposed LNG Export Facilities.[9] In the event that Jordan Cove resubmits an application for certification, DEQ requests that the analysis being performed for FERC (or the Corps, or other similar information) be included in the submittal to DEQ given the likelihood that if the JCEP becomes operational, the Channel Deepening Project is also likely to occur. Information that DEQ currently holds shows that there could be cumulative effects on salinity and dissolved oxygen. The significance of these effects has not been fully analyzed at this time.

4.0 Water Quality Standards

Water quality standards are comprised of three elements. These include the beneficial uses that must be protected, the water quality criteria intended to protect those uses, and an antidegradation policy that is designed to prevent worsening existing water quality. To support all beneficial uses, DEQ applies numeric and narrative criteria to specific waterbodies and reaches within those waterbodies. OAR 340, Division 41 contains Oregon's water quality standards including beneficial uses, policies, and criteria. This section of the Evaluation and Findings Report identifies the beneficial uses designated within the area of the proposed Project and the narrative and numeric criteria established to protect those uses.

[9] FERC DEIS, at 4-793.

4.1 Beneficial Uses

Table 3 identifies designated beneficial uses within the area of the proposed Project.

Table 3: Designated Beneficial Uses

	South Coast		Umpqua		Rogue			Klamath	
Beneficial Use	**Estuaries and Adjacent Marine Waters**	**All Streams and Tributaries Thereto**	**South Umpqua River Main Stem**	**All Other Tributaries to Umpqua, North and South Umpqua Rivers**	**Rogue River Main Stem From Estuary to Lost Creek Dam**	**Rogue River Main Stem above Lost Dam and Tributaries**	**All Other Tributaries to Rogue River and Bear Creek**	**Klamath River from Klamath Lake to Keno Dam**	**Lost River and Lost River Diversion Channel**
Public Domestic Water Supply		X	X	X	X	X	X	X	X
Private Domestic Water Supply		X	X	X	X	X	X	X	X
Industrial Water Supply	X	X	X	X	X	X	X	X	X
Irrigation		X	X	X	X	X	X	X	X
Livestock Watering		X	X	X	X	X	X	X	X
Wildlife and Hunting	X	X	X	X	X	X	X	X	X
Fishing	X	X	X	X	X	X	X	X	X
Boating	X	X	X	X	X	X	X	X	X
Water Contact Recreation	X	X	X	X	X	X	X	X	X
Aesthetic Quality	X	X	X	X	X	X	X	X	X
Hydro Power		X	X	X		X	X	X	
Commercial Navigation and Transportation	X				X			X	
Fish and Aquatic Life	X	X	X	X	X	X	X	X	X

4.2 Numeric and Narrative Criteria

Oregon has adopted numeric and narrative criteria to support designated beneficial uses. DEQ's biologically based numeric criteria identify minimum conditions necessary to support life-stage histories of sensitive aquatic receptors such as salmonids. DEQ further implement numeric criteria through basin-specific rules that reflect regional water quality requirements. DEQ uses Oregon's narrative criteria to identify goals, practices and objectives to prevent degradation of water quality characteristics necessary to support all beneficial uses.

Section 305(b) of the Clean Water Act requires that states bi-annually assess the status of water quality. Water bodies that do not provide full support for designated beneficial uses are included on a list of impaired water bodies as required by Section 303(d) of the Clean Water Act. Impaired water bodies cannot assimilate additional pollution. DEQ is required to develop Total Maximum Daily Loads for impaired segments of water bodies to reduce pollution loading with the objective of attaining compliance with numeric and narrative criteria. In water bodies that are on the 303(d) list, where no TMDL has yet been adopted, new discharges may be allowed only if it is demonstrated that they would not increase the applicable pollutant load or that any such increase is mitigated.

4.3 Antidegradation Policy

Oregon's antidegradation policy (OAR 340-041-0004) applies to all surface waters. Oregon's antidegradation policy complements the use of water quality criteria. While numeric criteria provide the minimum conditions

needed to protect designated uses, antidegradation extends protection to waters whose characteristics meet or exceed minimum criteria. The policy prohibits degradation of water quality in some circumstances and provides for exceptions in others; however, the policy allows the lowering of water quality only after a systematic decision-making process considering many factors. These factors include the waterbody classification, consideration of alternative treatments, and a comparison of economic and social benefits with environmental costs. In addition, the antidegradation policy requires the involvement of the public through direct notice and through coordination with other government agencies. In this way, DEQ makes decisions to maintain or to change current water quality only after a deliberate and inclusive process. The goal of the antidegradation policy is to prevent unnecessary further degradation of water quality and to protect, maintain, and enhance the quality of existing surfaces waters to ensure the full protection of all existing beneficial uses

5.0 Proposed Actions Included in this 401 Analysis

Sections 3.1 and 3.2 of this Evaluations and Findings Report summarize the activities that are considered in this 401 WQC. These sections describe, in more detail, the methods and activities proposed by Jordan Cove and Pacific Connector to construct and operate the Jordan Cove Energy Project.

5.1 Pipeline Construction

Pipeline construction procedures are described in Section 1.3 of Pacific Connector's Resource Report 1 and are summarized below.

The 229-mile proposed pipeline alignment extends from the Jordan Cove LNG Export Terminal in Coos Bay to interconnections with existing pipelines near Malin, Oregon. Typical construction steps include surveying and staking the alignment, clearing and grading, trenching for pipe installation, pipe assembly, pipe placement and backfilling, hydrostatic testing, and site restoration. Because of the geographic scope of the project, Applicant anticipates performing pipeline construction in at least five construction spreads.

Applicant proposes to construct the pipeline generally within a 95-foot wide temporary construction right-of-way. To reduce impacts to water bodies or other sensitive areas the construction corridor, Applicant proposes to reduce the construction right-of-way width to 75 feet when it is sited through wetlands and waterbodies. Applicant anticipates pipeline construction would require an additional 922 acres of temporary extra work areas adjacent to the construction right-of-way to accommodate temporary storage of timber, slash, soil, rock, material and other construction-related equipment.

Applicant expects to exceed the minimum pipeline burial depths required by US Department of Transportation in 49 CFR 192.327. Where possible, JCEP would install the pipeline up to 36-inches deep in Class 1 areas with normal soils and 24-inches deep in Class 1 areas with consolidated rock. Applicant may consider deeper burial depths at stream crossings based on site conditions and concerns about erosion or scour potential.

Applicant proposes a significant portion of the alignment in rugged mountainous areas of Oregon's Coast Range and Cascade Range. A portion of the alignment traverses the Tyee Core Area with in the Coast Range. This area is characterized by steep slopes, erosive soils, rapidly moving landslides, and deep-seated landslide activity. During routing of the Pipeline, Applicant generally aligned the pipeline along ridgelines, where feasible, to minimize cut and fill requirements, traversing steep slopes, and conflicts with other potential geologic hazards. However, in numerous areas the pipeline must descend and ascend steep slopes to cross stream valleys.

5.2 Waterbody Crossings

The proposed 229-mile pipeline would affect approximately 352 waterbodies (not including wetlands). Of these, 69 have been identified as perennial streams and 270 as intermittent streams. The pipeline route would also affect some ponds and ditches, and the Coos Bay estuary. For intermittent streams that are not flowing at the time of construction, Applicant proposes standard overland construction techniques consistent with FERC national guidelines. Applicant expects to bury the top of the pipe to at least five feet below the streambed at all crossings.

For most streams that are flowing at the time of construction, Applicant proposes to use one of three dry open cut crossing methods. These methods temporarily divert the flowing stream around the crossing location to allow construction to proceed in a dewatered work area. Dry open-cut techniques include:

Diverted Open-Cut

Applicant proposes a diverted open-cut for the eastern (second) crossing of the South Umpqua River at about MP 94.7. This is the only crossing where a diverted open-cut is proposed. Applicant would achieve this crossing by diverting the river's flow into half of the channel while work is performed on the opposite half. Upon completion, flow would be routed to the opposite side of the channel to complete the installation. Applicant prepared a site-specific plan for crossing the South Umpqua River at MP 94.7.39. The river is approximately 125 wide at this location.

Fluming and Dam-and-Pump Techniques

Both fluming and dam-and-pump techniques rely on diverting upstream flow around the work area. Fluming systems use gravity flow through a series of pipes, while dam-and-pump techniques use mechanical pumps to transfer flow around the isolated work area. Both are generally used on crossings under 100 feet in width. These techniques require the temporary installation of an upstream and downstream dam to isolate the work area and create a pool of water to be diverted, as well as a dewatering system to remove water from the active work area. Details of the waterbody crossing techniques proposed by Applicant are described further in Section 2.2.5 of Resource Report 2.

Direct Pipe

Direct Pipe is a trenchless technology that provides a continuously supported hole during installation. Direct Pipe installations use an articulated, steerable micro-tunnel boring machine mounted to the leading end of the pipe or casing. Applicant would use bentonite slurry to increase lubrication and advance the micro-tunnel boring machine. Direct Pipe uses lower internal pressures and eliminates the reaming and pullback requirements of a horizontal directional drill. Applicant provides an overview of Direct Pipe technology in Appendix J.2 of Resource Report 2 including a report on the proposed direct pipe crossings beneath Interstate I-5, Dole Road, a railroad, and the South Umpqua River at MP 71.30.

Horizontal Directional Drill

Applicant proposes to install the pipeline using trenchless, horizontal directional drilling techniques beneath two sections of the Coos Bay Estuary (MP 0.3–1.0 and MP 1.5–3.0), three major waterbodies (Coos River at MP 11.1R; Rogue River at MP 122.7; and Klamath River at MP 199.4). HDD installations require establishing a pilot hole along the drill path and enlarging the hole with successive passes of a reaming tool until Applicant can install the pipe . During drilling and reaming operations, Applicant would advance high pressure drilling fluid consisting of bentonite slurry through the drill pipe. Return fluid flows back through the annular space to the maintain borehole and provide lubrication. Maintaining proper pressure within the borehole is critical. Low pressure can cause the installation to seize. However, internal drilling pressures exceeding the resistive overburden forces can cause escape of drilling fluids to the overlying waterway.

5.3 Construction and Maintenance of Roads

Access to the pipeline right-of-way during construction and operation would require the use of existing access roads, the construction of new temporary and permanent access roads, and transportation of equipment within the construction and permanent right-of-ways. Roads under heavy loads represent a significant potential source of sediment input to hydrologically connected streams.

Applicant has identified over 660 miles of existing access roads that it would use to access the pipeline during construction.[10] These include roads on federal, municipal and private lands. Applicant identifies numerous miles of these existing access roads as gravel, dirt, rock, and pit run surfaced roads. Applicant has not provided a field inventory of these roads to ensure a realistic understanding of upgrades and/or best management practices that would be needed to prevent sediment runoff to receiving streams.

Applicant is also proposing the new construction of approximately 25 segments of Temporary Access Roads and Permanent Access Roads to connect the construction right-of-way with existing access roads identified above. Lastly, Applicant would use a 229-mile construction access road in the construction right-of-way to allow construction equipment and vehicles to perform trenching and pipeline construction activities. Temporary Access Roads and Permanent Access Roads must be designed, built and maintained according to minimum design standards to prevent sediment discharge during pipeline construction.

5.4 Permanent Pipeline Right-of-Way

JCEP would maintain a permanent easement for the long-term operation and maintenance of the pipeline. The permanent easement would occupy approximately 1,374 acres based on the proposed 50-foot width. Applicant would control the vegetation in 30-feet of this 50-foot permanent easement as described below. To allow access along the right-of-way for inspections and maintenance, Applicant would maintain the permanent easement in an herbaceous state within a 10-foot corridor centered on the pipeline. In addition, Applicant would maintain vegetation in a small shrub and herbaceous state within 5 feet beyond the 10-foot corridor described above. Applicant would not alter the revegetated area beyond 15 feet of the pipeline centerline.

Development and maintenance of the permanent easement would alter surface hydrology within the permanent right-of-way. To manage post-construction stormwater and groundwater flow beneath the pipeline, Applicant proposes to install permanent erosion control devices including of trench breakers, slope breakers or waterbars, and perform revegetation measures to permanently stabilize disturbed areas. DEQ recognizes stormwater runoff from permanently maintained portions of the Project right-of-way as potential sources of pollution to hydrologically connected streams and waterways. This Evaluations and Findings Report evaluates the effectiveness of BMPs and controls proposed by the JCEP to reduce the impact on water quality of stormwater from the permanent right-of-way.

5.5 Terminal and Off-Site Project Area Stormwater

DEQ requires a post-construction stormwater management plan from applicants for section 401 water quality certifications if the project will add or reconstruct impervious surface areas.[11] On September 7, 2018, DEQ requested JCEP prepare and submit a post-construction stormwater management plan developed according to DEQ's March 2018 guidelines. The plan must address proper management of process chemicals, spill containment controls, best management practices, and a maintenance schedule for engineering controls.

Applicant must also address the discharge of stormwater from off-site areas. DEQ also recognizes that stormwater discharges from these areas may contact off-site placement of dredged material causing sediment discharge, turbid

[10] Table A.8-1 (Access Road Table), Part 2, Appendix B, Section 404 Permit Application

[11] Post-Construction Stormwater Management Plan Submission Guidelines. DEQ, March 2018.

flows, and decant water (i.e., leachate) to public waters. For freshwater wetlands, the discharge of saline decant water can alter aquatic species composition. This Evaluations and Findings Report evaluates the effectiveness of BMPs proposed by the JCEP to reduce the impact on water quality of stormwater from Terminal and Off-Site Project Area stormwater.

5.6 Jordan Cove LNG Terminal Dredging

JCEP proposes to dredge portions of the North Spit of Coos Bay to construct its LNG Export Terminal. The principle areas include the marine slip, and access channel connecting the slip to the existing Federal Navigation Channel, and four areas abutting the current boundary of the navigation channel between RM 2 to RM 7 (figure 2.1-1). Dredging would modify the physical morphology of the channel, by widening four turns along the channel, to allow for more efficient transit of LNG carriers. The proposed dredging would be sloped to an angle of three feet horizontal to one foot vertical (3:1). The access channel and slip would have a depth of 45 feet (deeper than the current navigation channel, which is currently maintained at 37 feet). The proposed dredging would generate approximately 6.32 million cubic years of material. Dredged material would be used to elevate the proposed LNG Terminal facilities, and disposed of at a combination of other sites including Roseburg Forest Products, the Al Pierce Company (APCO), and at Kentuck slough (a 140-acre wetlands mitigation site). The Project would require ongoing maintenance dredging as well as the initial dredge operations.

6.0 Water Quality Compliance Evaluation

6.1 Statewide Narrative Criteria

6.1.1 Applicable Standard

Oregon Administrative Rule 340-041-0007 contains Oregon's statewide narrative criteria, which supplement Oregon's numeric water quality standards and Oregon's antidegradation policies. In pertinent part, this rule provides that:

(1) Notwithstanding the water quality standards contained in this Division, the highest and best practicable treatment and/or control of wastes, activities, and flows must in every case be provided so as to maintain dissolved oxygen and overall water quality at the highest possible levels and water temperatures, coliform bacteria concentrations, dissolved chemical substances, toxic materials, radioactivity, turbidities, color, odor, and other deleterious factors at the lowest possible levels. * * *

(7) Road building and maintenance activities must be conducted in a manner so as to keep waste materials out of public waters and minimize erosion of cut banks, fills, and road surfaces. * * *

(11) The formation of appreciable bottom or sludge deposits or the formation of any organic or inorganic deposits deleterious to fish or other aquatic life or injurious to public health, recreation, or industry may not be allowed.

6.1.2 DEQ Evaluation

6.1.2.1 Pipeline construction

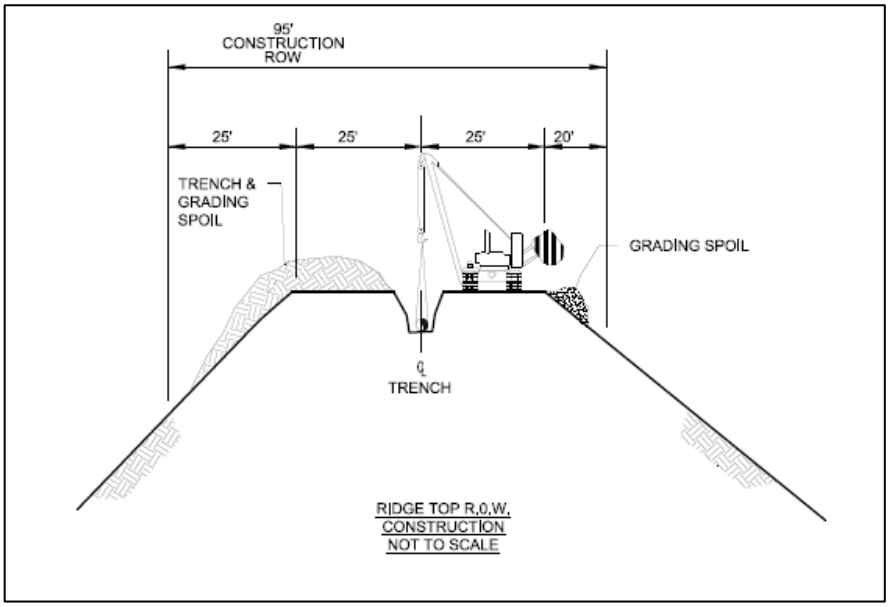
JCEP's proposed development of the construction right-of-way does not exhibit the highest and best controls and does not demonstrate that these improvements would minimize the erosion of and discharge of inorganic and organic debris, turbid flows, and sediment from cut banks, fills, and road surfaces. As noted above, pipeline construction necessitates the development of a construction right-of-way (ROW) including a construction access road for trenching and pipe laying equipment and Temporary Extra Work Areas (TEWAs) for construction staging and for storing equipment, material, and construction overburden. In developing the construction ROW, JCEP proposes to clear all trees and shrubs in this ROW. The width of this vegetation clearing would be 95 feet and

narrow down to 75 feet through wetlands and waterbody crossings. The development of TEWAs would increase the 95 foot width in upland areas and near streams and wetlands. In upland areas, JCEP would limit stump removal to the trench line and areas where grading is necessary to construct a safe, level working plane.[12] In the TEWAs, JCEP would store equipment and materials as well construction overburden (i.e., rock, soil, slash) for disposal or reuse.

The grading to level the surface in the ROW and TEWAs would include grading on steep slopes and ridgetops as depicted in Figure 3 below (Drawing Number 3430.34-X-0018).[13] This schematic is not drawn to scale as noted and does not reflect site-specific loads (trench/grading spoil and fill from leveling) placed on steep and potentially unstable slopes from the removal of rock and soil from ridgetops.

Although not delineated on JCEP's Environmental Alignment Sheets (Resource Report 1, Appendix H.1) or discussed in their Erosion Control and Revegetation Plan, typical drawings for right-of-way cross-sections in Resource Report 1 clearly show the use of a construction access road in the right-of-way. Without a durable surface, the soil in this corridor would experience compaction during the construction of the right-of-way, and during the trenching for pipe installation. The resulting soil compaction would increase runoff and, subsequently, erosion of native soils via rill and gully erosion without additional BMPs for the construction access road surface.

Figure 3: Schematic of Ridgetop Right-of-Way



JCEP has not provided BMPs for the 229-mile construction access roadway in the form design standards, specifications, and measures necessary to support the anticipated traffic load.[14] For example, design standards would inform the construction of the road surface based on estimated traffic load. Design manuals are available that provide BMPs for a stabilized construction roadway where displacement of soil occurs due to vehicle traffic.[15,]

[12] Pacific Connector Gas Pipeline. 2018. *Right-of-Way Clearing Plan for Federal Land*. Appendix E, Plan of Development Report U. Section 401 Water Quality Package

[13] Pacific Connector. 2017. *Erosion Control and Revegetation Plan*.

[14] Federal Highway Administration. 2000. *Gravel Roads – Maintenance and Design Manual*. U.S. Department of Transportation Local Transportation Assistance Program.

[15] State of California Department of Transportation. 2003, *Construction Site Best Management Practice Field Manual and Troubleshooting Guide*. CTSW-RT-02-007

[16] During a rain event, a durable unpaved road surface is essential to prevent fine soil particles from migrating to the road surface under truck traffic. Once on the road surface, stormwater entrains this soil during wet weather transporting it to swales (e.g., zero order streams), first order streams (e.g., bedrock hollows), and to streams. With the proposed pipeline alignment traversing 117 miles of steep slopes and 94 miles of severe erosion potential soils, careful selection of BMPs and the application of treatment methods are essential for water quality protection.

Construction access road design standards and specifications as well as design drawings should also guide construction of the 229-mile access road drainage system and the treatment controls for its discharge. These standards and specifications and their inclusion in design plans would influence the selection of discharge points that direct stormwater discharge to structural stormwater treatment controls or vegetated areas with permeable soils.

To avoid initiating a landslide on the extensive area of unstable slopes along the pipeline ROW, JCEP must identify the location of discharge points for concentrated stormwater flow from swales and channels collecting this runoff. In the sections below, DEQ documents the potential water quality impacts to streams that would likely result from discharges of stormwater to landslide prone slopes, as well as from the placement of fill or spoils on such slopes. JCEP has not provided specific designs for the construction access road stormwater management system adjacent to steep slopes (>30%) and landslide susceptibility zones. Rather, in Section 4.1 of the proposed ECRP, JCEP proposes a list of temporary erosion control BMPs for the construction ROW that DEQ evaluates below.

Construction Right-of-Way BMPs

JCEP would use temporary slope breakers (i.e., water bars) to prevent rill and gulley erosion when construction stormwater discharges from the ROW, the 229-mile construction access road, and the non-working side of the ROW. If properly spaced, slope breakers may effectively serve as a runoff control, preventing rill and gully erosion in the construction ROW and construction access road. However, JCEP has not provided information on how JCEP would ensure their proper function under anticipated traffic loads. Without additional design considerations, this traffic would compact the berm of the slope breaker and modify the excavated channel form, potentially modifying its flow path (see Resource Report 1, Drawing Number 3430.34-X-0008). Stormwater moving out of slope breaker and back onto the ROW would form rill and gully erosion and potentially affect the proper function of downstream temporary slope breakers.

Stormwater with suspended sediment from the construction ROW and construction access road would collect in the excavated channel in front of each slope breaker and would flow towards a discharge point. JCEP has not provided DEQ with specific information demonstrating that there are BMPs, for example, to prevent (1) rill and gully erosion from concentrated flow at discharge points and (2) sediment discharge from exposed soil to zero order streams. Zero order streams refer to swales such as bedrock hollows and are an integral part of stream networks serving as conduits to first order streams.[17] JCEP has not provided DEQ with information on the distance between the discharge point of slope breakers and other erosion control BMPs and zero order streams. Moreover, JCEP has not demonstrated that it would avoid stormwater discharge to areas of landslide susceptibility connected to zero order streams as discussed below in more detail. JCEP's proposed construction ROW would place grading spoils and, if needed, fill to level working surface. Construction of the pipeline appears likely to discharge stormwater to these landslide susceptibility zones commonly referred to convergent headwalls, as exhibited in Figure 4 below. As discussed in more detail and supported below, research and technical manuals indicate that adding water and weight to unstable slopes should be avoided during design of linear infrastructure projects.

In Section 4.1.4 of the ECRP, JCEP proposes to use mulch (i.e., effective ground cover). The application of mulch to exposed soil is an effective BMP presuming stormwater run-on controls are in place to prevent stormwater from

[16] Nevada Department of Transportation. 2004. *TC-2: Stabilized Construction Roadway*. Storm Water Quality Handbooks

[17] Gomi, Takashi, Roy C. Sidle, and John S. Richardson. 2002. *Understanding Processes and Downstream Linkages of Headwater Systems*. Bioscience, Volume 52(10): 905-916

mobilizing the mulch in runoff as discussed by Burroughs (1990). JCEP states that it would use this BMP when permanent stormwater controls such as reseeding and permanent slope breakers installed on the operational ROW are delayed beyond 20 days. During wet weather, exposed soil is subject to splash erosion initiating runoff and the potential for rill and gully erosion carrying sediment to streams. The criteria of a 20-day delay in installing permanent controls places water quality at risk. During wet weather, absent applying mulch to exposed soils within the construction ROW and control run-on to these mulched areas where construction activity is not occurring or planned in the immediate future, excessive sediment is likely to reach streams. Moreover, on its Environmental Alignment Sheets, JCEP has not delineated the travel ways into and within TEWAs or selected a durable surface for these travel way as a source control for these exposed soil surfaces. As discussed in construction stormwater manuals from California and Nevada cited above, durable surfacing for construction travel ways is a typical BMP that was not addressed in JCEP's erosion control planning.

To control sediment discharge from the 229-mile construction access road and construction right-of-way, JCEP proposes to use a silt fence parallel to the ROW. The construction ROW with its construction access road on ridgetops above steeps slopes has numerous adjacent areas with zero order streams that would serve as a channel carrying sediment from the ROW to first order streams. For areas of concentrated flow such as a swale, a silt fence is not designed to treat concentrated flow nor treat silt or clays deeper than sheet or overland flow.[18, 19] Additionally, according to the U.S. Environmental Protection Agency cited above, a silt fence has limits on the drainage area it can treat. In its submittal, JCEP provides no evaluation for the drainage area for silt fences, and does not identify alternative means of managing flow where a silt fence is inadequate. Sediment discharge overland within 200 feet of a waterbody *or a swale connected to a waterbody* has the potential to discharge sediment to this water body.[20, 21] JCEP appears to have limited its analysis to roadways and other land disturbances within 200 feet of a perennial or intermittent stream.[22]

[18] Minnesota Stormwater Manual. *Sediment Control Practices – Check Dams (Ditch Checks, Ditch Dikes)*

[19] Washington State Department of Ecology. 2017. BMP CW233: Silt Fence. Stormwater Management Manual for Western Washington

[20] Brake, D.M., Molnau, and J.G. King. 1997. *Sediment Transport Distances and Culvert Spacing on Logging Roads with the Oregon Coast Mountain Range*. Presented at the 1997 Annual Internationa ASAE Meeting Mineapolis, NM. Paper No. IM-975018

[21] Megahan, W.F. and G.L. Ketcheson. 1996. Prediction Downslope Travel of Granitic Sediments from Forest Roads in Idaho. Water Resources Bulletin Volume 32, No. 2, pages 371-382

[22] See, e.g., DEIS at 4-101.

Figure 4: Examples of Convergent Headwalls

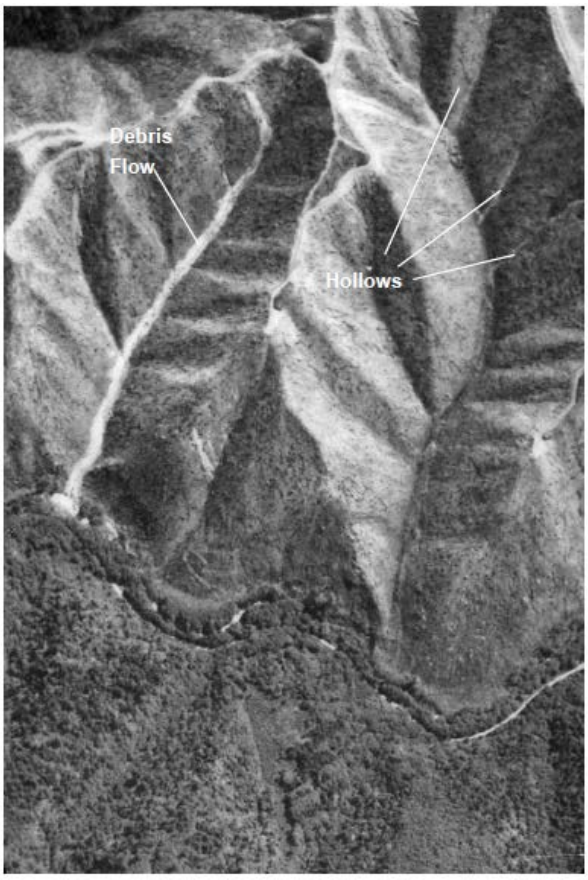


Figure 4a. Aerial View of a High Density of Bedrock Hollows in the Central Oregon Coast Range. This photo graph also shows a landslide in a bedrock hollow, triggered by a logging road, that transformed into a debris flow that deposited sediment into a larger stream. Source: Benda, Lee, Curt Veldhuisen, Dan Miller, Lynne Rodgers Miller. 1998. *Slope Instability and Forest Land Managers – A Primer and Field Guide*. Earth Systems Institute

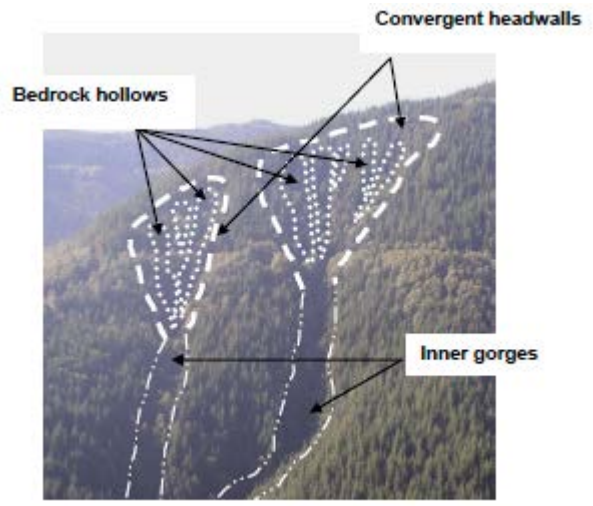


Figure 4b. Common hillslope relationship: bedrock hollows in convergent headwalls draining to inner gorges (photo and drawing by Jack Powell, DNR 2003). Source: Washington Department of Forestry. 2000. *Part 4. Characteristics of Unstable and Potentially Unstable Slopes and Landforms*. Forest Practices Board Manual

JCEP may also use biobags, straw wattles, and slash filter windrows to control sediment discharge from the construction ROW. According to the Minnesota and Washington manuals referenced above, check dams constructed of biobags and straw wattles are only moderately effective in trapping sediment and preventing channel erosion if properly spaced. Moreover, when used in a drainage swale according to the Minnesota manual, they provide only a secondary design benefit. Therefore, their application requires primary controls such as durable construction access road surfacing, stormwater management to avoid concentrated flows as well as other source controls. Additionally, JCEP would use slash filter windrows as a perimeter control for the construction right-of-way as indicated on JCEP's Environmental Alignment Sheets.

Slash filter windrows are typically placed on a contour at the toe of constructed road fill slopes to intercept sediment.[23] The research shows these windrows can reduce sediment leaving a fill slope by 75 to 85 percent

[23] Washington Department of Forestry. 2000. Forest Practices Board Manual

indicating that JCEP would need additional best management practices in a treatment train.[24] However, the literature does not indicate these controls are effective and designed for treating concentrated flows in rills, swales, and drainage channels arising from construction areas. JCEP has not provided information showing that forest slash when placed on soil surfaces dissected with rills, swales, and natural drainage channels would provide a continuous "seal" along the soil surface. Such a seal at the surface assures that a control measure for sheet runoff would trap suspended sediment. This seal at the soil surface may be achieved with a properly installed straw wattle countersunk into the soil. However, the rigid structure of forest slash would leave depressions from rills, swales, and channels below the windrow providing a path of least resistance for runoff and the sediment it carries.

In the Tyee Core Area, for example, JCEP proposes to place slash filter windrows below fill and spoils storage on headwalls. For example, in Drawing Number 3430.29-006 (Sheet 6 of 226) in the Environmental Alignment Sheets, JCEP proposes to use windrows on the border of the construction ROW where fill and/or grading spoils would be placed. JCEP would locate these windrows in a zero order stream below steep headwalls located along Pipeline Mileposts 8.56 to 8.75 (see Figure 5). These windrows and their construction stormwater discharged are directly connected to zero order streams (i.e., bedrock hollows) and, ultimately, first order streams. Absent supporting evidence demonstrating that the application of a slash filter windrow, by itself, is effective erosion control for these sensitive areas serving as conduits for first-order streams, DEQ finds this proposed method is insufficient to prevent violations of water quality. Additional information is required to demonstrate how construction stormwater would be managed above these sensitive areas.

As discussed above, JCEP proposes to use temporary slope breakers to concentrate and channel stormwater away from the construction ROW and construction access road. According to Burroughs (1990), research shows that rills and gullies resulting from concentrated road surface discharge reduces the effectiveness of mulch treatments on fill slopes and carries sediment long distances below these slopes. Burroughs (1990) also documents that uniform drainage from the road surface minimizes erosion on the fill slopes. In areas of steep slopes, JCEP is proposing to use temporary slope breakers (i.e., water bars) that – depending on its discharge point – would concentrate stormwater discharge onto fill slopes above slash filter windrows. These slash filter windrows are intended to manage sheet flow on fill slopes rather than concentrated flow from a temporary slope breaker.

In its December 20, 2018 supplemental information request, DEQ requested that JCEP use modeling to evaluate the efficacy of its proposed construction ROW BMPs to ensure JCEP is providing the highest and best treatment controls (see Page 1 – 2 of Attachment A). DEQ believes this modeling is essential to determining consistency with Oregon's statewide narrative water quality standard given the prevalence of steep slopes and zero order streams in close proximity to the construction ROW.[25] Models such as the Revised Universal Soil Loss Equation Version 2 (RUSLE2) are designed to evaluate the efficacy of BMPs proposed for concave, convex, and uniform slopes as well as cut and fill slope scenarios.[26] Practitioners of soil conservation have used versions of this model for decades. Moreover, Wisconsin requires comparable modeling for construction sites as a demonstration of compliance with a sediment performance standard.[27] JCEP has not performed an evaluation using RULSE2 or a comparable model to identify the most effective suite of BMPs given the site-specific conditions and constraints associated with its proposed activities.

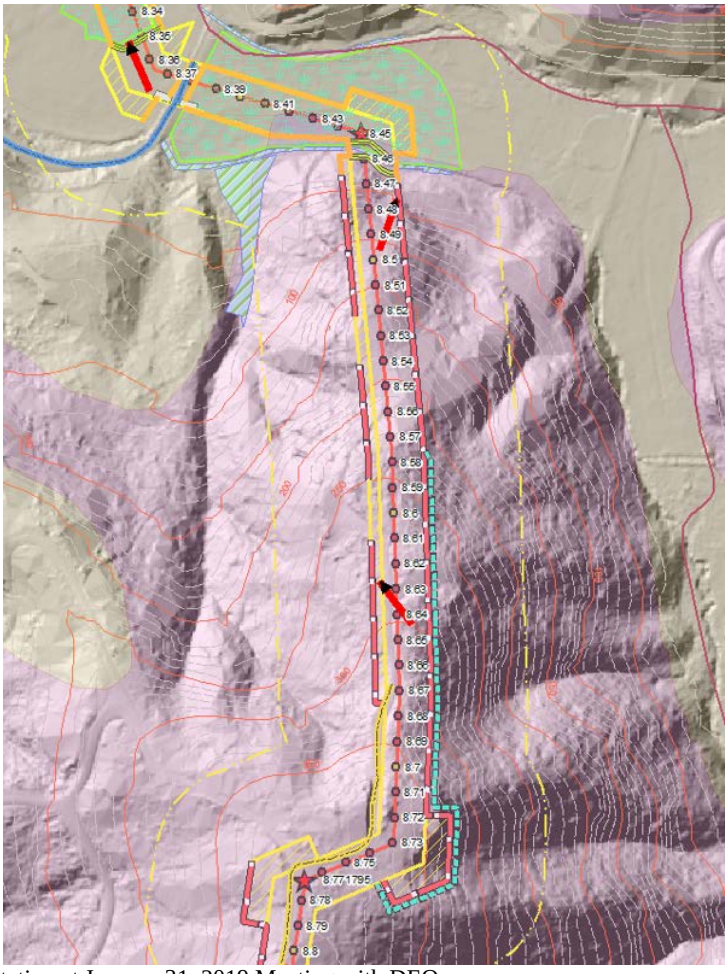
[24] Burroughs, E.R., Jr. 1990. *Predicting Onsite Sediment Yield from Forest Roads*. Proceeding of Conference XXI, International Erosion Control Association. Erosion Control: Technology in Transition. Washington, DC.

[25] See Attachment A, Page 1 and 2 of DEQ's December 20, 2018 Supplemental Information Request.

[26] USDA Natural Resource Conservation Service. Revised Universal Soil Loss Equation Version 2

[27] State of Wisconsin. 2017. *Construction Site Soil Loss and Sediment Discharge Calculation Guidance*. Bureau of Watershed Management Program Guidance, Wisconsin Department of Natural Resources. EGAD Number: 3800-2017-03

Figure 5: Spoil Placement on Headwalls for Construction ROW and TEWA 8.72-W between MP 8.56 – 8.75



Source: Pacific Connector Presentation at January 31, 2019 Meeting with DEQ.

Construction ROW Along Unstable Slopes

JCEP has not provided specific engineering drawings for its stormwater management system for the construction ROW and the 229-mile construction access road in areas of steep slopes and landslide susceptibility zones discussed below. JCEP is proposing to place grading spoils and, potentially, fill to level working surfaces, on geologically unstable slopes to support the 95-foot construction ROW including the Temporary Extra Work Areas (TEWAs). JCEP's Geologic Hazard Maps show geologically unstable slopes such as mapped landslides and rapidly moving landslide hazard areas in close proximity to the construction ROW.[28] The Oregon Department of Geology and Mineral Industries (DOGAMI) has documented landslide hazards in Oregon and, as discussed below, developed peer-reviewed procedures for identifying site-specific landslide hazards.[29] For example, the Tyee Core Area in Oregon's Coastal Range is an area of high landslide activity including both shallow and deep-seated landslides. The proposed pipeline traverses the Tyee Core Area from approximately Milepost 6 to 55. Research and technical references on slope stability are clear that land managers should avoid adding water or weight to unstable slopes and

[28] Appendix F, Geologic Hazards Maps for Pacific Connector Gas Pipeline. Part 2: Appendix C, Resource Report 6

[29] Oregon Department of Geology and Mineral Industries. Landslide Hazards in Oregon. State of Oregon

avoid cutting into unstable slopes without appropriate geotechnical engineering.[30, 31, 32, 33, 34] Oregon has seen other linear infrastructure development (i.e., roads, pipelines) initiate landslides, particularly in the Oregon coast range (State Highway 20, and Coos County Natural Gas Pipeline).[35]

Depending on the landslide type and proximity to streams, landslides can deposit substantial amounts of organic and inorganic debris into streams impacting the aquatic life dependent on these streams. Although landslides are a natural geomorphic process for streams in the Coast and Cascade Ranges, human-caused debris torrents affect water quality by changing the natural cycles of sediment delivery to stream systems.[36] For this reason as well as public safety, the Oregon Department of Forestry issued rules and technical guidance under the Oregon Forest Practice Act. The goal of these rules is to ensure forest operations such as road use and building do not initiate landslides.[37] As discussed in DEQ's December 20, 2018 supplemental information request (see Pages 13 and 19 of Attachment A), the Oregon Department of Forestry uses the Forest Practices Act rules to comply with Oregon water quality standards.[38] OAR 629-625-0200 provides that "operators shall avoid locating roads on steep slopes, slide areas, high landslide hazard locations, and in wetlands, riparian management areas, channels or floodplains where viable alternatives exist." OAR 629-625-0310(2)-(4) provides that "(2) operators shall end-haul excess material from steep slopes or high landslide hazard locations where needed to prevent landslides[;] (3) Operators shall design roads no wider than necessary to accommodate the anticipated use[;] (4) Operators shall design cut and fill slopes to minimize the risk of landslides[;] (5) Operators shall stabilize road fills as needed to prevent fill failure and subsequent damage to waters of the state using compaction, buttressing, subsurface drainage, rock facing or other effective means. Similarly, OAR 629-625-0330 includes other direction on management of drainage from forest land roads.

In the December 20, 2018 supplemental information request, DEQ provided JCEP with the basis for its concerns about slope stability along the ROW and the potential for pipeline ROW construction and ROW stormwater discharge to initiate landslides (see Pages 68 – 79 of Attachment A). DEQ also requested that JCEP use one of three slope stability models to objectively identify landslide risk areas and guide the siting of stormwater discharge points from slope breakers (i.e., water bars), the siting of grading and trench spoil storage, and design of fill on landslide susceptibility zones within or adjacent to the ROW. In preparation for a January meeting to discuss DEQ's comment, JCEP provided DEQ with several preliminary responses to DEQ's information request. These responses included a reference to a summary of JCEP's evaluation of slope stability in siting the pipeline alignment. DEQ's review of JCEP's landslide hazard assessment as presented in Resource Report 6 on Geologic Resources is summarized below.

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[30] Benda, L.E., Veldhuisen, C., Miller, D.J., and Rodgers-Miller, L. 2000. Slope instability and forest land managers: A primer and field guide. Seattle, Wash., Earth Systems Institute

[31] State of Washington. Forest Practices Board Manual. Section 16 Guidelines for Evaluating Potentially Unstable Slopes and Landforms

[32] Sidle, R.C. 1985. *Factors Influencing the Stability of Slopes*. Proceedings of a Workshop on Slope Stability: Problems and Solutions in Forest Management. USDA Forest Service. General Technical Report PN W-180

[33] Seaward, J.H. and T. Blackwood. 1998. Loading-induced Slope Failures on Bedding Planes in Sedimentary Geology of the Central Oregon Coast Range. In: Burns, S. (Editor), Environmental, Groundwater and Engineering Geology: Applications from Oregon. Belmont, California. Pages 497 – 506

[34] Hearn, G.J. 2011. Slope Engineering for Mountain Roads. Geological Society Engineering Geology Special Publication No. 24

[35] Hofmeister, R.J., D. J. Miller, K.A. Mills, J.C. Hinkle, A. Beier. 2002. Hazard Map of Potential Rapidly Moving Landslides in Western Oregon. GIS Layer for Local Governments in Implementation of Senate Bill 12. Interpretive Map Series IMS-22. Oregon Department of Geology and Mineral Industries

[36] Castro, Janine and Frank Reckendorf. 1995. Effects of Sediment on the Aquatic Environment: Potential NRCS Actions to Improve Aquatic Habitat. Working Paper No. 6. USDA Natural Resources Conservation Service

[37] Oregon Department of Forestry. 2003. *High Landslide Hazard Locations, Shallow, Rapidly Moving Landslides and Public Safety*: Screening and Practices. Forest Practice Technical Note Number 2

[38] Memorandum of Understanding between the Oregon State Department of Environmental Quality and the Oregon State Department of Forestry. April 16, 1998

Identification of Shallow Landslide Susceptibility

In Section 4.5.1 of Resource Report 6 (Geologic Resources), JCEP presents their three-phase methodology for a landslide hazard evaluation. Phase I involved an office review of geologic maps and publications, county and state hazard maps, Natural Resource Conservation Services soil surveys, topographic maps, LiDAR hillshade models, and stereo aerial photographs. Phase II involved an aerial reconnaissance, and Phase III involved a surface reconnaissance. In Section 4.5.2, JCEP clarifies its statements of risk in the landslide hazards evaluation report for Resource Report 6. For JCEP's hazard evaluation, risk only evaluated the potential for damage or failure of the pipeline from earth movements. JCEP's landslide hazard evaluation did not consider the risk of pipeline construction and operation initiating a landslide impacting water quality.

In Section 4.5.3.1, JCEP recognizes that rapidly moving landslides typically occur on steep slopes within zero order stream basins. In this section, JCEP notes that these landscape features can fail and generate a debris torrent that travels great distances along defined stream channels such a zero order streams and first order streams. DEQ provides examples of this type of unstable landscape feature in Figure 4 above.

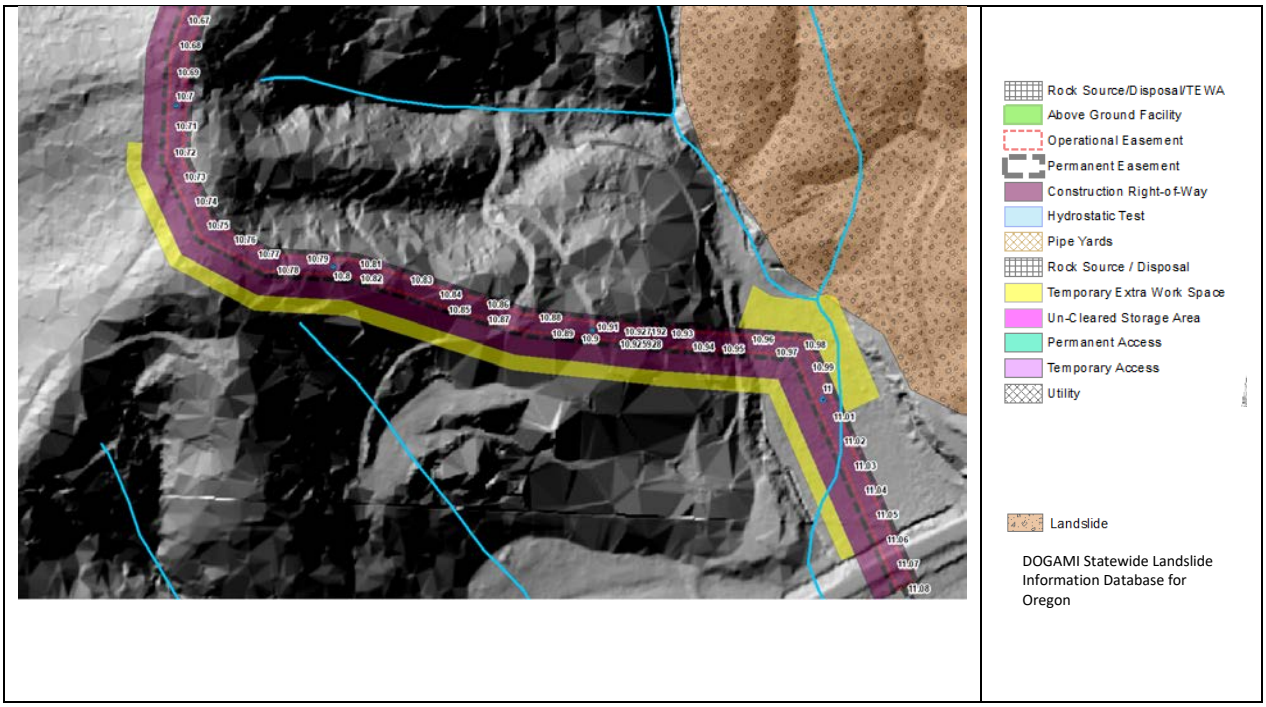
In the January 31, 2019 meeting to discuss the September 7, 2018 information request, JCEP presented a segment of the pipeline overlay on a Light Detection and Ranging Map (see Figure 5). This LiDAR map segment clearly shows the working side of the construction ROW with its construction access road and Temporary Extra Work Area above three headwalls (i.e., unstable slopes). As discussed above, these areas would support trenching and grading spoils and may require fill to level this working surface. The weight of the fill and/or trench and grading spoils, the anticipated traffic loads, and the stored material in combination with additional runoff due to the lack of a forest canopy present a substantial water quality risk to streams as well as a risk to worker and public safety.

Given its concern about slope stability above zero order streams, DEQ requested and received in February 2019 the LiDAR shapefiles used in their landslide hazard evaluation. DEQ performed a preliminary review of the LiDAR maps in a sample section of the Tyee Core Area and found many areas of concern. Two of these areas are illustrated below in Figures 6 and 7. DEQ searched for site-specific geo-engineering measures for fills and cuts on unstable slopes in information provided to-date by JCEP but found this information lacking as noted in DEQ's December 20, 2018 supplemental information request (see Page 70 – 73 and 75 to 79 of Attachment A).

Given the proposed placement of trench and grading spoils and, potentially, fill placed on the rapidly moving landslide risk area from Pipeline Milepost 8.56 to 8.75 (see Figure 5), DEQ reviewed Table B-3a in Resource Report 6 as a quality assurance check on JCEP's Phase I landslide hazard evaluation. Table B-3a summarizes the sites investigated in JCEP's Phase II field reconnaissance. In its review of this table, DEQ determined that JCEP did not include the area from between Milepost 8.56 to 8.75 in its field data collection and risk assessment. JCEP also did not conduct a surface reconnaissance for the areas of concern featured in Figures 6 and 7. Given this, DEQ referenced the methodology for identifying moderate and high rapidly moving landslide (RML) risks in Resource Report 6 as described below.

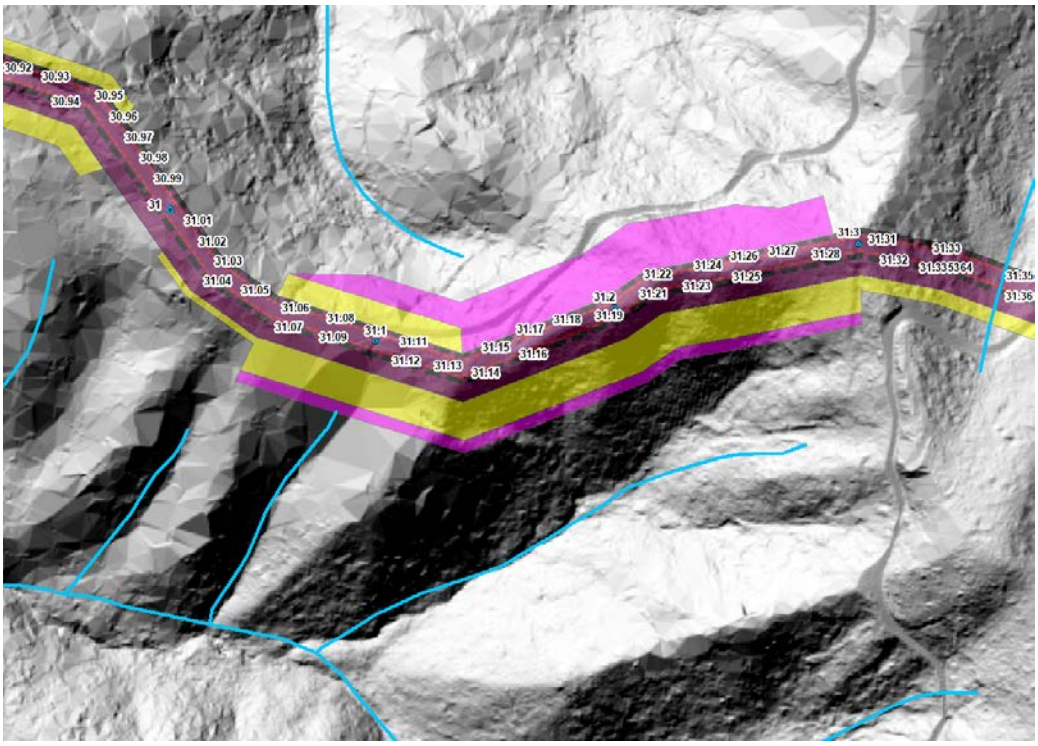
On Page 31 in Section 4.5.3.2 of Resource Report 5 (Geologic Resources), JCEP indicates it used LiDAR, 10-meter DEM, and aerial photography to identify moderate and high RML sites. This section provides the risk criteria JCEP used to identify the RML sites selected for surface reconnaissance and included in Table B-3a. JCEP's selection criteria was to identify the potential for a RML to induce strain on the pipeline and for RML erosion to expose a pipeline. These two selection criteria would not ensure the identification of RML sites posing a risk to streams and water quality. The above quality assurance check confirmed DEQ's concerns presented in the December 20, 2018 information request that JCEP's landslide hazard evaluation did not consider the landslide hazard risks to streams initiated by the construction and operational ROW.

Figure 6: Fill Placement on Headwalls for Construction Right-of-Way and TEWA 10.71-W MP 10.78 – 10.87



Source: LiDAR and pipeline ROW data from Pacific Connector

Figure 7: Fill Placement on Headwalls for Construction Right-of-Way and TEWA 31.06-W MP 31.07 – 31.28.


Source: LiDAR and pipeline ROW data from Pacific Connector

Landslide Hazard Evaluation

DEQ consulted with the Oregon Department of Geology and Mineral Industries (DOGAMI) to identify an accepted methodology for evaluating landslide susceptibility. DOGAMI provided DEQ with protocols for inventorying existing landslides, for mapping shallow landslide susceptibility, and for mapping deep-seated landslide susceptibility.[39] While regional studies of published landslide information such as DOGAMI's State Landslide Information Database for Oregon can be useful as a screening tool, in areas of high potential risk DOGAMI recommends a site-specific landslide evaluation.

For site-specific landslide hazard evaluations, DOGAMI considers the method in Special Paper 42 (SP-42) as state-of-the-practice.[40] To evaluate this protocol, DOGAMI compared remote sensing data for effectiveness in a pilot study.[41] Findings from this study indicate the use of LiDAR data resulted in 3 to 200 times the number of landslides identified compared to regional studies using already published information. A SP-42 landslide inventory results in an Arc-GIS format geodatabase of landslide data including landslide type, size, scarp height, estimated depth to failure plane, and confidence of identification. As noted below, the results from an inventory using this protocol support the identification of shallow-landslide and deep-seated landslide susceptibility zones to complete a landslide hazard assessment.

Using the SP-42 inventory, DOGAMI recommends following the procedure in Special Paper 45 (SP-45) to identify shallow landslide susceptibility maps.[42] DOGAMI is using this procedure to produce standardized shallow landslide maps for areas in Oregon. Use of a SP-45 map to identify shallow landslide susceptibility zones is necessary to reduce landslide risk through planning and engineering. For identifying deep-seated landslide susceptibility zones, DOGAMI recommends following the procedure in Special Paper 48 (SP-48).[43] Using the site-specific landslide inventory from SP-42, the procedure in SP-48 can assist in identifying and mitigating existing deep-seated landslides and slopes. The use of SP-42 in conjunction with SP-45 and SP-48 ensures identification of all the sites within and along the pipeline ROW where geo-engineering controls are needed to prevent spoil storage, cuts, and fills from pipeline construction and stormwater discharge from initiating landslides depositing organic and inorganic debris into streams.

BMPs to Mitigate Landslides

As discussed above and supported by references, JCEP's proposed activities create a significant risk of sediment transport to both perennial and intermittent streams. In Section 4.6.1 of Resource Report 6 (Geologic Resources), JCEP identifies two primary ways that pipeline construction methods would reduce slope stability and create a risk of sediment transport. Those are deep excavation perpendicular to the slope (i.e., creating a cut across a slope), and capturing and concentrating stormwater along the ROW and discharging this stormwater to potentially unstable slopes. Placing fill on a headwall is a third way that pipeline construction would reduce slope stability.

In Section 4.6.2 of Resource Report 6, JCEP states that it would engineer fill slopes constructed at gradients of 30 percent or greater to ensure long-term slope stability. JCEP states that it would identify side-slope ROW construction segments on steep slopes during the final design phase for this project. In its December 20, 2018 supplemental information request, DEQ reviewed and noted the deficiencies in the conceptual BMPs with regard to JCEP's Erosion Control and Revegetation Plan (see Pages 76 – 77 of Attachment A).

[39] Wang, Yumei. March 20, 2019. Email to Chris Bayham Regarding DOGAMI SLIDO Data.

[40] Burns, William, J and Ian P. Madin. 2009. *Protocol for Inventory Mapping of Landslide Deposits from LiDAR Imagery*. Special Paper 42. Department of Geology and Mineral Industries. State of Oregon

[41] Burns, W.J. 2007. Comparison of Remote Sensing Datasets for the Establishment of a Landslide Mapping Protocol in Oregon. AEG Special Publication 23: Vail, Colorado, Conference Presentations. First North American Landslide Conference

[42] Burns, W.J., Ian P. Madin, and Katherine A. Mickelson. 2012. *Protocol for Shallow-Landslide Susceptibility Mapping*. Special Paper 45. Department of Geology and Mineral Industries. State of Oregon

[43] Burns, William J and Katherin A.Mickelson. 2016. Protocol for Deep Landslide Susceptibility Mapping. Special Paper 48. Department of Geology and Mineral Industries. State of Oregon

In Section 4.6.2.1 of Resource Report 6, JCEP references its Erosion Control and Revegetation Plan for BMPs to manage surface water and groundwater near unstable slopes. For BMPs to address stormwater near steep slopes, JCEP identifies the use of temporary and permanent slope breakers (i.e., water bars). As discussed above in this Evaluation and Findings Report, slope breakers concentrate stormwater in an excavated channel in front of a berm (see Resource Report 1, Drawing Number 3430.34-X-0008). Runoff would substantially increase after JCEP removes the forest and shrub canopy and herbaceous vegetation. During construction and for several years post-construction, the drainage area for each temporary slope breaker is the 95-foot wide construction ROW and the 100 feet of ROW to the next temporary slope breaker based on FERC's spacing requirements. JCEP has not provided DEQ with the location of the discharge points for the concentrated flow in temporary slope breakers near unstable geologic features. Without additional BMPs near unstable slopes, temporary slope breakers increase the likelihood for this discharge to reduce slope stability identified by JCEP and highlighted above.

Without more developed information about the extent of areas of landslide risk and BMPs, DEQ is unable to determine what engineering controls for the design and construction of the pipeline are both feasible and reasonably likely to succeed in keeping waste materials out of public waters and minimizing erosion of cut banks, fills, and road surfaces. DEQ also is unable to determine whether JCEP can or would utilize the highest and best practicable treatment and/or control of wastes, activities, and flows so as to maintain dissolved oxygen and overall water quality at the highest possible levels and water temperatures, coliform bacteria concentrations, dissolved chemical substances, toxic materials, radioactivity, turbidities, color, odor, and other deleterious factors at the lowest possible levels. As a result, DEQ concludes that it is unable to determine that JCEP's proposed activities would be conducted in a manner that would not violate the statewide narrative criteria in OAR 340-041-0007.

6.1.2.2 Waterbody Crossings

JCEP's proposal to install a pipeline across streams does not exhibit the highest and best controls, does not demonstrate that these improvements would minimize the erosion of and discharge of inorganic and organic debris, turbid flows, and sediment from cut banks, fills, and road surfaces. Pipeline construction would affect about 352 waterbodies.[44] JCEP would install the pipeline below the stream bed of waterbodies using either trenchless methods (conventional bore, horizontal directional drill, or Direct Pipe® technique) or dry open–cut methods (diverted open cut, fluming, dam-and-pump) techniques. An evaluation of the potential water quality impacts of these waterbody crossing procedures is provided below.

Trenchless Waterbody Crossings – Horizontal Directional Drill

JCEP proposes to use the horizontal directional drill method for two crossings under the Coos Bay Estuary (MPs 0.3–1.0 and 1.5–3.0) and crossings of three major waterbodies (Coos River at MP 11.1R; Rogue River at MP 122.7; and Klamath River at MP 199.4). DEQ describes the horizontal directional drill method in section 5.2 of this report. JCEP prepared a HDD Feasibility Report that includes geotechnical engineering, recommendations, and HDD design criteria for the three proposed HDD river crossings. The report also includes a feasibility analysis of completing a HDD crossing beneath Coos Bay estuary. However, JCEP's consultant states that the "* * *feasibility evaluation of the proposed Coos Bay East HDD is based on limited subsurface data. Our conclusions should be considered preliminary pending completion of a subsurface exploration program. Resource Report 2, Appendix G.2. The feasibility analysis generally finds a low risk of drilling fluid releases. However, at the east end of the crossing approaching Kentuck Slough there is a high risk of hydraulic facture and drilling fluid surface release. Resource Report 2, Appendix G.2., at 9. The evaluation identifies potential mitigation for this risk, but it is unclear what specific mitigation measures JCEP is currently proposing.

On March 11, 2019, DEQ requested additional information to confirm the proposed HDD routes beneath the Coos

[44] There is some inconsistency between FERC's DEIS, DEIS at 2-60, which states that the pipeline would cross 352 waterbodies and Pacific Connector Gas Pipeline Resource Report 2, Appendix 2/A.2-2. September 2017, which provides that the number of crossings would be 326. DEQ has not, as this time, been able to determine the reason(s) for the discrepancy, and uses the more recent figure of 352 from the FERC DEIS here.

Bay estuary, the drilling fluid containment plans, the response procedures, and other information. As of the date of preparation of this report, DEQ had not received formal responses to this request. It is possible that some or all of this information was included in the materials submitted to DEQ on April 30, 2019. However, the timing of that submission did not provide any meaningful opportunity for DEQ review. Accordingly, because the available information evaluated to-date does not adequately characterize the proposed activities and mitigation measures, or the potential effects on water quality, DEQ cannot conclude there is a reasonable assurance that the proposed HDD crossings of the Coos Bay estuary would be conducted in a manner that would not violate the statewide narrative criteria in OAR 340-041-007.

Open Cut Waterbody Crossings

JCEP would perform dry open-cut crossing procedures at most waterbody crossings that are flowing at the time of construction (conventional trenching would be used to cross intermittent streams without flow). Both fluming and pumping methods rely on isolating a stream section with temporary dams, dewatering the work area, and bypassing flow around the isolated work area. Upon completion of pipeline installation activities JCEP proposes to restore waterways and embankments using the restoration and revegetation procedures discussed in the Erosion Control and Revegetation Plan.

The following proposed actions of the JCEP are evaluated for compliance with the Statewide Narrative Criteria:

Stream Crossings and Restoration:

To reduce impacts, JCEP proposes to complete these stream crossings in dewatered areas isolated from normal streamflow using temporary dams. JCEP's Stream Fluming Procedures and Dam and Pump Procedures describe the method for removing the flume upon completion. Upon removal, JCEP expects that short-term turbidity "could increase considerably" as the "streambed flushed clean of sediments left over from construction".[45, 46] DEQ has identified three waterbody crossings that are listed on the DEQ's 2012 303(d) list as impaired for sedimentation (S. Fork Little Butte Cr., MP 162.45; Spencer Cr. MP 171.07; Clover Cr. MP 177.76). In these particular areas, any increase in sediment loading is prohibited, at least until completion of a Total Maximum Daily Load that includes an allocation for the proposed activity, or until completion of an implementation plan that demonstrates that increased loading would be avoided. Under a Clean Water Act Section 404 Permit, DEQ would allow limited duration turbid discharges, but only if the project applies all practicable turbidity controls to minimize these discharges. JCEP's proposed methodologies include dewatering of construction areas, and dewatering and removal of temporary dams. JCEP has not presented how it would minimize sediment and turbid discharges during these activities.

DEQ's information request dated March 11, 2019, requested specific waterbody construction and restoration plans for stream crossings involving an open trench cut. These plans are necessary to demonstrate that JCEP has considered all construction concerns and constraints, restoration design alternatives, and selected the highest and best treatment alternatives to minimize pollution discharge in compliance with provisions of Oregon's Statewide Narrative Criteria. The importance of careful, detailed, site-specific planning for pipeline crossing construction and stream restoration is well-documented in the construction of the Ruby Pipeline. In the Ruby Pipeline project, a team of experts developed an approach to minimize impacts at 849 stream crossings.[47] DEQ's March 11, 2019 information request is consistent with the approach used in the Ruby Pipeline project.

Detailed construction planning is important for water quality protection. For example, on steep unstable slopes, a dewater structure can saturate the area round the structure creating a positive soil pore pressure. A positive soil pressure can destabilize a slope causing a small slope failure that discharges a debris flow into a stream. In addition, on steep slopes, spoils from trenching can discharge sediment to the stream if JCEP does not properly site

[45] September 2017. Stream Fluming Procedures. Pacific Connector Gas Pipeline. Appendix C.2 Resource Report 2

[46] September 2017. Dam and Pump Procedures. Pacific Connector Gas Pipeline. Appendix D.2 Resource Report 2

[47] Castro, J.M., A. MacDonald, E. Lynch, and R. Thorne. 2014 *Risk-based Approach to Designing and Reviewing Pipeline Stream Crossings to Minimize Impacts to Aquatic Habitats and Species*. River Research and Applications

these spoils and prevent the decant water with suspended sediment from discharging into the stream. In fact, on page 10 of JCEP's Stream Fluming Procedures, the drawing in Figure 8 of these procedures show turbid discharges of decant water from spoils placed on the construction access road and right-of-way discharging into the stream channel. This would constitute a violation of DEQ's NPDES 1200-C General Construction Stormwater Permit. Moreover, documenting and restoring the bankfull width and depth is important to avoid aggradation in front of the crossing or stream incision below the crossing.[48] DEQ has not yet received the requested plans. For this reason, DEQ cannot determine at this time that there is a reasonable assurance that the proposed action would be conducted in a manner that would not violate OAR 340-041-0007(1).

Dewatering Discharge:
JCEP describes general procedures for dewatering work areas during dry open-cut waterbody crossings. These methods rely on upland containment areas to promote sediment settling and infiltration of the turbid discharge. JCEP expects to site these structures in areas that can infiltrate the overflow from the dewatering structure into the surrounding area.

Discharging water to upland areas can locally saturate shallow soils causing slope failure and mass movement. DEQ identified several crossing locations where existing terrain and soil conditions may cause slope instability. For example, the pipeline alignment crosses Steinnon Creek at two locations, at MP 20.02BR, and 24.32BR. Steinnon Creek is a Level 0 stream and is upstream of spawning and rearing habitat for Endangered Species Act (ESA) listed Coho salmon. In Table B.3-4, JCEP notes steep topographic conditions for this reach near Milepost 20.20BR. Roering et al. (2005) and JCEP's Geologic Hazard Map (see Figure 5 of 47) identify contrasting steep and dissected terrain and a bench-like, low gradient form adjacent to this reach suggesting remnants of a deep-seated landslide and therefore an unstable slope. Steinnon Creek is crossed again at MP 24.32BR using a dry open cut procedure. The slopes adjacent to this crossing are landslides 126 and 127 identified from the Department of Geology and Mineral Industries Open File Report. JCEP has not provided DEQ with the proposed location of each dewater structure and the number of these structures for each crossing. JCEP has not presented the maintenance schedule for these dewater structure. DEQ noted additional crossing locations characterized by aquatic habitat value and steep, potentially unstable hillsides.[49]

The pipeline alignment is located in portions of the Tyee Core Area of the Oregon Coast Range characterized by steep hillsides and shallow rapidly moving landslides. To reduce the risk of landslides, the Oregon Department of Forestry recommends not discharging water or placing material on or near headwall areas. JCEP's general waterbody crossing procedures do not include site-specific information necessary to conclude that JCEP would would site and operate the dewatering structures to prevent turbid discharge, sediment discharge, and debris flows into streams. On March 11, 2019, DEQ requested information on dewatering procedures, spoil placement locations and monitoring procedures. DEQ requests this information to confirm that dewatering activities would not cause turbid discharge, sedimentation, or a discharge of organic or inorganic deposits to receiving waters as prohibited by Oregon's Statewide Narrative Criteria. DEQ has not received responses from JCEP. For this reason, DEQ also cannot find reasonable assurance that the proposed activities would be conducted in a manner that would not violate OAR 340-041-0007(1) and (11).

6.1.2.3 Road Construction and Maintenance

During pipeline construction, JCEP proposes to improve and maintain several hundred miles of existing access roads. Pipeline construction would also require the development of 25 segments of Temporary Access Roads and Permanent Access Roads. JCEP proposes to decommission the Temporary Access Roads after pipeline construction is complete, while the Permanent Access Roads would remain in use during pipeline operation. Oregon's Statewide Narrative Criteria include measures to prevent or minimize the discharge of pollutants from impacting waterbodies.

[48] Simon, Andrew, Sean J. Bennett, and Janine M. Castro. 2011. *Stream Restoration in Dynamic Fluvial System: Scientific Approaches, Analyses, and Tools*. Geophysical Monograph 194. American Geophysical Union, Washington, DC

[49] See waterbody crossings at mileposts 34.46, 44.21, 55.71, 55.90, 55.94, 56.28, 56.34, 57.11, and others.

DEQ's evaluation of the anticipated effects of JCEP's road maintenance and construction is presented below.

Existing Access Roads

JCEP proposes to use approximately 660 miles of existing access road to construct the pipeline. JCEP identifies numerous miles of these existing access roads as gravel, dirt, rock, and pit run surfaced roads. As presented on Drawing Number 3430.31-Y-Map 1 through 34 of the submittal, many of these access roads traverse steep slopes and landslide hazard areas that are in close proximity to zero order streams discussed above.

During wet weather, the existing roads would experience traffic loads moving heavy equipment, logs, and construction overburden (e.g., soil, rock, slash) during the preparation for and the construction of the pipeline. Unpaved roads require careful attention to the selection of construction design and maintenance standards to support their anticipated traffic loads. Proper selection of design standards for road surfaces prevent the failure of these surfaces under traffic loads. Heavy traffic on unstable road surfaces can result in sediment discharge to streams during wet weather. [50, 51]

JCEP would use both existing privately-owned and public access roads to clear trees from the construction right-of-way, Temporary Extra Work Areas, and other areas necessary for building and operating the pipeline. Tree harvesting on non-federal lands would require compliance with Oregon's Forest Practices Act (FPA) rules. Oregon Department of Forestry (ODF) administers these FPA rules. FPA rules regulate road construction and maintenance on privately owned roads during forest harvesting operations in wet weather. [52, 53, 54] ODF uses the FPA rules to ensure forest operations comply with water quality standards such as OAR 340-041-0007(1), (7), and (11). [55]

Maintenance Standards for Public and Private Roads

Tree harvesting and pipeline construction would also require compliance with road construction and maintenance standards for the U.S. Department of Agriculture Forest Service and U.S. Department of Interior Bureau of Land Management. These Forest Service and BLM standards include potential BMPs that could help assure compliance with the Statewide Narrative Criteria for road building and maintenance. These construction and maintenance standards would also help asssure compliance with the turbidity water quality standard discussed in Section 6.10 of this report. When DEQ lists waterbodies as water quality limited (not meeting standards) on the Clean Water Act 303(d) list, these two federal agencies develop Water Quality Restoration Plans (WQRP) to guide Forest Service and BLM actions to protect water quality standards. [56, 57, 58] In its December 20, 2018 supplemental information request, DEQ provided JCEP with an example WQRP for the South Umpqua. This WQRP identified roads as a source of sediment from erosion (see Page 43, Attachment A).

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[50] Grace III, J.M. and Clinton, B.D. 2007. Protecting Soil and Water in Forest Road Management. USDA Forest Service/University of Nebraska-Lincoln Faculty Publication Volume 50(5):1579-1584. 2007 American Society of Agricultural and Biological Engineers ISSN 0001-2351

[51] Furniss, M.J., T.D. Roelofs, and C.S. Yee. 1991. *Road Construction and Maintenance*. American Fisheries Society Special Publication 19:297-323

[52] Oregon Department of Forestry. 2003. *Wet Weather Road Use*. Forest Practice Technical Note Number 9

[53] Oregon Department of Forestry. 1999. *Road Maintenance*. Forest Practices Technical Note Number 4

[54] Oregon Department of Forestry. 2003. *Installation and Maintenance of Cross Drainage Systems on Forest Roads*. Forest Practice Technical Note Number 8

[55] Memorandum of Understanding between the Oregon State Department of Environmental Quality and the Oregon State Department of Forestry. April 16, 1998

[56] *Forest Service and Bureau of Land Management Protocol for Addressing Clean Water Act Section 303(d) Listed Waters* (May 1999, Version 2.0)

[57] Memorandum of Understanding Between United States Department of Interior Bureau of Land Management and the State or Oregon Department of Environmental Quality to Meet State and Federal Water Quality Rules and Regulations. BLM Agreement Number BLM-OR930-1702

[58] Memorandum of Understanding Between State of Oregon Department of Environmental Quality and the USDA, Forest Service Pacific Northwest Region. OMB 0596-0217, FS-1500-15

In addition, in this supplemental information request, DEQ provided JCEP with example requirements from the Forest Service regarding road maintenance (see Page 30 of Attachment A). These Forest Service requirements stem from the Forest Service Handbook and provide JCEP with water quality BMPs in the form of design and maintenance standards for unpaved roads on federal forestlands. In its October 25, 2018 response to DEQ's September 7, 2018 information request, JCEP referred DEQ to Table A.8-1 in Part 2 of Appendix B of it submittal. In DEQ's December 20, 2018 supplemental information request, DEQ reviewed Table A.8-1. In its review, DEQ highlighted the lack of information on maintenance treatments and needed road improvements in this table (see Page 41 – 42 of Attachment A).

Once tree harvesting is complete, JCEP proposes to grade a construction right-of-way including a construction access road for trenching and pipe laying equipment. This construction access road would require a durable surface to support heavy traffic loads. As discussed and referenced above in Section 6.1.2.1 on Pipeline Construction, a durable road surface prevents fine soil particles from being pushed to the road surface and carried by stormwater to drainage swales along the construction right-of-way. This durable surface as well as its stormwater management system would require monitoring and periodic maintenance to avoid erosion and subsequent sediment discharge to, for example, zero order and first order streams on ridge tops and along steep slopes. JCEP has not provided DEQ with information demonstrating that this monitoring would occur nor information on how JCEP would perform maintenance on this construction access road as well as existing access roads.

Planning for Erosion Control

JCEP proposes to use its Transportation Management Plan and Erosion Control and Revegetation Plan to identify BMPs for road construction and maintenance to minimize erosion of road cut slopes, fills, and surfaces. In reviewing these plans do not address, DEQ found no demonstration of compliance with the Oregon Forest Practice Act's road construction and maintenance requirements for non-federal, privately owned forest road segments. hydrologically connected to streams. Additionally, DEQ did not find County, Forest Service, BLM, and Bureau of Reclamation road construction and maintenance standards for unpaved road hydrologically connected to streams. In fact, a As noted in the December 20, 2018 information request (Pages 20-22 of, Attachment A) , DEQ found blank pages in the Appendices. JCEP referenced these pages in the Transportation Management Plan as containing information on JCEP's road operation and maintenance actions. Finally, DEQ did not find any discussion of the 229-mile construction access road and JCEP's maintenance plan to protect water quality while operating this road during pipeline construction.

Given this missing information, DEQ requested that JCEP provide a detailed maintenance and improvement plan for existing access roads in its September 7, 2018 information request (see Page 8 of 15 of Attachment B). DEQ also requested JCEP inventory the existing access roads to identify unpaved road segments needing improvements to support anticipated traffic loads and to ensure compliance with Forest Practices Act rules. DEQ requested that JCEP's road maintenance and improvement plan use road assessment protocols such as the Geomorphic Road Assessment and Inventory Package (GRAIP) to evaluate the potential for road surface erosion risk, gully risk, and landslide risks along the existing access roads.

In an October 25, 2018 response to these requests, JCEP indicated it would provide DEQ with a revised Table A.2-6 from Appendix A.2 of Resource Report 2 identifying BMPs for water bodies crossed by or within 100 feet of Temporary and Permanent Access Roads. In its December 20, 2018 supplemental information request, DEQ informed JCEP that lists of generic BMPs in a summary table were not responsive to DEQ's concerns regarding traffic loads on existing access roads (see Pages 40 – 41 of Attachment A). DEQ requested specific design and maintenance standards and specification by road ownership. DEQ also noted that JCEP's selection criteria for existing access roads in its inventory was not acceptable. More specifically, limiting the inventory to road segments that cross by or within 100 feet of a perennial or intermittent stream would not capture many existing access road segments that are hydrologically connected to streams. As one example, a road segment may be several hundred feet from a stream but still discharge sediment from its road surface if it has an in-slope drainage ditch with no cross drains. If its road surface is unstable during wet weather, a ditch with this design would discharge sediment

directly to a stream. Given these concerns, DEQ requested that JCEP use models such as GRAIP or the Washington Road Surface Erosion Model (WARSEM) to evaluate its proposed use of road segments. These models provide detailed protocols for determining which unpaved road segments are hydrologically connected to a stream.

In a January 2019 meeting and a February 20, 2019 response, JCEP proposed using WARSEM to perform the DEQ-requested inventory of unpaved roads to develop the DEQ-requested road maintenance and improvement plan.[59] During further discussions in conference calls, JCEP proposed to perform a Level I Inventory in WARSEM of existing access roads. A Level I Inventory is a desktop analysis using maps. In Section 4.3.2.2 of the Draft Environmental Impact Statement (DEIS) for this project activity (see Page 4-102), JCEP concludes that only 21 existing access roads could potentially deliver sediment to streams. As explained below, this conclusion is clearly erroneous given the numerous road-stream interactions in areas traversed by the construction right-of-way and given the procedures for determining hydrologic connectivity in a road system.

As a sample of road-stream intersections in the highly dissected drainage basins of the Coast and Cascade Ranges, Figure 8 shows the number of BLM road-stream crossings in just one of numerous subwatersheds where the construction ROW is located. This map does not include cross drains for roads that are also within 200 feet of a stream and, therefore, hydrologically connected to this stream. If a field inventory included cross drains, the number of road-stream interactions on this map would be greater than currently displayed in Figure 8. Many of the BLM roads depicted in the map below would serve as an existing access road for pipeline construction. Given this small area, JCEP's estimate of 21 existing access roads that could potentially deliver sediment is a significant underestimation.

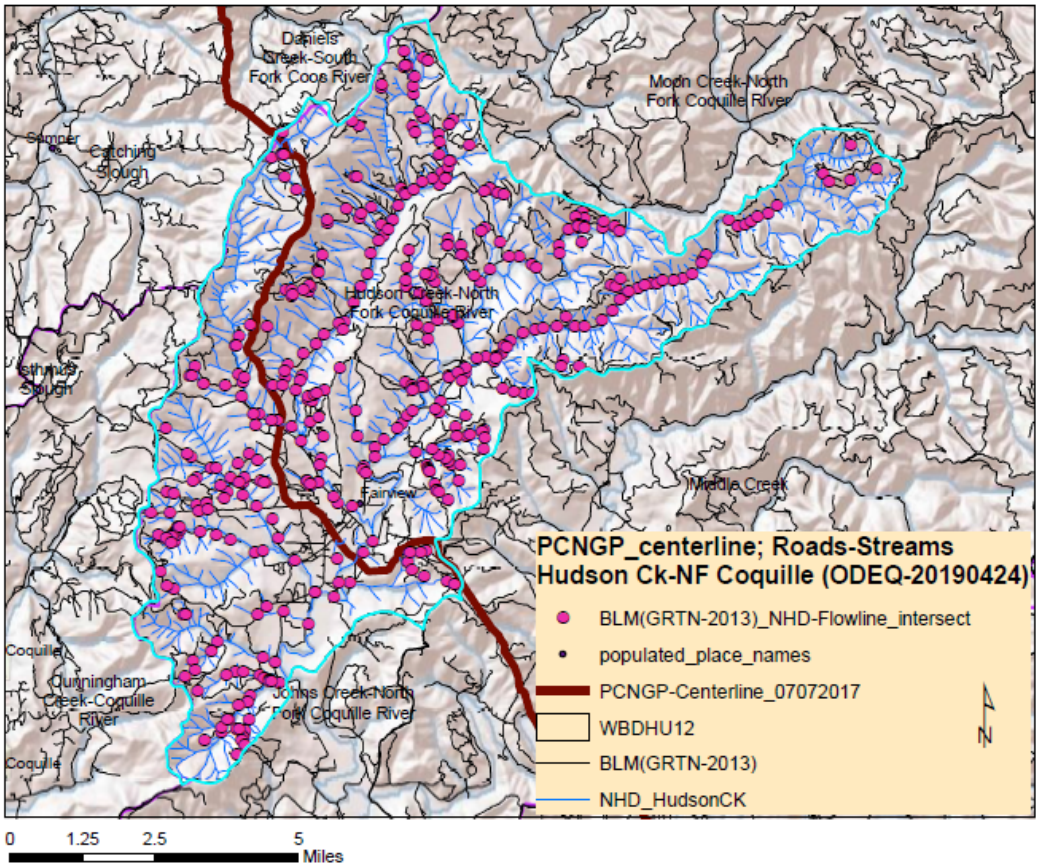
DEQ informed JCEP during the January 2019 meeting and subsequent conference calls that JCEP needed to perform an inventory of all roads segments to identify those hydrologically connected to streams. These road segments using maps during a desktop analysis. In Table 2 of the WARSEM Manual, the authors of this model clearly indicate that a determination of hydrologic connectivity requires field verification. As a result, DEQ requested a Level IV Inventory using WARSEM as this allows JCEP to document the erosion reduction from road surfaces using JCEP's maintenance and improvement plan. JCEP's conclusion that only 21 existing access roads have the potential to discharge sediment to streams is based upon road system surveys using aerial photos, maps, or other remote sensing tools. Remote sensing tools cannot serve as a substitute for a field inventory as explained below.

For example, JCEP cannot determine using maps if the surface of a road segment is out-sloping and, therefore, draining overland via the road's fill slope and undisturbed landscape. In addition, maps cannot indicate if the surface of a road segment is in-sloping and draining to a ditch carrying stormwater to a stream over several hundred feet or more downslope from this road segment. Moreover, maps cannot indicate if a road surface drains to an in-slope ditch that drains to a cross culvert (or drain) which discharges to a zero order stream connected to a first order stream. Given this, JCEP's desktop analysis of road segments is making significant assumptions that incorporate considerable error into its estimate of the number and location of road segments hydrologically connected to streams.

Such errors place surface water quality at risk from unpaved roads discharging sediment from their surface if JCEP does not maintain or improve these roads to support the anticipated traffic loads. To eliminate these errors, a WARSEM inventory protocol requiring field verification such as a Level IV Inventory or comparable analysis must be used. Further, development of a Transportation Management Plan for nonfederal roads is also required (the TMP in the 401 submittal did not discuss these roads).

[59] Dube, Kathy, Walt Megahan, and Marc McCalmon. 2004. *Washington Road Surface Erosion Model*. State of Washington Department of Natural Resources.

Figure 8: Map of Hudson Creek-North Fork Coquille Subwatershed



Road Construction

JCEP's proposed improvements of access roads include the widening of roads, the recommissioning of roads, the installation and removal of a temporary bridge, the development of turnouts, replacement of culverts at stream crossings, and the installation and removal of a temporary culvert at a stream crossing. JCEP would also build 25 segments of Temporary Access Roads and Permanent Access Roads. These proposed improvements and additions involve land disturbance that may lead to sediment and turbid discharges to streams and wetland depending on the site constraints at each improvement (Furniss et al. 1991). In Table 1.2-1 of Resource Report 1, JCEP estimates that road improvements would disturb 22.70 acres. On September 7, 2018, DEQ requested designs and specifications for these improvements and for the new roads. JCEP has not provided DEQ with the requested information regarding these improvements.

Road improvement designs and specifications as well as plan drawings showing constraints such as landslide susceptibility zones, sensitive receptors such as streams and wetlands, and BMPs are not available for DEQ to review and evaluate at this timeIn Section 1.3.4 of JCEP's Resource Report 1, JCEP notes that it would not conduct civil surveys to prepare engineering designs until the fourth quarter of 2019 for the road improvements. JCEP has only provided the general location of erosion controls proposed for the construction right-of-way on the Environmental Alignment Sheets submitted with JCEP's NPDES 1200-C Permit Application. These do not provide the engineering detail necessary to describe how JCEP would manage and treat stormwater from improved and new roads. The information submitted to date does not provide the engineering detail sufficient to describe how JCEP would stabilize road cut and fill slopes in landslide susceptibility zones.

Additionally, DEQ has not received the 1200-C required erosion control and sediment plan for these improvements to evaluate their compliance with Permit Schedule A.8.b on prevention of earth slides and A.10 on water quality

standards. In its December 20, 2018 supplemental information request (see Pages 46 – 50 and Page 80 of Attachment A), moreover, DEQ provided JCEP examples of new roads where JCEP did not provide design information, drawings, or site-specific BMPs. In providing these examples, DEQ identified its water quality concerns and the information DEQ needed to evaluate JCEP's actions to control road construction actions and road design elements that can lead to sediment and turbid discharges to streams.

As discussed in more detail above, when widening existing access roads, JCEP would cut into and the place fill on steep and/or unstable slopes. These proposed actions can initiate landslides discharging turbid flows and sediment with organic matter into zero order streams (i.e., bedrock hollows) as depicted in Figures 6 and 7. [60] DEQ detailed the potential water quality impacts of road construction and the deficiencies in JCEP's submittal in DEQ's December 20, 2018 supplemental information request (see Pages 18 – 25 of Attachment A). For example, while excavating a culvert from a stream crossing, sediment and fine soil particles generating turbid flows can discharge into streams and riverine wetlands. However, JCEP has not detailed how JCEP would address these discharges. JCEP's reliance on an Environmental Inspector to ensure effective sediment and turbidity controls during the construction process does not provide DEQ a reasonable assurance that the proposed activities will be conducted in a manner that will not violate the statewide narrative criteria.

In addition, JCEP must prepare for wet weather with an erosion and sediment control plan. Ten percent of the rain falls in the summer in Southwestern Oregon. [61] Although the probability is considerably lower, rain does occur during Oregon's in-water work period. Culvert replacements may involve the removal of substantial amounts of fill depending on the topography and road alignment relative to this topography. For its proposed culvert replacements projects, JCEP has not provided plans for locating and managing large stockpiles of excavated fill to avoid sediment and turbid discharges while JCEP installs a new culvert.

For culvert replacement projects, JCEP may clear riparian vegetation and grub their stumps from the soil adjacent to stream crossing approaches to create space for the crossing's footprint. These actions can discharge turbid flows and sediment to streams as well as increase thermal loading from the loss of riparian shade. JCEP has not documented these impacts or demonstrated what BMPs JCEP would deploy and where. Road recommissioning may involve the removal of water bars (i.e., slope breakers), reshaping the unpaved road surface to manage drainage, and reshaping drainage ditches. These land disturbing actions also can lead to sediment discharges and turbid flows into streams and wetlands during wet weather. If a decommissioned road was restored to approximate the natural contours, recommissioning may involve substantial regrading to create a travel way. This regrading may involve the development of cut and fill slopes on steep slopes and/or unstable slopes requiring geotechnical engineering to prevent landslides altering the roads' drainage system and leading to sediment and turbid discharges during wet weather.

JCEP presents it the Erosion Control and Revegetation Plan and Transportation Management Plan with their BMPs as its approach for managing water quality impacts from roads. DEQ reviewed these plans and identified their deficiencies in its December 20, 2018 supplemental information request (see Pages 10 – 25 of Attachment A). Based on DEQ's evaluation, JCEP's proposed access road improvements do not exhibit the highest and best controls, do not demonstrate that these proposed BMPs would minimize the erosion of and discharge of inorganic and organic debris, turbid flows, and sediment from cut banks, fills, and road surfaces.

6.1.2.4 Post-Construction Operation and Maintenance of Pipeline Right-of-Way

On steep slopes and near stream crossings, JCEP proposes to use permanent slope breakers to manage post-construction stormwater on the permanent ROW in compliance with 2013 FERC guidelines.[62] As discussed in Section 6.1.2.1 of this Evaluation and Findings Report, slope breakers (i.e., water bars) concentrate stormwater and

[60] Hearn, G.J. 2011. Slope Engineering for Mountain Roads. Geological Society Engineering Geology Special Publication No. 24

[61] National Climate Data Center. 2006. *Climate in Oregon*. National Oceanic and Atmospheric Administration

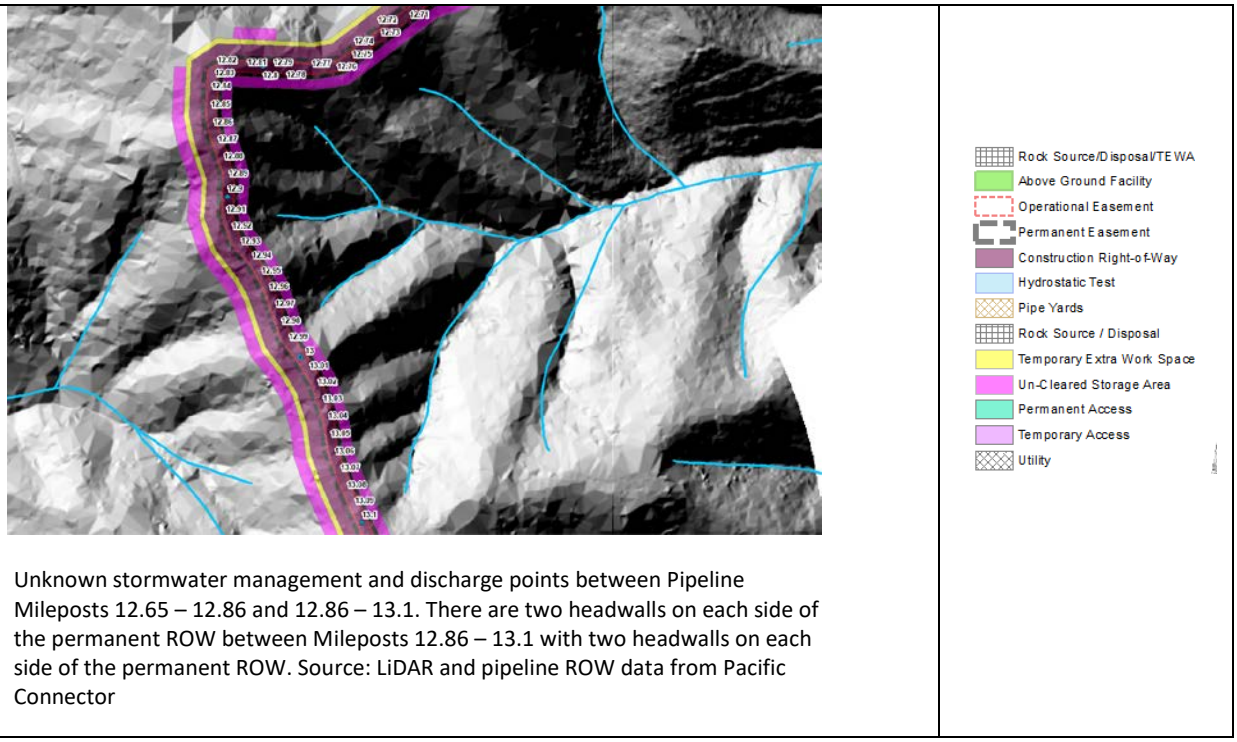
[62] Federal Energy Regulatory Commission. 2013. Upland Erosion Control, Revegetation and Maintenance Plan

discharge it outside the ROW. In the September 7, 2018 information request, DEQ requested JCEP evaluate the post-construction stormwater discharge from the 30-foot permanent ROW during the development of a post-construction stormwater management plan (see page 11 of 15 of Attachment B). For several years following the pipeline's construction, the drainage area for each permanent slope breaker on steep slopes would include 95-feet of the construction ROW width and the 100-feet of ROW to the next permanent slope breaker. This drainage area would decrease to 30 feet by 100 feet once a more mature canopy develops over several decades in the restored construction ROW. As referenced in preceding sections of this Evaluation and Findings Report, concentrating stormwater and discharging it to unstable slopes can produce positive soil pore pressures that initiate landslides.

Stormwater Discharge Relative to Unstable Slopes

To ensure compliance with statewide narrative criteria OAR 340-041-0007(1), DEQ developed the *Section 401 Water Quality Certification Post-Construction Stormwater Management Plan Submission Guidelines* (March 2018). In Section E.2.2 of these plan submission guidelines, DEQ requests that project proponents determine if infiltration of stormwater discharge should be avoided due to steep slopes or landslide risks (see Page 9). The proposed permanent ROW traverses over and along unstable slopes in numerous locations. For example, Figure 9 below shows sections of the permanent ROW above headwalls. JCEP has not provided DEQ with a post-construction stormwater plan for the permanent ROW demonstrating how JCEP would manage stormwater along the permanent ROW and, in particular, along landslide susceptibility zones. As discussed in Section 6.1.2.1 of this Evaluation and Findings Report, the stormwater discharge from slope breakers can reduce slope stability.

Figure 9: Construction Right-of-Way Above Headwall



Unknown stormwater management and discharge points between Pipeline Mileposts 12.65 – 12.86 and 12.86 – 13.1. There are two headwalls on each side of the permanent ROW between Mileposts 12.86 – 13.1 with two headwalls on each side of the permanent ROW. Source: LiDAR and pipeline ROW data from Pacific Connector

Stormwater Discharge Near Streams

In its December 20, 2018 supplemental information request, DEQ stressed that the permanent ROW is functioning as a primitive road (see Page 6 and 7 of Attachment A). Additionally, the permanent ROW would have soil compaction from pipe installation and post-construction maintenance, necessitating the need for a stormwater collection system in the form of slope breakers (i.e., water bars). Information from JCEP supports these concerns. For example, on Page 19 of JCEP's Erosion Control and Revegetation Plan (ECRP), JCEP states that it would not mitigate soil compaction over the pipeline's trench line. On page 24 of JCEP's Resource Report 6 (Geologic

Resources), JCEP notes that it would compact the fill over the pipeline after installation. In addition, on page 71 of Resource Report 1, JCEP states that – depending on trench settlement and its damage to slope breakers – sections of the pipeline would require additional fill. The compaction of this additional fill would also lead to soil compaction within the permanent right-of-way during regrading and repair of the permanent slope breakers. These activities as well as those noted below would increase runoff and sediment discharge into the permanent slope breakers.

In its Erosion Control and Revegetation Plan, JCEP references the 2013 FERC Upland Erosion Control, Revegetation and Maintenance Plan. On Page 17 of these guidelines, FERC requires pipeline operators to routinely mow or clear a corridor of 10-feet in width centered on the pipeline. This purpose of this corridor is to maintain this area in an herbaceous state. FERC also requires routine mowing and clearing at least every 3 years to maintain the remaining portion of the 30-foot right-of-way in an herbaceous and small shrub state. A pipeline industry survey indicates that more than 80% of the pipeline operators use mechanical mowing for post-construction ROW maintenance.[63] This mechanical mowing would also contribute to soil compaction. Grass surface roads discharge 50% of the sediment that discharges from a native soil surface road.[64] In fact, the authors of the Washington Road Surface Erosion Model (WARSEM) assign grass surface roads a higher erosion factor for road surfacing than gravel roads with ruts.

Figure 10 shows one of several examples of the permanent ROW crossing or paralleling streams on the 303(d) list for sediment or crossing streams discharging to these sediment-listed streams. Based on its proposed conceptual approach for operating the ROW, the permanent ROW has the potential to discharge sediment at stream crossings. Ongoing increases in sediment loading to a waterbody that is listed on the 303(d) list for sediment in not allowed without either a TMDL allocation, or an implementation plan showing that there will be no increase in loading. OAR 340-41-0004(7)("Water quality limited waters may not be further degraded except in accordance with paragraphs (9)(a)(B), (C) and (D) of this rule."[65]JCEP has not provided the analyses for the discharges that would

[63] Nowak, C., B. Ballard, P. Appelt, and D. Gartman. 2002. *Integrated Vegetation Management of Gas Pipeline Rights-of-Way*. Gas Technology Institute. GRI-01/0096

[64] Swift, L.W. 1984. Gravel and Grass Surfacing Reduces Soil Loass from Mountain Roads. Forestry Science Volume 30 Pages 657-670

[65] (9) Exceptions. The commission or department may grant exceptions to this rule so long as the following procedures are met:

(a) In allowing new or increased discharged loads, the commission or department must make the following findings:

(A) The new or increased discharged load will not cause water quality standards to be violated;

(B) The action is necessary and benefits of the lowered water quality outweigh the environmental costs of the reduced water quality. This evaluation will be conducted in accordance with DEQ's "Antidegradation Policy Implementation Internal Management Directive for NPDES Permits and section 401 water quality certifications," pages 27, and 33-39 (March 2001) incorporated herein by reference; and

(C) The new or increased discharged load will not unacceptably threaten or impair any recognized beneficial uses or adversely affect threatened or endangered species. In making this determination, the commission or department may rely on the presumption that, if the numeric criteria established to protect specific uses are met, the beneficial uses they were designed to protect are protected. In making this determination the commission or department may also evaluate other state and federal agency data that would provide information on potential impacts to beneficial uses for which the numeric criteria have not been set;

(D) The new or increased discharged load may not be granted if the receiving stream is classified as being water quality limited under sub-section (a) of the definition of "Water Quality Limited" in OAR 340-041-0002, unless:

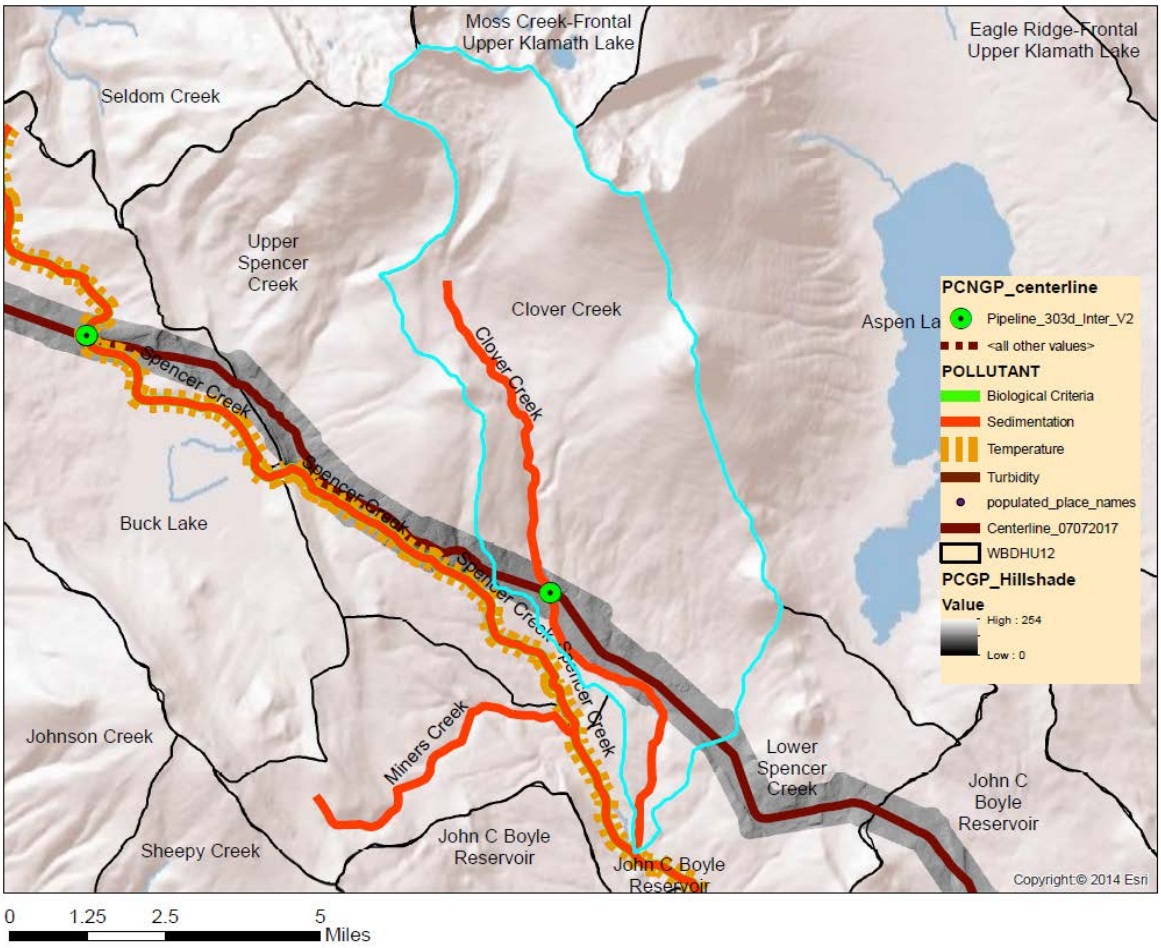
(i) The pollutant parameters associated with the proposed discharge are unrelated either directly or indirectly to the parameter(s) causing the receiving stream to violate water quality standards and being designated water quality limited; or

(ii) Total maximum daily loads (TMDLs), waste load allocations (WLAs) load allocations (LAs), and the reserve capacity have been established for the water quality limited receiving stream, compliance plans under which enforcement action can be taken have been established, and there will be sufficient reserve capacity to assimilate the increased load under the established TMDL at the time of discharge; or

(iii) Effective July 1, 1996, in water bodies designated water-quality limited for dissolved oxygen, when establishing WLAs under a TMDL for water bodies meeting the conditions defined in this rule, the department may at its discretion provide an allowance for WLAs calculated to result in no measurable reduction of dissolved oxygen (DO). For this purpose, "no measurable reduction" is defined as no more than 0.10 mg/L for a single source and no more than 0.20 mg/L for all anthropogenic activities that influence the water quality limited segment. The allowance applies for surface water DO criteria and for Intergravel dissolved oxygen (IGDO) if a determination is made that the conditions are natural. The allowance for WLAs applies only to surface water 30-day and seven-day means; or

occur at each slope breaker for each stream crossing. In addition, JCEP has not performed an analysis to demonstrate that the herbaceous area in the permanent ROW between the last slope breaker and stream is an effective BMP by itself and would not contribute to or cause a water quality standard violation, particularly near waterbodies that are not meeting standards for sediment. As noted in DEQ's September 7 (Page 11 of 15 of, Attachment B) and December 2018 (Page 66 – 68 of Attachment A) information requests, DEQ requested that JCEP evaluate the efficacy of these proposed BMPs using modeling. JCEP has not provided DEQ with this evaluation of the water quality impacts from this slope breaker discharge nor has it provided DEQ with the analysis of the proposed treatment for the discharge from slope breakers immediately upslope of a steam..

Figure 10: Pipeline Parallel to and Crossing Spencer Creek and crossing Clover Creek, near Milepost 177



(iv) Under extraordinary circumstances to solve an existing, immediate and critical environmental problem, the commission or department may, after completing a TMDL but before the water body has achieved compliance with standards, consider a waste load increase for an existing source on a receiving stream designated water quality limited under sub-section (a) of the definition of "Water Quality Limited" in OAR 340-041-0002. This action must be based on the following conditions:

(I) That TMDLs, WLAs and LAs have been set; and

(II) That a compliance plan under which enforcement actions can be taken has been established and is being implemented on schedule; and

(III) That an evaluation of the requested increased load shows that this increment of load will not have an unacceptable temporary or permanent adverse effect on beneficial uses or adversely affect threatened or endangered species; and

(IV) That any waste load increase granted under subparagraph (iv) of this paragraph is temporary and does not extend beyond the TMDL compliance deadline established for the water body. If this action will result in a permanent load increase, the action must comply with sub-paragraphs (i) or (ii) of this paragraph.

On page 63 to 68 (Attachment A) of the December 20, 2018 supplemental information request, DEQ provided JCEP with the basis for DEQ's request for the analyses described in Section E.3, E.6, and E.7 of DEQ's submission guidelines for post-construction stormwater management plans. On Page 78 to 80 of Attachment A in its December 20, 2018, supplemental information request, DEQ provided JCEP with an example of a landslide prone slope combined with erosive soils and stormwater to create soil slumping on a power line right-of-way intersecting JCEP's proposed pipeline right-of-way. These examples illustrate the site-specific challenges and need for effective BMPs to control sediment at stream crossings along the permanent right-of-way.

Based upon its evaluation, DEQ is unable to conclude that JCEP's proposed permanent pipeline right-of-way exhibits the highest and best controls, and demonstrates that proposed BMPs would minimize the erosion of and discharge of inorganic and organic debris, turbid flows, and sediment from cut banks, fills, and road surfaces. OAR 340-041-0007.

6.1.2.5 Terminal and Off-Site Project Area Stormwater

JCEP proposes to build and operate a LNG Export Terminal that would generate stormwater. JCEP proposes to use an oily waste collection system to collect and transport stormwater from drainage areas with various containment systems for tanks and bulk storage containers holding gas, diesel, and process chemicals such as amine and other chemicals yet to be identified. This oily waste system conveys stormwater to an oil/water separator that in turn discharges to an existing industrial wastewater pipeline that discharges to the Pacific Ocean. In its September 25, 2018 information request, DEQ requested JCEP identify the significant material transported within, stored, and used at the Terminal. JCEP has not identified the type of amine it would use or other process chemicals at the Terminal. This information is necessary to evaluate the water quality impacts of JCEP's proposed activities.

Additionally, the construction of the Terminal necessitates the excavation of uplands to create the Marine Slip for the Terminal and dredging to create the Access Channel and Material Offloading Facility. JCEP would use this excavated soil and dredged material as fill in the Terminal's Ingram Yard and South Dunes areas as well as in several Off-Site Project Areas such as the Roseburg Forest Products Property.[66] The leachate from dredged estuarine deposits would potentially drain to sensitive receptors such the freshwater wetlands.[67] To address during construction and post-construction stormwater discharges from the Terminal and the Off-Site Project Areas, JCEP proposed the November 2017 Storm Water Management Plan. For managing discharges transporting dredge material and the leachate from dredged material disposal, JCEP proposes to use specified Potential Dredge Disposal Locations featured in Enclosures 19 – 22 of Part 1, Appendix N-5. DEQ reviewed these documents and, based on this review, issued the information requests noted below.

In its review of the Terminal Stormwater Management Plan, DEQ used the March 2018 Section 401 Water Quality Certification Post-Construction Stormwater Management Plan Submission Guidelines. DEQ developed these guidelines to ensure project proponents used the highest and best practicable treatment control as required in Statewide Narrative Criteria OAR 340-041-0007(1). In its September 25, 2018 information request, DEQ provided JCEP with comments describing how the stormwater management plan did not address these guidelines. DEQ also requested that JCEP seek a National Pollutant Discharge Elimination System 1200-C Permit Application for the Terminal and the Off-Site Project Areas noted in its plan.

In an October 25, 2018 response to this information request, JCEP informed DEQ that it would address DEQ's comments in the first quarter of 2019. On April 1, 2019, DEQ received a revised plan entitled LNG Terminal Stormwater Management Plan. JCEP revisions partially addressed DEQ's information request. However, as noted below, JCEP has not yet demonstrated it would manage stormwater discharge with the highest and best practicable

[66] Drawing 21, Potential Dredge Disposal Locations Plan View. Section 401 Water Quality Submittal, U.S. Army Corps of Engineers Joint Permit Application. Jordan Cove Energy Project.

[67] Page 17, Table 4-1. Wetland and Estuarine Resources, LNG Terminal Stormwater Management Plan. March 2019

treatment controls, manage construction access road building and maintenance to reduce erosion, and prevent the deposit of organic and inorganic deposits deleterious to aquatic life. Moreover, JCEP has not yet demonstrated that the construction stormwater discharges would comply with applicable turbidity and biocriteria standards.

To manage construction stormwater, JCEP has not provided DEQ with a NPDES 1200-C General Permit Application(s) for construction stormwater in the Terminal, Off-Site Project Area as well as construction access roads proposed for these construction sites. The 1200-C permit application requires JCEP to submit an Erosion and Sediment Control Plan with the application. This ESCP must contain among other requirements areas of soil disturbance, drainage patterns, discharge points, sensitive receptors such as wetlands, and sediment and erosion controls including installation techniques (see Page 13 – 14 of 30, Schedule A.12, NPDES 1200-C Permit). DEQ does not have an ESCP to determine if the management of construction stormwater at these sites would violate OAR 340-041-0007(1), (7), and (11) as well as Schedule A.10 of the 1200-C permit. Schedule A.10 on In-stream Water Quality Standards states that compliance with this permit would result in stormwater discharges being controlled as necessary to meet water quality standards in the absence of information demonstrating otherwise. Without the information in the ESCP, DEQ cannot determine if the construction stormwater discharge would comply with the turbidity standard. Moreover, DEQ cannot reasonably determine that construction stormwater discharge would sufficiently protect aquatic life in wetlands and in Coos Bay.

For the revised LNG Storm Water Management Plan, DEQ's review noted significant progress in addressing DEQ's 401 plan submission guidelines. However, among the deficiencies in this revised plan, DEQ identified two proposed categories of action that do not demonstrate JCEP would meet OAR 340-041-0007(1) given the information provided in this plan. JCEP has provided incomplete information for spill containment within the Terminal. JCEP has not provided DEQ the design information for stormwater controls in the Terminal's abandoned Construction Facility Areas in the Terminal. These two deficiencies are detailed below.

In Section 5.5.2.1 of the JCEP's revised plan, JCEP proposes three categories of spill containment. In each category, JCEP provides qualitative information on proposed controls. In addition, in its April 1, 2019 response to DEQ's September 25, 2018 information request, JCEP directed DEQ to its proposed Spill Prevention, Control, and Countermeasure Plan for spill containment controls for the Terminal Stormwater Management Plan.[68] The cover of JCEP's SPCC Plan contains a note that this plan is a preliminary version. DEQ reviewed this plan and determined that it is not a complete or final plan. For example, in Table 1-1 of the SPCC Plan, the list of bulk storage containers and their secondary containment system is incomplete. JCEP does not provide information on the secondary containment for transformers. JCEP also notes that other oil storage systems and their containment controls are to be determined in the future. Additionally, Section 8 of this plan is preliminary information and JCEP notes that it would update this plan to reflect as-built controls.

In the final SPCC Plan, DEQ is seeking information on where exactly JCEP would locate on its stormwater site plan the proposed loading aprons, lined earthen berms, double walled tanks, and other containment structures designed to contain spills as well as information on the specific design features of these controls. For reasonable assurance, DEQ needs to know if JCEP would size the containment berms coupled with the containment capacity of the oil/water to capture the largest anticipated spill. Statements in the current draft SPCC Plan that JCEP would comply with federal regulations are not a demonstration that JCEP's proposed control concepts have the capacity to prevent a discharge to surface water. Site-specific information on proposed structural spill controls is essential for DEQ to evaluate their potential to control discharges to surface water. JCEP's containment controls must demonstrate consistency with the statewide narrative criteria for highest and best practicable controls to prevent the release of toxic substances to the Pacific Ocean. Site-specific design information is missing in the SPCC Plan and the revised Terminal Stormwater Management Plan.

For the abandoned Construction Facility Areas at the Terminal, JCEP did not provide DEQ with the drainage area

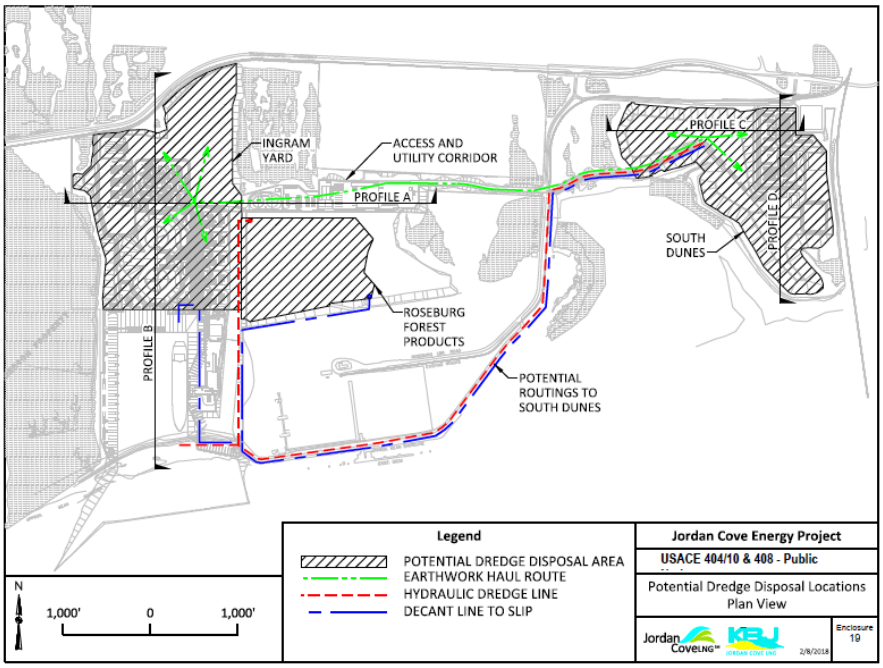
[68] Spill Prevention, Control, and Countermeasure Plan – Operation. August 29, 2017. Part 1: Appendix K, Section 401 Water Quality Package

for each infiltration control for these areas. JCEP did not provide the designs for each infiltration control that DEQ requests in Section E.7 of its 401 plan submission guidelines. Construction designs and specifications that DEQ requests in Section E.8 of these guidelines are necessary to demonstrate JCEP would prevent sediment inundation and erosion in all control prior to their operation (i.e., commissioning). Moreover, JCEP needs to provide design information to demonstrate that the infiltration controls can contain the volume of stormwater they receive without altering the hydrology of adjacent groundwater fed wetlands. Inundating these wetlands with surface water would convert them into stormwater detention ponds thus altering their resident aquatic biological communities by altering their values and functions. At present, JCEP's submittal does not demonstrate that the stormwater infiltration controls in the Construction Facility Areas provide the highest and best practicable controls of flows to meet OAR 340-041-0007(1).

For managing discharges transporting dredge material and the leachate from dredged material disposal, DEQ identified deficiencies in JCEP's proposed documents for managing dredging operations and dredge material to prevent discharges to wetlands and Coos Bay. Specifically, in its December 20, 2018 supplemental information request (see Pages 85 - 87, Attachment A), DEQ informed JCEP did not demonstrate in its submittal that the highest and best treatment controls were proposed to meet statewide narrative criteria OAR 340-041-0007(1) and (11). For example, DEQ noted that JCEP did not provide details on how JCEP would manage leachate from discharging to surround freshwater or estuarine wetlands altering their chemical composition and turbidity. Increasing turbidity in and inundating freshwater wetlands with saline leachate would alter their capacity to support the aquatic biological communities dependent on these wetlands.

In its October 8, 2018 response to DEQ's September 7, 2018 information request, JCEP referred DEQ to Potential Dredge Disposal Locations featured in Enclosures 19 – 22 of Part 1, Appendix N-5 of the 401 Water Quality Package. DEQ presents Enclosure 19 below to highlight the lack of detailed practices to manage the wetlands – shaded gray – adjacent to proposed dredging disposal areas:

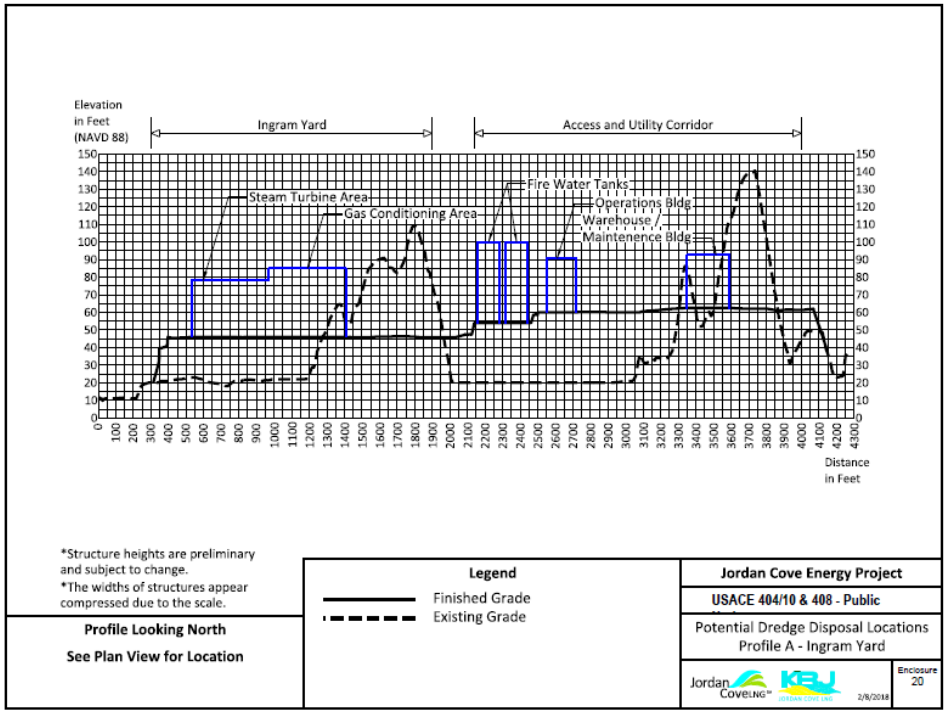
Figure 11: Potential Dredge Disposal Areas Relative to LNG Terminal and Adjacent Wetlands



Enclosure 19 does not show structural controls to demonstrate saline leachate or decant from dredged material would not discharge to adjacent freshwater wetlands. JCEP has not indicated how it would place containment

structures around the dredged material nor change the grade to direct decant to the dredge line, size a collection basin to capture the decant, operate a pump to transfer the decant to a discharge location, or propose a discharge location. Enclosures 20 – 22 only provide the elevation of dredge material as shown in Figure 12.

Figure 12: Proposed Finish Grade of Dredge Soil Locations



For upland confined dredge disposal facilities, the State of New Jersey requires project proponent to consider five factors in the placement of dredged material. These factors are illustrative on what DEQ would consider in evaluating a proposal with the required information. These factors are:

- Location of facility and site-specific condition including compatibility with adjacent and nearby land use.
- Characterization of the dredged material proposed for placement at the facility.
- Design and construction of the facility.
- Operation of the facility.
- Final closure of the facility.[69]

At present, JCEP's submittal does not demonstrate that controls for the disposal of dredged material provide the highest and best practicable controls of flows to meet OAR 340-041-0007(1) and prevent the deposit sediment deleterious to aquatic life to meet OAR 340-041-0007(11). Given this, DEQ cannot conclude that the JCEP's proposed disposal of dredge material would be conducted in a manner that would comply with the turbidity standard and biocriteria standard.

6.1.2.6 Dredging

JCEP's dredging in the North Spit of Coos Bay would reduce water quality by increasing turbidity above the numeric limits established in Oregon's Turbidity water quality standard.[70] JCEP provides an overview of dredging

[69] State of New Jersey. October 1997. Dredging Technical Manual, "The Management and Regulation of Dredging Activities and Dredge Material Disposal in New Jersey's Tidal Waters." Pages 73

[70] [70] Hydrodynamic Studies – Turbidity Analysis, Moffat and Nichol, November 2017.

procedures in the Dredge Material Management Plan and preferred locations for dredge material disposal but does not address procedures to minimize adverse effects of these actions on water quality. In particular, the plan does not specify methods to manage dredge spoil disposal in a manner that protects water quality. In one example, the plan recommends hydraulically transferring dredged material to the APCO sites and discharge of the slurry material to temporary containment berms. Hydraulic transfer requires large volumes of water to maintain dredge material in suspension during transfer. JCEP's Dredge Material Management Plan includes no proposal to manage and treat discharge from these containment areas to remove suspended material and reduce turbidity.

On September 7 and December 20, 2018, DEQ requested JCEP provide additional information, including a Dredging Pollution Prevention Plan, to describe specific dredging methods and procedures. In particular, DEQ requested the following information from JCEP to describe measures to reduce project effects on water quality:

- The type of pollution controls JCEP would use including its design and specifications.
- The specific applications for these controls.
- The specific location where JCEP would employ these controls relative to sensitive sites as well as other landscape features (e.g., drainage pattern, vegetation, etc.).
- The maintenance schedule for each control.
- A monitoring plan for evaluating the efficacy of all proposed controls and compliance with the turbidity standard.[71]

Oregon's Statewide Narrative Criteria requires applicants to demonstrate the activity includes the highest and best treatment controls and measures to prevent the discharge of organic and inorganic material into waterways. Absent a plan demonstrating JCEP has addressed these requirements, DEQ cannot confirm that JCEP has selected the highest and best treatment options to minimize anticipated project-effects in compliance with Oregon's Statewide Narrative Criteria.

6.1.3 DEQ Findings

Based on the preceding evaluation of Project effects, DEQ adopts the following findings related to OAR 340-041-0007 (Statewide Narrative Criteria):

1. JCEP has not demonstrated that the proposed pipeline construction, access road construction and maintenance, and pipeline right-of-way activities would employ the highest and best treatment to control pollution, as required by OAR 340-041-0007(1);
2. JCEP has not demonstrated that the proposed road construction and maintenance activities would be conducted in a manner to keep waste materials from cut banks, fills, and road surfaces out of public waters, as required by OAR 340-041-0007(7);
3. JCEP has not demonstrated that the proposed pipeline construction, access road construction and maintenance, and pipeline right-of-way activities would employ state-of-practice methods to identify landslide susceptibility zones and mitigate landslide risks to control discharge of organic or inorganic debris, as required by OAR 340-041-0007(11);
4. JCEP's failure to provide requested specific waterbody crossing and restoration plans, or plans that include descriptions of methods to construct and maintain roads in a manner to keep waste materials out of public waters and descriptions of methods to control discharge of organic or inorganic debris, prevented the department from being able to process the application within the time allowed by law. OAR 340-048-0020(3);and,
5. JCEP has not demonstrated that the proposed LNG Export Terminal and associated facilities will comply with Oregon's statewide narrative criteria. DEQ makes this finding because:
    a. JCEP did not provide details for spill containment for Terminal.
    b. JCEP did not provide details for infiltration controls for Construction Facility Areas.

[71] Supplemental Information Request. DEQ, December 20, 2018.

c. JCEP did not provide details for dredged material disposal controls.
d. JCEP did not demonstrate that proposed construction stormwater controls are the highest and best treatment options to control pollution as required by OAR 340-041-0007(1).
e. JCEP's proposed dredging activities do not employ the highest and best treatment options for preventing or minimizing turbidity as required by OAR 340-041-0007(1); and,
f. JCEP's proposed dredging activities do not employ sufficient methods to keep organic or inorganic material out of public waters as required by OAR 340-041-0007(11).

Based upon these findings, violations of the statewide narrative criteria are likely to occur and DEQ concludes that it does not have a reasonable assurance that the proposed activities will be conducted in a manner that will not violate the Statewide Narrative Criteria.

6.2 Biocriteria

6.2.1 Applicable Standard

Oregon Administrative Rules 340-041-0011:

Waters of the State must be of sufficient quality to support aquatic species without detrimental changes in the resident biological communities.

DEQ's Biocriteria narrative water quality standard is intended to avoid detrimental changes to biological communities caused by pollution. EPA guidance recommends using biological community assessments as an indicator for measuring support for aquatic life.[72] DEQ has developed procedures to characterize the existing condition of benthic communities as a means to assess whether detrimental changes affecting water quality are likely to occur.[73] DEQ's methods use information from reference sites throughout Oregon to assess existing and future conditions of biological communities resulting from anthropogenic activities.

This narrative criterion recognizes that compliance with individual criteria may not fully capture synergistic effects resulting from multiple stressors and cumulative impacts on aquatic species and resident biological communities. The biocriteria standard complements parameter-specific standards by extending broad protections to all designated beneficial uses with the implicit assumption that if the most sensitive beneficial use is protected, then all uses would be protected. Application of the biological criteria standard is intended to assess the overall impact to the aquatic community from water quality changes attributable to an anthropogenic activity.

Definitions applicable to the biocriteria standard include (OAR 340-041-0002):

(5) "Appropriate Reference Site or Region" means a site on the same waterbody, or within the same basin or ecoregion that has similar habitat conditions, and represents the water quality and biological community attainable within the areas of concern.

(6) "Aquatic Species" means plants or animals that live at least part of their life cycle in waters of the state.

(17) "Designated Beneficial Use" means the purpose or benefit to be derived from a water body, as designated by the Water Resources Department or the Water Resources Commission.

[72] US EPA, July 29, 205, Guidance for 2006 Assessment, Listing and Reporting Requirements Pursuant to Sections 303(d), 305(b) and 314 of the Clean Water Act, page 41.
[73] Methodology for Oregon's 2018 Water Quality Report and List of Water Quality Limited Waters, November 2018. Oregon Department of Environmental Quality: https://www.oregon.gov/deq/FilterDocs/ir2018assessMethod.pdf.

(19) "Ecological Integrity" means the summation of chemical, physical and biological integrity capable of supporting and maintaining a balanced, integrated, adaptive community of organisms having a species composition, diversity, and functional organization comparable to that of the natural habitat of the region.
(50) "Resident Biological Community" means aquatic life expected to exist in a particular habitat when water quality standards for a specific ecoregion, basin, or water body are met. This must be established by accepted biomonitoring techniques.

(75) "Without Detrimental Changes in the Resident Biological Community" means no loss of ecological integrity when compared to natural conditions at an appropriate reference site or region.

6.2.2 Evaluation of Biocriteria

6.2.2.1 Pipeline construction

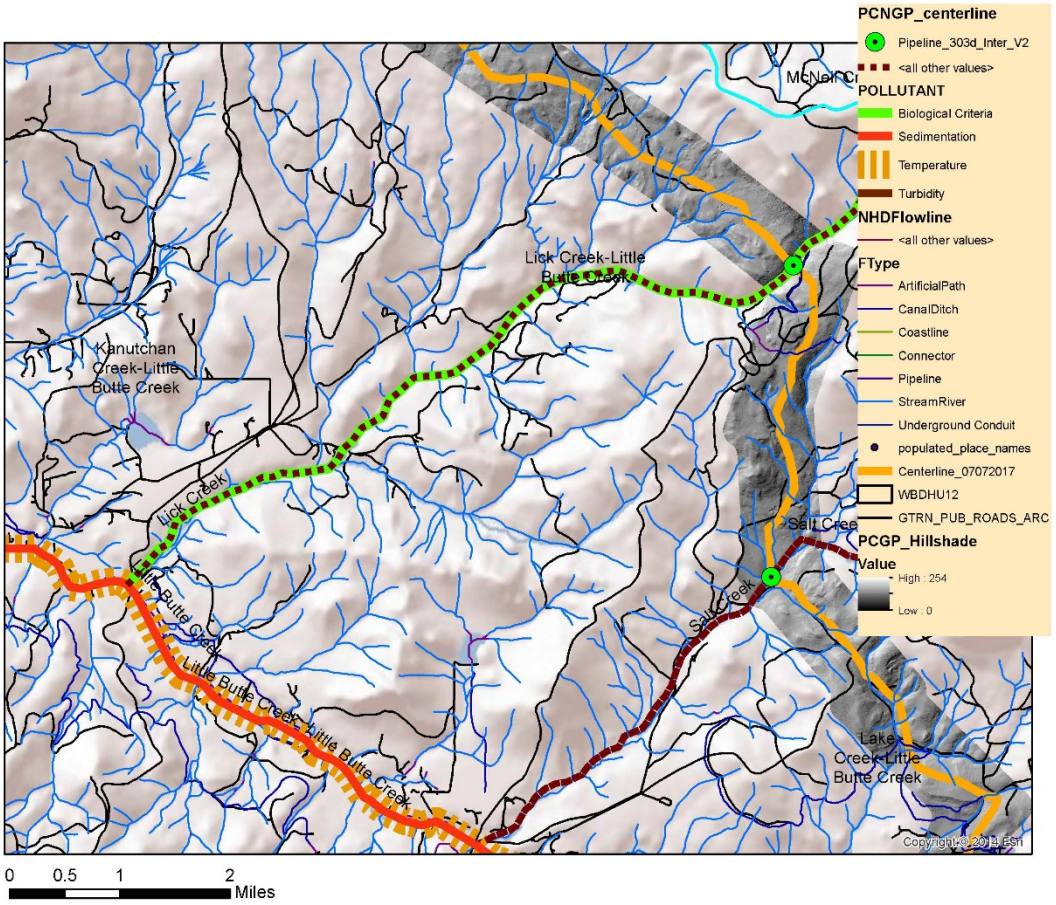
Section 6.1.2.1 of this report provides an evaluation of pipeline construction effects in areas of known or suspected landslide occurrence. In particular, portions of the Tyee Core Area in the Oregon Coast Range are characterized by historical land movement including rapidly moving landslides. Many of these areas form the upper drainages of headwater streams. Debris flows triggered by the placement of material and/or the management of stormwater can result increase landslide frequency that causes sediment discharge to receiving waters. Discharge of sediment and turbid flows to headwater (i.e., zero order) streams would commonly and adversely impact habitat and beneficial uses protected by the biocriteria standard. Information provided by JCEP does not demonstrate that pipeline construction would sufficiently avoid these impacts to provide reasonable assurance that the activities would not violate this standard by resulting in a loss of ecological integrity when compared to natural conditions.

DEQ refers the reader to Section 6.1.2.1 of this Report for DEQ's evaluation of JCEP's proposal to develop a construction right-of-way and a construction access road to install approximately 229 miles of pipeline. The evaluation in Section 6.1.2.1 is also relevant to DEQ's evaluation of JCEP's compliance with Oregon's biocriteria while developing the construction right-of-way (ROW) and the construction access road to build the pipeline. DEQ briefly summarizes this evaluation below.

In Section 6.1.2.1, DEQ summarizes JCEP's proposal to grade an access road and construct a 229-mile line pipeline. DEQ describes how this action would likely result in both the temporary and ongoing discharge of sediment without adequate BMPs.

Figure 13 shows the JCEP Gas Pipeline crossing tributaries to Lick Creek and crossing Lick Creek near Milepost 140.27. Lick Creek is listed on the 303(d) List for biocriteria. Sediment discharge from pipeline construction and debris flows from landslides initiated by the construction of the right-of-way could affect aquatic life in Lick Creek and the attainment of the biocriteria standard in this impaired waterbody. As noted earlier in this report, for a 303(d) listed waterbody, without a TMDL, no ongoing detrimental impact is authorized. Although natural landslides are an integral part of stream form and function, human-caused debris torrents and sedimentation impact water quality by changing the natural cycles of sediment delivery to systems, which impacts the aquatic environment; thus, affecting aquatic life (Castro and Reckendorf 1995).

Figure 13: Lick Creek and Little Butte Creek Vicinity



JCEP has not demonstrated that methods employed in pipeline construction, the development of the construction ROW, and the use of the construction access roads would sufficiently protect State waters to avoid detrimental changes in resident biological communities to comply with Oregon's biocriteria standard. The following information would be needed in order for DEQ to have a reasonable assurance that the biocriteria standard will be met:

- Modeling demonstrating that proposed right-of-way erosion controls are the most effective.
- A landslide hazard assessment following state-of-practice protocols, including both construction-induced risks and post-construction risks.
- Designs for stormwater management above unstable slopes in the right-of-way.
- Designs for fill, trenching spoils, and/or grading spoils placed on unstable slopes.

JCEP's identified siting, design and construction methods provide an inadequate analysis of Project hazards and inadequate measures to reduce potential impacts to streams and the aquatic life dependent upon these streams. DEQ cannot conclude from JCEP's proposed methods and available information that construction of the pipeline will comply with the biocriteria standard.

6.2.2.2 Waterbody Crossings

The JCEP gas pipeline would cross approximately 252 waterbodies, and in most cases, use dry open-cut crossing

techniques.[74] Dry open-cut crossings rely on diverting water around the work area to allow trenching and pipe placement to proceed across the temporarily dewatered stream. JCEP expects to backfill and restore the trench site according to the FERC's Wetland and Waterbody Procedures for most dry open-cut crossings. FERC's procedures call for one foot of clean gravel or native cobbles in all streams that contain coldwater fisheries. JCEP, however, has proposed to modify the approach where the existing substrate is not gravel or cobbles and site access is limited.[75] In these cases, JCEP would attempt to match the natural streambed material size, gradation, and composition as closely as possible.

Potential Effects on Biocriteria

Waterbody crossings can cause short- and long-term alterations of stream habitat and hydrology. The biocriteria standard extends protections to waterbodies to provide full support for beneficial uses affected by project-related actions. These actions include dry open-cut trenching, backfill placement, and restoration actions as discussed further below.

JCEP proposes a minimum of five-feet of cover above pipeline segments beneath stream crossings. The resulting trenches would temporarily displace native soils that can alter in-situ characteristics including intrinsic permeability. Zones of higher permeability can cause local infiltration, partial stream capture, and create a fish passage barrier. Project-related actions that reduce streamflow may limit habitat availability, alter channel hydrology, and modify hyporheic exchange in riparian areas.

In addition, trenches installed in consolidated rock may require blasting, rock-sawing, or jackhammering to achieve excavation specifications. Open cut trenches in bedrock-dominated stream channels are susceptible to upstream propagation of knickpoints created by fractures and joints in the stream's bedrock created during the excavation process.[76] Knickpoint propagation in bedrock-dominated streams can alter stream geomorphology and potentially develop into barriers to fish migration.

Last, general construction practices related to flume installation and removal, site-restoration, and other Project-related activities can increase stream sediment releases. Sediment releases can have an adverse effect on substrate characteristics, oxygen availability, and habitat complexity.

Evaluation

Project-related activities including trenched waterbody crossings may affect stream habitat and reduce support for beneficial uses. JCEP must identify appropriate mitigation or restoration procedures that address the specific negative impacts to the biological communities present at each waterbody crossing to demonstrate compliance with this standard. While the biocriteria standard extends protections to all waterbodies, DEQ has identified that the pipeline would cross five stream segments listed as impaired for the biocriteria water quality standard. Two of these crossings, Olalla Creek (MP 58.78) and North Myrtle Creek (MP 79.12), include spawning and rearing habitat for Endangered Species Act-listed Oregon Coast ESU Coho salmon. JCEP has classified these crossings as Level 2 with a high potential for migration, avulsion and/or scour. In addition, JCEP proposes numerous waterbody crossings for headwater streams that are hydrologically connected with upper-watershed habitat networks. Maintaining protections at each affected waterbody crossing is critical to protecting state waters and designated beneficial uses to comply with the biocriteria water quality standard.

DEQ requested information on March 11, 2019, including specific field data to characterize the pre-development hydrology, geomorphic characteristics, and habitat features. DEQ based this request on protocol developed by the U.S. Fish and Wildlife Service in conjunction with Ruby Pipeline, LLC for assessing risks from pipeline stream

[74] Pacific Connector Gas Pipeline Resource Report RR2, Appendix 2/Table A.2-2.

[75] Pacific Connector Gas Pipeline, Erosion Control and Revegetation Plan. October 2017.

[76] Selander, Jacob. 2004. Processes of Knickpoint Propagation and Bedrock Incision in the Oregon Coast Range. Department of Geologic Sciences. University of Oregon.

crossings.[77] The site assessments DEQ requested for planning construction and restoration actions are necessary for DEQ to evaluate compliance with the biocriteria standard. Without this information DEQ is unable to find that the proposed waterbody crossing methods will comply with OAR 340-041-0011.

6.2.2.3 Road Construction and Maintenance

For pipeline construction, JCEP would need to improve and maintain several hundred miles of existing access roads. JCEP would also need to develop a 229-mile construction access road in the construction right-of-way. Moreover, JCEP would need to construction 25 segments of Temporary Access Roads and Permanent Access Roads. The improvement of existing access roads would involve resurfacing, widening of the travel way, culvert replacements, installation of temporary bridges, and other actions necessary to provide transportation access during construction. As documented in Section 6.1.2.3 of this report, road surfaces, fills, and cut slopes serve as a potential source of sediment input to streams. Sedimentation from road can significantly affect habitat function and availability.

DEQ refers the reader to Section 6.1.2.3 of this Report for DEQ's evaluation of JCEP's proposed road use and construction during pipeline construction. The evaluation in Section 6.1.2.3 is relevant to DEQ's evaluation of JCEP's compliance with the biocriteria standard while using existing access roads, improving existing roads, and constructing new roads. DEQ briefly summarizes this evaluation below.

In Section 6.1.2.3, DEQ describes how JCEP's use of existing access roads can cause sediment discharge to streams. DEQ also describes the lack of clear BMPs that JCEP would use to maintain and, if needed, improve these roads to prevent sediment discharge to streams during pipeline construction. In addition, DEQ evaluates the Erosion Control and Revegetation Plan and Transportation Management Plan that JCEP proposed to control sediment discharge from roads. The evaluation of these plans documents their deficiencies. Finally, DEQ evaluates JCEP's actions to conduct an inventory of unpaved existing access roads to develop a DEQ-requested maintenance and improvement for these roads. DEQ documents the incomplete inventory that JCEP conducted to identify hydrologically connected existing access road segments. This incomplete inventory provides a gross underestimate of the access road segments that have the potential to discharge sediment to streams.

In its December 20, 2018 supplemental information request, DEQ summarized the scientific literature and technical resources concerning the importance of nonpaved road design to protect water quality for aquatic life (see Page 18 - 19 of Attachment A). Notably, the National Marine Fisheries Service identified routine road maintenance as a needed action to assist in the recovery of salmonids listed under the Endangered Species Act (see Page 18 of Attachment A). Castro and Reckendorf (1995) summarize the impact of sediment in aquatic environments and its effect on aquatic life.

JCEP has not demonstrated that methods employed in pipeline construction and the design of the construction access road would avoid detrimental changes to resident biological communities as required by Oregon's biocriteria standard. Specifically, the application lacks the following information necessary to evaluate project effects on the biocriteria standard:

- Comprehensive inventory of hydrologically connected existing access road segments.
- Comprehensive maintenance and improvement plan for existing access roads.
- Information supporting proposed erosion controls on unstable cut and fill slopes on improved/new roads.
- Modeling demonstrating that the proposed erosion controls on roads are the most effective.
- A landslide hazard assessment including post-construction landslide hazards.

[77] Castro, J.M., A. MacDonald, E. Lynch, and R. Thorne. 2014 *Risk-based Approach to Designing and Reviewing Pipeline Stream Crossings to Minimize Impacts to Aquatic Habitats and Species*. River Research and Applications

Without this information, DEQ is unable to find that the proposed road construction and maintenance activities will comply with OAR 340-041-0011.

6.2.2.4 Pipeline Right-of-Way

JCEP proposes to manage the pipeline permanent easement in such a way to provide access and maintenance in perpetuity. Pipeline corridor management includes maintaining stormwater controls along the alignment. Sediment runoff is a potential source of pollutants to receiving streams. Proper runoff controls and management practices are necessary to avoid discharges that reduce support for aquatic receptors.

DEQ refers the reader to Section 6.1.2.4 of this report for DEQ's evaluation of the potential effects of JCEP's permanent pipeline right-of-way. DEQ's analysis in Section 6.1.2.4 is relevant to the potential effects of stormwater discharge and the management of cut and fill slope on the biocriteria standard. DEQ briefly summarizes this evaluation below.

In Section 6.1.2.4, DEQ evaluates the function of a permanent slope breaker (i.e., water bar) and describes how this stormwater collection system concentrates stormwater discharge along the permanent ROW. DEQ details the initial and final drainage area for permanent slope breakers on steep slopes. In addition, DEQ notes the potential for JCEP to discharge post-construction stormwater from the permanent ROW to landslide susceptibility zones. DEQ points out that JCEP did not provide DEQ with a post-construction stormwater management plan following DEQ's 2018 guidelines for post-construction stormwater plan submissions which request project proponents consider steep and landslide risks when siting discharge points.

In the evaluation in Section 6.1.2, DEQ evaluates the permanent slope breakers closest to pipeline stream crossings and their potential to discharge sediment and other pollutants to streams. DEQ explains how the permanent ROW is functioning as primitive road due soil compaction in the ROW during pipeline construction and during post-construction maintenance. DEQ finds that the permanent ROW may discharge sediment streams at a rate equivalent to a gravel road with ruts. Additionally, DEQ's finds that discharges from slope breakers within 200 feet of streams would likely deliver sediment to these streams. Moreover, DEQ notes that the area between the stream and permanent slope breaker upslope from the stream is a source of sediment delivery to streams. Given these sources of discharge, DEQ is unable to find that the proposed permanent operation and maintenance of the pipeline right-of-way will comply with OAR 340-041-0011.determine that the proposed activities will

In its December 20, 2018 supplemental information request (see Pages 66 - 68 of Attachment A), DEQ's explained its rationale for its request for modeling and engineering analysis for the permanent ROW stormwater discharges to stream described above. This evaluation further documents the potential sources of sediment discharge that can contribute to or cause a violation of Oregon's biocriteria standard.

6.2.2.5 Terminal and Off-Site Project Area Stormwater

Section 6.1.2.5 of this report provides an evaluation of Jordan Cove's proposed actions to manage stormwater in the construction and operation of the Terminal and Off-site Areas. DEQ refers the reader to Section 6.1.2.5 for DEQ's evaluation of these proposed actions. The evaluation in Section 6.1.2.5 is also relevant to DEQ's evaluation of Pacific Connector's compliance with Oregon's biocriteria while managing construction stormwater in the Terminal and Off-Site Project areas, managing stormwater and decant from dredge material disposal sites, and managing post-construction stormwater during the operation of the Terminal. DEQ notes particularly that the proposed stormwater discharge is via an existing ocean outfall. DEQ has not evaluated the effects of this aspect of the proposed activity on biological receptors in the vicinity of the outfall.

6.2.2.6 Dredge Material Management

JCEP proposes to dredge and excavate 6.32 million cubic yards to create the project's slip and access channel, as well as marine waterway modifications. JCEP proposes to dispose of this material at the LNG facility, the APCO sites, and at the Kentuck mitigation site. JCEP anticipates disposing much of the material at the Jordan Cove facility to increase the site elevation to a minimum of 34.5 feet NAVD88 consistent with design-level tsunami mitigation criteria.[78,79] Several upland wetland areas are known to exist in the immediate vicinity of developed portions of the LNG site. These are identified as Wetlands 2013-2, 2013-3, and 2013-4 on Figure 14 and include seasonally flooded Palustrine emergent wetlands whose hydrology is influenced by seasonally high groundwater conditions.

JCEP proposes to avoid site development that directly affects the wetland areas referenced above. However, placement of dredge material near these locations can permanently alter surface hydrology necessary to maintain hydrologic function of the wetland habitat. Further, runoff from marine dredged material may alter salinity and water quality characteristics of these areas. Hydrologic and chemical alteration of wetland habitats may reduce support for biological communities adapted to freshwater, seasonally flooded wetland environments. Oregon's biocriteria requires that water quality be preserved to provide support for aquatic species without detrimental changes in the resident biological communities. On December 20, 2018, DEQ requested JCEP provide information to demonstrate what measures JCEP would undertake to demonstrate protection of water quality given the proposed potential disposal of such materials in proximity to wetlands. Specifically, DEQ requested:

- How would JCEP manage the fresh and/or saline decant water if discharged from these sites to the surrounding landscape?
- How would the management of the decant water comply with Oregon's biocriteria (OAR 340-041-0011) if this decant water is discharged to waters of the state such as fresh or estuarine wetlands?[80]

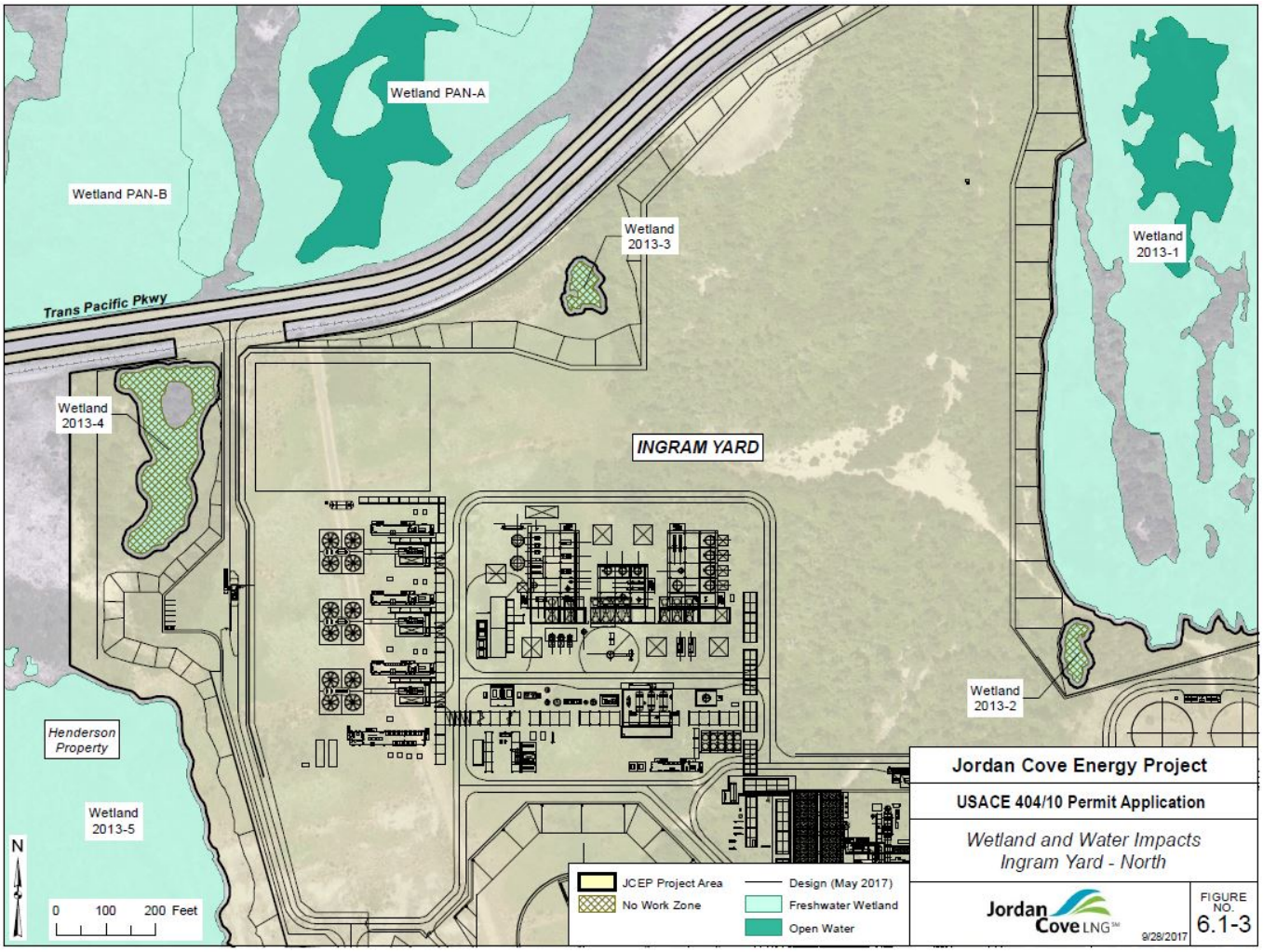
In correspondence dated February 20, 2019, JCEP proposed to address measures to demonstrate compliance with the biocriteria standard in a Dredging Pollution Prevention Plan. JCEP has not submitted a Dredging Pollution Prevention Plan that demonstrates how JCEP would minimize or mitigate the known likely violations of biocriteria standard. Accordingly, for the reasons discussed above, DEQ in unable to determine that JCEP's proposed management of dredged material will comply with OAR 340-041-0011.

[78] North American Vertical Datum of 1988.

[79] Jordan Cove Resource Report 1. September 2017.

[80] Supplemental Information Request. DEQ, December 20, 2018.

Figure 14: Wetland Areas Adjacent to LNG Terminal and Dredge Spoil Placement



6.2.3 DEQ Findings

Based on the preceding evaluation of Project effects, DEQ adopts the following findings related to OAR 340-041-0011 (Biocriteria):

1. JCEP has not demonstrated that the proposed pipeline construction, access road construction and maintenance, and pipeline right-of-way activities would avoid or mitigate detrimental changes in habitat structure and function, flow and resident biological communities;
2. JCEP has not demonstrated that the proposed road construction and maintenance activities would be conducted in a manner to avoid or mitigate detrimental changes in the resident biological communities;
3. JCEP has not demonstrated that the proposed pipeline construction, access road construction and maintenance, and pipeline right-of-way activities would identify and avoid or mitigate increases in landslide frequency that would result in detrimental changes in the resident biological communities;
4. JCEP's proposed management of stormwater in the Terminal and Off-Site Project Areas during construction and operation of the Project is likely to cause short and long-term alterations to wetland hydrology, turbidity, and form with sediment deposits, and these changes would result in detrimental alterations to the resident biological community dependent on these wetlands.
5. JCEP's management of stormwater and decant water during construction and operation of dredged material disposal sites is likely to cause short and long-term alterations to wetland hydrology, turbidity, and form with sediment deposits, and these alterations likely would result in detrimental changes to the resident biological community dependent on these wetlands.
6. JCEP proposes the permanent placement of marine sediments in upland locations that may alter the hydrologic and chemical characteristics of nearby wetland areas in a manner that would likely lead to violation of biocriteria, OAR 340-041-0011. Absent a plan to avoid or mitigate these effects, DEQ finds no reasonable assurance that these proposed activities would not violate the biocriteria standard. OAR 340-041-0011, OAR 340-048-0020(3).

6.3 Dissolved Oxygen

6.3.1 Applicable Standard

Oregon Administrative Rules 340-041-0016 set forth the state's water quality standards for dissolved oxygen. For spawning areas, the criteria range between 8.0 and 11.0 mg/l. For cold-water aquatic life, 8.0 mg/l is an absolute minimum. For cool water aquatic life, and for estuaries, dissolved oxygen may not be less than 6.5 mi/l: See, OAR 340-041-0016.

Dissolved oxygen is a principal parameter necessary to support of aquatic life. Adequate dissolved oxygen is vital to fish, invertebrates, and other aquatic life and can vary with life stages (egg, larvae, and adults). Maintaining adequate dissolved oxygen within gravels is particularly important during incubation of salmonid embryos.

Along the route of the proposed pipeline, the following waterbodies are listed as water quality limited for dissolved oxygen:

- North Fork of the Coquille River (all year)
- Middle Fork of the Coquille River (all year)
- South Umpqua River (all year)
- Bilger Creek (all year)
- North Myrtle Creek (May 15 – Oct 15)
- South Myrtle Creek (May 15 – Oct 15)
- Days Creek (May 15 – Oct 15)
- West Fork Trail Creek (Summer)
- Lick Creek (Summer)

- Klamath River (all year)
- Lost River (all year)

6.3.2 DEQ Evaluation: Dissolved Oxygen

6.3.2.1 Pipeline construction

Land disturbance during construction can cause organic and inorganic sediment discharge to streams as described above in section 6.1. Sediment loading directly impacts oxygen saturation potential and can reduce oxygen availability in spawning gravels.. In addition to sediment, the placement of slash and vegetation in waterbodies from land clearing activities can result in a reduction of dissolved oxygen, as can the introduction of runoff from lands that are fertilized for re-establishment of vegetation. Jordan Cove would need to manage these activities carefully in order to avoid adding pollutants that could reduce dissolved oxygen levels.

6.3.2.2 Waterbody Crossings

As discussed in Section 6.1.2.2 of this report, JCEP proposes to cross about 252 waterbodies (not including wetlands) using dry open-cut techniques. For the second South Umpqua River crossing (MP 94.73) JCEP proposes a diverted open cut crossing. For all other dry open-cut locations, JCEP proposes to temporarily dewater the work area using either fluming or dam-and-pump techniques.

Streamflow diversions can depress dissolved oxygen in several ways. First, bypassing streamflow through channelized diversions can alter natural stream function and reduce stream reaeration. Impoundments above the isolated work area may also reduce hydraulic energy that can further reduce saturation potential. In addition, solar gain and/or mechanical warming from transfer pumps may increase water temperature and reduce the dissolved oxygen saturation potential. Last, sediment releases following removal of the dam can increase oxygen demand below the work area.

JCEP states they intend to conduct stream crossings during seasonally low flow conditions. However, seasonally low flow conditions reduce the waterbody's capacity to assimilate pollutant loads without detrimental changes to water quality. According to DEQ's Antidegradation policy, up to a 0.1 mg/l decrease in dissolved oxygen from the upstream end of a stream reach to the downstream end of the reach is not considered a reduction in water quality so long as it has no adverse effects on threatened and endangered species.[81]

During pipeline construction, and as detailed above, JCEP proposes to cross 11 streams identified as impaired for dissolved oxygen. In these areas, no additional degredation of dissolved oxygen levels is allowed. These areas include the West Fork Trail Creek (MP 118.89), a perennial stream in a bedrock-dominated channel. This reach includes rearing and spawning habitat for ESA-listed Southern Oregon Northern California Coho salmon. JCEP proposes a dry open-cut crossing at this location, and JCEP provides no specific measures to mitigate water quality impacts. In addition, JCEP provides no water quality measures in the site specific restoration plan developed for this proposed crossing.[82]

The waterbody crossing at West Fork Trail Creek is impaired for dissolved oxygen and cannot assimilate additional pollutant loading without causing a violation of the standard. Because the actions proposed by JCEP are known to affect streamflow in ways that may decrease oxygen saturation potential, DEQ expects dry open-cut waterbody crossings would cause a violation of water quality standards. Furthermore, because smaller streams are more susceptible to water quality degradation from environmental stressors than streams with higher base flow, DEQ expects the JCEP's proposed actions would likely reduce oxygen saturation potential at other locations, as well.

[81] OAR 340-041-0004(3)(d).

[82] Stream Crossing Risk Analysis Addendum, Exhibit C-6. Pacific Connector Gas Pipeline, April 2018.

6.3.2.3 Road construction and Maintenance

Depending on the design, new road construction and the management of stormwater on existing roads can initiate debris flows into streams in landslides susceptibility zones. As noted in Sections 6.1.2.1 and 6.1.2.3, JCEP has not performed a comprehensive landslide hazard assessment to identify potential landslide risks associated with JCEP's proposed road use and construction. This assessment is necessary to mitigate landslide risks. Moreover, as noted in Section 6.1.2.3, JCEP has not conducted an inventory of existing access roads to identify road segments hydrologically connected to streams. This inventory is necessary for the development of a maintenance and improvement plan for existing access road to prevent and minimize sediment discharge to streams.

Debris flows initiated by roads can deposit substantial quantities of soil, coarse woody debris, and leaves into streams. Sediment discharge from road use also contains organic matter. The decomposition of this organic matter in streams can reduce dissolved oxygen. Given the lack of a comprehensive landslide hazard assessment and a road maintenance and improvement plan from JCEP, DEQ cannot conclude the proposed road use and construction would be conducted in a manner consistent with the dissolved oxygen standard.

6.3.2.4 Permanent Pipeline Right-of-Way

Depending on the design and operation of the pipeline right-of-way, the design cut and fill slopes and/or the stormwater management system can initiate debris flows into streams in landslides susceptibility zones. As noted in Sections 6.1.2.4, JCEP has not performed a comprehensive landslide hazard assessment to identify potential landslide risks associated with JCEP's pipeline right-of-way. This assessment is necessary to mitigate landslide risks. The design of the stormwater management system in the right-of-way can also discharge sediment containing organic matter into streams at crossings and near discharge points. The decomposition of organic debris in streams can reduce dissolved oxygen levels.

In a September 7, 2018 information request, DEQ requested that JCEP provide a post-construction stormwater management plan addressing DEQ's 401 plan submission guidelines as discussed in Section 6.1.2.4. JCEP has not provided DEQ with this post-construction stormwater management plan. DEQ does not have sufficient information from JCEP to evaluate whether minimization or mitigation measures would be sufficient to prevent or offset increases in dissolved oxygen levels caused by JCEP's proposed activities, including but not limited to its maintenance of the pipeline permanent right-of-way.

6.3.3 DEQ Findings: Dissolved Oxygen

Based on the preceding evaluation of Project effects, DEQ adopts the following findings related to OAR 340-041-0016 (Dissolved Oxygen):

1. JCEP has not demonstrated that the proposed pipeline construction, access road construction and maintenance, and pipeline right-of-way activities would avoid or mitigate adverse effects on dissolved oxygen, particularly in the 11 waterbody crossings where standards are not currently met and no additional loading is allowed. JCEP's proposed construction and use of temporary and permanent rights of way are land disturbance activities that would likely reduce oxygen availability in spawning gravels and likely result in organic and inorganic sediment discharge to streams in amounts inconsistent with dissolved oxygen standard.
2. JCEP's proposed activities do not include sufficient methods to minimize or mitigate for potential Project-related reductions in dissolved oxygen at proposed waterbody crossings or from the impacts of roads, including plans to avoid increases in the frequency of landslides from road construction and use.

Based upon these findings, DEQ concludes that it does not have a reasonable assurance that the proposed activities will be conducted in a manner that will not violate the Dissolved Oxygen water quality standard at OAR 340-41-0016.

6.4 Nuisance Phytoplankton Growth

6.4.1 Applicable Standard

The Nuisance Phytoplankton Growth standard is found in Oregon Administrative Rules 340-041-0019

The standard establishes average Chlorophyll-a values for water bodies where phytoplankton may impair the recognized beneficial uses.

6.4.2 DEQ Evaluation: Nuisance Phytoplankton Growth

Although several waterbodies are identified as water quality limited for Chlorophyll, DEQ does not expect the proposed Project to significantly affect conditions that would cause nuisance phytoplankton growth.

6.4.3 DEQ Findings

DEQ is reasonably assured the proposed Project will comply with the Nuisance Phytoplankton Growth water quality standard.

6.5 Hydrogen Ion Concentration (pH)

6.5.1 Applicable Standard

Oregon Administrative Rules 340-041-0021 provides that:

1) Unless otherwise specified in OAR 340-041-0101 through 340-041-0350, pH values (Hydrogen ion concentrations) may not fall outside the following ranges:

(a) Marine waters: 7.0-8.5;

(b) Estuarine and fresh waters: See basin specific criteria (OAR 340-041-0101 through 340-041-0350).

The applicable basin-specific criteria are presented in the table below.

Table 4: Basin-Specific Criteria: pH

	South Coast	Umpqua	Rogue	Klamath
Fresh (except Cascade lakes)	NA	NA	NA	6.5 – 9.0[a]
Estuarine & Fresh	6.5 – 8.5	6.5 – 8.5	6.5 – 8.5	NA
Marine	7.0 – 8.5	7.0 – 8.5	7.0 – 8.5	NA
Cascade lakes above 3,000 feet elev.	NA	6.0 – 8.5	6.0 – 8.5	NA
Cascade lakes above 5,000 feet elev.	NA	NA	NA	6.5 – 8.5

[a] When greater than 25 percent of ambient measurements taken between June and September are greater than pH 8.7, and as resources are available according to priorities set by the Department, the Department would determine whether the values higher than 8.7 are anthropogenic or natural in origin.

6.5.2 DEQ Evaluation: pH

Surface waters are susceptible to changes in pH caused by several factors including chemical releases, elevation, temperature, and biological processes such as photosynthesis and algal respiration. Surface water pH varies regionally throughout Oregon. External factors that cause aquatic pH to exceed regional ranges may stress biological functions of aquatic receptors. In addition, water column pH also determines the solubility and

biological availability of chemical constituents such as nutrients (e.g., phosphorus, nitrogen, and carbon) and heavy metals (e.g. lead and copper). In the case of certain heavy metals, water column pH also determines their toxicity.

The South Umpqua (Clark Branch) is water quality limited for pH. JCEP proposed to place the pipeline under the river bed via the direct pipe method.

Days Creek also is water quality limited for pH during the summer, as is the Rogue River. The Rogue River crossing is proposed as a HDD boring under the river bed. Butte Creek also is water quality limited for pH during the summer, as is the Klamath River (HDD bore).

6.5.2.1 Road Construction and Maintenance

Depending on the design, new road construction and the management of stormwater on existing roads can initiate debris flows into streams in landslides susceptibility zones. As noted in Sections 6.1.2.1 and 6.1.2.3, JCEP has not performed a comprehensive landslide hazard assessment to identify potential landslide risks associated with JCEP's proposed road use and construction. Debris flows initiated by roads can deposit substantial quantities of soil, coarse woody debris, and leaves into streams. The pH of the soil input, the pH the receiving water, the underlying bedrock geology, and the composition of the stream microbial community interact to influence the decomposition of this deposited organic matter. The decomposition of these organic matter inputs may alter stream pH. For example, over time, decaying leaves in streams can increase pH.[83] The decomposition of roots, wood, and bark release tannins such as tannic acid, which can lower stream pH. Without site-specific information on the source of debris flow, the chemistry of the receiving stream, and a comprehensive landslide hazard assessment, DEQ cannot conclude there is a reasonable assurance that the proposed road use and construction will be conducted in a manner that will not violate the pH standard.

6.5.2.2 Pipeline Right-of-Way

The pipeline's permanent easement would alter the surface hydrology and local stormwater runoff characteristics. Increased sediment loading to hydrologically connected streams may likely affect certain water quality characteristics including increasing pH in such waterbodies. On September 7, 2018, DEQ requested JCEP prepare and submit a post-construction stormwater management plan with procedures to manage the discharge of pollutants from the 1,373.66 acres of permanent right-of-way occupied by the pipeline. Because JCEP has not provided DEQ with the required management plan, DEQ cannot determine whether the proposed operation of the pipeline would meet the pH standard.

6.5.3 DEQ Findings

Based upon these findings, violations of the pH standard may occur in a few locations where the standard is not currently being met. JCEP has not identified methods to assure that no additional loading will occur in these areas whether the pipeline would cross a waterbody that is limited for pH. DEQ concludes that it does not have a reasonable assurance that the proposed activities will be conducted in a manner that will not violate the pH water quality standard at OAR 340-41-0021.

6.6 Temperature

Oregon's water quality standard for temperature is complex. Oregon Administrative Rules 340-041-0028. It include biologically based numeric criteria for waterbodies supporting salmonids, a numeric standard for the ocean and bays, a standard for waterbodies supporting cool water species, and a standard for protecting cold water in salmon, steelhead and bull trout waterbodies. In the numerous waterbodies that do not meet these standards, if there is a TMDL, the TMDL will contain allocations for non-point sources, and require implementation plans,

[83] Deano, Paula M. and J. W. Robinson. 1985. *The Effect of Decaying Leaves on pH and Buffer Capacity of Waters*. Journal of Environmental Science and Health. Volume 20: 903-911

including from the BLM and the USFS. Typically, these plans limit the increase in temperature from all anthropogenic sources to no more than 0.3 degrees C. If no TMDL has been adopted, a new source may be allowed only if it is demonstrated that the source will not add to temperature loads. This could be done through a temperature implementation plan, and could include mitigation, so long as the mitigation is in the same watershed.

Biologically based numeric temperature criteria applicable to the Project are determined by the Fish Use and Spawning Maps presented as Figures 340A and 340B of Oregon Administrative Rule 340, Division 041. Figure 340A designates the entire project as suitable habitat for bull trout. The seven-day-average maximum temperature of a stream identified as having bull trout spawning and juvenile rearing use is 12.0 degrees Celsius year round.

6.6.1 Applicable Standard

Oregon Administrative Rules 340-041-0028:

(1) Background. Water temperatures affect the biological cycles of aquatic species and are a critical factor in maintaining and restoring healthy salmonid populations throughout the State. Water temperatures are influenced by solar radiation, stream shade, ambient air temperatures, channel morphology, groundwater inflows, and stream velocity, volume, and flow. Surface water temperatures may also be warmed by anthropogenic activities such as discharging heated water, changing stream width or depth, reducing stream shading, and water withdrawals.

(2) Policy. It is the policy of the Commission to protect aquatic ecosystems from adverse warming and cooling caused by anthropogenic activities. The Commission intends to minimize the risk to cold-water aquatic ecosystems from anthropogenic warming, to encourage the restoration and protection of critical aquatic habitat, and to control extremes in temperature fluctuations due to anthropogenic activities. The Commission recognizes that some of the State's waters will, in their natural condition, not provide optimal thermal conditions at all places and at all times that salmonid use occurs. Therefore, it is especially important to minimize additional warming due to anthropogenic sources. In addition, the Commission acknowledges that control technologies, best management practices and other measures to reduce anthropogenic warming are evolving and that the implementation to meet these criteria will be an iterative process. Finally, the Commission notes that it will reconsider beneficial use designations in the event that man-made obstructions or barriers to anadromous fish passage are removed and may justify a change to the beneficial use for that water body.

(3) Purpose. The purpose of the temperature criteria in this rule is to protect designated temperature-sensitive, beneficial uses, including specific salmonid life cycle stages in waters of the State.

(4) Biologically Based Numeric Criteria. Unless superseded by the natural conditions criteria described in section (8) of this rule, or by subsequently adopted site-specific criteria approved by EPA, the temperature criteria for State waters supporting salmonid fishes are as follows:

(a) The seven-day-average maximum temperature of a stream identified as having salmon and steelhead spawning use on subbasin maps and tables set out in OAR 340-041-0101 to 340-041-0340: Tables 101B, and 121B, and Figures 130B, 151B, 160B, 170B, 220B, 230B, 271B, 286B, 300B, 310B, 320B, and 340B, may not exceed 13.0 degrees Celsius (55.4 degrees Fahrenheit) at the times indicated on these maps and tables;

(b) The seven-day-average maximum temperature of a stream identified as having core cold water habitat use on subbasin maps set out in OAR 340-041-101 to 340-041-340: Figures 130A, 151A, 160A, 170A, 180A, 201A, 220A, 230A, 271A, 286A, 300A, 310A, 320A, and 340A, may not exceed 16.0 degrees Celsius (60.8 degrees Fahrenheit);

(c) The seven-day-average maximum temperature of a stream identified as having salmon and trout rearing and migration use on subbasin maps set out at OAR 340-041-0101 to 340-041-0340: Figures 130A, 151A, 160A,

170A, 220A, 230A, 271A, 286A, 300A, 310A, 320A, and 340A, may not exceed 18.0 degrees Celsius (64.4 degrees Fahrenheit);

(d) The seven-day-average maximum temperature of a stream identified as having a migration corridor use on subbasin maps and tables OAR 340-041-0101 to 340-041-0340: Tables 101B, and 121B, and Figures 151A, 170A, 300A, and 340A, may not exceed 20.0 degrees Celsius (68.0 degrees Fahrenheit). In addition, these water bodies must have cold water refugia that are sufficiently distributed so as to allow salmon and steelhead migration without significant adverse effects from higher water temperatures elsewhere in the water body. Finally, the seasonal thermal pattern in Columbia and Snake Rivers must reflect the natural seasonal thermal pattern;

(e) The seven-day-average maximum temperature of a stream identified as having Lahontan cutthroat trout or redband trout use on subbasin maps and tables set out in OAR 340-041-0101 to 340-041-0340: Tables 121B, 140B, 190B, and 250B, and Figures 180A, 201A, 260A and 310A may not exceed 20.0 degrees Celsius (68.0 degrees Fahrenheit);

(f) The seven-day-average maximum temperature of a stream identified as having bull trout spawning and juvenile rearing use on subbasin maps set out at OAR 340-041-0101 to 340-041-0340: Figures 130B, 151B, 160B, 170B, 180A, 201A, 260A, 310B, and 340B, may not exceed 12.0 degrees Celsius (53.6 degrees Fahrenheit). From August 15 through May 15, in bull trout spawning waters below Clear Creek and Mehlhorn reservoirs on Upper Clear Creek (Pine Subbasin), below Laurance Lake on the Middle Fork Hood River, and below Carmen reservoir on the Upper McKenzie River, there may be no more than a 0.3 degrees Celsius (0.5 Fahrenheit) increase between the water temperature immediately upstream of the reservoir and the water temperature immediately downstream of the spillway when the ambient seven-day-average maximum stream temperature is 9.0 degrees Celsius (48 degrees Fahrenheit) or greater, and no more than a 1.0 degree Celsius (1.8 degrees Fahrenheit) increase when the seven-day-average stream temperature is less than 9 degrees Celsius.

(5) Unidentified Tributaries. For waters that are not identified on the “Fish Use Designations” maps referenced in section (4) of this rule, the applicable criteria for these waters are the same criteria as is applicable to the nearest downstream water body depicted on the applicable map. This section (5) does not apply to the “Salmon and Steelhead Spawning Use Designations” maps.

(6) Natural Lakes. Natural lakes may not be warmed by more than 0.3 degrees Celsius (0.5 degrees Fahrenheit) above the natural condition unless a greater increase would not reasonably be expected to adversely affect fish or other aquatic life. Absent a discharge or human modification that would reasonably be expected to increase temperature, DEQ will presume that the ambient temperature of a natural lake is the same as its natural thermal condition.

(7) Oceans and Bays. Except for the Columbia River above river mile 7, ocean and bay waters may not be warmed by more than 0.3 degrees Celsius (0.5 degrees Fahrenheit) above the natural condition unless a greater increase would not reasonably be expected to adversely affect fish or other aquatic life. Absent a discharge or human modification that would reasonably be expected to increase temperature, DEQ will presume that the ambient temperature of the ocean or bay is the same as its natural thermal condition.

(8) Natural Conditions Criteria. Where the department determines that the natural thermal potential of all or a portion of a water body exceeds the biologically-based criteria in section (4) of this rule, the natural thermal potential temperatures supersede the biologically-based criteria, and are deemed to be the applicable temperature criteria for that water body.

NOTE: On August 8, 2013, the Environmental Protection Agency disapproved rule section OAR 340-041-0028(8). Consequently, section (8) is no longer effective as a water quality criterion for purposes of CWA Section 303(c) and it cannot be used for issuing certifications under CWA Section 401, permits under CWA Section 402, or total maximum daily loads under CWA section 303(d).

(9) Cool Water Species.

(a) No increase in temperature is allowed that would reasonably be expected to impair cool water species. Waters of the State that support cool water species are identified on subbasin tables and figures set out in OAR 340-041-0101 to 340-041-0340; Tables 140B, 190B and 250B, and Figures 180A, 201A and 340A.

(b) See OAR 340-041-0185 for a basin specific criterion for the Klamath River.

(10) Borax Lake Chub. State waters in the Malheur Lake Basin supporting the Borax Lake chub may not be cooled more than 0.3 degrees Celsius (0.5 degrees Fahrenheit) below the natural condition.

(11) Protecting Cold Water.

(a) Except as described in subsection (c) of this rule, waters of the State that have summer seven-day-average maximum ambient temperatures that are colder than the biologically based criteria in section (4) of this rule, may not be warmed by more than 0.3 degrees Celsius (0.5 degrees Fahrenheit) above the colder water ambient temperature. This provision applies to all sources taken together at the point of maximum impact where salmon, steelhead or bull trout are present.

(b) A point source that discharges into or above salmon & steelhead spawning waters that are colder than the spawning criterion, may not cause the water temperature in the spawning reach where the physical habitat for spawning exists during the time spawning through emergence use occurs, to increase more than the following amounts after complete mixing of the effluent with the river:

(A) If the rolling 60 day average maximum ambient water temperature, between the dates of spawning use as designated under subsection (4)(a) of this rule, is 10 to 12.8 degrees Celsius, the allowable increase is 0.5 Celsius above the 60 day average; or

(B) If the rolling 60 day average maximum ambient water temperature, between the dates of spawning use as designated under subsection (4)(a) of this rule, is less than 10 degrees Celsius, the allowable increase is 1.0 Celsius above the 60 day average, unless the source provides analysis showing that a greater increase will not significantly impact the survival of salmon or steelhead eggs or the timing of salmon or steelhead fry emergence from the gravels in downstream spawning reach.

(c) The cold water protection narrative criteria in subsection (a) do not apply if:

(A) There are no threatened or endangered salmonids currently inhabiting the water body;

(B) The water body has not been designated as critical habitat; and

(C) The colder water is not necessary to ensure that downstream temperatures achieve and maintain compliance with the applicable temperature criteria.

(12) Implementation of the Temperature Criteria.

(a) Minimum Duties. There is no duty for anthropogenic sources to reduce heating of the waters of the State below their natural condition. Similarly, each anthropogenic point and nonpoint source is responsible only for controlling the thermal effects of its own discharge or activity in accordance with its overall heat contribution. In no case may a source cause more warming than that allowed by the human use allowance provided in subsection (b) of this rule.

(b) Human Use Allowance. Insignificant additions of heat are authorized in waters that exceed the applicable temperature criteria as follows:

(A) Prior to the completion of a temperature TMDL or other cumulative effects analysis, no single NPDES point source that discharges into a temperature water quality limited water may cause the temperature of the water body to increase more than 0.3 degrees Celsius (0.5 Fahrenheit) above the applicable criteria after mixing with either twenty five (25) percent of the stream flow, or the temperature mixing zone, whichever is more restrictive; or

(B) Following a temperature TMDL or other cumulative effects analysis, waste load and load allocations will restrict all NPDES point sources and nonpoint sources to a cumulative increase of no greater than 0.3 degrees Celsius (0.5 Fahrenheit) above the applicable criteria after complete mixing in the water body, and at the point of maximum impact.

(C) Point sources must be in compliance with the additional mixing zone requirements set out in OAR 340-041-0053(2)(d).

(D) A point source in compliance with the temperature conditions of its NPDES permit is deemed in compliance with the applicable criteria.

(c) Air Temperature Exclusion. A water body that only exceeds the criteria set out in this rule when the exceedance is attributed to daily maximum air temperatures that exceed the 90th percentile value of annual maximum seven-day average maximum air temperatures calculated using at least 10 years of air temperature data, will not be listed on the section 303(d) list of impaired waters and sources will not be considered in violation of this rule.

(d) Low Flow Conditions. An exceedance of the biologically-based numeric criteria in section (4) of this rule, or an exceedance of the natural condition criteria in section (8) of this rule will not be considered a permit violation during stream flows that are less than the 7Q10 low flow condition for that water body.

(e) Other Nonpoint Sources. The department may, on a case-by-case basis, require nonpoint sources (other than forestry and agriculture), including private hydropower facilities regulated by a 401 water quality certification, that may contribute to warming of State waters beyond 0.3 degrees Celsius (0.5 degrees Fahrenheit), and are therefore designated as water-quality limited, to develop and implement a temperature management plan to achieve compliance with applicable temperature criteria or an applicable load allocation in a TMDL pursuant to OAR 340-042-0080.

(A) Each plan must ensure that the nonpoint source controls its heat load contribution to water temperatures such that the water body experiences no more than a 0.3 degrees Celsius (0.5 degree Fahrenheit) increase above the applicable criteria from all sources taken together at the maximum point of impact.

(B) Each plan must include a description of best management practices, measures, effluent trading, and control technologies (including eliminating the heat impact on the stream) that the nonpoint source intends to use to reduce its temperature effect, a monitoring plan, and a compliance schedule for undertaking each measure.

(C) The Department may periodically require a nonpoint source to revise its temperature management plan to ensure that all practical steps have been taken to mitigate or eliminate the temperature effect of the source on the water body.

(f) Compliance Methods. Anthropogenic sources may engage in thermal water quality trading in whole or in part to offset its temperature discharge, so long as the trade results in at least a net thermal loading decrease in anthropogenic warming of the water body, and does not adversely affect a threatened or endangered species. Sources may also achieve compliance, in whole or in part, by flow augmentation, hyporheic exchange flows, outfall relocation, or other measures that reduce the temperature increase caused by the discharge.

(g) Release of Stored Water. Stored cold water may be released from reservoirs to cool downstream waters in order to achieve compliance with the applicable numeric criteria. However, there can be no significant adverse impact to downstream designated beneficial uses as a result of the releases of this cold water, and the release may not contribute to violations of other water quality criteria. Where the Department determines that the release of cold water is resulting in a significant adverse impact, the Department may require the elimination or mitigation of the adverse impact.

(13) Site-Specific Criteria. The Department may establish, by separate rulemaking, alternative site-specific criteria for all or a portion of a water body that fully protects the designated use.

(a) These site-specific criteria may be set on a seasonal basis as appropriate.

(b) The Department may use, but is not limited by the following considerations when calculating site-specific criteria:

(A) Stream flow;

(B) Riparian vegetation potential;

(C) Channel morphology modifications;

(D) Cold water tributaries and groundwater;

(E) Natural physical features and geology influencing stream temperatures; and

(F) Other relevant technical data.

(c) DEQ may consider the thermal benefit of increased flow when calculating the site-specific criteria.

(d) Once established and approved by EPA, the site-specific criteria will be the applicable criteria for the water bodies affected.

6.6.2 DEQ Evaluation

6.6.2.1 Pipeline construction

In developing the construction right-of-way and construction access roads for the pipeline, JCEP would clear all trees and shrubs. The width of this vegetation clearing would be 95 feet and, according to JCEP, would "neck down" (i.e., narrow) to 75 feet through wetlands and waterbody crossings. However, JCEP's Environmental Alignment Sheets do not show this narrowing of the construction ROW at any of the stream crossings as indicated in Section 1.2.1.1 of Resource Report 1 (see Figures 15 and 16). Further, it appears that JCEP's analysis fails to include consideration of the pipeline alignment when in runs parallel to waterbodies, as it does in the vicinity of Spencer Creek (discussed in more detail below). The analysis also fails to account for changes in vegetation and warming as a result of new roadways, widening of existing roadways and the development of Temporary Extra Work Areas (TEWAs). All of these activities would increase thermal loading to waterbodies unless they are adequately set back. The riparian protection rules adopted by the Oregon Department of Forestry to comply with Oregon's temperature standard require retention of all trees within specified distances of streams with salmon, steelhead or bull trout (typically 60 to 80 feet for small and medium-sized streams). OAR 629-642-0105.

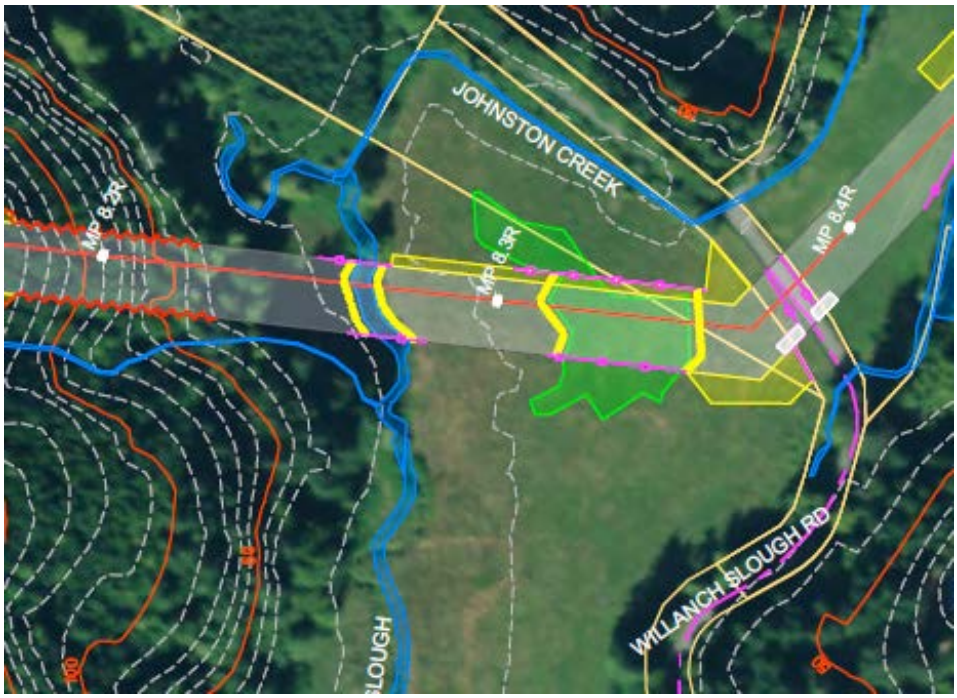
After the installation of the pipeline, JCEP would restore the vegetation removed during construction except within the 30-foot permanent right-of-way as discussed in Section 6.7.2.4 below. As a result, there would be a time lag between the removal of vegetation providing shade to waterbodies, and the reestablishment of that shade cover.

Based on FERC requirements its Wetland and Waterbody Procedures, JCEP can develop the construction right-of-way within 15 feet of streams when paralleling a stream. These procedures are significantly less protective than Oregon water quality requirements, and would allow increased thermal gain for these areas. On Forest Service and Bureau of Land Management administered public lands, JCEP proposes to site TEWAs 50 feet from streams, thereby providing somewhat more protection from increased thermal radiation to adjacent waterbodies. JCEP has not provided DEQ information regarding the setback for TEWAs at stream crossings on private land.

In its September 7, 2018 information request, DEQ requested that JCEP evaluate compliance with Total Maximum Daily Load allocations and with Designated Management Agencies' Total Maximum Daily Implementation Plans. DEQ has not received information on JCEP's compliance with TMDL allocations for temperature.

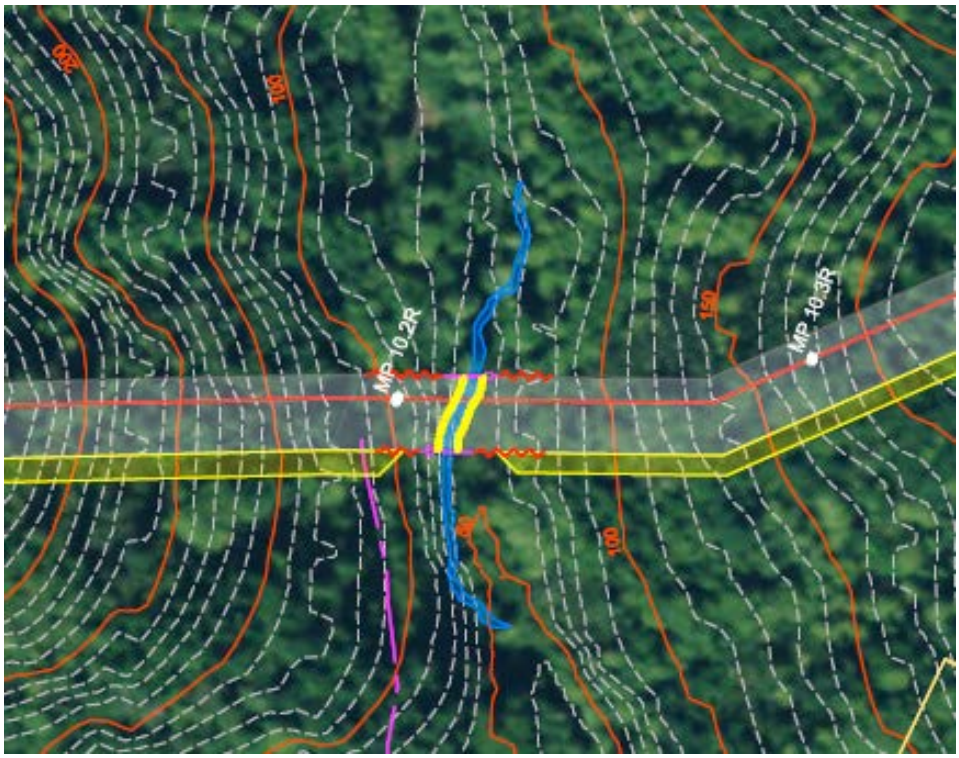
As an illustration of the reasons for DEQ's concerns about the temperature impacts of the proposed Project, at pipeline stream crossing at Milepost 58.78, Ollala Creek is limited for temperature year round and is under an approved TMDL. Similarly, DEQ has placed Rice Creek (Milepost 65.76), South Umpqua River (Milepost 71.27), North Myrtle Creek (Milepost 79.12), South Myrtle Creek (Milepost 81.19), and many others on the 303(d) list for temperature. These streams are under an approved temperature TMDL.

Figure 15: Pipeline Crossing at Wetland S1-04 (Willanch Slough) showing no "neckdown" of the ROW



Source: Environmental Alignment Sheet, Drawing Number 3430.29-006, Sheet 6 of 226.

Figure 16: Pipeline Crossing at Tributary to Cooston Channel showing no "neckdown" of ROW



Source: Environmental Alignment Sheet, Drawing Number 3430.29-008, Sheet 8 of 226.

For streams listed as impaired for temperature on the 303(d) list but not under temperature TMDL, Pacific Connector may not increase thermal loading leading to higher stream temperatures without effective mitigation. In Oregon's 2012 Integrated Report Assessment Database and 303(d) list, these streams are assigned an assessment category of five indicating a TMDL is needed to ensure these streams achieve the water quality standard. The lack of a temperature TMDL for Category 5 streams means DEQ has not established a human use allowance and reserve capacity for these streams. The reserve capacity in a TMDL ensures that loading capacity has been set aside for a safety margin and is otherwise unallocated.[84] Moreover, the human use allowance in the temperature standard does not permit a source to cause more warming than allowed under this allowance as stated in OAR 340-041-0028(12)(b).[85] Pacific Connector proposes to remove effective riparian shade on the following temperature limited Category 5 streams: North Fork Coquille River at Milepost 23.06, Middle Creek at Milepost 27.04, East Fork Coquille River at Milepost 29.85, Elk Creek at Milepost 32.40, Upper Rock Creek at Milepost 44.21, Middle Fork Coquille River at Milepost 50.28, Spencer Creek at Milepost 171.07, and Lost River at Milepost 212.07.

In evaluating compliance with TMDL Implementation Plans, DEQ's request was – in part – to determine if JCEP evaluated the thermal impact to streams from riparian vegetation removal during the development of the proposed 922.64 acres of TEWAs. DEQ was also seeking to determine JCEP's compliance with FERC's 15-foot buffer requirements noted above impacted riparian vegetation and if these impacts were evaluated in the 2017 Thermal Impact Assessment.

For example, given the proposed pipeline route, Figure 10 shows the potential for the loss of effective shade from the construction right-of-way as the pipeline parallels Spencer Creek near Milepost 177. Spencer Creek is listed as impaired for temperature. JCEP informed DEQ that the riparian impacts from TEWAs and impacts from FERC's 15-feet buffer requirement, noted above, were not included in the 2017 Thermal Impact Assessment. DEQ requested that JCEP include these impacts in a revised assessment. To-date, JCEP has not provided this revision.

Additionally, in the Draft Environmental Impact Statement for this proposed project (see Figure 3.4-2), JCEP is considering a pipeline route change referred to as the Blue Ridge Variation. This potential route change would also necessitate adjustments to the 2017 Thermal Impact Assessment. Moreover, in its September 7, 2018 information request (see Page 6 of 15, Attachment B), DEQ also requested information summarizing JCEP's action to first avoid riparian impacts then, if avoidance is not possible, minimize these impacts prior to siting TEWAs and the construction right-of-way parallel to streams. In DEQ's information request, DEQ noted it was seeking the location of these riparian impacts and the detailed rationale justifying these impacts. Specifically, DEQ was seeking information on the specific constraints and operational procedures at each site preventing avoidance or minimization.

In January 2019, DEQ received information from JCEP that the detailed justification for riparian impacts that DEQ was seeking was in Table A.1-1 of the Department of State Lands and Army Corps of Engineers Joint Permit Application. DEQ reviewed this information and found that it focuses primarily on wetland impacts associated with the siting of a TEWA rather than riparian impacts and temperature changes in streams. The modification rationale presented in this table provides no information regarding alternative locations for TEWAs that JCEP considered and provides no detailed explanation why these alternative locations were unsuitable. Moreover, DEQ cannot determine from the information in Table A.1-1 if riparian impacts from the construction ROW are a result of FERC's 15-foot buffer guidelines or some other factor, as the columns of information in this table present only information on the wetlands impacted, Cowardin Type for each wetland impacted, and TEWAs involved in the impact. From Table A.1-1, DEQ cannot find information on why JCEP could not avoid or minimize impacts to effective shade to streams when siting TWEAs and the construction ROW parallel to a stream.

In sum, DEQ cannot determine if JCEP avoided or minimized proposed impacts to riparian shade particularly for streams listed as impaired for temperature and currently under a TMDL such as Spencer Creek shown in Figure 10.

[84] Oregon Administrative Rule OAR 340-041-0002(49)

[85] Oregon Administrative Rule OAR 340-041-0028(12)(a)

Absent revision to the 2017 Thermal Impact Assessment, DEQ does not have a thermal impact assessment considering the riparian shade impacts described above (additional impacts from roadway alterations are addressed below).

In addition, DEQ has not received a detailed mitigation plan from JCEP identifying the following:

1. The mitigation site location.
2. The site-specific schedule for mitigation.
3. The site-specific riparian restoration plan including drawings.
4. Proposed planting density.
5. A proposed plant species composition.
6. A strategy to ensure seedling survival.
7. A maintenance schedule to ensure the trees are free to grow.
8. Performance standards for mitigation sites.
9. A mechanism for ensuring the mitigation persists in perpetuity.
10. Access for DEQ to evaluate the mitigation actions.

It appears from the FERC DEIS that JCEP is proposing some mitigation for losses to riparian areas on USFS and BLM lands. However, the proposed mitigation appears to be located in watersheds other than those where impacts would occur. In order for mitigation to be considered in relation to Oregon's temperature standard, it must occur in the same watershed.

Given the incomplete thermal impact assessment from pipeline construction (including TEWAs) and the lack of thermal mitigation plan to restore and protect effective shade, DEQ determines that it does not have a reasonable assurance that Pacific Connector's pipeline construction will comply with the applicable temperature standards.

6.6.2.2 Waterbody Crossings

The information JCEP provided to evaluate thermal loading from proposed water body crossings is incomplete and does not demonstrate JCEP would prevent stream temperature increases when constructing the pipeline through streams. Pipeline installations at the trenched open-cut waterbody crossings proposed by JCEP require the management of surface and groundwater resources in a manner that may negatively affect temperature. For waterbody crossings completed using dry open-cut methods, JCEP would isolate the work area using temporary upstream and downstream dams. The excavation through the work area would presumably capture shallow groundwater as well as seepage through the temporary flume dams. Water from the excavation would be pumped to dewater structures in upland areas where it would infiltrate into soil.

Many of the proposed dry open-cut crossings occur in headwater streams that are tributaries to fish-bearing streams lower in the watershed. Headwater streams provide a critical source of cold water particularly in summer months when flows decline and a higher fraction of base flow is derived from subsurface groundwater. In addition, JCEP proposes many waterbody crossings at streams listed as impaired for temperature on Oregon's 303(d) list of impaired waterbodies. Dewatering actions proposed by JCEP would reduce the volume of cold groundwater available for hyporheic exchange in the reach below each waterbody crossing. This reduction in groundwater exchange below crossings would reduce the assimilative capacity for thermal loading. JCEP proposes to alter groundwater flow at numerous stream to construct its pipeline. Many of these streams are currently impaired for temperature. For example, at pipeline stream crossing at Milepost 58.78, Ollala Creek is limited for temperature year round and is under an approved TMDL. Similarly, DEQ has placed Rice Creek (Milepost 65.76), South Umpqua River (Milepost 71.27), North Myrtle Creek (Milepost 79.12), South Myrtle Creek (Milepost 81.19), and many others on the 303(d) list for temperature. These streams are under an approved temperature TMDL.
In its September 7, 2018 information request, DEQ requested information on JCEP's Shallow Groundwater Study revised August 24, 2017. Under Oregon Administrative Rule 340-048-0042(2)(e), DEQ was seeking to determine if potential modifications of groundwater flows during pipeline construction would affect surface water quality

and, in particular, stream temperature from the alteration of groundwater flows into streams (see Page 14 of 15, Attachment B). In its October 8, 2018 response to DEQ's request, JCEP informed DEQ that the purpose of shallow groundwater study was to aid pipeline design to account for buoyancy in areas of shallow groundwater and referred DEQ to the Erosion Control Revegetation Plan for practices regarding trench dewatering to manage groundwater inflows. In DEQ's December 20, 2018 response to JCEP's response, DEQ again requested a completed shallow groundwater study, provided the rationale for this specific information request, and provided guidance on the specific information DEQ was seeking. DEQ has not received the information requested.

As noted, dry crossings accomplished by flumed or pumped diversions would rely on an impoundment above the crossing where pumps or gravity-operated flume pipes can bypass streamflow below the work area. Impoundments typically would increase temperature by exposing an increased wetted surface area to solar gain. Given this increase in thermal load as well as the reduction in groundwater flows into streams, proposed activities are likely to cause violations of the temperature standard.

DEQ expects that trenched open-cut waterbody crossings would increase thermal loading of streams below certain crossing locations. The potential for thermal loading is greatest in headwater streams with low seasonal baseflow. DEQ has requested additional information on the effect of these actions on shallow groundwater, but to date has not received the requested information. Based on the information currently available DEQ cannot determine that trenched open-cut waterbody crossings will not violate the temperature water quality standard. The FERC DEIS refers to the 2017 GeoEngineers report prepared for JCEP. That report identified average impacts for fifteen streams (0.03 degrees F) and a maximum increase of 0.3 degree F. However, as noted above this analysis did not consider the impacts of stream crossings together with TEWAs, new and altered roadways, or areas where the pipeline alignment (or roadways) parallel streams.

6.6.2.3 Road construction and Maintenance

JCEP's road improvements include replacing existing culverts in stream crossings, installing temporary bridges, and widening roads. JCEP may clear riparian vegetation adjacent to the approaches for road-stream crossings to create space for the increased crossing footprint. This increased crossing footprint may reduce effective shade at a reach. This reduction in effective shade may be permanent. JCEP has not provided information regarding these impacts for DEQ to evaluate the duration of impact. In addition, road widening that parallels a stream may reduce effective shade in the riparian areas between the access road and stream.

JCEP provided DEQ with a 2017 Thermal Impact Assessment (GeoEngineers 2017) addressing projected thermal impacts of the pipeline crossings of selected waterbodies, but it appears that riparian impacts from proposed improvements to existing and new access roads were not evaluated in this report.

Moreover, DEQ has not received a detailed mitigation plan from JCEP.

For these reasons, DEQ is unable to determine that JCEP's proposed roadway construction and maintenance associated with the Project will comply with Oregon's water quality standard for temperature, particularly with regard to the many water quality limited streams potentially affected by the Project.

6.6.2.4 Permanent Pipeline Right-of-Way

The information JCEP provided to evaluate thermal loading from pipeline operation is incomplete and does not demonstrate JCEP would be able to mitigate unavoidable permanent thermal loading consistent with applicable temperature standard. In developing the permanent rights-of-way, JCEP would clear all trees and shrubs. Initially, the width of this vegetation clearing would be 95 feet and, according to JCEP, "neck down" (i.e., narrow) to 75 feet through wetlands and waterbody crossings. After the construction ROW, JCEP would maintain a 30-foot permanent ROW in herbaceous and herbaceous/small shrub vegetative condition. Specifically, to protect the pipeline from tree roots, JCEP would maintain 10 feet of the permanent ROW in an herbaceous state centered on the pipeline. JCEP would maintain the remainder of the 30-foot permanent ROW in an herbaceous/small shrub

condition for the operational life of the pipeline. For riparian areas permanently impacted by the operational right-of-way, JCEP would propose sites it would use to mitigate the permanent loss of riparian shade at the pipeline's stream crossings. DEQ has received no details regarding the mitigation of riparian shade impacts.

Moreover, based on FERC requirements its Wetland and Waterbody Procedures, JCEP may develop the rights-of-way within 15 feet of streams when paralleling a stream. This proximity reduces effective shade on these streams. In its September 7, 2018 information request, DEQ requested that JCEP evaluate compliance with Total Maximum Daily Load allocations and with Designated Management Agencies' Total Maximum Daily Implementation Plans for temperature.

For streams listed as impaired for temperature on the 303(d) list but not under temperature TMDL, Pacific Connector may not increase thermal loading leading to higher stream temperatures. In Oregon's 2012 Integrated Report Assessment Database and 303(d) list, these streams are assigned an assessment category of five indicating a TMDL is needed to ensure these streams achieve the water quality standard. The lack of a temperature TMDL for Category 5 streams means DEQ has not established a human use allowance and reserve capacity for these streams. The reserve capacity in a TMDL ensures that loading capacity has been set aside for a safety margin and is otherwise unallocated.[86] Moreover, the human use allowance in the temperature standard does not permit a source to cause more warming than allowed under this allowance as stated in OAR 340-041-0028(12)(b).[87] Pacific Connector proposes to remove effective riparian shade permanently on the following temperature limited Category 5 streams: North Fork Coquille River at Milepost 23.06, Middle Creek at Milepost 27.04, East Fork Coquille River at Milepost 29.85, Elk Creek at Milepost 32.40, Upper Rock Creek at Milepost 44.21, Middle Fork Coquille River at Milepost 50.28, Spencer Creek at Milepost 171.07, and Lost River at Milepost 212.07.

Figure 10 shows the potential for the loss of effective shade from the permanent right-of-way as the pipeline parallels Spencer Creek near Milepost 177. DEQ listed Spencer Creek as impaired for temperature. JCEP informed DEQ that the riparian impacts from FERC's 15-feet buffer requirement, noted above, were not included in the 2017 Thermal Impact Assessment. DEQ requested that JCEP include these impacts in their assessment and provide a revised assessment.

Given the incomplete thermal impact assessment and the lack of thermal mitigation plan to restore effective shade DEQ is unable to determine that JCEP's operation of the pipeline will comply with Oregon's temperature standard.

6.6.3 DEQ Findings

Based upon the foregoing findings, DEQ determines that the proposed pipeline and associated work areas and roadways are likely to violate Oregon's water quality standard for temperature, particularly in areas that are not currently meeting numeric standards. JCEP has adequately identified methods to avoid or mitigate these impacts, particularly by providing for mitigation in the watersheds where the impacts will occur. DEQ concludes that it does not have a reasonable assurance that the proposed activities will be conducted in a manner that will not violate the temperature water quality standards at OAR 340-41-0028 and TMDLs adopted to meet those standards.

6.7 Total Dissolved Gas

6.7.1 Applicable Standard

Oregon Administrative Rule 340-041-0031:

> *(1) Waters would be free from dissolved gases, such as carbon dioxide hydrogen sulfide, or other gases, in sufficient quantities to cause objectionable odors or to be deleterious to fish or other aquatic life, navigation, recreation, or other reasonable uses made of such water.*

[86] Oregon Administrative Rule OAR 340-041-0002(49)

[87] Oregon Administrative Rule OAR 340-041-0028(12)(a)

(2) Except when stream flow exceeds the ten-year, seven-day average flood, the concentration of total dissolved gas relative to atmospheric pressure at the point of sample collection may not exceed 110 percent of saturation. However, in hatchery-receiving waters and other waters of less than two feet in depth, the concentration of total dissolved gas relative to atmospheric pressure at the point of sample collection may not exceed 105 percent of saturation.

6.7.2 DEQ Evaluation: Total Dissolved Gas

Water discharged to a receiving waterbody may entrain ambient atmospheric gases causing the concentration of dissolved gases to increase. Certain hydraulic conditions (e.g., deep laminar flow reaches or glides) prevent equilibration and can cause total dissolved gases concentrations to increase above levels deemed safe for aquatic life.

JCEP does not propose actions that may increase the concentration of total dissolved gas in Project waterways.

6.7.3 DEQ Findings

DEQ is reasonably assured the JCEP's specified proposed actions considered in this focused Evaluations and Findings Report would not violate the Total Dissolved Gas water quality standard.

6.8 Toxic Substances

6.8.1 Applicable Standard

Oregon Administrative Rule 340-041-0033:

(1) Toxic Substances Narrative. Toxic substances may not be introduced above natural background levels in waters of the state in amounts, concentrations, or combinations that may be harmful, may chemically change to harmful forms in the environment, or may accumulate in sediments or bioaccumulate in aquatic life or wildlife to levels that adversely affect public health, safety, or welfare or aquatic life, wildlife or other designated beneficial uses.

(2) Aquatic Life Numeric Criteria. Levels of toxic substances in waters of the state may not exceed the applicable aquatic life criteria as defined in Table 30 under OAR 340-041-8033.

(2) Human Health Numeric Criteria. The criteria for waters of the state listed in Table 40 under OAR 340-041-8033 are established to protect Oregonians from potential adverse health effects associated with long-term exposure to toxic substances associated with consumption of fish, shellfish and water.

6.8.1 DEQ Evaluation: Toxic Substances

6.8.2.1 Pipeline construction

Hazardous substances are known to exist at certain locations along the route of the proposed pipeline. These substances include high concentrations of naturally occurring minerals such as arsenic and mercury, post-process wastes from former mercury mining operations, and chemical contaminants from spills at current and former industrial sites. These substances may be present at concentrations that exceed applicable human health and/or aquatic life numeric criteria. DEQ evaluates the effects of ground-disturbing activities on toxic substances in the sections below.

Naturally Occurring Mineralization

A study in 2009 investigated naturally occurring mercury mineralization between MP 109 and the East Fork Cow Creek.[88] Local geology includes mercury mineralization at concentrations sufficient to support commercial mining

[88] Potential for natural-occurring mercury mineralization to enter the aquatic environment between M.P. 109 and East Fork

operations in the early to mid-1900s. [89] The study confirmed "very low concentrations of mercury mineralization" near the proposed pipeline route. The study also identified two intermittent streams that cross the final pipeline alignment. These studies noted that the streams "lack connectivity to the main stem East Fork Cow Creek. However, JCEP did not provide the methodology to evaluate hydrologic connectivity. Finally, the study concludes that JCEP may minimize the discharge of sediments containing mercury mineralization by implementing procedures in the Erosion Control and Revegetation Plan. In Sections 6.1.2.1, 6.1.2.3, and 6.1.2.4 of this report, DEQ identifies necessary information absent from in the JCEP's erosion control and landslide mitigation analysis and practices in both JCEP's Erosion Control and Revegetation Plan and its Transportation Management Plan. JCEP also proposes to use the Transportation Management Plan to control sediment discharge during road use and construction. DEQ summarizes the deficiencies in JCEP's proposed Transportation Management Plan in Section 6.1.2.3.

Metals

In response DEQ's March 2010 information request, JCEP provided information on the effects of Project-related activities on certain contaminants including turbidity, nutrients, and metals.[90] In particular, the study found the increase of suspended mercury due to expected sediment loading (0.017 ng/l) is far lower than the Human Health Numeric Criteria of 144 ng/l.

Existing Solid and Hazardous Waste Sites

The Draft Environmental Impact Statement (FERC, 2019) identified 116 sites with documented existing or historical soil and/or groundwater contamination within 0.25 mile of the pipeline route. The Draft Environmental Impact Statement further directs JCEP, before close of the public comment period, to consult with DEQ "regarding existing soil and groundwater contamination at the sites listed in appendix G. The DEIS further directs JCEP to file the results of this consultation along with any proposed site-specific soil or groundwater handling, management, and disposal procedures. DEQ anticipates JCEP would submit additional requested information to allow DEQ to evaluate the effects of pipeline construction.

6.8.2.2 Waterbody Crossings

Trenched crossings across waterbodies can increase the mobilization, solubility, and availability of soil contaminants. As discussed above, sources of soil contaminants include naturally occurring minerals, legacy wastes from mining operations, and chemical contaminants from industrial operations.

On March 11, 2019, DEQ requested JCEP develop site-specific water body crossing and restoration plans for each waterbody affected by the pipeline. The plans are necessary to address methods needed to restore hydrologic and habitat function to predevelopment conditions. At locations where toxic or hazardous substances may be present, DEQ would rely on these plans to determine that construction and site restoration is completed in a manner that prevents the mobilization of soil contaminants.

DEQ has not yet received the waterbody crossing plans from JCEP. Absent such plans, DEQ cannot conclude that project actions avoid or minimize activities that discharge toxic substances into waters of the state.

6.8.2.3 Road construction and Maintenance

DEQ recognizes that stormwater runoff from road surfaces represents a significant source of potential pollutants, including toxic substances present in soils. Referring to our evaluation in Section 6.1.2.3, additional information is

Cow Creek. Larry Broeker, November 18, 2009 (Revised February 3, 2010).

[89] Potential for natural-occurring mercury mineralization to enter the aquatic environment between M.P. 109 and East Fork Cow Creek. Larry Broeker, November 18, 2009 (Revised February 3, 2010).

[90] Turbidy Nutrients Metals Water Quality Impacts Analysis, GeoEngineers August 29, 2017.

needed to evaluate potential risks presented by potentially toxic substances. Absent such plans, DEQ cannot conclude that measures to prevent or minimize the discharge of toxic substances to waters of the state during road construction and maintenance would not cause an exceedance to the toxic substances water quality standard.

6.8.2.4 Pipeline Right-of-Way

JCEP would maintain portions of the permanent right-of-way in an herbaceous state to facilitate access for pipeline maintenance and inspection. Methods to control vegetation are described in the Erosion Control and Revegetation Plan and include the application of herbicides and pesticides. The plan references procedures in FERC's Waterbody and Wetland Construction and Mitigation Procedures that prohibit chemical applications within 100 feet of wetlands or waterbodies except as allowed by federal or state authorities.

To comply with the Toxic Substances water quality standard, applicants must comply with state regulations regarding the application of chemical herbicides and pesticides at locations that may directly or indirectly affect waters of the state.

6.8.2.5 Terminal and Off-Site Area Stormwater

Jordan Cove's LNG terminal would create that would cause stormwater discharging to Coos Bay, groundwater fed wetlands, and the Pacific Ocean.

In Section 5.5.2.1 of the revised Terminal Storm Water Management Plan (March 2019), Jordan Cove proposes three categories of spill containment. In each category, Jordan Cove provides qualitative information on proposed controls. In addition, in its April 1, 2019 response to DEQ's September 25, 2018 information request, Jordan Cove directed DEQ to its proposed Spill Prevention, Control, and Countermeasure Plan for spill containment controls for the Terminal Storm Water Management Plan.[91] The cover of Jordan Cove's SPCC Plan contains a note that this plan is a preliminary version. DEQ reviewed this plan and determined that it is not a complete or final plan. For example, in Table 1-1 of the SPCC Plan, the list of bulk storage containers and their secondary containment system is incomplete. Jordan Cove does not provide information on the secondary containment for transformers. Jordan Cove also notes that other oil storage systems and their containment controls are to be determined in the future. Additionally, Section 8 of this plan is preliminary information and Jordan Cove notes that it would update this plan to reflect as-built controls.

In the final SPCC Plan, DEQ is seeking information on where exactly Jordan Cove would locate on its stormwater site plan the proposed loading aprons, lined earthen berms, double walled tanks, and other containment structures designed to contain spills as well as information on the specific design features of these controls. For reasonable assurance, DEQ needs to know if Jordan Cove would size the containment berms coupled with the containment capacity of the oil/water to capture the largest anticipated spill. Statements in the current draft SPCC Plan that Jordan Cove would comply with federal regulations are not a demonstration that Jordan Cove's proposed control concepts have the capacity to prevent a discharge to surface water. Site-specific design information on all proposed structural spill controls is essential for DEQ to evaluate their potential to control discharges to surface water. This detailed information meets DEQ's need for reasonable assurance that Jordan Cove's containment controls would achieve the toxic substances standard by selecting and designing the highest and best practicable controls to prevent the release of toxic substances to the Pacific Ocean. This design information is missing in the SPCC Plan and the revised Terminal Stormwater Management Plan.

6.8.2 DEQ Findings

1. DEQ expects JCEP would consult with DEQ and provide additional information as directed by FERC to identify potential hazardous waste and cleanup sites within the project area. Absent this information,

[91] Spill Prevention, Control, and Countermeasure Plan – Operation. August 29, 2017. Part 1: Appendix K, Section 401 Water Quality Package

violations of toxicity water quality standards are likely, and wouldDEQ concludes there is no reasonable assurance that the proposed activities would be conducted in a manner that would not violate the Toxic Substances water quality standard. OAR 340-041-0033, OAR 340-048-0020(3).

2. JCEP proposes a stormwater management plan that does not demonstrate the spill containment controls are designed, for example, to capture a spill from the largest storage vessel in a drainage area.
    a. Without this demonstration, DEQ does not have reasonable assurance that Jordan Cove designed and located spill containment controls in manner to prevent a spill from causing a violation of the toxic substance standard. OAR 340-041-003.

6.9 Turbidity

6.9.1 Applicable Standard

Oregon Administrative Rule 340-041-0036

Oregon Administrative Rule 340-041-0036 provides, in pertinent part, that " No more than a ten percent cumulative increase in natural stream turbidities may be allowed, as measured relative to a control point immediately upstream of the turbidity causing activity. However, limited duration activities necessary to address an emergency or to accommodate essential dredging, construction or other legitimate activities and which cause the standard to be exceeded may be authorized provided all practicable turbidity control techniques have been applied * * *."

For activities authorized under a Clean Water Act Section 401 Water Quality Certification, CWA Section 404 Permit, and emergency activities coordinated with the Oregon Department of Fish and Wildlife, this standard may allow limited duration exceedances of the standard for dredging and construction activities. However, as set forth above, for a temporary exceedance, the project proponent must apply all practicable turbidity control techniques.

6.9.2 DEQ Evaluation: Turbidity

6.9.2.1 Pipeline construction

The information JCEP provided to DEQ does not demonstrate that pipeline construction and use of the construction access roads would avoid exceedances of the turbidity standard. DEQ refers the reader to Section 6.1.2.1 of this Report for DEQ's evaluation of JCEP's proposal to develop a construction right-of-way and a construction access road to install approximately 229 miles of pipeline. The evaluation in Section 6.1.2.1 is also relevant to DEQ's evaluation of JCEP's compliance with Oregon's turbidity standard while developing the construction right-of-way and the construction access road within it. DEQ briefly summarizes this evaluation below.

In Section 6.1.2.1, DEQ summarizes JCEP's proposal to grade and construct 229 miles construction access road to build the pipeline in the construction ROW. DEQ describes how this action would discharge sediment in stormwater without appropriate BMPs. DEQ evaluates JCEP's proposed erosion control BMPs for the construction ROW and the construction access road. DEQ highlights the lack of modeling in JCEP's submittal to evaluate the efficacy of its proposed BMPs for the construction ROW and its access road. DEQ considers the numerous landslide susceptibility zones in close proximity the ROW and, in many locations, beneath the fill of the ROW and the construction access road. DEQ notes the lack of engineering designs with support for construction ROW above and potentially discharging stormwater. Moreover, DEQ evaluates JCEP's methodology to identify landslide susceptibility zones and its criteria for addressing these zones during pipeline construction and operation. Finally, DEQ evaluates JCEP's BMPs to avoid pipeline construction initiating landslides.

In its December 20, 2018 supplemental information request, DEQ documents scientific literature concerning JCEP's proposed actions that can initiate a landslide (see Page 12 - 18 of Attachment A). In this supplemental request, DEQ also reviews JCEP's proposed BMPs relative to the information presented in literature to avoid

landslides initiated by linear infrastructure projects (see Page 71 – 77 of Attachment A). Human-caused debris torrents impact water quality by changing the natural cycles of sediment delivery to streams, which increases turbidity and this impacts the aquatic environment; thus, affecting aquatic life (Castro and Reckendorf 1995).

Given the following, JCEP has not demonstrated that pipeline construction and the use of the construction access road would avoid exceedances of the turbidity standard for the following reasons:

- Lack of technical support for erosion controls on unstable slopes.
- Lack of modeling demonstrating proposed erosion controls are the most effective.
- A landslide hazard assessment that does not follow state-of-practice protocols.
- A landslide hazard assessment that does not evaluate construction induced landslide hazards.
- Lack of engineering design and their support for mitigating landslide risk during pipeline construction.
- Lack of engineering designs for stormwater management above unstable slopes.

6.9.2.2 Waterbody Crossings

JCEP proposes pipeline installation using dry open-cut techniques at many minor waterbody crossings. This technique relies on temporary dams to isolate the work area thereby allowing the use of standard overland construction techniques to complete the waterbody crossing. JCEP provided general techniques and best management practices in their reports on dry open-cut waterbody crossings. The plans state, "For the first 10 to 30 minutes, turbidity downstream of the crossing area could increase considerably."[92]

Oregon's Turbidity water quality standard authorizes turbidity to increase more than ten percent above background levels *provided* all practicable turbidity control techniques have been applied. On March 11, 2019, DEQ requested JCEP to develop specific crossing plans for each waterbody crossed by the pipeline. DEQ would utilize this information to determine whether all practicable turbidity control techniques are employed to reduce Project-effects on turbidity. Because DEQ has not received the requested plans, DEQ cannot determine that pipeline installation would comply with the turbidity standard.

6.9.2.3 Road construction and Maintenance

The information JCEP provided to DEQ does not demonstrate that existing access road use and new road construction would avoid exceedances of the turbidity standard. The information provided for road improvements at stream crossings does not demonstrate that JCEP would apply all practicable turbidity controls during potential limited duration exceedances of the turbidity standard. DEQ refers the reader to Section 6.1.2.3 of this Report for DEQ's evaluation of JCEP's proposed use of existing access roads for pipeline construction. The evaluation in Section 6.9.2.1 is also relevant to DEQ's evaluation of JCEP's compliance with Oregon's turbidity while using existing access roads. DEQ briefly summarizes the evaluation in Section 6.1.2.3 here.

In Section 6.1.2.3, DEQ describes how JCEP's use of existing access roads can cause sediment and turbid discharges to streams. DEQ also describes the lack of clear BMPs that JCEP would use to maintain and, if needed, improve these roads to prevent sediment discharge to streams during pipeline construction. In addition, DEQ evaluates the Erosion Control and Revegetation Plan and Transportation Management Plan that JCEP proposed to control sediment discharge from roads. DEQ also evaluates JCEP's actions to conduct an inventory of unpaved existing access roads to develop a DEQ-requested maintenance and improvement for these roads. Finally, DEQ provides examples of proposed new roads where JCEP did not provide design information to demonstrate the cut and fills on these roads would prevent landslides from discharging to streams

[92] Stream Fluming Procedures, September 2017.

In its December 20, 2018 supplemental information request, DEQ summarizes the scientific literature and technical resources concerning the importance of non-paved road design to protect water quality for aquatic life (see Page 18 - 19, Attachment A). In this supplemental request, DEQ stresses to JCEP that the National Marine Fisheries Service identified routine road maintenance as a needed action to assist in the recovery of salmonids listed under the Endangered Species Act (see Page 18 of Attachment A). Castro and Reckendorf (1995) summarize the impact of sediment and turbid discharges in aquatic environments and its effect on aquatic life.

JCEP has not demonstrated that existing access road use and construction would avoid exceedances of the turbidity standard for the following reasons:

- Lack of a comprehensive inventory of unpaved roads hydrologically connected to streams.
- Lack of a comprehensive and complete maintenance and improvement plan for unpaved roads hydrologically connected to streams.
- A landslide hazard assessment that does not follow state-of-practice protocols.
- A landslide hazard assessment that does not evaluate construction induced landslide hazards.
- Lack of engineering designs with specifications demonstrating effective turbidity controls and landslide prevention measures for road construction.

6.9.2.4 Pipeline Right-of-Way

The information JCEP provided to DEQ does not demonstrate that pipeline operation would avoid violations of the turbidity standard. DEQ refers the reader to Section 6.1.2.4 of this Report for DEQ's evaluation of JCEP's proposal to maintain a permanent right-of-way (ROW) to operate the pipeline. The evaluation in Section 6.1.2.4 is also relevant to DEQ's evaluation of JCEP's compliance with Oregon's biocriteria while operating a permanent ROW. DEQ briefly summarizes the evaluation in Section 6.1.2.4 below.

In Section 6.1.2.4, DEQ evaluates the function of a permanent slope breaker (i.e., water bar) and describes how this stormwater collection system concentrates stormwater discharge along the permanent ROW. DEQ details the initial and final drainage area for permanent slope breakers on steep slopes. In addition, DEQ notes the potential for JCEP to discharge post-construction stormwater from the permanent ROW to landslide susceptibility zones. DEQ points out that JCEP did not provide DEQ with a post-construction stormwater management plan following DEQ's 2018 guidelines for post-construction stormwater plan submissions which request project proponents consider steep and landslide risks when siting discharge points.

In the evaluation in Section 6.1.2.4, DEQ evaluates the permanent slope breakers closest to pipeline stream crossings and their potential to discharge sediment and other pollutants to streams. DEQ explains how the permanent ROW is functioning as primitive road due soil compaction in the ROW during pipeline construction and during post-construction maintenance. Based on the information in JCEP's submittal, DEQ's demonstrates that the permanent ROW may discharge sediment streams at a rate equivalent to a gravel road with ruts. Moreover, DEQ notes that the area between the stream and permanent slope breaker upslope from the stream is a source of sediment delivery to streams. Given these sources of discharge, DEQ's requested that JCEP perform modeling; however, JCEP has not completed modeling and an engineering analysis of these discharges.

In its December 20, 2018 supplemental information request (see Pages 66 - 68, Attachment A), DEQ's evaluation provides the rationale for its request for modeling and engineering analysis for the permanent ROW stormwater discharges to stream described above. This rationale is also emphasized in the evaluation presented in Section 6.4.2.3. This evaluation documents the potential sources of sediment and turbid discharges that can contribute to or cause a violation of Oregon's turbidity standard.

JCEP has not demonstrated that pipeline operation would avoid violations of the turbidity standard for the following reasons:

- Lack of an engineering analysis and modeling for the right-of-way discharge at stream crossings.
- Lack of engineering designs and analysis for stormwater management above unstable slopes.
- Lack of post-construction stormwater management plan following DEQ guidelines.

6.9.2.5 Terminal and Off-Site Project Area Stormwater

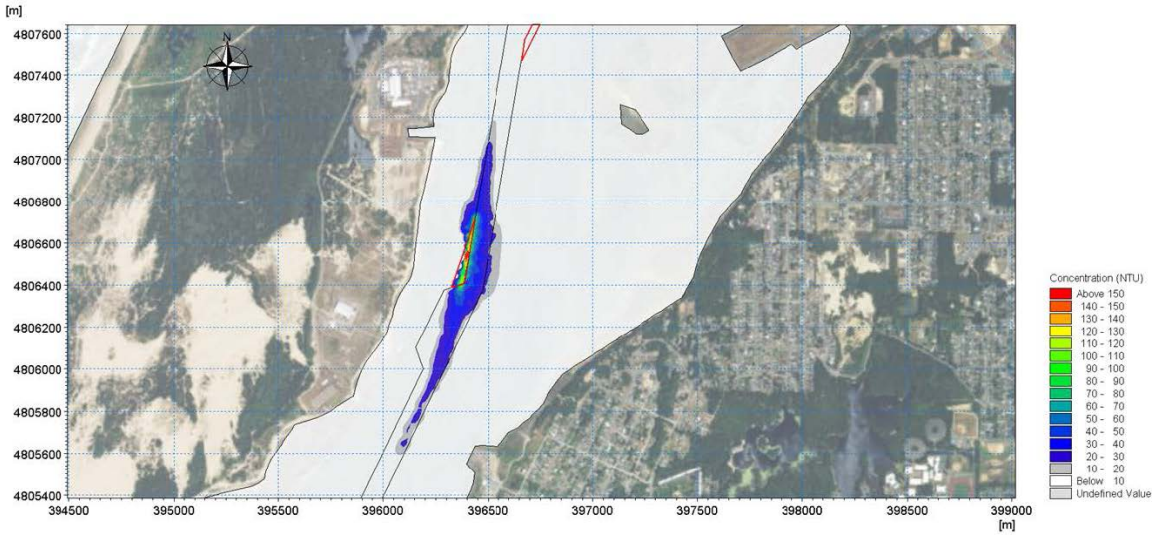
Section 6.1.2.5 of this report provides an evaluation of Jordan Cove's proposed actions to manage stormwater in the construction and operation of the Terminal and Off-site Areas. DEQ refers the reader to Section 6.1.2.5 for DEQ's evaluation of these proposed actions. The evaluation in Section 6.1.2.5 is also relevant to DEQ's evaluation of Pacific Connector's compliance with Oregon's turbidity standard while managing construction stormwater in the Terminal and Off-Site Project areas, managing stormwater and decant from dredge material disposal sites, and managing post-construction stormwater during the operation of the Terminal.

6.9.2.6 Dredging

Development of the proposed Slip and Access Channel would require the excavation and dredging of approximately 5.70 million cubic yards (mcy) of material. JCEP developed a Dredge Material Management Plan to guide dredging operations.[93] The DMMP describes three potential dredging methodologies, clamshell, hydraulic cutter-head, hydraulic hopper dredging, but acknowledges that the final dredging methods would depend on the equipment availability and the contractors' individual experience.

In addition, JCEP modeled the effects of turbidity at each of the proposed dredging locations using clamshell, hydraulic suction dredging, and excavation methods.[94] The modeling confirmed turbidity exceeding 10 NTU above background levels extending a total of more than one mile above and below the Navigational Reliability Improvement dredge locations. The modeling also confirmed elevated but comparatively localized turbidity plumes at the Slip, Access Channel, and eelgrass mitigation dredge locations. The report recommends that both capital and maintenance dredging operations incorporate construction BMPs, although the "nature and extent of BMPs should be determined through coordination with the regulatory agencies".

Figure 17: Modeled Turbidity from Capital and Maintenance Dredging at NRI-3



Oregon's Turbidity water quality standard allows DEQ to issue Section 401 water quality certifications that

[93] Dredge Material Management Plan. David Evans & Associates, Inc. October 2017.
[94] Hydrodynamic Studies – Turbidity Analysis, Moffat and Nichol, November 2017.

authorize actions to exceed numeric turbidity limits provided the applicant employ all practicable turbidity control techniques. On September 7, 2018, DEQ requested additional information related to JCEP's proposed dredging methods and measures to avoid or minimize turbidity. Specifically, DEQ requested a Dredging Pollution Control Plan. In particular, the request was for a "description of water pollution controls (operational controls, structural such as floating turbidity curtain etc.) that JCEP would use in dredging and transporting dredged material".

JCEP has not submitted a Dredging Pollution Prevention Plan. DEQ finds JCEP's proposed activities would cause turbidity to increase in excess of numeric limits, and absent any Dredging Pollution Prevention Plan, JCEP has failed to demonstrate its methods include sufficient controls to prevent exceedance of turbidity standard in OAR 340-041-0036.

6.9.3 DEQ Findings: Turbidity

DEQ's preceding evaluation of Project results in the following findings related to OAR 340-041-0036:

1. JCEP's proposed activities do not employ the highest and best treatment to control turbid discharges by failing to:
    a. Demonstrate the deployment of effective BMPs during pipeline construction and operation.
    b. Demonstrate the use of effective BMPs during road maintenance.
    c. Provide a site-specific waterbody crossing and restoration plans to minimize turbid discharges and restore stream form and function supporting water quality.
2. JCEP's proposed activities do not employ methods to construct and maintain roads in a manner to prevent turbid discharges to public waters by minimizing erosion of cut bank, fills, and roads.
3. JCEP's proposed activities do not employ methods to control turbid discharges generated by organic or inorganic debris from landslides during pipeline construction, pipeline operation, waterbody construction planning, and road maintenance, and road construction.
4. JCEP has not provided site-specific waterbody crossing and restoration plans that sufficiently describe required methods to avoid, minimize, and mitigate for turbidity. DEQ relies on the plans and information described above to confirm the project has considered the highest and best treatment techniques for minimizing turbidity during construction activities. Absent these plans and information, DEQ does not have a reasonable assurance that the JCEP's proposed activities will comply with the turbidity water quality standard. OAR 340-048-0020(3).
5. JCEP's proposed activity would likely violate the Turbidity water quality standard for the following reasons:
    a. JCEP has not provide an NDPDES 1200-C required Erosion and Sediment Control Plan demonstrating sediment and erosion controls with installation techniques have been properly deployed during the construction of the Terminal and Off-Site Project Areas to control turbidity from construction activities.
    b. JCEP proposes the disposal of dredged material producing turbid discharges from the leachate (i.e., decant flows), from this disposed material, and from exposed soils without demonstrating the deployment of site-specific controls to prevent exceedance of turbidity standard in OAR 340-041-0036.
6. JCEP's modeling conducted confirms that dredging at the Navigational Reliability Improvement locations, the Slip, and Access Channel would cause turbidity levels to increase above allowable numeric limits.
7. JCEP did not provide a Dredging Pollution Prevention Plan that sufficiently demonstrates JCEP considered and proposed all practicable turbidity control techniques to avoid, minimize, and mitigate these effects as required by OAR 340-041-0036.

Based upon these findings, violations of the turbidity water quality standard are likely to occur and DEQ concludes that it lacks a reasonable assurance that the proposed activities will be conducted in a manner that will not violate the Turbidity water quality standard.

6.10 Antidegradation

Oregon water quality standards have three main elements: beneficial uses; numeric and narrative criteria designed to protect those uses; and an antidegradation policy that is design to assure that water quality continues to improve. When the Department considers issuing a permit or a water quality certificate that would allow the existing water quality to be diminished in some way, the Department action must comply with the antidegradation provisions of the water quality standards.

6.10.1 Applicable Standard

Oregon's antidegradation policy provides a process to protect, maintain, and enhance water quality, support beneficial uses, and guide decision-making to prevent further degradation from new or increased point and nonpoint pollution sources. The antidegradation policy supplements other provisions of DEQ's water quality rules and is further implemented through guidance provided in Oregon's Antidegradation Internal Management Directive.

Oregon's antidegradation policy recommends a complete antidegradation review for new discharge sources requiring a Section 401 water quality certification. DEQ has established antidegradation review procedures for waterbodies classified as Outstanding Resource Waters, High Quality Waters, and Water Quality Limited Waters. The policy establishes a process in which DEQ may authorize actions that lower water quality in High Quality and Water Quality Limited Waters providing the action does not violate water quality standards, the action maintains support for beneficial uses, and feasible alternatives were implemented to reduce water quality impacts. If no feasible alternatives exist, the antidegradation policy may consider whether the action's social and economic benefits outweigh the environmental costs of reduced water quality.

The proposed Project does not affect any waterbodies classified as Outstanding Resource Waters.
Oregon Administrative Rule OAR 340-041-0004:

(1) Purpose. The purpose of the Antidegradation Policy is to guide decisions that affect water quality to prevent unnecessary further degradation from new or increased point and nonpoint sources of pollution, and to protect, maintain, and enhance existing surface water quality to ensure the full protection of all existing beneficial uses. The standards and policies set forth in OAR 340-041-0007 through 340-041-0350 supplement the Antidegradation Policy. * * *

(3) Nondegradation Discharges. The following new or increased discharges are subject to this division. However, because they are not considered degradation of water quality, they are not required to undergo an antidegradation review under this rule:

* * *

(c) Temperature. Insignificant temperature increases authorized under OAR 340-041-0028(11) and (12) are not considered a reduction in water quality.

(d) Dissolved Oxygen. Up to a 0.1 mg/l decrease in dissolved oxygen from the upstream end of a stream reach to the downstream end of the reach is not considered a reduction in water quality so long as it has no adverse effects on threatened and endangered species. * * *

(6) High Quality Waters Policy: Where the existing water quality meets or exceeds those levels necessary to support fish, shellfish, and wildlife propagation, recreation in and on the water, and other designated beneficial uses, that level of water quality must be maintained and protected. However, the commission, after full satisfaction of the intergovernmental coordination and public participation provisions of the continuing planning process, and with full consideration of sections (2) and (9) of this rule, and 340-041-0007(4), may allow a lowering of water quality in these high quality waters if it finds:

(a) No other reasonable alternatives exist except to lower water quality; and

(b) The action is necessary and benefits of the lowered water quality outweigh the environmental costs of the reduced water quality. This evaluation will be conducted in accordance with DEQ's "Antidegradation Policy Implementation Internal

Management Directive for NPDES Permits and section 401 water quality certifications," pages 27, and 33-39 (March 2001) incorporated herein by reference;

(c) All water quality standards will be met and beneficial uses protected; and

(d) Federal threatened and endangered aquatic species will not be adversely affected.

(7) Water Quality Limited Waters Policy: Water quality limited waters may not be further degraded except in accordance with paragraphs (9)(a)(B), (C) and (D) of this rule.

(8) Outstanding Resource Waters Policy. Where existing high quality waters constitute an outstanding State or national resource such as those waters designated as extraordinary resource waters, or as critical habitat areas, the existing water quality and water quality values must be maintained and protected, and classified as "Outstanding Resource Waters of Oregon." * * *

6.10.2 DEQ Evaluation

The preceding sections of this Evaluation and Findings report conclude that proposed activity would affect certain water quality standards and result in a lowering of water quality. Oregon's antidegradation policy requires DEQ to undertake a review of these actions in accordance with procedures established in the Antidegradation Internal Management Directive. The construction and operation of the Pacific Connector Pipeline would not meet the minimum requirements of Oregon's antidegradation policy because the applicant has not fully considered feasible alternatives to avoid, minimize, or mitigate for impacts to waters of the state. Absent an evaluation of feasible alternatives DEQ is prevented from considering the economic and social benefits of the proposed action against the environmental impacts of lowered water quality.

Temperature

Section 6.6 of this Evaluation and Findings Report finds that the temporary and permanent pipeline right-of-way would increase thermal impacts to waterbodies. JCEP has not provided a Source Specific Implementation Plan to propose methods to mitigate these impacts. Absent such a plan, DEQ finds the project does not meet the Antidegradation policy by failing to consider and implement alternative methods.

Turbidity and Sedimentation

Sections 6.1 and 6.9 of this Evaluation and Findings Report finds the proposed project would increase sedimentation and turbidity. JCEP has not submitted plans to address mitigation of project-related effects for road construction and maintenance, waterbody crossings, pipeline construction, and right-of-way maintenance. Information in plans is necessary to demonstrate JCEP proposed methods that would result in the least impact to water quality. Absent plans that support this requirement, DEQ finds the project does not meet the antidegradation policy by failing to consider and implement alternative methods.

Biocriteria

Section 6.2 of this Evaluation and Findings Report finds that trenched waterbody crossings would affect aquatic and riparian habitat and may cause detrimental changes to resident biological communities. JCEP has not submitted specific waterbody crossing and restoration plans for each proposed crossing. DEQ finds the project does not meet the Antidegradation policy's requirements by failing to demonstrate that alternative methods were considered.

6.10.3 DEQ Findings

DEQ's antidegradation policy requires a complete antidegradation review for projects subject to section 401 water quality evaluation. OAR 340-041-0004. Upon completion of such a review, DEQ may authorize projects that result in reduced water quality providing certain conditions are demonstrated. As discussed more fully in preceding

sections, JCEP failed to provide information necessary to complete such a review. Absent plans that demonstrate JCEP considered methods to avoid and minimize water quality impacts to temperature, turbidity, sedimentation, and biocriteria, DEQ finds the project does not meet the requirements of DEQ's antidegradation policy.

Based on the preceding evaluation, DEQ finds the proposed Project does not comply with Oregon's antidegradation policy.

7 Evaluation of Compliance with Sections 301, 302, 303, 306 and 307 of the Federal Clean Water Act

To certify a project pursuant to Section 401 of the federal Clean Water Act, DEQ must find that the project complies with applicable provisions of Sections 301, 302, 303, 306 and 307 of the Act and state laws and regulations adopted to implement these sections. Sections 301, 302, 306 and 307 of the federal Clean Water Act deal with effluent limitations, water quality related effluent limitations, national standards of performance for new sources and toxic and pretreatment standards. All of these requirements relate to point source discharges and are the foundation for conditions in National Pollutant Discharge Elimination System permits issued to the point sources.

Section 303 of the Clean Water Act relates to Water Quality Standards and Implementation Plans. EPA has adopted regulations to implement Section 303 of the act. The Environmental Quality Commission adopted water quality standards consistent with the requirements of Section 303 and the applicable EPA rules. The commission standards are in Oregon Administrative Rules Chapter 340, Division 41. EPA has approved the Oregon standards pursuant to the requirements of Section 303 of the act and has approved TMDLs that implement those standards in basins where standards are not currently being met. For the reasons set forth in the preceding sections of this report, DEQ finds that the proposed Project would not comply with Oregon Water Quality Standards and, in certain aspects, applicable TMDLs.

8.0 Evaluation Of Other Appropriate Requirements Of State Law

Pursuant to § 401(d) of the Clean Water Act, DEQ may condition a water quality certification to assure compliance with other appropriate requirements of state law. Such requirements are "appropriate" if they have any relation to water quality, Arnold Irrigation Dist. v. DEQ, 79 Or.App. 136 (1986), PUD No.1 of Jefferson Co. v. Washington Dept. of Ecology, 511 U.S. 700 (1994). Because DEQ is denying the requested water quality certification for the proposed Project for the reasons stated above in this report, DEQ has not fully evaluated what conditions would be necessary to comply with other appropriate requirements of Oregon law. However, DEQ lists below the requirements that it would consider should JCEP make a new request for certification.

Department of Land Conservation and Development

While the denial of certification may not be based on land use considerations, land use regulations protecting water quality and aquatic resources must be considered by DEQ. DEQ has determined that JCEP has not provided an adequate land use exhibit, as required by OAR 340-048-0020(i). This section of this report provides background for this determination and provides information that may be helpful should the application be resubmitted.

General Land Use Requirements under ORS 197.180

Unlike most states, Oregon has a system of statewide laws governing land use. The system includes 19 rules designated as statewide goals. The goals encompass a range of issues relating to land use, land development, and environmental protection, including goals and rules directly relating to water quality and to estuaries. OAR chapter 660, division 15. Local governments have the primary responsibility for implementing these statewide rules. Under ORS 197.180, however, state agencies also must comply with the statewide planning goals and act in a manner that is compatible with local comprehensive plans and land use regulations when taking actions in programs affecting land use.

A state agency generally complies with the statewide planning goals by acting compatibly with applicable comprehensive plans and local land regulations when such plans and regulations are acknowledged to comply with the statewide planning goals. OAR 660-030-0065(2); Schreiner's Gardens v. DEQ, 71 Or. App. 381(1984). Under the general rules adopted by the Land Conservation and Development Commission (LCDC) to implement ORS 197.180 and the specific rules governing DEQ, the agency may, and generally does, rely on determinations by local governments concerning whether a proposed use is compatible with acknowledged local plans and regulations. OAR 660-030-0070; OAR 340-018-0050. These determinations are known as "land use compatibility statements" or as a "LUCS". In situations where a local government cannot or does not provide a satisfactory LUCS, DEQ must determine for itself whether a proposed project or activity complies with the statewide goals, and is compatible with applicable acknowledged local plans and regulations.

Special Limitations Under CWA Section 401

The section 401 certification program is a program affecting land use for purposes of ORS 197.180. OAR 340-018-0030(4)(g). To the extent permitted by law, the DEQ certification decision must comply with the statewide planning goals and be consistent with acknowledged local land use plans and regulations as described above. Oregon case law, however, limits the application of ORS 197.180 in the context of certifications issued under CWA Section 401. Specifically, DEQ may apply applicable state and local land use regulations only to the extent that they relate to water quality, and then only for purposes of determining whether to impose conditions to assure compliance with those regulations (and not for purposes of approval or denial). Such provisions are "other appropriate requirement of State law" for purposes of CWA Section 401(d). Arnold Irrigation Dist. v. DEQ, 79 Or.App. 136 (1986).

Oregon's rule implementing the CWA, ORS 197.180 and the Arnold Irrigation Dist. decision requires:
(i) An exhibit that:
(A) Includes land use compatibility findings for the activity prepared by the local planning jurisdiction;
(B) If land use compatibility findings have not been obtained, identifies the specific provisions of the local land use plan and implementing regulations applicable to the activity and describes the relationship between the activity and each of the land use provisions identified in paragraph (A) of this subsection; and
(C) Discusses the potential direct and indirect relationship to water quality of each finding or land use provision.

OAR 340-048-0020.

On January 28, 2019, JCEP submitted to DEQ a land use exhibit pursuant to OAR 340-048-0020(2)(i). As discussed below, however, it is incomplete and otherwise inadequate to satisfy the rule.

JCEP has not supplied valid or complete LUCSs from the counties where the facility and pipeline would be located. Accordingly, before a certificate can issue, DEQ would be required to make its own determination regarding

whether the Project is compatible with water quality related requirements in the local comprehensive plans and land use regulations and complies with water quality related requirements in the statewide planning goals. (In the context of this application, DEQ has determined that elements of statewide Goals 5, 6, 12, and 16 (and their implementing regulations) are applicable.)

To the extent that a local government has applicable acknowledged local land use plans and regulations, and the Project components in the county would be compatible with those plans and regulations, DEQ generally would rely on the compatibility findings to determine goal compliance. To the extent a county does not have acknowledged plans and regulations addressing the project or DEQ cannot determined that the project is compatible with such provisions, DEQ would make its own finding regarding goal compliance and local compatibility. As noted above, however, in the context of Section 401 certifications, the findings would be limited to water quality related provisions. ORS 197.180(1)(b). The following subsections of this report describe DEQ's current evaluations of these issues.

Klamath County

Klamath County provided a LUCS dated January15, 2019, that covers both the proposed pipeline and compressor station. The LUCS states that both uses are compatible with the acknowledged comprehensive plan and allowed by conditional use permit. The County has issued a conditional use permit (CUP 5-15) for the proposed compressor station. The County has not issued a permit or approval from the pipeline, however, because it believes its authority to do so has been pre-empted by FERC. Although the LUCS acknowledges that approvals have not been issued for the pipeline, it incorporates proposed findings prepared by the JCEP for the LUCS previously issued in 2015 and a review of plan and regulation amendments that occurred after 2015. The proposed findings indicate that the pipeline would be approvable if the County were to exercise its land use jurisdiction.

Based on the County's findings and the supporting information provided by the JCEP to DEQ and the County, DEQ believes that the compressor station is compatible with the local acknowledge comprehensive plan and regulations and with the statewide goals. Based on the statements in the LUCS and proposed findings of the JCEP, DEQ has sufficient information at this time to determine the other elements of the Project within Klamath County are compatible with the County's comprehensive plan and land use regulations and would be approved or permitted if the County were to assert its land use jurisdiction. Because the pipeline use would be compatible with the County's acknowledged comprehensive plan and land use regulations, the Project elements in Klamath County could be deemed to comply with the statewide land use goals as well.

Jackson County

JCEP has provided an unsigned and undated LUCS from Jackson County. The LUCS states that the Project within Jackson County is allowed, but only because the Project is not subject to the County's comprehensive plan and land use regulations. The unsigned LUCS indicates that the County's refusal to assert jurisdiction arises from County policy number 17 relating to linear transmission facilities. The County does not take a position on whether the pipeline would be allowed outright or by conditional use permit if it were subject to the County's plan and land use regulations. JCEP provided proposed findings prepared in September 15, 2015, that purport to demonstrate that the Project would be compatible with the County's comprehensive plan and land use regulations if the County were to assert jurisdiction. JCEP has also provided evidence that there have been no relevant changes in the plan and land use regulations after 2015.

Without confirmation from the County that it concurs with the proposed findings, DEQ declines to determine at this time whether the pipeline is compatible with acknowledged comprehensive plan provisions and land use regulations for Jackson County. Some of the provisions in the comprehensive plan and land use regulations, including those relating to approval of conditional uses for linear facilities, appear to be water quality related. JCEP's land use exhibit, however, does not attempt to identify specifically which applicable plan provisions and implementing regulations are water quality related.

Douglas County, Non-Coastal Zone

JCEP provided a LUCS from Douglas County dated January 23, 2019, stating the pipeline use is allowed, but this is based on findings that County zoning authority over portions of the pipeline outside the coastal zone are pre-empted by the Natural Gas Act. JCEP has also provided proposed findings prepared in September 15, 2015, purporting to demonstrate that the project would be compatible with the County's comprehensive plan and land use regulations if the County were to assert jurisdiction.. JCEP has also supplied evidence that there have been no relevant changes to the plan and regulations after 2015. The LUCS acknowledges but does not incorporate or approve the proposed findings submitted by the JCEP.

Without confirmation from the County that it concurs with the proposed findings, DEQ declines to determine at this time whether the pipeline is compatible with acknowledged comprehensive plan provisions and land use regulations. Some in the plan and land use regulations, including those relating to approval of linear facilities, appear to be water quality related. JCEP's exhibit, however, does not attempt to identify specifically which applicable plan provisions and implementing regulations are water quality related.

Douglas County, Coastal Zone

The County provided a LUCS dated January 23, 2019, stating the pipeline use is allowed based on the prior issuance of conditional use permit and the findings supporting that permit. On this same day, however, the Douglas County Circuit Court determined that the conditional use permit issued by the County for construction of the pipeline on lands within the coastal zone is void based on the failure of the County to grant timely extension of the permit. McLaughlin et al. v. Douglas County, 17CV32687, 17CV41672 and 18CV04396. Under the provisions of OAR 340-018-0050(2)(a)(G), DEQ cannot base compatibility with acknowledge local plans and regulations and the applicable statewide planning goals on the basis of a LUCS that has been invalidated.

JCEP's land use exhibit is predicated on establishing compatibility with the comprehensive plan and land use regulations. Some of the provisions in the comprehensive plan and land use regulations, including those relating to approval of conditional uses for linear facilities, appear to be water quality related. JCEP's exhibit, however, does not attempt to identify specifically which applicable plan provisions and implementing regulations are water quality related.

The conditional use permit in question appears to be a requirement for the project under the regulations implementing the federal Coastal Zone Management Act. Consequently. DEQ anticipates that the JCEP would reapply for the CUP. If the permit is re-issued, DEQ would be able to determine the pipeline with in the Coastal Zone in Douglas County is compatible with the acknowledged plan and land use regulations.

Coos County

Coos County issued a LUCS dated December 17, 2018, that states the Project is not compatible with local comprehensive plan and land use regulations. This determination is based on several factors including necessary conditional use permits and plan amendments that have not yet been obtained for the pipeline and roadways, and the invalidation and remand of county decisions approving the LNG terminal itself. Ocean Shores Conservation Coalition v. Coos County, LUBA No. 2016-095 (2017). LUBA's decision was subsequently affirmed by the Oregon Court of Appeals.

With respect to the terminal, LUBA concluded that the County's findings were inadequate or improper. The remand involves, but is not limited to, the following water quality related issues:

- Findings relating to the need and substantial benefit required under Coos Bay Estuary Management Plan

policy 5(I) with respect to the dredging required in areas zoned 5-DA and 6-DA;
- Findings of no unreasonable interference with the public trust rights required under Coos Bay Estuary Management Plan policy 5(I) with respect to the dredging required in areas zoned 5-DA and 6-DA;
- Findings relating to whether the public need and gain from the project warrants the loss or modification to the estuarine system under Policy 4 and 4(a); and
- Mitigation findings with respect to its approval for filling a portion of the estuary in the 7-D zone.

Because key elements of the proposed Project are not currently allowed under the county's acknowledged comprehensive plan and land use regulations, DEQ cannot (at this time) determine that the Project is compatible with the acknowledged comprehensive plan and land use regulations. Some aspects of these decisions are clearly water quality related.

City of Coos Bay

As JCEP acknowledges, the Project requires a land use goal exception, comprehensive plan change, zoning map amendments, and a conditional use permit from the City of Coos Bay. These land use actions are needed at least in part to comply with water quality related requirements of the statewide land use goals as implemented through the city's comprehensive plan and land use regulations. As a result, DEQ cannot (at this time) determine that the Project is compatible with the acknowledge comprehensive plan and land use regulations.

City of North Bend

As JCEP acknowledges, conditional use permits from the City of North Bend are required in order for the Project to be compatible with the acknowledged comprehensive plan and land use regulations. These permits implement water quality related requirements of the statewide land use goals.

Laws Administered by the Oregon Department of State Lands
ORS 196.795 to 196.990 requires that permits be obtained from the Department of State Lands (DSL) prior to any fill or removal of material from the bed or banks of any stream.

Laws Administered by the Oregon Department of Fish and Wildlife
ORS 496.012 sets wildlife policy for prevention of depletion of indigenous species and toward wildlife resource decisions to be made in the best social, economical and recreational interests of all user groups

ORS 496.164 provides for cooperation and technical assistance to other agencies with regard to wildlife resource management

ORS 496.170 to 496.192 requires collection and analysis of scientific data to determine and inventory biological status of species, develop conservation strategies, and provide recommendations to other agencies regarding actions affecting threatened or endangered species

OAR 635-007-0502 et. seq. native fish conservation policy – protection of natural ecological communities and habitats tailored to individual watersheds and situations

OAR 635-059-0000 et. seq. aquatic invasive species control

OAR 635-100-0135 Survival Guidelines for Species Listed as Threatened or Endangered – lower Columbia coho

OAR 635-100-0150 requires consultation with ODFW on affects to endangered species OAR 635-410-0000 natural resource losses

OAR 635-412-0005 et. seq. addresses fish passage

OAR 635-413-0000 et. seq. fish habitat mitigation policy OAR 635-425-0000 et. seq. in-water blasting

OAR 635-500-0002 et. seq. addresses fish management plans

Laws Administered by the Oregon Department of Environmental Quality

ORS 459.005 – 418 Solid Waste Management Law

ORS 466.020, 075, 105, and 195 Hazardous Waste Management Law

ORS 468B.155 prevention of groundwater contamination

ORS 468B.160 (5) triggers action to prevent groundwater contamination or restore acceptable levels

OAR 340-040-0030 permitted operation (5) action requirements and (6) remedial action requirements

OAR 340-045 pertaining to NPDES and WPCF permits

OAR 340-143-0000 pertaining ballast water management

Laws Administered by the Oregon Department of Water Resources

OAR 690-009 groundwater interference with surface water OAR 690-010 appropriation and use of groundwater
OAR 690- 012 out-of-basin diversion OAR 690-020 dam safety

OAR 690-28 surface water registrations

OAR 690-033 standards for new appropriations

OAR 690-077 instream water rights
OAR 690-086 water management and conservation plans

Laws Administered by the Oregon Watershed Enhancement Board

ORS 541-351 et. seq. Oregon Plan for Salmon and Watersheds

9.0 Public Comment

The Corps' and DEQ's public comment period for the Project was originally from May 22, 2018 through July 21, 2018. The agencies extended the public comment period until August 20, 2018. DEQ received about 42,000 public comments electronically and by mail.

This document does not include responses to these public comments because DEQ is denying certification based, in part, upon the failure of the applicant to provide necessary information; therefore, a complete response to public comments has not been prepared.

10.0 Conclusion

For the reasons set forth in this report, DEQ denies Jordan Cove's request for 401 WQC for the Project. DEQ does not have a reasonable assurance that the construction and operation of the Project will comply with applicable state water quality standards, as described in this report. DEQ's decision, however, is made without prejudice. Jordan Cove may reapply for a 401 WQC for the Project, and DEQ will consider additional information that is responsive to the bases for denial in this decision.

Attachment A

Additional Information Requests

Oregon
Kate Brown, Governor

Department of Environmental Quality
Western Region Eugene Office
165 East 7th Avenue, Suite 100
Eugene, OR 97401
(541) 686-7838
FAX (541) 686-7551
OTRS 1-800-735-2900

September 7, 2018

Derik Vowels
Jordan Cove LNG, LLC
Consultant, Lead Environmental Advisor
111 SW 5th Ave., Suite 1100,
Portland OR 97204

Re: Additional Information Request
Jordan Cove Energy Project (FERC Project No. CP17-494)
Pacific Connector Gas Pipeline (FERC Project No. CP17-495)
U.S. Army Corps of Engineers (Project No. NWP-2017-41)

Dear Mr. Vowels:

The Oregon Department of Environmental Quality (DEQ) is currently reviewing an application from Jordan Cove LNG, LLC (Jordan Cove) for Clean Water Act section 401 water quality certification for a Section 404 permit from the U.S. Army Corps of Engineers necessary for construction of the Jordan Cove Energy Project and Pacific Connector Gas Pipeline (collectively, "the Project"). Jordan Cove proposes to construct a liquefied natural gas export facility near North Bend, Oregon, and a 232-mile natural gas pipeline connecting the terminal with existing pipelines near Malin, Oregon.

Section 401 of the Clean Water Act bars federal agencies from issuing a license or permit for an action that may result in a discharge to Oregon waters without first obtaining water quality certification from DEQ. DEQ anticipates Jordan Cove's construction and operation of the Project will require authorizations from multiple federal agencies, including but not limited to a Section 404 permit from the U.S. Army Corps of Engineers and authorizations from the Federal Energy Regulatory Commission (FERC) pursuant to the Natural Gas Act. DEQ is conducting a comprehensive section 401evaluation of the Project's direct, indirect, and cumulative effects on water quality. DEQ currently expects to develop a single certification decision based on this comprehensive evaluation of the Project that will be applicable to both the Corps and FERC decisions on the Project.

DEQ is processing the applications pursuant to Section 401 of the Clean Water Act, 33 USC §1341, ORS 468B.035 through 468B.047, and DEQ's certification rules found in Oregon Administrative Rules 340, Division 048. To certify the Project, DEQ must have a

reasonable assurance that the proposed Project, as conditioned, will comply with Sections 301, 302, 303, 306, and 307 of the Clean Water Act, Oregon water quality standards, and any other appropriate requirements of state law.

DEQ has conducted a preliminary review of the application package material submitted February 6, 2018, by David Evans and Associates, Inc. on behalf of Jordan Cove. The information described in the attachments to this correspondence is necessary to complete DEQ's analysis of the Project's compliance with applicable standards. Please file a complete response to this additional information request within 30 days of the date of this letter. Please forward your responses to:

Christopher Stine
Oregon Department of Environmental Quality
165 East 7th Avenue, Suite 100
Eugene, Oregon 97401

If Jordan Cove cannot provide certain information within the requested period, please indicate which items will be delayed and provide a projected filing date. You may reference previously submitted documents, in whole or in part, to support your responses to the requests in Attachments A through B

DEQ reserves the right to request additional information as necessary to complete its analysis and fulfill its obligations under state and federal law.

If you have any questions, please contact me directly at (541) 686-7810, or via email at stine.chris@deq.state.or.us.

Christopher Stine, PE
Water Quality Engineer

ec: Mike Koski, mkoski@pembina.com
Rose Haddon, rhaddon@pembina.com
Keith Andersen, Dave Belyea, Steve Mrazik, Chris Bayham, Mary Camarata, Sara Christensen/DEQ
Tyler Krug, Tyler.J.Krug@usace.army.mil
John Peconom, John.Peconom@ferc.gov
Sean Mole, sean.mole@oregon.gov

ATTACHMENT A

Jordan Cove Energy Project / Pacific Connector Gas Pipeline
Additional Information Request

1. Application for Certification
   Oregon Administrative Rule (OAR) 340-048-0020(2) identifies the minimum requirements for applications to the Oregon Department of Environmental Quality for section 401 water quality certification. Please provide complete responses to the application requirements given in OAR 340-048-0020(2)(a-j). If Jordan Cove has previously submitted portions of this information, please reference the location and include any supplemental or clarifying information, as necessary, to provide complete responses.

2. Proposed Action
   Jordan Cove must provide and update DEQ with a complete and current description of the construction and operation of the proposed Project and the impacts of these actions on affected waterbodies. DEQ recognizes that Jordan Cove may revise project elements during the design process. Jordan Cove must provide DEQ with timely submissions describing changes to the proposed activity that may directly or indirectly affect water quality. Jordan Cove must also specify clearly that it is requesting that DEQ accept these submissions as changes to the proposed activity and consider the effects of the revised action in our section 401 water quality evaluation.

3. Submission of Application Information
   Jordan Cove's application to DEQ for section 401 water quality certification must provide DEQ with a comprehensive description of the proposed action including all resource reports, maps, electronic data files, and supporting documentation provided to federal agencies from whom Jordan Cove is seeking permits or authorizations. DEQ's certification rules require applicants to file information directly with the Department. For this reason, DEQ does not consider the availability of information on external websites or other sources as a submittal unless the applicant explicitly directs DEQ to obtain application materials from these sources.

4. Water Quality Standards
   Oregon's water quality standards consist of beneficial uses, numeric and narrative criteria developed to support these uses, and an antidegradation policy that prohibits an activity from further degrading water quality. Applicants for water quality certification must provide sufficient information to demonstrate the activity will comply with Oregon water quality standards (OAR 340-048-0020(g)).

   Provide information to demonstrate how the Project will comply with the water quality standards found in OAR 340 Division 041. For project activities that do not affect State waters, note how the Project will not violate applicable standards. For project activities that do impact State waters, note how Jordan Cove is proposing to mitigate, reduce, or prevent impacts so as to ensure the Project, as proposed, does not violate applicable water quality standards. Project impacts should be assessed in terms of direct, indirect, and cumulative effects of the activity on state water quality.

ATTACHMENT B

Jordan Cove Energy Project / Pacific Connector Gas Pipeline
Additional Information Request

Preliminary evaluation of the proposed activities to determine compliance with the requirements for a Certification Decision as described in Oregon Administrative Rules 340-048-0042(2):

Oregon Administrative Rule	Requirement	Information Requested
340-048-0042(2)	Compliance with Clean Water Act Sections 301 and 302	Please provide a NPDES 1200-C Permit Application demonstrating that land disturbing activities associated with the construction of Jordan Cove Energy Project's Liquefied Natural Gas Terminal as well as the following: • Land disturbing activities associated with the dry excavated portion of this terminal's Marine Slip, • Land disturbing activities associated with all offsite project areas associated with this terminal and its construction including those areas described in Section 5.3 of this terminal's stormwater management plan (Part 1, Attachment A3). • Land disturbing activities associated with roads used to access this terminal and offsite project areas. • Land disturbing activities associated with any other facilities (staging areas, refueling areas, employee parking etc.) that Jordan Cove Energy Project will use to construct of this terminal. DEQ will need to determine if these land disturbing activities will comply with the technology-based effluent limits of this permit. DEQ will also need an erosion and sediment control plan that, for example, addresses Schedule A.12.b.v and other conditions in this permit. For DEQ to evaluate the water quality impacts of the construction process on waters of the state, DEQ needs this information in an erosion and sediment control plan.
		Please provide a NPDES 1200-C Permit Application for land disturbing activities associated with the construction of Pacific Connector's gas pipeline and with the construction of all associated facilities such as communication towers, roads (existing and new), disposal sites, block valve facilities, and compressor stations. DEQ will need to determine if these land disturbing activities will comply with the technology-based effluent limits of this permit. DEQ will also need an erosion and sediment control plan that, for example, addresses Schedule A.12.b.v and other conditions in this permit. For DEQ to evaluate the water quality impacts of the construction process on waters of the state, DEQ needs this information in an erosion and sediment control plan.
		Please provide a NPDES 1200-A Permit Application demonstrating that the proposed 20 sites to obtain rock for Pacific Connector's gas pipeline construction and maintenance. DEQ will need to determine if these land disturbing activities will comply with the technology-based effluent limits of this permit.
		Please provide a NPDES 1200-A Permit Application demonstrating that the concrete batch plant proposed for the offsite project area referred to as Boxcar Hill in the LNG Terminal's stormwater management plan (Section 5.3,

		page 19). DEQ will need to determine if rock quarries will operate in compliance with the technology-based effluent limits of this permit.
		Please provide a NPDES Individual Permit Application for the LNG Terminal's two domestic wastewater facilities discharging to surface water. DEQ will use the information in this permit application to develop a discharge permit containing technology-based and water quality-based effluent limits associated with this permit.
		Please provide a NPDES Individual Permit Application for discharges of non-contact cooling wastewater discharged from Liquefied Natural Gas carriers using the Marine Slip at the LNG Terminal. DEQ will use this permit application to develop a discharge permit containing technology-based and water quality-based effluent limits.
		If the discharge from wastewater treatment plants proposed for the LNG Terminal has a design flow capacity of 1 million gallons per day or more or requires pretreatment under 40 CFR §403, please provide a NPDES 1200-Z Permit Application demonstrating that the Terminal's stormwater management plan will comply with the technology-based and water quality-based effluent limits in this permit.
		Please provide an application for a NPDES Individual Permit for the discharge of vehicle and equipment washwater to surface water during the operation of the LNG Terminal. DEQ will use this permit application to develop technology-based and water quality-based effluent limits for this permit if the operations.
		Please provide an application for a NPDES Individual Permit for the discharge of vehicle and equipment washwater to surface water during the construction and operation of the gas pipeline and all its associated facilities. DEQ will use this permit application to develop technology-based and water quality-based effluent limits for this permit.
	Compliance with Clean Water Act Section 302	DEQ will evaluate compliance with CWA Section 302 upon the receipt of information requested above.
	Compliance with CWA Section 303	In compliance with OAR 340-041-0007(8), please provide an assessment of Pacific Connector Gas Pipeline's compliance with all applicable DEQ-approved Total Maximum Daily Load Implementation Plans or compliance programs for the following: • United States Department of Agricultural Forest Service Water Quality Restoration Plans and the USDA National Best Management Practices for Water Quality Management on National Forest System Lands (Volume 1: National Core BMP Technical Guide) noted in DEQ's Memorandum of Understanding with the Forest Service. • US Department of Interior Bureau of Land Management's Water Quality Restoration Plans. • Oregon Department of Forestry's Forest Practices Act Program. • Oregon Department of Agriculture's Water Quality Plans. • Coos County Total Maximum Daily Load Implementation Plan. • Douglas County Total Maximum Daily Load Implementation Plan. • Jackson County TMDL Implementation Plan. • Klamath County TMDL Implementation Plan. In this compliance assessment, please also note all the support documents such as design manuals, guidance documents, road permits etc. that PCGP will follow when complying with these Implementation Plans. In addition, please identify all proposed amendments to federal land and resource management plans that would necessitate amendments to current Forest Service, Bureau of Land Management, or Bureau of Reclamation Total

		Maximum Daily Load Implementation Plans covering the pipeline's construction and operation. Federal Water Quality Restoration Plans represent the Forest Service's and BLM's plan for activities on these federal lands serving as a source of point and nonpoint source pollutants including pollutants addressed in a Total Maximum Daily Load. Finally, for determining compliance with TMDL allocations covering federal lands, please provide for DEQ's review and approval all proposed Forest Service, Bureau of Land Management, and Bureau of Reclamation road permits and access grants or right-of-way permits. For determining compliance with TMDL allocations on non-federal lands, please provide for DEQ's review and approval all proposed easements, agreements, and access or right-of-way permits. This compliance assessment must also include a summary of the steps taken to first avoid and then minimize impacts to the Designated Management Agency's riparian buffer protection areas prior to: • Siting Temporary Extra Work Areas for the pipeline construction • Siting of the construction and the permanent right-of-way for the pipeline. DEQ is requesting this information in response to Pacific Connector Gas Pipeline's proposal to locate TEWAs 50 feet from a waterbody and wetland boundary (see page 25 of Resource Report 1 for the gas pipeline). For example, this setback will not comply with the Forest Service's and Bureau of Land Management's riparian buffer protection requirements as presented in their Water Quality Restoration Plans which serve as their TMDL Implementation Plans. In Resource Report 1 noted above, PCGP notes that there are 922.64 acres of TEWAs. Please identify the location of each TEWA that PCGP will locate within one and two potential tree heights away to 50 feet from waters of the state. For streams, please indicate the distance of each TEWA from the ordinary high water mark of the stream or riverine wetland. Additionally, please note the land ownership where each TEWA is located. In addition, on page 58 of Resource Report 1 for the gas pipeline, PCGP indicates that the pipeline – in some places – will impact riparian vegetation while paralleling streams. Specifically, this report notes that the "proposed route will avoid paralleling a waterbody within 15 feet or less, where feasible." In this report, PCGP notes that this placement is consistent with the Section V.B.2.a of FERC's Wetland and Waterbody Procedures. However, 15 feet of riparian buffer would violate DMA riparian buffer protection requirements. Moreover, based on the literature, a 15-foot riparian buffer for thermal regulation of streams may result in thermal gain to the adjacent water body. As result, please identify each segment of the pipeline's construction right-of-way and permanent right-of-way that is parallel to waters of the state and within two site potential tree heights from waters of the state. Please provide the location and a detailed rationale for siting TEWAs closer to streams than authorized by a DMA's riparian buffer protection requirements and when siting sections of the construction and permanent right-of-way. For example, the PCGP's rationale in Resource Report 1 (page 58) for not proposing setbacks larger than 50 feet in Riparian Reserves is that larger setbacks "would render the TEWA useless for the stream crossing." PCGP should justify its proposal for non-standard riparian buffer protections by providing the following information:

		• A description of the specific constraints at each site preventing the use of a TEWA in an area. • The specific rationale why the TEWA must be closer to the stream crossing. Without this specific information, DEQ cannot determine that Pacific Connector Gas Pipeline attempted to first avoid and minimize riparian impacts to the maximum extent practicable before seeking to mitigate these impacts. This compliance assessment must also identify other locations where PCGP will not comply with Designated Management Agencies' riparian protection areas when siting the following: • Temporary and Permanent Access Roads, • Staging areas, • Material storage areas, and • Other components (e.g., compressor stations, metering stations) of the pipeline. Please include a detailed justification for seeking alternative riparian buffer protection requirements when siting these facilities within riparian areas. Pacific Connector Gas Pipeline must evaluate the thermal impacts from all noncompliance with DMA riparian protection requirements requested above where PCGP has provided and DEQ has approved the following information: • Detailed information demonstrating it considered all actions to first avoid or then minimize impacts to riparian areas to the maximum extent practicable. • Detail rationale for proposing nonstandard widths for riparian buffer protections. This evaluation must be included in PCGP's Thermal Impacts Assessment noted in the comments below on compliance with state water quality standards.
		There is no information presented in Pacific Connector Gas Pipeline's Appendices for Timber Removal and Construction in the Transportation Management Plan (Part 2, Appendix E-8). Please provide the location of the approximately 660 miles of existing public and private roads that PCGP proposes to use to construct the gas pipeline and/or support its operation. In this updated plan, please delineate these existing public and private roads by ownership as follows: • Private road on land zoned for forest use • Private road on land zoned for agricultural use • Private road on land zoned residential/commercial/industrial use by Coos/Douglas/Jackson/Klamath County • Public road owned and operated by Coos/Douglas/Jackson/Klamath County • Public road on the Umpqua/Rogue-Siskiyou/Winema-Fremont National Forest • Public road on land in the Bureau of Land Management Coos Bay District/Roseburg District/Medford District/Klamath Resource Area • Public road on Bureau of Reclamation land

		DEQ will use this information to evaluate compliance with the Section 303 of the Clean Water Act as noted above. There is also no information presented in PCGP's Appendices for Operations and Maintenance in the Transportation Management Plan. Please provide the documentation demonstrating that PCGP inventoried these existing roads to identify necessary maintenance actions and needed improvements to protect water quality prior to their use. This documentation should also include: • The results of the inventory for each road segment and the recommended maintenance prescription for each segment. • The road assessment protocols used (e.g., USDA Forest Service Water/Road Interaction Field Guide) and the evaluation tool (e.g. Geomorphic Road Analysis and Inventory Package) used to evaluate the surface erosion risk, gully risk, landslide risk, and stream crossing failure risk during road use. Please also provide a detailed maintenance and improvement plan for the approximately 660 miles of existing roads. This plan must demonstrate that PCGP will implement all maintenance actions and improvements necessary to protect water quality – identified during the road inventory – prior to road use for pipeline construction or operation. This maintenance and improvement plan must also: • Implement the Designated Management Agencies' DEQ-approved TMDL Implementation Plans. • Comply with maintenance standards, requirements, and/or other design standards developed and used by DMAs to implement these TMDL Implementation Plans. Additionally, please identify the location of all existing roads that PCGP will use to access the gas pipeline during its operation. Please provide a maintenance plan for these existing roads that includes: • A description of the level of use these roads will experience during the pipeline's operation. • A description of the maintenance practices to protect water quality and a schedule for performing these practices and supporting this level of use.
		Please provide the location of the propose 25 miles of new Temporary and Permanent Access Roads and the selection criteria used to site these new roads to avoid and minimize impacts to water quality. Please delineate these new roads by land ownership (e.g., private ownership on land zoned for forest use) consistent with the information request noted above. DEQ will need this delineation by land ownership to evaluate compliance with Section 303 of the Clean Water Act. To ensure these roads will not serve as a source of sediment to and hydromodification of waters of the state and as a source of debris flows into streams from road-related landslides, please include the design standards and specifications for constructing these roads including their drainage systems, cut-slopes, and fill-slopes. Please identify the proposed designs to stabilize fillslopes and cutslopes and manage stormwater on new temporary and permanent roads located on the steep slopes (i.e., slopes greater than 30%) and engineering support for these designs. This information is necessary for DEQ to evaluate compliance with the statewide water quality criteria for

		road building and maintenance (OAR 340-041-0007)(7) and for ensuring that PCGP uses the highest and best practicable treatment control (OAR 340-041-0007(1). Additionally, please provide detailed best management practices and design standards for DEQ review and approval for decommissioning the Temporary Access Roads.
	Compliance with Clean Water Act Section 306	DEQ will complete its review upon the receipt of information requested above.
	Compliance with Clean Water Act Section 307	DEQ will complete its review upon the receipt of information requested above.

	Compliance with other appropriate requirements of state law	DEQ has not completed this review at this time but will consult in the future with other DEQ programs and other state agencies concerning compliance with other state statutory requirements such as:
		
		• Oregon Revised Statute 468B.035 and 105 (Enabling Legislation for Implementing the Coastal Zone Amendments and Reauthorization Act)
		• ORS 783.620 through 640 and 783.990 through 992 (Ballast Water Management Law)
		• ORS 466.020, 075, 105, and 195 (Hazardous Waste Management Law)
		• ORS 196.795 through 990 (Removal-Fill Law)
		• ORS 496.172 – 496.192 (Oregon Threatened and Endangered Species Act)
		• ORS 496.012, 496.138, and ORS 506.109
		  ○ Fish and Wildlife Habitat Mitigation Policy
		  ○ In-water Timing and In-water Blasting Permits
		• ORS 509.585 (Fish Passage Requirements)
		• ORS 498 (Fish Screening)
		• ORS 497.298 (Scientific Taking Permit)
		• ORS 537 (Water Rights Law)
		• ORS 197 (Oregon Land Use Planning Law)
		• ORS 390.235 (Permits for Removal of Archaeological or Historical Material)
		• ORS 569 (Weed Control Law)
		• ORS 527 (Forest Practices Act)
		
		At this time, please provide applications for Construction and Demolition Landfill Permits required under Oregon Revised Statute 459.005 through 418 (Solid Waste Management Law) for the several proposed disposal sites associated with the construction or operation of the gas pipeline.

340-048-0042(2)(a)	Potential Alterations to Water quality standards in OAR 340 Division 41	DEQ is reviewing the Jordan Cove Energy Project's proposed stormwater management plan for the Liquefied Natural Gas Terminal. DEQ will provide comments in another information request.
		In compliance with OAR 340-041-0007(8), please provide for DEQ review and approval the resource and land management plans, guidance, design standards, design manuals, access permits or grants, and other programs from the U.S. Bureau of Reclamation that Pacific Connector Gas Pipeline will use to protect water quality during the following:

		• Siting Temporary and Permanent Access Roads and the construction/permanent right-of-way on U.S. Bureau of Reclamation land, over BOR water-bearing infrastructure (e.g., canals), or paralleling this infrastructure. • Maintaining both Temporary and Permanent Access Roads for pipeline construction and operation. • Siting other components to necessary to construct and operate such as staging areas, material storage areas, and other components (e.g., compressor stations, metering stations) of the pipeline. • Installing the construction and permanent right-of-way for the gas pipeline. • Operating the permanent right-of-way for the pipeline. Please identify any proposed amendments and changes to existing BOR resource and land management plans and other documents noted that are necessary to construct, use, or maintain access roads and the permanent right-of-way on BOR land.
		The scope of work in Pacific Connector Gas Pipeline's August 31, 2017 Thermal Impacts Assessment suggests that PCGP evaluated only stream crossings for their potential to influence or regulate thermal properties of streams. Please indicate if this Thermal Impacts Assessment of the gas pipeline's construction and operation includes the following: • An analysis of the impacts from the 50-foot setbacks from waterbodies in riparian areas currently proposed for the Temporary Extra Work Areas. • An analysis of the impacts from siting the pipeline alignment within riparian areas as close as 15 feet from streams as currently proposed when paralleling these waterbodies. • An analysis of the impacts from siting Temporary and Permanent Access Roads, Staging Areas, material storage area, and other pipeline components (e.g., compressor stations, metering stations) within riparian areas. DEQ is requesting this clarification because the scope of work from the Thermal Impacts Assessment suggests that the estimate of solar loading for stream crossings under both the construction (i.e., 75-95 foot wide) corridor and the permanent (i.e., 30-foot wide) corridor using the Shade-A-Lator tool did not consider the impact of these TEWAs. The use of TEWAs during pipeline construction extends the construction corridor beyond 75 and 95 feet. Currently, the Pacific Connector Gas Pipelines proposes to site TEWAs 50 feet from waterbodies as noted in the comment above. In addition, the scope of work in this assessment does not indicate PCGP evaluated the influence on stream thermal properties when the pipeline's construction and permanent corridor closely parallels streams and comes within 15 feet or less of these streams. For a comprehensive analysis of PCGP's compliance with the temperature standard, PCGP's Thermal Impact Assessment must also evaluate these impacts as well as other impacts (e.g., roads, staging areas etc.) as requested in the comments above on compliance with Section 303 of the Clean Water Act.
		In compliance with OAR 340-041-0007(1) and (7), please provide a post-construction stormwater management plan addressing DEQ's Section 401 Water Quality Certification Post-Construction Stormwater Management Plan Submission Guidelines for all the road stream crossings that Cove Energy Project and Pacific Connector Gas Pipeline will: • Replace or improve to construct and/or operate the gas pipeline and

		• Result in an increase in impervious surface area during the replacement/improvement process. This information is necessary (see OAR 340-048-0042(2)(a)) to determine whether the stormwater discharge from the pipeline's road stream crossings will contribute to or cause violations of water quality standards.
		In compliance with OAR 340-041-0007(1) and (7), please provide a post-construction stormwater management plan addressing DEQ's Section 401 Water Quality Certification Post-Construction Stormwater Management Plan Submission Guidelines for all stream crossings for the pipeline. The focus of this plan should be the drainage area for the right-of-way approaches that discharge stormwater into the stream crossing. To ensure compliance with OAR 340-048-0042(2)(a), please evaluate if the discharge from the pipeline's permanent 30 foot right-of-way at all stream crossings for the pipeline will contribute to or cause violations of water quality standards. In compliance with OAR 340-048-0042(2)(a), please propose the analytical model(s) (e.g., X-DRAIN) that Pacific Connector Gas Pipeline will use to evaluate if the stormwater discharge from the permanent 30 foot right-of-way with its 10 feet of compacted soil overlying the gas pipeline will contribute to or cause violations of water quality standards. In compliance with OAR 340-041-0002(1), this evaluation must also consider the impact of the change in stormwater volume discharged to receiving waters from the vegetation conversion (i.e., from forest canopy to herbaceous vegetation) during pipeline construction. The evaluation of this impact is necessary to determine if pipeline's permanent right-of-way will cause bed and bank erosion and, therefore, violate Oregon's biocriteria water quality standard (i.e., OAR 340-041-0011).
		In compliance with OAR 340-041-0007(1) and (7), please provide a post-construction stormwater management plan addressing DEQ's Section 401 Water Quality Certification Post-Construction Stormwater Management Plan Submission Guidelines for the 30-foot permanent right-of-way for the approximately 117 miles of the proposed pipeline right-of-way traversing steeps slopes (i.e., slopes greater than 30%). This information is necessary before Pacific Connector Gas Pipeline, in compliance with OAR 340-048-0042(2)(a), can determine whether the discharge from the pipeline right-of-way will contribute to or cause violations of water quality standards. The information provided in PCGP's documents (e.g., 401 Application Submittal, drafts of Resource Reports) – made available to DEQ – only provides generic diagrams and erosion controls practices. DEQ can find no information on PCGP's field investigations or remote sensing for these areas to evaluate slope stability when siting the pipeline alignment. DEQ can find no information on the specific designs and practices that PCGP will use on cutslopes and fillslopes located on these steep slopes. In developing this plan in compliance with OAR 340-041-0007(1) and (7), please provide information on the designs and engineering support for these designs for the permanent controls Pacific Connector Gas Pipeline proposes to stabilize cut-slopes and fill slopes for the right-of-way sited along the steep slopes. The purpose of these controls is to prevent sediment discharge in stormwater and debris flows from landslides discharging into streams. Please note these on the post-construction stormwater plan in the information request above. Additionally, please identify where the 117 miles of proposed pipeline noted above coincide with the 94 miles of the proposed pipeline that would be located in soils that PCGP has identified as having a high or severe erosion

		potential. Please provide the designs and engineering support for these designs for the permanent controls in these areas of high/severe erosion potential and steep slopes. In compliance with OAR 340-041-0007(1) and (7), the engineering support must indicate that these permanent controls are sufficient to: • Manage stormwater to prevent erosion on the permanent right-of-way, its cut-slope, and its fill-slope. • Prevent debris flows into streams from landslides from cut-slope and fill-slope failures. On the post-construction stormwater management plan requested above, please also provide the location for these controls along the 117 miles of pipeline on steep slopes (>30%).
		In compliance with OAR 340-041-0007(1) and (7), please provide post-construction stormwater management plans for the proposed 25 miles of new permanent and temporary roads addressing DEQ's Section 401 Water Quality Certification Post-Construction Stormwater Management Plan Submission Guidelines. This information is required before Pacific Connector Gas Pipeline can determine whether the discharge from these new roads will contribute to or cause violations of water quality standards. In compliance with OAR 340-048-0042(2)(a), please propose the analytical model(s) (e.g., X-DRAIN) that Pacific Connector Gas Pipeline will use to evaluate if the stormwater discharge from these 25 miles of proposed new roads will contribute to or cause violations of water quality standards.
		Please provide an evaluation of compliance with water quality standards if Jordan Cove Energy Project and Pacific Connector Gas Pipeline will use dredged material in the construction of facilities in uplands and drainage from this dredge material will discharge to waters of the state. This request is to expand upon the Portland Sediment Evaluation Team's assessment (PSET Letters, January 19, 2016) that considered these constructed upland facilities to be outside federal Clean Water Act jurisdiction for the dredged material suitability determination. However, upland constructed facilities using dredged material are not outside the effects considered in a 401 Water Quality Certification of a FERC application for the construction of a gas pipeline.
		Please provide a post-construction stormwater management plans addressing DEQ's Section 401 Water Quality Certification Post-Construction Stormwater Management Plan Submission Guidelines for North Point Workforce Housing Project noted in the Part 1, Section 404 Permit Application, Attachment F, Portland Sediment Evaluation Team Letters, Section 404 Permit Application. (If this site is not going to be used for the North Point Workforce Housing, please provide the post-construction stormwater plans for the proposed uses.) In addition, please provide the results of the Phase II environmental assessments evaluating the potential for contaminated soils summarized in the "FEIS, Section 4.3.1.3 (Soil Limitations) as noted in these PSET Letters.
		The 401 Water Quality Submittal package provides insufficient information concerning the dredging operations for the Marine Slip, Access Channel, and Material Offloading Facility. DEQ used a copy of Resource Report 1 (Section 1.5.5.2) for the development of an Environmental Impact Statement to obtain general information on the dredging operation. To direct the reader to additional information, this resource report references to the Dredge Material Management Plan and Resource Report 7 (Section 7.3.2.5). These two additional references provide few details regarding the water pollution control practices in the Marine Slip and Access Channel dredging operations. In compliance with OAR 340-041-0007(1) and -0036, please provide for DEQ review and approval a detailed pollution control plan for constructing the Access Channel and Marine Slip that provides at least the following information:

		• A detailed description of the sequencing of all construction dredging activities associated with the in-water Marine Slip construction, Access Channel construction, and Material Offloading Facility construction. • A site map of these construction actions and location of all structural controls to protect water quality. The site maps must include the following information: o A delineation of the areas in the Marine Slip that Jordan Cove will dry excavate and dredge. ▪ Please include the pollution controls for the dry excavation activities in response to the request above for an Erosion and Sediment Control Plan for a NPDES 1200-C Permit Application. o The location of the natural earthen berm separating the upland area of the Marine Slip that Jordan Cove will dry excavate from the remaining portion of the Marine Slip adjacent to the bay that Jordan Cove will dredge. o The location of the in-water dredging for the Access Channel and Material Offloading Facility. o The location of the slurry/hydraulic transport pipeline(s) for the transportation of the dredged material. o The location of all containment systems and/or spill response materials. • A construction dredging plan providing the following: o Dredging schedule for the Marine Slip, Access Channel, and Material Offloading Facility. o Type (e.g., cutter-suction dredging) and number of dredging plants that Jordan Cove will use during the dredging of the Marine Slip, Access Channel, and the Material Offloading Facility. o A description of water pollution controls (operational controls, structural such as floating turbidity curtain etc.) that Jordan Cove will use in dredging and transporting dredged material. o Detailed spill response procedures including all emergency shut-off procedures and procedures for a spill associated with the hydraulic transport pipeline. o A description of all operational and structural water pollution controls for breaching and removing the natural earthen berm noted in Section 1.5.5.4 of the Jordan Cove's Resource Report 1. o A dredging monitoring plan for DEQ review and approval to evaluate the effectiveness of all proposed controls. • A maintenance dredging plan providing the following: o A site map containing the following: ▪ The location of all areas Jordan Cove will dredge. ▪ The location of the slurry/hydraulic transport pipeline(s) for the transportation of the dredged material. ▪ The location of all containment systems and/or spill response materials. o Dredging schedule. o Type (e.g., cutter-suction dredging) and number of dredging plants that Jordan Cove will use during the maintenance dredging. o A description of water pollution controls (operational controls, structural controls such as floating turbidity curtain etc.) that Jordan Cove will use and the location of all structural controls to minimize the migration of turbid water from maintenance dredging activities, o Detailed spill response procedures including all emergency shut-off procedures and procedures for a spill associated with the hydraulic transport line. o A dredging monitoring plan for DEQ review and approval to evaluate the effectiveness of all proposed controls.
		In compliance with OAR 340-041-0007(1) and -0036, please provide for DEQ review and approval a detailed water pollution control plan presenting all practicable operational and structural control techniques that Jordan Cove

		Energy Project will employ when constructing the Material Offloading Facility east of the opening for the slip at the Liquefied Natural Gas Terminal. Please include in this plan a characterization of the fill material Jordan Cove will use to construct this facility that evaluates this fill material for contamination.
340-048-0042(2)(b)	Existing and potential designated beneficial uses of surface water or groundwater that might be affected by the activity	DEQ will perform this review upon the receipt of information requested elsewhere in this matrix.
340-048-0042(2)(c)	Potential water quality impacts from the use, generation, storage, or disposal of hazardous substances	DEQ will perform this review upon the receipt of information requested elsewhere in this matrix.
340-048-0042(2)(d)	Potential modifications of surface water quality or quantity affecting water quality	DEQ will perform this review upon the receipt of information requested above. In addition to these requests for information, please provide to DEQ an application for an Individual Industrial Water Pollution Control Facility Permit for the proposed discharges of the hydrostatic testing wastewater. Please provide the location of each point of discharge. If Jordan Cove Energy Project or Pacific Connector Gas Pipeline expects to discharge washwater to the ground from vehicle and equipment washing, please provide an application for a Water Pollution Control Facility Individual Permit for these discharges. Please provide the location of each point of discharge.
340-048-0042(2)(e)	Potential modifications of groundwater quality that might affect surface water quality.	DEQ will perform this review upon the receipt of information requested elsewhere in this matrix. In addition to these requests for information, please provide a copy of the results from the first phase (i.e., desktop data review with maps) of the Shallow Groundwater Study (Revised August 24, 2017 by GeoEngineers) showing suspected locations of shallow groundwater along the pipeline right-of-way. Please expand the maps proposed in this study to include suspected locations of shallow groundwater along the proposed route for the 25 miles of Temporary or Permanent Access Roads. When complete, please provide the results from the implementation of the subsurface exploration plan proposed for phase two of this study with an analysis of how the construction and permanent right-of-way will impact shallow groundwater as well as the construction of any proposed new roads. Moreover, please propose practices for how Pacific Connector Gas Pipeline will avoid, minimize, and, if necessary, mitigate the impacts identified in the Shallow Groundwater Study noted above.

340-048-0042(2)(f)	Potential water quality impacts from the construction of intake, outfall, or other structures associated with the activity.	DEQ will perform this review upon the receipt of information requested elsewhere in this matrix.
340-048-0042(2)(g)	Potential water quality impacts from wastewater discharges.	DEQ will perform this review upon the receipt of information requested elsewhere in this matrix.
340-048-0042(2)(h)	Potential water quality impacts from construction activities.	DEQ will perform this review upon the receipt of information requested elsewhere in this matrix.
340-048-0042(2)(i)	Compliance with plans applicable under Section 208 of the CWA.	Please provide signed Land Use Compatibility Statements from Coos, Douglas, Jackson, and Klamath Counties.

Oregon
Kate Brown, Governor

Department of Environmental Quality
Western Region Eugene Office
165 East 7th Avenue, Suite 100
Eugene, OR 97401
(541) 686-7838
FAX (541) 686-7551
TTY 711

December 20, 2018

Derik Vowels
Jordan Cove LNG, LLC
Consultant, Lead Environmental Advisor
111 SW 5th Ave., Suite 1100,
Portland OR 97204

Re: Supplemental Information Request
Response to October 8, 2018 Jordan Cove Correspondence

Jordan Cove Energy Project (FERC Project No. CP17-494)
Pacific Connector Gas Pipeline (FERC Project No. CP17-495)
U.S. Army Corps of Engineers (Project No. NWP-2017-41)

Dear Mr. Vowels:

The Oregon Department of Environmental Quality (DEQ) is currently reviewing an application from Jordan Cove LNG, LLC (Jordan Cove) for Clean Water Act section 401 water quality certification for a Section 404 permit from the U.S. Army Corps of Engineers necessary to construct the Jordan Cove Energy Project and Pacific Connector Gas Pipeline (collectively, "the Project").

On September 7, 2018, DEQ requested additional information from Jordan Cove to assist with our project analysis. Jordan Cove provided responses to the information request on October 8, 2018. In general, DEQ finds that many of Jordan Cove's responses do not fully address the information requests in our September 7, 2018, correspondence. Certain responses, for example, provide qualitative descriptions of best management practices or refer to previously submitted information. To be clear, measures proposed to reduce project-related water quality impacts must be supported by quantitative data, such as engineering specifications or output from appropriate numerical models, to demonstrate compliance with applicable water quality objectives.

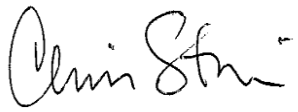
DEQ has supplemented its September 7, 2018, information request. The supplemental data request, provided as Attachment A, provides comments and clarifies, as needed, the information deemed necessary to meet certification requirements. For consistency, Attachment A retains the numbering format initiated by Jordan Cove in their October 8, 2018, response.

Please file a complete response to this supplemental information request by January 22, 2019, to:

Christopher Stine
Oregon Department of Environmental Quality
165 East 7th Avenue, Suite 100
Eugene, Oregon 97401

If Jordan Cove cannot provide certain information within the requested period, please indicate which items will be delayed and provide a projected filing date.

If you have any questions, please contact me directly at (541) 686-7810, or via email at stine.chris@deq.state.or.us.



Christopher Stine, PE

Water Quality Engineer

Attachment A: Response to Jordan Cove's October 8, 2018 Information Filing

ec: Mike Koski, mkoski@pembina.com
Natalie Eades, Neades@pembina.com
Tyler Krug, Tyler.J.Krug@usace.army.mil
John Peconom, John.Peconom@ferc.gov
Sean Mole, sean.mole@oregon.gov
DEQ: Keith Andersen, Dave Belyea, Steve Mrazik, Chris Bayham, Mary Camarata, Sara Christensen
FERC Dockets: CP17-494-000, CP17-495-000

Comment No.	September 7, 2018 Information Request	Jordan Cove Response	DEQ's Review and Response to Jordon Cove's Response
1, 2	Must provide and timely update DEQ with complete description of construction/operation activities and specify clearly DEQ's acceptance of submissions as changes to proposed activities.	Jordan Cove will notify DEQ to update 401 application materials.	DEQ accepts response.
3	Must provide directly to DEQ a comprehensive description of the propose action including all resource reports, maps, electronic data files etc.	Jordan Cove will provide links to DEQ to access all information.	DEQ accepts response.
4, 5	Comment 4: Water Quality Standards Oregon's water quality standards consist of beneficial uses, numeric and narrative criteria developed to support these uses, and an antidegradation policy that prohibits an activity from further degrading water quality. Applicants for water quality certification must provide sufficient information to demonstrate the activity will comply with Oregon water quality standards (OAR 340-048-0020(g)). Comment 5: Provide information to demonstrate how the Project will comply with the water quality standards found in OAR 340 Division 041. For project activities that do not	The JCEP 401 Water Quality Memorandum (Part 1) and PCGP 401 Water Quality Summary Table (Part 2, Appendix A) in the application specifically address the Project's compliance with Oregon water quality standards.	**Summary Statement: Jordan Cove references previously submitted material that describes Best Management Practices to reduce project effects on water quality. Citing potential BMPs by themselves is insufficient. DEQ recognizes BMPs as one part of a broader strategy that must also consider existing water quality, local environmental conditions, the anticipated magnitude of project-related effects, and appropriate engineering controls to mitigate negative effects on water quality. Proposed BMPs must be well-supported using quantitative analyses such as modeling, manufacturer's technical specifications, results of pilot tests, or other quantitative data to support their site-specific use to effectively achieve water quality objectives. Please provide a plan that demonstrates how proposed BMPs or other engineering controls will protect water quality at each location where project actions may directly or indirectly affect waters of the state. The plan should provide a site-specific analysis of each proposed activity and technical justification for each proposed remedy as discussed more fully in the following section.** Jordan Cove's responses must provide a comprehensive analysis of potential project-related water quality impacts or the quantitative data necessary to evaluate proposed remedies. Jordan Cove's responses frequently refer to plans that rely on qualitative descriptions of BMPs with no site-specific reference to individual waterbodies, water quality conditions, or a discussion of proposed activities. Applications that propose BMPs to mitigate water quality impairment must identify the location, design details including engineering technical data, and a maintenance schedules to ensure adequate protection during use. In developing its response, Jordan Cove should refer to the information below. Jordan Cove must include quantitative and/or engineering support for the proposed controls or best management practices. For example, DEQ suggests using models such as Geomorphic Road Analysis and Inventory Package (GRAIP) and X-DRAIN to provide DEQ with the requested evaluation of potential water quality impacts from PCGP's proposal to use existing roads and to build new roads. Adequate quantitative analysis is necessary to demonstrate that current and future

	affect State waters, note how the Project will not violate applicable standards. For project activities that impact State waters, note how Jordan Cove is proposing to mitigate, reduce, or prevent impacts so as to ensure the Project, as proposed, does not violate applicable water quality standards. Project impacts should be assessed in terms of direct, indirect, and cumulative effects of the activity on state water quality.		erosion control planning will not "cause or contribute to a violation of in-stream water quality standards" as required in Schedule A.10.a of the NPDES 1200-C General Permit and OAR 340-048-0042(2)(a). Jordan Cove's response does not include estimates of sediment discharge from the construction and post-construction right-of-way. Models such as the Revised Universal Soil Loss Equation Version 2 (RULSE2), Watershed Assessment Tool for Environmental Risk (WATER), and/or Soil and Water Assessment Tool (SWAT) may be used to quantitatively estimate sediment control practices. PCGP can use GRAIP noted above to evaluate the need for BMPs on existing access roads for pipeline construction and operation.[1, 2, 3] Qualitative descriptions of proposed erosion and sediment control practices do not adequately demonstrate that measures will sufficiently mitigate risks to water quality. Jordan Cove must provide well-supported quantitative analyses of proposed engineering remedies based on site-specific understanding of water quality conditions. DEQ's comments on PCGP's response to Comment 15 provide additional examples of information required to demonstrate compliance with Oregon water quality standards.
6, 7	Comment 6: Please provide a NPDES 1200-C Permit Application demonstrating that land disturbing activities associated with the construction of Jordan Cove Energy Project's Liquefied Natural Gas Terminal as well as the following: • Land disturbing activities associated with the dry excavated portion of this terminal's Marine Slip, • Land disturbing activities associated with all offsite project areas associated	Jordan Cove's will submit its permit application for construction & land disturbing activities at the LNG Terminal to DEQ in Q4 2018.	**Summary Statement: DEQ will need detailed Site Map and Drawings for an NPDES 1200-C General Permit for:** • **Constructing the LNG Terminal and all its associated components.** • **Constructing the entire length of the pipeline and all associated components for constructing and operating this pipeline.** **The Site Maps and Drawings for these two construction projects must fully address Schedule A.12 of this permit as well as all the other applicable permit conditions. In developing these drawings, PCGP will need to provide geo-engineering analyses and the technical support for these analyses for the following concerns:** • **All cut and fill areas for the construction right-of-way and road improvements (Schedule A.12.b.v.3.b).** • **Construction stormwater discharge points for the construction right-of-way and road improvements (Schedule A.12.b.v.3.d).** • **Areas used for storage of logs, soils, or wastes (Schedule A.12.b.v.3.e).** **DEQ requests that PCGP use one of three modeling options noted in the section below to identify potential unstable slopes requiring further geotechnical analyses and engineering. Additionally, in the section below, DEQ provides**

[1] Natural Resource Conservation Service and USDA Agricultural Research Service. 2008. Revised Universal Soil Loss Equation, Version 2 (RULSE2)
[2] Wilson, Bruce N. Aleksey Sheshukov, and Reid Pulley. 2006. Erosion Risk Assessment Tool for Construction Sites (Final Report). Office of Research Administration. Minnesota Department of Transportation
[3] Gassman, P.W., M.R. Reyes, C.H. Green, and J.G. Arnold. 2007. The Soil and Water Assessment Tool: Historical Development, Applications, and Future Research Directions. American Society of Agricultural and Biological Engineers. Volume 50(4): 1211-1250

	with this terminal and its construction including those areas described in Section 5.3 of this terminal's stormwater management plan (Part 1, Attachment A3). • Land disturbing activities associated with roads used to access this terminal and offsite project areas. • Land disturbing activities associated with any other facilities (staging areas, refueling areas, employee parking etc.) that Jordan Cove Energy Project will use to construct of this terminal. Comment 7: DEQ will need to determine if these land disturbing activities will comply with the technology-based effluent limits of this permit. DEQ will also need an erosion and sediment control plan that, for example, addresses Schedule A.12.b.v and other conditions in this permit. For DEQ to evaluate the water quality impacts of the construction process on waters of the state, DEQ needs this information in an erosion and sediment control plan.		**examples of the level of detail DEQ is seeking from Jordan Cove and the data gaps in Jordan Cove's current planning documents. DEQ provides the rationale for this information request in the section below.** A complete NPDES 1200-C Permit Application is necessary for Jordan Cove to comply with the following: • NPDES 1200-C General Permit Conditions (Schedule A.1,10, and 12 in particular) • OAR 340-041-0007(1) and (7) • OAR 340-048-0042(2) Jordan Cove's response to Comment 6 only recognizes the need to address construction/land disturbing activities associated with the LNG Terminal. Jordan Cove's response does not address the need to develop a required erosion and sediment control plan for the approximately 229 miles of pipeline as noted in comments in AIR-1. As noted in the sources covered by the NPDES 1200-C General Permit, these include construction activities that are part of a common plan of development. For example, this includes land disturbing activities to widen an existing road, develop employee parking, lodging for workers, and develop communication towers. To comply with the technology-based effluent limits in this permit and, in particular, Schedule A.12 of this permit, Jordan Cove will need to demonstrate that the Site Map and Drawings for approximately 229 miles of pipeline construction right-of-way contains the following: *a. Preparation.* *i. The permit registrant must ensure that an ESCP is prepared and revised as necessary to reflect site conditions for the construction activity regulated by this permit, and submit revisions to DEQ or Agent in accordance with requirements of this permit. The design, installation, and maintenance of erosion and sediment controls must be adequate to address factors such as the amount, frequency, intensity, and duration of precipitation, the nature of resulting stormwater runoff, and soil characteristics, including the range of soil particle sizes expected to be present on the site.* *ii. Qualifications to Prepare ESCP.* *1. For construction activities disturbing 20 or more acres, the ESCP must be prepared and stamped by a Certified Professional in Erosion and Sediment Control, Certified Professional in Storm Water Quality, Oregon Registered Professional Engineer, Oregon Registered Landscape Architect, or Oregon Certified Engineering Geologist.* *2. If engineered facilities such as sedimentation basins or diversion structures for erosion and sediment control are required, the ESCP must be prepared and stamped by an Oregon Registered Professional Engineer.* *b. The ESCP must include the following elements:* *i. Name of the site.* *ii. Local Government Requirements. Include any procedures necessary to meet applicable local government erosion and sediment control or stormwater management requirements.*

	Please provide a NPDES 1200-C Permit Application for land disturbing activities associated with the construction of Pacific Connector's gas pipeline and with the construction of all associated facilities such as communication towers, roads (existing and new), disposal sites, block valve facilities, and compressor stations. DEQ will need to determine if these land disturbing activities will comply with the technology-based effluent limits of this permit. DEQ will also need an erosion and sediment control plan that, for example, addresses Schedule A.12.b.v and other conditions in this permit. For DEQ to evaluate the water quality impacts of the construction process on waters of the state, DEQ needs this information in an erosion and sediment control plan.		*iii. Erosion and Sediment Control Inspector.* *1. Inspections must be conducted by a person knowledgeable in the principles and practice of erosion and sediment controls who possesses the skills to assess conditions at the construction site that could impact stormwater quality, is knowledgeable in the correct installation of the erosion and sediment controls, and is able to assess the effectiveness of any sediment and erosion control measures selected to control the quality of stormwater discharges from the construction activity.* *2. Beginning January 1, 2017, for projects that are five or more acres, inspections must be conducted by a person certified in an erosion and sediment control program that has been approved by DEQ. DEQ has approved the following programs:* *a. Certified Professional in Erosion and Sediment Control,* *b. Certified Professional in Storm Water Quality,* *c. Washington State Certified Erosion and Sediment Control Lead, or* *d. Rogue Valley Sewer Services Erosion and Sediment Control Certification.* *3. Inspections must be conducted by the Erosion and Sediment Control Inspector identified in the ESCP.* *4. Provide the following for all personnel that will conduct inspections:* *a. Name and title;* *b. Contact phone number and, if available, e-mail address; and* *c. Description of experience and training.* *iv. Narrative Site Description.* *1. Description of the construction activity;* *2. Proposed timetable indicating when each erosion and sediment control BMP is to be installed and the duration that it is to remain in place;* *3. Estimates of the total area of the permitted site and the area of the site that is expected to undergo clearing, grading or excavation;* *4. Nature of the fill material to be used, and of the site soils prior to disturbance;* *5. Names of the receiving water(s) for stormwater runoff;* *6. The types of pollutants that could be found in stormwater and their likely sources;* *7. Any authorized non-stormwater discharges; and* *8. If a surface water of the state is within 50 feet of the permitted activities,* *a. Description of area within 50 feet of project site (including any natural buffer), and* *b. Description of approach to manage the natural buffer zone, if any (for example, maintain natural buffer, reduce natural buffer and increase BMPs, or eliminate flow through natural buffer).* *v. Site Map and Drawings.*

			1. *The site map and drawings must be kept on site and must represent the actual BMP controls being used onsite;* 2. *The site map must show sufficient roads and features for DEQ or Agent to locate and access the site;* 3. *The site map and drawings must include (but is not limited to) the following features (as applicable):* *a. Total property boundary including surface area of the development;* *b. Areas of soil disturbance (including, but not limited to, showing cut and fill areas and pre- and post-development elevation contours);* *c. Drainage patterns before and after finish grading;* *d. Discharge points;* *e. Areas used for the storage of soils or wastes;* *f. Areas where vegetative practices are to be implemented;* *g. All erosion and sediment control measures or structures;* *h. Impervious structures after construction is completed (including buildings, roads, parking lots and outdoor storage areas);* *i. Springs, wetlands and other surface waters on site or adjacent to the site;* *j. Temporary and permanent stormwater conveyance systems;* *k. Onsite water disposal locations (for example, for dewatering);* *l. Storm drain catch basins depicting inlet protection, and a description of the type of catch basins used (for example, field inlet, curb inlet, grated drain and combination);* *m. Septic drain fields;* *n. Existing or proposed drywells or other UICs;* *o. Drinking water wells on site or adjacent to the site;* *p. Planters;* *q. Sediment and erosion controls including installation techniques;* *r. Natural buffer zones and any associated BMPs for all areas within 50 feet of a water of the state; and* *s. Detention ponds, storm drain piping, inflow and outflow details.* The requirements noted above are critical for evaluating the potential efficacy of JCEP's/PCGP's erosion and sediment control program and proposed structural erosion and sediment controls as applied on the landscape along the entire pipeline alignment. This information is also critical for ensuring compliance with 1200-C permit requirements when construction is in progress. For example, in PCGP's Erosion Control and Revegetation Plan [Part 2, Appendix B, 404-10 JPA), Section 3.3.4] states:

			Temporary erosion control measures will be installed after vegetation clearing and immediately prior to/after initial soil disturbance…Section 4.0 of the ECRP describes in detail the temporary erosion control procedures or BMPs that will be implemented during construction to minimize impacts from erosion and sedimentation.. This information does not indicate to DEQ where, for example, PCGP will locate construction storage areas for soils, logs, boulders, and other construction debris. This information does not indicate where PCGP will locate stormwater discharge points as required in the NPDES 1200-C General Permit. PCGP does not indicate where PCGP will install erosion and sediment controls in the construction right-of-way and associated facilities during the construction phase. DEQ needs this information to determine if PCGP will store logs, rock, soil, and other construction debris from forest clearing operations and construction materials on or at the head mapped landslides or areas identified Potential Rapidly Moving Landslides Hazards. The Tyee Core Area is prevalent in the Oregon Coast Range where PCGP proposes to install the pipeline. The Tyee Core Area is commonly associated with thick sandstone beds that have few fractures. These beds allow water to concentrate in shallow soils overlying these beds creating positive soil pressure and the hazard of shallow, rapidly moving landslides. Human-caused landslides diminish water quality when they discharge into surface waters. Placement of additional weight and the discharge of construction or post-construction stormwater on to an unstable slope in the Tyee Core Area can initiate a landslide/debris torrent affecting water quality. In DEQ's desktop analysis of PCGP's proposed pipeline construction activities using maps provided by PCGP as well as aerial photos and datasets available to DEQ, DEQ has identified numerous potential constraints along the proposed pipeline alignment. If PCGP does not identify and address these in the construction and operation planning, these constraints have the potential to impact water quality. Constraints such as mapped landslide areas and convergent headwalls (see examples in the review, below) are numerous along the pipeline alignment. PCGP has provided limited analysis and recommendations and no site-specific engineering plans, specifications, and supporting technical analyses for how PCGP will construct and operate the pipeline among these constraints. As discussed in DEQ's comments below, the pipeline right-of-way with its area of soil compaction above the gas pipeline is essentially functioning as a permanent, primitive road alignment. Therefore, research and engineering evaluations such as those concerning roads on steep and/or unstable slopes are suitable technical references for identifying constraints that – if not addressed – may impact water quality. PCGP will need to formulate site-specific controls to prevent, for example, debris flows into streams initiated from pipeline construction and operation. DEQ will not accept the generic best management practices currently presented in PCGP's Erosion Control and Revegetation Plan as a substitute for the detailed information requested above and below in this review. During its desktop analysis, DEQ identified several landscape features or constraints discussed in more detail in the technical reference in *Slope Engineering for Mountain Roads* (Hearn 2011). In DEQ's review of PCGP's response to Comment 15, DEQ highlights below several examples of these constraints. These examples represent potential site-specific

			constraints that could impact water quality that PCGP did not address in its 401 Water Quality Certification submittal. In developing its Certification decision, DEQ must evaluate PCGP's efforts to identify and, if needed, develop engineering solutions to site-specific constraints encountered during its planning and field investigations for the following: (1) constructing and operating the pipeline, (2) using existing access roads, (3) improving/reconstructing existing access roads, and (4) building new roads. In reviewing the Section 4.0 of the PCGPs Erosion Control and Revegetation Plan for more detail, DEQ can find no information on where exactly PCGP will locate stormwater discharge from the construction right-of-way, the Temporary Extra Work Areas, and other areas cleared of vegetation. DEQ is seeking this information to determine how PCGP will manage construction stormwater discharge to streams, wetlands, Areas of Potential Rapidly Moving Landslide Hazards, and mapped landslides. Without this detailed information regarding how PCGP will address these significant constraints during the construction process, DEQ can only assume that PCGP will execute its erosion and sediment control program in an impromptu fashion consequently placing waters of the state at risk. DEQ requests PCGP employ one of the slope stability models noted below to identify potential unstable slopes. This information would guide the following: • Siting of log, construction debris, and/or equipment storage. • Design of the construction stormwater management and discharge system. • Design of the post-construction stormwater management and discharge system. • Design of cut and fill slopes for the pipeline alignment and access roads. To identify potential unstable slopes needing further geotechnical analyses and engineering, DEQ request the application of one of the following models: • Deterministic Level I Stability Analysis (DLISA) and Probabilistic Level I Stability Analysis (LISA).[4] • Shallow Landsliding Stability Model (SHALSTAB).[5] • Map-based Probabilistic Infinite Slope Analysis Program (PISA-m).[6] In DEQ's review of PCGP's response to Comment 15 below, DEQ highlights examples where PCGP is proposing to discharge construction/post-construction stormwater and store logs/construction spoils/etc. along concave-shaped slopes without providing DEQ with a slope stability analysis in its submittal. As discussed below, human actions initiate many debris flows within concave-shaped slopes and water plays a key role in destabilizing slopes.

[4] Koler, Thomas E. 1998. Evaluating Slope Stability in Forest Uplands with Deterministic and Probabilistic Models. Environmental & Engineering Geoscience, Volume IV, No. 2, pp. 185-194

[5] Montgomery, David R. Montgomery and William E. Dietrich. 1994. A Physically Based Model for the Topographic Control on Shallow Landsliding. Water Resources Research. Vol. 30, No. 4, pp. 1153-1171

[6] Haneberg, William C., William F. Cole, and Gyimah Kasali. 2009. High-Resolution Lidar-Based Landslide Hazard Mapping and Modeling. Bulletin of Engineering Geology and the Environment. 68:263-276

8	Please provide a NPDES 1200-A Permit Application demonstrating that the proposed 20 sites to obtain rock for Pacific Connector's gas pipeline construction and maintenance. DEQ will need to determine if these land disturbing activities will comply with the technology-based effluent limits of this permit.	PCGP will obtain rock commercially.	PCGP will not need coverage under NPDES 1200-A for rock material that is obtained commercially. PCGP will need to update the information in the 401Water Quality submittal package to reflect this revision to its proposal.
9	Please provide a NPDES 1200-A Permit Application demonstrating that the concrete batch plant proposed for the offsite project area referred to as Boxcar Hill in the LNG Terminal's stormwater management 9 plan (Section 5.3, page 19). DEQ will need to determine if rock quarries will operate in compliance with the technology-based effluent limits of this permit.	Jordon Cove's contractor KBJ will obtain a permit prior to operating.	DEQ understands Jordan Cove's contractor will apply for and receive coverage under NPDES 1200-A General Permit for the concrete batch plant at Boxcar Hill.
10, 11, 13	Comment 10: Please provide a NPDES Individual Permit Application for the LNG Terminal's two domestic wastewater facilities discharging to surface water. DEQ will use the information in this permit application to develop a discharge permit containing technology-based and water quality-based effluent limits associated with this permit.	JCEP is preparing an application for submittal in Q4 2018 to modify existing Permit No. 101499. JCEP provided a Discharge Characterization Memo to DEQ on May 25, 2018.	DEQ anticipates a response to this request in Q4 2018. The information provided in JCEP's Discharge Characterization Memo is insufficient for DEQ to draft a NPDES Individual Permit for the LNG Terminal's domestic wastewater discharge.

	Comment 11: Please provide a NPDES Individual Permit Application for discharges of non-contact cooling wastewater discharged from Liquefied Natural Gas carriers using the Marine Slip at the LNG Terminal. DEQ will use this permit application to develop a discharge permit containing technology-based and water quality-based effluent limits. Comment 13: Please provide an application for a NPDES Individual Permit for the discharge of vehicle and equipment washwater to surface water during the operation of the LNG Terminal. DEQ will use this permit application to develop technology-based and water quality-based effluent limits for this permit if the operations.		
12	If the discharge from wastewater treatment plants proposed for the LNG Terminal has a design flow capacity of 1 million gallons per day or more or requires pretreatment under 40 CFR §403, please provide a NPDES 1200-Z Permit Application demonstrating that the Terminal's stormwater	JCEP submitted a stormwater management plan to DEQ on February 6, 2018.	Information provided by JCEP indicates operation of these two small treatment plants would not require coverage under a NPDES 1200-Z General Permit. For this reason, JCEP will not need to submit an application to DEQ for a NPDES 1200-Z General Permit for the LNG Terminal.

	management plan will comply with the technology-based and water quality-based effluent limits in this permit.		
14	Please provide an application for a NPDES Individual Permit for the discharge of vehicle and equipment washwater to surface water during the construction and operation of the gas pipeline and all its associated facilities. DEQ will use this permit application to develop technology-based and water quality-based effluent limits for this permit.	JCEP and PCGP is preparing a NPDES 1200-C permit application and the ESCP in this application will describe how this wastewater will be treated before discharge under this 1200-C General Permit.	Schedule A.6.a-c of the NPDES 1200-C General Permit prohibits the discharge of wastewater from construction operations and vehicle/equipment washing operations. To comply with NPDES 1200-C General Permit requirements and OAR 340-045-0015(1)(a), PCGP must submit a separate NPDES and/or WPCF Individual Permit Application for the discharge of equipment and vehicle wash water to waters of the state.
15	In compliance with OAR 340-041-0007(8), please provide an assessment of Pacific Connector Gas Pipeline's compliance with all applicable DEQ-approved Total Maximum Daily Load Implementation Plans or compliance programs for the following: • United States Department of Agricultural Forest Service Water Quality Restoration Plans and the USDA National Best Management Practices for Water Quality Management on National Forest System Lands (Volume 1: National Core BMP Technical Guide) noted in DEQ's	PCGP provided DEQ Appendix A of Part 2 of the 401 Water Quality Package to DEQ demonstrating compliance with water quality standards and the plans used to meet water quality standards. The conditions in the Federal ROW grants will ensure compliance with applicable water quality plans.	**<u>Summary Statement</u>:** **PCGP's response does not fully address the requirements described in Comment 15. DEQ requires a comprehensive analysis using appropriate quantitative support to demonstrate compliance with water quality objectives, including TMDLs. As requested in Comment 15 and more fully described below, please describe how PCGP will comply with the Federal, State, and County plans/programs for complying with TMDLs. Please include or identify relevant supporting documents (e.g., design manuals, standards, and specifications) that each Designated Management Agency uses to implement their TMDL compliance programs. DEQ will need to review the conditions in all Federal access or right-of-way grants to ensure these conditions comply with OAR 340-048-0042(2).** Plans referenced by Jordan Cove provide a qualitative analysis of proposed BMPs. As discussed previously, DEQ requires BMPs to be supported by an evaluation of existing water quality, the impact of the proposed activity on water resources, and a quantitative assessment of mitigation provided by the proposed BMPs. For example, PCGP briefly describes BMPs in a table in Part 2 Attachment G that PCGP asserts will comply with water quality standards. In making this assertion, PCGP lists various plans developed to comply water quality standards. PCGP includes no analysis to demonstrate these BMPs will prevent a water quality violation for all pollutant discharges. Certain portions of the project that occur on state and federal lands are governed by existing TMDLs. PCGP has not demonstrated to DEQ that proposed activities such as right-of-way construction, road maintenance, and road construction will comply with USDA Forest Service, U.S. Department of Interior BLM, Bureau of Reclamation, Oregon Department of Forestry, and County Total Maximum Daily Load compliance plans and programs. DEQ developed these TMDL to achieve compliance with water quality standard in water bodies impaired by specific pollutants. For an example of this deficiency in PCGP's response to AIR-1, please refer to DEQ's review of PCGP's response to Comment 24 demonstrating that some

	Memorandum of Understanding with the Forest Service. • US Department of Interior Bureau of Land Management's Water Quality Restoration Plans. • Oregon Department of Forestry's Forest Practices Act Program. • Oregon Department of Agriculture's Water Quality Plans. • Coos County Total Maximum Daily Load Implementation Plan. • Douglas County Total Maximum Daily Load Implementation Plan. • Jackson County TMDL Implementation Plan. • Klamath County TMDL Implementation Plan. In this compliance assessment, please also note all the support documents such as design manuals, guidance documents, road permits etc. that PCGP will follow when complying with these Implementation Plans.		of PCGP's proposed activities will not comply with Forest Service, BLM, ODF, and County TMDL compliance programs without the submittal of additional information. Under state rules, TMDL compliance plans are enforceable when Designated Management Agencies such as the Forest Service, BLM, and ODF, for instance, fail to implement these plans. Right-of-way permits are not the only mechanism these Federal agencies will use to ensure compliance with their Water Quality Restoration Plans.[7, 8, 9] WQRPs can and do address road impacts on water quality. Federal agencies address these impacts in their efforts to comply with Clean Water Act requirements such as Section 303. DEQ provides PCGP an example of how federal agencies use WQRPs to address road impact on water quality in DEQ's review of PCGP's response to Comments 26 and 27 below. For this reason, DEQ will review all proposed road permits to cover all access roads Jordan Cove will use to construct and operate the terminal and gas pipeline. If acceptable, DEQ will use the conditions provided in Federal road permits when developing its Certification Decision. In Appendix A of Part 2 of the 401 Water Quality Package cited in PCGP's response to Comment 15, PCGP lists in a table the following: • Potential impairment parameters. • Sources and activities associated with these potential impairment parameters. • PCGP's proposed plans/BMPs developed to comply with water quality standards. In many of these plans and reports, PCGP provides only a qualitative description of actions or BMPs PCGP will use to avoid violations of water quality standards. DEQ highlights specific examples below. For example, PCGP provides no quantitative analysis or engineering designs with technical support demonstrating that the construction of the pipeline and operation of the pipeline right-of-way will prevent water quality impairments from landslides and sediment discharge resulting from the following: • Design and maintenance of roads. • Design of both the construction and permanent pipeline right-of-way. PCGP's qualitative analysis of compliance with water quality standards does not even list the more than 660 miles of access roads as a source of sediment. The scientific literatures clearly shows roads as a major source of sediment and soil erosion in forested watersheds. The scientific literature identifies road maintenance practices, road construction decisions,

[7] USDA Forest Service and DOI Bureau of Land. 1999. *Forest Service and Bureau of Land Management Protocol for Addressing Clean Water Act Section 303(d) Listed Waters*. USDA Forest Service, Pacific Northwest Region
[8] Memorandum of Understanding Between State of Oregon Department of Environmental Quality and the USDA, Forest Service Pacific Northwest Region. OMB 0596-0217, FS-1500-15
[9] Memorandum of Understanding Between United States Department of Interior Bureau of Land Management and the State or Oregon Department of Environmental Quality to Meet State and Federal Water Quality Rules and Regulations. BLM Agreement Number BLM-OR930-1702

			road construction and maintenance standards, road improvements, and decommissioning standards as key elements in protecting soil and water quality.[10] Among the proposed pollution control plans and reports in Appendix A of Part 2 that PCGP presents to avoid or minimize potential water quality impairments are: • Resource Report 6 (Geologic Resources) • Erosion Control and Revegetation Plan • Transportation Management Plan The information below demonstrates how these two plans and this report – with their current information – do not address how PCGP's proposed activities will comply with water quality standards. These two plans and this report lack either the quantitative analysis or engineering analysis and technical support to give DEQ reasonable assurance that PCGP's actions will not contribute to or cause a violation of water quality standards. **Examples of Inadequate Engineering Analysis and Support** **1. Unclear Drainage Management and Storage Activities Adjacent to Potentially Unstable Slopes** In areas where there is a potential for rapidly moving landslides such as the Tyee Core Area, PCGP should avoid certain activities. As recommended by authorities regulating forest management on unstable slopes, PCGP should avoid placing additional weight from (1) construction debris and logging and (2) water onto the upper or mid-scarp areas of unstable slopes such as those associated with: • Convergent headwalls/concave-shaped slopes • Bedrock hollows

[10] Grace III, J.M. and Clinton, B.D. 2007. Protecting Soil and Water in Forest Road Management. USDA Forest Service/University of Nebraska-Lincoln Faculty Publication Volume 50(5):1579-1584. 2007 American Society of Agricultural and Biological Engineers ISSN 0001-2351

			• Inner gorges with steep slopes.[11, 12, 13, 14, 15, 16, 17] In fact, the Oregon Department of Forestry issued rules under the Forest Practice Act that ODF uses to comply with the Clean Water Act requirements such as Total Maximum Daily Loads and to achieve Oregon's water quality standards.[18] Among these FPA rules is a rule OAR 629-625-0330 to ensure forest operations provide a stable forest roads that protect water quality when in use. As discussed in DEQ's review of PCGP's response to Comment 34, PCGP's pipeline right-of-way is functioning as a primitive road. Specifically, this forest road drainage rule for the FPA states: *(1) The purpose of this rule is to provide a drainage system on new and reconstructed roads that minimizes alteration of stream channels and the risk of sediment delivery to waters of the state. Drainage structures should be located based on the priority listed below. When there is a conflict between the requirements of sections (2) through (6) of this rule, the lowest numbered section takes precedence, and the later-numbered and conflicting section shall not be implemented.* *(2) Operators shall not concentrate road drainage water into headwalls, slide areas, high landslide hazard locations, or steep erodible fillslopes.* *(3) Operators shall not divert water from stream channels into roadside ditches.* *(4) Operators shall install dips, water bars, or cross drainage culverts above and away from stream crossings so that road drainage water may be filtered before entering waters of the state.* *(5) Operators shall provide drainage when roads cross or expose springs, seeps, or wet areas.*

[11] State of Washington. Forest Practices Board Manual. Section 16 Guidelines for Evaluating Potentially Unstable Slopes and Landforms
[12] State of Oregon. Landslide Hazards in Oregon. Oregon Department of Geology and Mineral Industries
[13] Jones & Stokes. 2008. Volume I: *Draft Environmental Impact Statement for Elliot State Forest Section 3.2.5 on Slope Stability*. Prepared for U.S. Fish & Wildlife Service and National Marine Fisheries Service.
[14] Report to the 70th Legislative Assembly. 1998. Joint Interim Task Force on Landslides and Public Safety.
[15] Hofmeister, R.J., D. J. Miller, K.A. Mills, J.C. Hinkle, A. Beier. 2002. Text to Accompany the Hazard Map of Potential Rapidly Moving Landslides in Western Oregon. GIS Layer for Local Governments in Implementation of Senate Bill 12. Interpretive Map Series IMS-22. Oregon Department of Geology and Mineral Industries
[16] Sidle, R.C. 1985. *Factors Influencing the Stability of Slopes*. Proceedings of a Workshop on Slope Stability: Problems and Solutions in Forest Management. USDA Forest Service. General Technical Report PN W-180,
[17] Benda, L.E., Veldhuisen, C., Miller, D.J., and Rodgers-Miller, L. 2000. Slope instability and forest land managers: A primer and field guide. Seattle, Wash., Earth Systems Institute, 74 p.
[18] Memorandum of Understanding between the Oregon State Department of Environmental Quality and the Oregon State Department of Forestry. April 16, 1998

(6) Operators shall provide a drainage system using grade reversals, surface sloping, ditches, culverts and/or waterbars as necessary to minimize development of gully erosion of the road prism or slopes below the road.

PCGP has not demonstrated in the Erosion Control and Revegetation Plan or Transportation Management Plan that PCGP will avoid discharging road drainage water into headwalls, slide areas, high landslide hazard locations, or steep erodible fill slopes. Moreover, PCGP has not addressed any of the ODF requirements noted below regarding forest road maintenance. ODF established FPA rule OAR 629-625-0600 to comply with water quality standards by timely maintenance of all active and inactive roads.

DEQ excerpted the following sketches and photographs from technical manuals designed to prevent landslides during forest operations. DEQ used these technical manuals during its desktop analysis of PCGP's proposed actions to identify potential unstable slopes that could initiate debris flows into water bodies. The examples depict convergent headwalls (i.e., concave-shaped slopes) and bedrock hollows. These landscape features can be found adjacent to the proposed PCGP pipeline alignment in numerous locations:

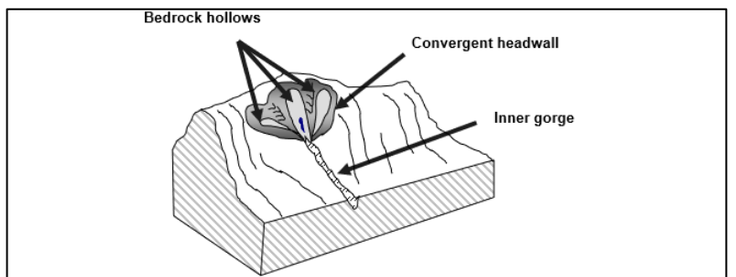


Figure 8. Typical hillslope relationships between bedrock hollows, convergent headwalls, and inner gorges (drawing by Jack Powell, DNR 2003).

Source: Text to Accompany the Hazard Map of Potential Rapidly Moving Landslides in Western Oregon (Hofmeister et al. 2002)

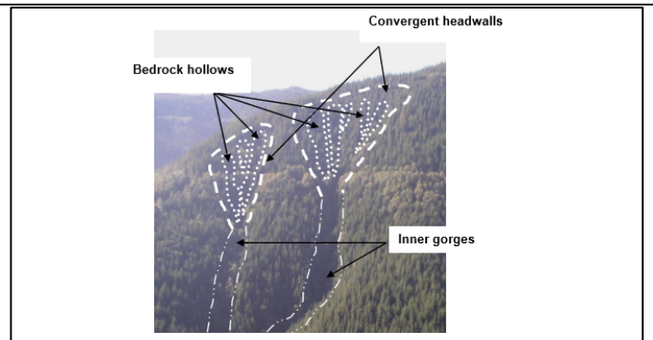


Figure 9. Common hillslope relationship: bedrock hollows in convergent headwalls draining to inner gorges (photo and drawing by Jack Powell, DNR 2003).

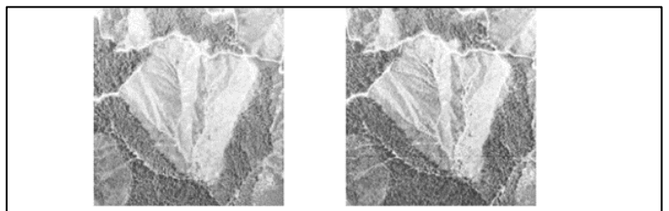
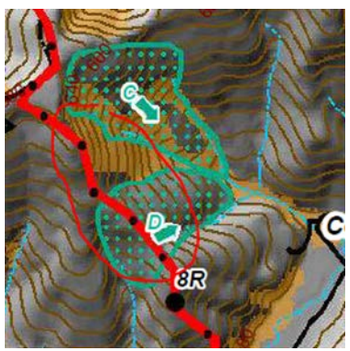


Figure 14a. Stereo pair of a clearcut convergent headwall in Pistol Creek basin, North Fork Calawah River, Washington.

Source: State of Washington Forest Practices Board Manual

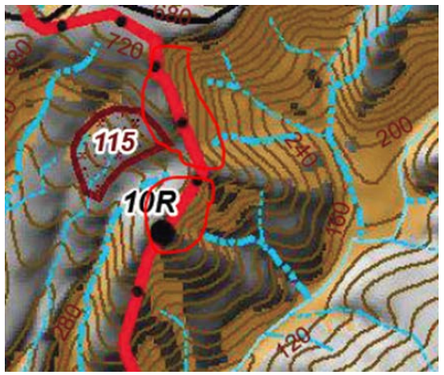
These three examples are among many that PCGP can identify when reviewing its Geologic Hazards Map in combination with aerial photos showing the pipeline's right-of-way and other components such as the Temporary Extra Work Areas relative to Areas of Rapidly Moving Landslide Hazard, convergent headwalls, and bedrock hollows. The light brown areas in the excerpt of PCGP's Geologic Hazards Maps are Potential Rapidly Moving Landslide Hazards. The accompanying excerpt of aerial photos show unstable slope features from the Statewide Landslide Information Database for Oregon (SLIDO). These excerpts from the aerial photos also show the pipeline right-of-way (in yellow) and Temporary Extra Work Areas (in light blue).

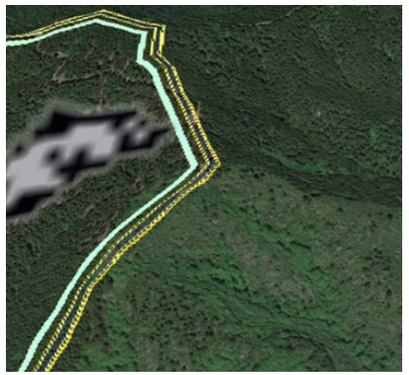
Figure 2 of 47 from PCGP's Geologic Hazards Maps (Northwest of Milepost 8R):



			PCGP's Erosion Control and Revegetation Plan does not indicate if the Temporary Work Area above the unstable slope feature will be used to store spoils (soil, boulders, root wads) and logs from forest clearing. However, PCGP's Resource Report 1 indicates that PCGP may use these work areas for these purposes. The ECRP does not detail how PCGP will manage construction stormwater above this unstable feature. Stormwater discharge at the top of convergent headwalls and bedrock hollow adds load to the top of this unstable slope. This stormwater discharge may create a positive soil pore pressure leading to a landslide. PCGP has not provided DEQ with an engineered post-construction stormwater management plan for the permanent pipeline right-of-way for this area and others indicating how PCGP will manage drainage above unstable slope features. On page 35 of Resource Report 6, PCGP discusses two primary ways in which pipeline construction has the potential to adversely impact slope stability. PCGP notes in Report 6 that routing drainage to potentially unstable slopes has the potential to adversely impact slope stability. However, PCGP does not provide DEQ with an analysis using the slope stability models to identify unstable slopes noted in DEQ's review of PCGP's response to Comments 6 and 7. Additionally, PCGP does not provide DEQ with a construction and post-construction stormwater management plan demonstrating how specifically PCGP will manage stormwater along these unstable landscape features. PCGP only identifies slope breakers along the construction and permanent right-of-way as the only technique to manage construction and post-construction stormwater. PCGP does not discuss, for example, or demonstrate the application of cutoff trenches presented in technical manuals on stabilizing slopes. PCGP does not detail the grade and placement of slope breakers on the ground in engineering plans for the construction and permanent right-of-way. Without this information as well as the drainage pattern, DEQ is unable to determine if the proposed use of slope breakers alone is sufficient to prevent the addition of weight from stormwater and an increase in soil pore pressure on an unstable slope. With the current submittal, DEQ cannot determine if the proposed slope breakers highlighted in the Erosion Control and Revegetation Plan will prevent landslides due to pipeline construction and operation. Additionally, in Resource Report 6 and the proposed ECRP, PCGP does not address site-specific constraints (i.e., roads, unstable landforms on each side of the right-of-way etc.) that may limit the application of slope breakers to route drainage away from unstable slopes. PCGP is proposing to remove trees and shrubs to install this gas pipeline. This loss of tree interception will increase the volume of runoff generated along pipeline's construction and permanent right-of-way. The discharge of this additional runoff among these unstable slope features has the potential to impact water quality. The following are two more examples highlighting similar concerns discussed in DEQ's review immediately above.

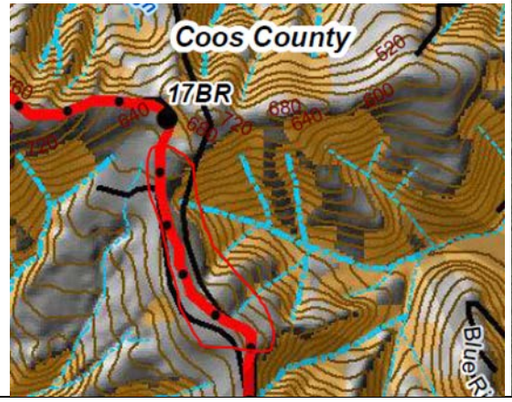
Figure 2 of 47 (Northwest and South of Milepost 10R) – Area No. 115 delineated in red is an identified landslide from the Department of Geology and Mineral Industries:





PCGP's ECRP does not show the engineering analysis and its technical support for how PCGP will manage the construction and post-construction stormwater above the Area of a Rapidly Moving Landslide Hazard and convergent headwall as well as the mapped landslide 115 identified by the Oregon Department of Geology and Mineral Industries..

Figure 4 of 47 (Southeast of Milepost 17 BR) – Blue square is a hydrostatic test location while the magenta polygon is an uncleared storage area:



			PCGP's ECRP does not show the engineering analysis and its technical support for how PCGP will manage the construction and post-construction stormwater above the Area of a Rapidly Moving Landslide Hazard and convergent headwall. **2. No Engineering Designs for Fill Slopes on Steep, Unstable Slopes and/or Steep Slopes with Erosive Soils** In Resource Report 6 (Geologic Resources), PCGP provides few specifics regarding controls to stabilize slopes to prevent landslides. Moreover, as noted in DEQ's review of PCGP's response to Comment 35 below, PCGP provides no engineering designs and the technical support for these designs for stabilizing fill slopes on steep, unstable slopes greater than 30% including slopes with highly erosive soils. PCGP identifies this deficiency on page 35 of Section 4.6.2 of Resource Report 6 by stating the following: *Steep side slope Pipeline construction segments will be identified during the final design phase of the Pipeline project. Fill slope construction details and specifications will be designed for the identified steep side slope Pipeline segments.* In Section 11.0 (Steep and Rugged Terrain), PCGP provides only a qualitative description of how it may approach fill slopes on steep, unstable slopes starting at the bottom of page 47. However, this mostly qualitative discussion does not consider terracing on erosive soils nor does it thoroughly address the management of stormwater on a terraced fill slope. The management of drainage on these steep slopes, the use of geotextiles or other engineering techniques to support terracing, and the need to reinforce the toe of slope are also not addressed in PCGP's submittal. These are issues typically addressed in technical references developed to construct linear infrastructure such as roads on steep slopes. However, PCGP does not discuss or addressed these issues in PCGP's submittal. **3. Unclear Design Standards/Specifications for Needed Road Improvements and Maintenance Standards/Specifications for Existing Access Roads** PCGP is proposing to use more than 660 miles of roads to construct this gas pipeline and its associated components. PCGP lists the Transportation Management Plan in Appendix A part 2 of the Water Quality Package as PCGP's approach to comply with water quality standards. As highlighted below, PCGP has not provided DEQ with specific road maintenance standards for access roads PCGP will use to construct and operate the pipeline. As highlighted below, PCGP has not provided DEQ with designs and specifications for any identified improvement to these existing access roads nor has PCGP demonstrated it conducted an inventory of the current condition of all access roads to determine their capacity to support the proposed level of use while minimizing the impact of these access roads on water quality.

			The scientific literature is replete with research documenting the importance of non-paved road design for protecting water quality. There are a number of references providing information on designing stable roads, including improving existing roads, and maintaining non-paved roads to protect water quality.[19, 20, 21, 22, 23] PCGP has not provided DEQ with engineering design details and their technical support for site-specific cut and fill slopes. PCGP has provided no information in the Transportation Management Plan on the improvements to protect water quality that PCGP proposes for existing access roads nor has PCGP presented for DEQ approval the methodology it will use to evaluate the potential water quality impact when using existing access roads given their current condition and design. Requesting that PCGP provide the engineering designs and specifications used to improve roads for pipeline construction and operation is essential for protecting water quality and, at minimum, assuring compliance with water quality standards and, in particular, OAR 340-041-0007(7). As noted in DEQ's review of PCGP's response to Comment 15, the scientific literature is replete with research documenting the importance of routine road maintenance for protecting water quality. For example, routine road maintenance for water quality is important to maintaining water quality necessary for the recovery of salmonids listed under the Endangered Species Act and found in streams receiving runoff from PCGP's proposed access roads. The National Marine Fisheries Service issued the Limit 10 Section 4(d) rule concerning routine road maintenance to protect water quality for ESA-listed salmon. For decades, the scientific community has established the harmful effects of roads on streams.[24] DEQ is requesting that PCGP provide the specific maintenance standards PCGP will apply to access roads while in use for pipeline construction. As discussed above, this is essential for protecting water quality and, at minimum, assuring compliance with water quality standards and, in particular, OAR 340-041-0007(7). Additionally, the Oregon Department of Forestry has rules for road maintenance and road building on private forest roads. ODF developed these rules to address public safety and water quality given the risk of landslides, road failure, and sediment discharge from road use and construction.[25, 26, 27, 28] ODF uses road maintenance and building requirements associated with the Forest Practices Act to comply with Clean Water Act requirements such as those associated with Total Maximum Daily Loads and water quality standards. However, PCGP does not provide DEQ with information on how

[19] Choctawatchee, Pea, and Yellow Rivers Watershed Management Authority. 2000. Recommended Practices Manual – A Guideline for Maintenance and Service of Unpaved Roads
[20] Berkshire Regional Planning Commission. 2001. The Massachusetts Unpaved Roads BMP Manual – A Guidebook on How to Improve Water Quality While Addressing Common Problems
[21] Gordon Keller and James Sherar. 2003. Low-Volume Roads Engineering – Best Management Practices Field Guide. US Agency for International Development and USDA Forest Service
[22] R. Jonathan Fanin and Joachim Lorbach. 2007. Guide to Forest Engineering in Mountainous Terrain. Forestry Harvesting and Engineering Working Paper 2. Food and Agricultural Organization of the U.N.
[23] Hearn, G.J. 2011. Slope Engineering for Mountain Roads. Geological Society Engineering Geology Special Publication No. 24
[24] Furniss, M.J., T.D. Roelofs, and C.S. Yee. 1991. Road Construction and Maintenance. American Fisheries Society Special Publication 19:297-323
[25] Oregon Department of Forestry. 2003. *Wet Weather Road Use*. Forest Practice Technical Note Number 9
[26] Oregon Department of Forestry. 1999. *Road Maintenance*. Forest Practices Technical Note Number 4
[27] Oregon Department of Forestry. 2003. *Installation and Maintenance of Cross Drainage Systems on Forest Roads*. Forest Practice Technical Note Number 8
[28] Oregon Department of Forestry. 2003. *High Landslide Hazard Locations, Shallow, Rapidly Moving Landslides and Public Safety*: Screening and Practices. Forest Practice Technical Note Number 2

			specifically PCGP will address OAR 629-625-0700 (Wet Weather Road Use). ODF's Wet Weather Road Use rule requires the following: *…durable surfacing or other effective measures to resist deep rutting or the development of a layer of mud on top of the road surface on road segments that drain directly to streams that will be used for log hauling and moving construction equipment during wet periods.* In its Forest Practices Technical Note 9, ODF provides a discussion of aggregate surfacing, road use, and turbidity in streams. DEQ can find no information in any of the plans included in PCGP's analysis of its compliance with water quality standards that addresses the issues raised in this ODF technical note and in Forest Practices Act rules. Moreover, for public safety, under OAR 629-623-0000 – 0800, a forest harvesting operator must submit to ODF a detailed road design for all new or reconstructed roads crossing high landslide hazard locations. For water quality protection and compliance with OAR 340-041-0007(7), DEQ is requesting in Comment 31 that PCGP provide detailed road designs for new or reconstructed roads in landslide hazard areas and other locations where these roads are hydrologically connected to waters of the state. PCGP must demonstrate in its plans and supporting documents where and when exactly PCGP is applying these designs on the proposed access roads for pipeline construction and operation. As with ODF's requirements for private forest roads, Counties have authority to establish road construction designs and specifications for County roads.[29] At minimum, these county requirements will ensure that an unpaved county road will support PCGP's proposed level of use while protecting the stability of the road surface and, consequently, water quality for roads hydrologically connected to waters of the state. In its proposed Transportation Management Plan, PCGP has not identified any maintenance standards as well as design and specifications for reconstructed County roads used as access roads. Additionally, PCGP has not provided DEQ with Forest Service, Bureau of Land Management, and Bureau of Reclamation road permits roads containing maintenance standards and design and specifications for reconstructed federal roads proposed by PCGP for use as access roads. These road permits must provide PCGP with clear and enforceable standards and specifications. The following is an example of the maintenance standards PCGP has proposed in its Transportation Management Plan in Section 2.2.2: *PCGP will perform or make commensurate share payment(s) for maintenance on existing Agency roads used during construction and any subsequent non-casual use in accordance with USDA-FS Manual Chapter 7730, the USDA-FS Handbook section 7709.59, Chapter 60, BLM Manual 9100 Series and the various BLM District Resource Management Plans and as shown*

[29] Association of Oregon Counties. 2014. Chapter 13: Design and Specification for Roads. County Road Manual

			in TMP Appendices C1, C2, C3, D, and D1. *Existing Agency-jurisdiction Roads will be maintained to ensure compliance with any applicable Road Use Permit, Reclamation standards for "Engineering and O&M Guidelines for Crossings" (Exhibit H of the Grant and TUP), the Grant and TUP, this TMP and in consultation with the Agencies regarding current standards for the maintenance level identified for the Road(s). Roads constructed by PCGP on Agency lands will be maintained to standards approved by the Agency.* *To facilitate consistency across the Pipeline Project, Agencies have agreed to utilize the most current USDA-FS, Pacific Northwest Region (Region 6), standard timber sale road maintenance specifications ("T-specs") and Pipeline Project specific supplemental specifications as appropriate. Agency Roads requiring PCGP maintenance and associated specifications are shown on maps in TMP Appendices B and B1 and in tables in TMP Appendices C, C1, C2, C3, D, and D1. Copies of the specifications are available from the Supervisor's Office of any National Forest in Region 6.* *Paved Roads will be kept free of mud and other debris that may be deposited by construction equipment. Track-driven equipment would cross paved Roads on tires or equipment pads to minimize Road damage. Any paved, gravel, or dirt roadways damaged by construction activities will be repaired to a condition equal to or better than the condition prior to damage. Agencies may require PCGP to provide selected pre-use Road and/or sign condition surveys, including photos or video, to aid in assessing use-induced changes.* Similarly, in Section 2.2.3, PCGP proposes road improvements to accommodate equipment for pipeline construction and roads slated for improvements are described in: *TMP Appendices B and B1 maps* *TMP Appendices C, C1, C2, C3, and D1 tables* However, PCGP has provided no information in Appendices B, B1, C1, C2, C3, D, and D1 as PCGP has left these pages in the Transportation Management Plan blank. PCGP indicates in the excerpt above that PCGP will maintain existing "Agency-jurisdiction Roads" to ensure compliance with any applicable road use permit and other standards. However, PCGP provides no road permits for DEQ to review nor any applicable road maintenance standards and specifications for all the access roads. In DEQ's Comment 15, DEQ requests that PCGP provide supporting documents such as design standards and road permits that PCGP will use when complying with TMDL Implementation Plans such as Federal Water Quality

			Restoration Plans. However, in PCGP's response to DEQ's Comment 15, PCGP indicates that Right-of-Way Grants will ensure compliance with water quality plans. DEQ disagrees with this assertion and provides the rationale for this disagreement in DEQ's review of PCGP's response to Comment 15. Moreover, the statement below from PCGP's Transportation Management Plan undermines this assertion regarding right-of-way grants. In the TMP, PCGP states that roads "will be maintained to ensure compliance with any applicable Road Use Permit." Although PCGP intends to use compliance with applicable road use permits to comply with water quality standards and, therefore, obtain a 401 Water Quality Certification, PCGP does not consider road use permits essential for demonstrating compliance with a Total Maximum Daily Load. Additionally, in the excerpts from PCGP's Transportation Management Plan above, PCGP does not provide the actions it will take to maintain Coos, Douglas, Jackson, and Klamath County and private forest roads that PCGP will use to access pipeline right-of-way for construction and operation. What are the County road maintenance standards that PCGP will follow? For private forest roads used to haul harvested trees, Oregon Department of Forestry has issued a road drainage rule to implement the Forest Practices Act.[30] As noted above, ODF uses the FPA and its administrative rules to regulate road maintenance for water quality and compliance with the Clean Water Act and, in particular, water quality standards. ODF requires the operator of private forest roads used for forest harvesting to install additional drainage such as cross drains where needed to filter stormwater from roads to protect water quality. In ODF's Technical Note Number 8 referenced above, ODF provides technical guidance to address ditch erosion and the sediment it produces. Specifically, ODF presents typical minimum culvert spacing for erosion control in a roadside ditch. As the grade of a road increases, this drainage becomes increasingly important. In OAR 629-625-600(9), ODF requires the following: *Where needed to protect water quality, as directed by the State Forester, operators shall place additional cross drainage structures on existing active roads within their ownership prior to hauling to meet the requirements of OAR 629-625-0330.* PCGP must determine in collaboration with ODF the need for additional cross drainage structures prior to using access roads for pipeline construction and operation. As discussed above, PCGP must include this determination as well as the evaluation of the current condition and design of existing access roads in its submittal for Water Quality Certification. DEQ will review this information when developing the Certification Decision. Additionally, in its Transportation Management Plan excerpted above, PCGP does not indicate specifically how PCGP will keep paved roads free of mud and other debris PCGP may deposit with its construction equipment. How specifically will PCGP keep paved roads free of mud and other debris? What BMPs will PCGP use to implement this stated goal? Will PCGP operate a wheel wash station at access road crossings with the construction right-of-way? DEQ cannot fully evaluate

[30] Oregon Department of Forestry. 2003. Installation and Maintenance of Cross Drainage System on Forest Roads. Forest Practices Technical Note Number 8 (Version 1.0)

			the efficacy of the proposed Transportation Management Plan on general statements unless PCGP follows these statements with specific practices applied to specific locations with a schedule identifying when PCGP will implement these practices. In PCGP's Transportation Management Plan excerpted above, PCGP has not provided road permits showing maintenance standards that DEQ can review. PCGP has not provided DEQ with proposed "T-specs" to review nor demonstrated that these "T-specs" will comply with County and ODF Forest Practice Act requirements developed to comply with Clean Water Act requirements. As requested in Comment 23 and 24, PCGP has not identified access requiring maintenance and improvements to protect water quality nor standards and specifications noted in the Transportation Management Plan excerpt above. Additionally, PCGP has not provided maintenance specifications for Forest Service roads. As noted in DEQ's Comment 15 and Comment 29, DEQ must ensure compliance with Section 303 of the CWA and other appropriate requirements of state law in developing its Certification Decision. To protect water quality and to comply with water quality standards such as OAR 340-041-007(7), PCGP must design needed access road improvements to ensure these improvements do not cause landslides. Moreover, PCGP must maintain access roads to prevent water quality impacts during logging truck and heavy equipment traffic. Regarding any proposed improvements to proposed access roads, PCGP provides few details that DEQ can use to evaluate the efficacy of proposed controls to prevent erosion and sedimentation. For DEQ's concerns regarding slope stability and the construction and operation of the pipeline, DEQ can find only the following information in Section 3.5 of the Transportation Management Plan: *Refer to Slope Stability Stipulation D.20 of the Grant and TUP.* PCGP has not provided the Grant (Right-of-Way Grant, Serial No. OR 63542-01) and the TUP (Temporary Use Permit, Serial No. OR 63542) for DEQ to review to determine if the grant and permit contain enforceable details regarding road maintenance and improvements. Our review of the "Grant and TUP" is essential for the development of the Certification Decision and determining PCGP's compliance rules for developing this decision as stated in OAR 340-048-0042. Given the above, DEQ is unable to determine what this "Slope Stability Stipulation" entails and how PCGP will respond to it. PCGP's Introduction in Section 1.0 of the Transportation Management Plan states that this plan: *…includes details regarding timber removal and construction access Road improvements, Road maintenance and management of use before, during, and after construction. A final TMP will be submitted by PCGP to the Agencies for approval prior to issuance of the TUP and Grant. This TMP applies to Agency-jurisdiction Roads located on Agency and privately-owned land.* To date, PCGP's Transportation Management Plan does not contain and PCGP has not provided DEQ with any detailed information in engineering plans on how and where exactly PCGP will perform road improvements to prepare the proposed

			access roads for their proposed use and to protect water quality. In the Transportation Management Plan, PCGP also states the following: *…where construction schedules require Road use outside the normal operating season, more substantial work such as surfacing or resurfacing of may be necessary.* The season of rainfall is typically from mid-October to mid-July. Timber and ridgetop removal as well as heavy equipment access for pipeline construction are levels of use that have the potential to generate sediment discharge to receiving waters if the non-paved roads are not reconstructed and maintained to support this proposed use during the season of rainfall. To date, PCGP has not provided DEQ with a road maintenance plan for all access roads to ensure that during the season of rainfall road use will not impact water quality. PCGP states in its Transportation Management Plan that: *All maintenance and improvements will be completed in accordance with Pipeline Project requirements and Agency, state, county and private landowner standards.* PCGP has not provided DEQ with any information on road maintenance standards and road improvement design standards in this Transportation Management Plan or any other document PCGP included in it 401 Water Quality Certification Submittal. In Section 2.2.1 of PCGP's Transportation Management Plan, DEQ states the following: *PCGP will be responsible for performing Road maintenance on all newly constructed Roads on Federal Lands and decommissioning of temporary Roads as specified in this plan.* PCGP has not presented in this plan any road decommissioning standards. Rather, PCGP only provides the following information and references to documents that are currently unavailable to DEQ: *TARs and previously decommissioned Roads that are constructed or reconstructed for use during the Pipeline Project will be reclaimed or decommissioned as specified by the Agency. In addition, as mitigation for impacts to various late-successional and riparian-dependent species as well as soil productivity losses, PCGP proposes to decommission off-site Roads in cooperation with the Agency in accordance with Agency specifications and the Compensatory Mitigation Plan (Exhibit G, Appendix CC to the Grant and TUP).*

			As noted in the USDA Forest Service's review of the science regarding road construction and maintenance, unmaintained roads are a substantial source of sediment delivery to streams in forest watersheds.[31] Given this and other research on water quality impacts from road design and maintenance, DEQ requested information in AIR-1 on road decommissioning to develop its Certification Decision. Although PCGP provides a definition of decommissioning in Appendix E of the Transportation Management Plan, PCGP does not indicate in this plan what roads PCGP will decommission nor provide detailed management practices and design standards that PCGP will employ at each decommissioned road segment. DEQ requested this information in Comment 28 of AIR-1. The definition of decommissioning used in PCGP's Transportation Management Plan indicates that treatments may include stabilizing slopes, pulling back road shoulder, removing unstable road fills, or installing water bars. How will PCGP carry out these treatments at each site to ensure roads on landslide prone, steep slopes are not destabilized further? Does stabilizing slopes refer to unstable cut slopes if the road prism is left in place? If so, what are PCGP's proposed designs for stabilizing unstable cut slopes? If PCGP uses slope breakers or water bars to manage stormwater on a decommissioned road surface, who will maintain this system for managing stormwater and are there financial resources to maintain this system for the operational life of this pipeline? PCGP has not demonstrated to DEQ that it has thought through the details of decommissioning road segments to protect water quality.
16	In addition, please identify all proposed amendments to federal land and resource management plans that would necessitate amendments to current Forest Service, Bureau of Land Management, or Bureau of Reclamation Total Maximum Daily Load Implementation Plans covering the pipeline's construction and operation. Federal Water Quality Restoration Plans represent the Forest Service's and BLM's plan for activities on these federal lands serving as a source of point and nonpoint source pollutants including	The Forest Service provided in a Notice of Intent a preliminary list of plan amendments required for the pipeline in Federal Register 27473 (June 15, 2017). In this notice of intent, BLM reviewed the proposed route and determined plan amendments required to accommodate the pipeline including changes to right-of-way Avoidance Areas where the pipeline would cross. BLM indicated that it will identify additional pathways via scoping or further analysis and that minor design modifications are needed for conformance with approved	**Summary Statement: DEQ requests that the Federal agencies not proceed with proposed amendments to land management plans until DEQ can determine how these changes may affect the Federal agencies' compliance with existing Total Maximum Daily Loads. DEQ makes this request so that DEQ can develop a Certification Decision in compliance with OAR 340-048-0042(2). In the section below, DEQ provides examples how these proposed plan amendments currently undermine Federal agency compliance with TMDLs.** **The proposed plan amendments to allow additional soil compaction suggest the surface of the proposed permanent right-of-way will have increased runoff similar to that of a primitive road. As such, DEQ requires PCGP to provide a quantitative assessment of the post-construction stormwater discharge from the permanent right-of-way at all stream crossings. This assessment should demonstrate this stormwater discharge complies with water quality standards. PCGP must also include design information for all stormwater treatment controls used at these stream crossings as requested in DEQ's submission guidelines for post-construction stormwater management. In Comment 34 of AIR-1, DEQ requested this information, but PCGP has not yet provided it.** **The BMPs and plans noted in PCGP's response do not fully address the Erosion and Sediment Control Plan requirements of a NPDES 1200-C General Permit. In the section below, DEQ details its concerns and the specific information DEQ is seeking in Comment 16 as well as the rationale for the information requested in this comment.** **1. Proposed Federal Land Use Plan Amendments**

[31] Furniss, M.J., T.D. Roelofs, and C.S. Yee. 1990. Road Construction and Maintenance. American Fisheries Society Special Publication 19:297-323

	pollutants addressed in a Total Maximum Daily Load.	plans. Four streams are proposed and presented for dry open cut crossings on Federal lands. Appendix A to Part 2 of the JPA details BMPs and plans PCGP to avoid and minimize effects to water quality when constructing waterbody crossings.	Federal Register 27473 (June 15, 2017) does not contain the information presented in JCEP's response to DEQ comments. Given this, DEQ cannot verify the information provided and requests that Jordan Cove provide the correct Federal Register citation. Although not referenced in JCEP's response to comments, Federal Register 28837 (June 26, 2017) presents proposed amendments to Federal land and resource management plans associated with PCGP's proposed gas pipeline construction. The proposed land and resource management amendments listed below may lead to amendments of the Forest Service's Total Maximum Daily Loads Implementation Plans referred to as Water Quality Restoration Plans. Changes to the Forest Service's Water Quality Restoration Plans may affect compliance with TMDLs. For example, proposed amendments entitled UNF-1, UNF-2, RRNF-5, and WNF-5 affecting effective shade and riparian areas may affect compliance with a temperature load allocation in a TMDL. For this reason, DEQ requests that proposed amendments to Forest Service land and resource management plans not proceed until PCGP has provided DEQ the information requested in Comment No. 19. In particular, DEQ request information on PCGP's effort to first avoid, then minimize and, if unavoidable, mitigate impacts to shade in riparian areas. DEQ also requests more information regarding BLM's proposed Resource Management Plan amendments to (1) make changes to land use allocations along the pipeline route and (2) make changes to right-of-way Avoidance Areas to determine if these areas contribute to the implementation of or alter BLM's Water Quality Restoration Plans. Water Quality Restoration Plans are the Forest Service's and BLM's TMDL Implementation Plans. **Umpqua National Forest** The following two proposed plan changes below are relevant to DEQ concerns regarding TMDL compliance: (1) effects of proposed amendments on Riparian Reserves and (2) detrimental soil conditions from the project. • Amendment (UNF-2) would allow the pipeline to run parallel to the East Fork of Cow Creek for .1 mile between MP 109.5 and 109.6 and will impact 1 acre of riparian vegetation. • Amendment (UNF-3) would remove for this proposed project established limits for soil compaction (i.e., no more than 20% allowed of the project area). This proposed amendment supports DEQ's concern and request in AIR-1 (see Comment 34) for a (1) post-construction stormwater management plan for the permanent right-of-way particularly as it discharges to streams and (2) for modeling to evaluate the impact of this discharge. The proposed amendment also supports DEQ's concern raised in AIR-1 regarding the impacts to riparian vegetation and the shade it provides streams with PCGP's proposal to use FERC guidelines that allow clearing for the pipeline alignment within 15 feet of a water body. This information in the proposed amendment supports the need for PCGP to address DEQ's Comment 32. **Rogue National Forest**

			Two of these proposed changes below are relevant to DEQ's concerns and both involve soil compaction. One area of soil compaction is in a restricted riparian area and the other is in all management areas. • Amendment (RRNF-5) potentially affects approximately 2.5 acres of the Restricted Riparian Management Strategy at one perennial stream crossing on South Fork of Little Butte Creek around MP 162.45. • Amendment (RRNF-6) would exempt PCGP from the requirement to limit soil compaction to 10% of the activity area (not including permanent roads or landings) upon completion and to limit soil compaction to no more than 20% from management practices. This proposed amendment supports DEQ's concern and request in AIR-1 (see Comment 34) for a (1) post-construction stormwater management plan for the permanent right-of-way particularly as it discharges to streams and (2) for the modeling of this impact of this discharge. **Winema National Forest** Two of these proposed changes below are relevant to concerns raised in DEQ's comments in AIR-1 and both involve soil compaction. This soil compaction is in all management areas and the other involves a specific riparian area. • Amendment (WNF-4) would exempt PCGP in all management areas from the requirement to limit soil compaction to 20% of the activity area. This proposed amendment supports DEQ's concern and request in AIR-1 (see Comment 35) for a (1) post-construction stormwater management plan for the Permanent ROW particularly as it discharges to streams and (2) for the modeling of this impact of this discharge. • Amendment (WNF-5) would exempt PCGP in Management Area 8. Management Area 8 is a riparian area where the pipeline affects approximately .5 mile or an estimated 9.6 acres of this particular management area and where the limit to soil compaction is 10% of the total riparian zone. Given the information in the Federal Register notice, DEQ cannot determine if the extent of potential water quality impacts are limited to soil compaction or riparian vegetation removal or both. DEQ requests that PCGP clarify the extent of potential water quality impacts associated with this proposed plan amendment for the Winema National Forest. Considering the proposed amendments above, DEQ has concerns with soil compaction's influence on the movement and volume of stormwater on the landscape and, ultimately, its erosive force over the landscape and potential to cause hydromodification in streams. Given the documentation in the Federal Register citation above, the operation of the gas pipeline will result in permanent soil compaction and this soil compaction will exceed the level permitted in the Forest Service's current land management plan. As a result, to evaluate compliance with OAR 340-041-0007(1), DEQ is

			requesting that PCGP submit for DEQ's review and approval a soil compaction monitoring plan clearly delineating the following: • Area of the right-of-way that PCGP will address soil compaction. • Area of the ROW where soil compaction will occur to support the operation of the pipeline. This monitoring plan must identify all the locations where PCGP will evaluate soil compaction from construction activities and include the methodology selected for soil compaction testing and quality assurance measures to support the accuracy and precision of soil compaction measurements. **2. BMPs and Plans to Avoid and Minimize Water Quality Impacts to Water Body Crossings** BMPs in Waterbody Crossing Plans and Figures in Resource Report 2 Appendix E.2 referenced in PCGP's response to DEQ's Comment 16 lack specific information required in, for example, the NPDES 1200-C General Permit's Schedule A.12.b.v. Compliance with this permit schedule will help demonstrate that PCGP will implement specific controls to avoid and minimize effects to water quality during the development of these water body crossings. The general description of BMPs excerpted below and referenced in PCGP's response when referring DEQ to PCGP's Wetland and Waterbody Crossing Plan will not comply with the NPDES 1200-C General Permit: *…Sediment barriers will be installed immediately after clearing and prior to initial ground disturbance (i.e., grading). Sediment barriers will be properly maintained throughout construction and reinstalled as necessary (such as after backfilling of the trench) until replaced by permanent erosion controls or restoration of adjacent upland areas is complete and revegetation has stabilized the disturbed areas…* To evaluate the efficacy of proposed BMPs to control pollutant discharge during the construction of all waterbody crossings, DEQ requests that PCGP include in its permit application for a NPDES 1200-C General Permit the information requested in Schedule A.12 including the Site Map and Drawings for all waterbody crossings. DEQ also requests that PCGP propose a model to demonstrate quantitatively that the application of these construction BMPs will not cause or contribute to a violation of in-stream water quality standards. This analysis is needed to comply with NPDES 1200-C General Permit Schedule A.10.a and OAR 340-048-0042(2)(a).
17	Finally, for determining compliance with TMDL allocations covering federal lands, please provide for DEQ's review and approval all proposed Forest Service,	PCGP submitted an application to BLM, Forest Service, and BOR for issuance of a right-way-grant across federal lands including a plan of development containing BMPs	**<u>Summary Statement</u>: The information provided in Federal agency road permits and access/right-of-way grants is critical to the process of developing a Certification Decision given its potential to protect water quality. DEQ is requesting that PCGP provide DEQ with drafts of all federal agency road permits and access/right-of-way grants to review and, if necessary, request modifications and/or additions to these permits/access grants/right-of-way grants. DEQ provides the rationale for this information request in the section below and the level detail it expects in a future response to Comment 17.**

	Bureau of Land Management, and Bureau of Reclamation road permits and access grants or right-of-way permits.	and PCGP commitments during and after construction. PCGP will provide a revised Table A.2-6 from Appendix A.2 of Resource Report 2. This revised table will identify BMPs for waterbodies crossed by or within 100 feet of the pipeline.	PCGP's response to Comment 17 did not address DEQ's request to review and approve road permits from Federal agencies that support or will support Federal agency compliance with Section 303 of the Clean Water Act. DEQ presents the rationale for requesting this information in DEQ's review of PCGP's response to Comment 15 provided above and to Comment 17 below. In summary, the intent of DEQ's information request in Comment 17 is to determine if the practices in these permits and right-of-way grants will protect water quality and, for example, comply with Total Maximum Daily Loads. As part of the 401 Certification process, DEQ will need to review and – if needed – request changes and/or additions to the conditions in road permits for Federal road and access/right-of-way grants to use Federal lands. This request supports DEQ's compliance with rules governing the development of a certification decision [OAR 340-048-0042(2)]. This request will also contribute to Federal agency compliance with the Presidential Order to coordinate environmental review and permitting.[32] To obtain an access or right-of-way grant from the Forest Service, PCGP must submit an application for a special-use authorization. In applying for this authorization, PCGP will submit with other information an environmental protection plan including actions to ensure environmental protection and rehabilitation during construction and maintenance of the gas pipeline.[33] The Forest Service uses the information in this required environmental protection plan to develop the right-of-way grant for PCGP. DEQ is seeking to review the environmental protections included in this grant to evaluate their efficacy in protecting water quality and complying with Federal agency programs for compliance with Total Maximum Daily Loads. PCGP's response to Comment 17 indicates that PCGP is providing Federal agencies with the same information PCGP provided DEQ in its submittal for a Section 401 Water Quality Certification. At this point in DEQ's review of PCGP's submittal, PCGP has not provided documents containing site-specific information such as plans with drawings and specifications identifying best management practices on the landscape designed to prevent water quality impacts. PCGP has provided some generic drawings and best management practices along with limited information in the narrative of plans included in its submittal as noted in elsewhere in this DEQ review. However, these generic drawings do not address site-specific landscape constraints such as fill and cut slopes on steep and, in many cases, unstable slopes (e.g., potential Areas of Rapidly Moving Landslide Hazards) and/or soils with a high erosion potential. These generic drawings do not provide the engineering designs and the technical support for these designs to demonstrate to DEQ that PCGP has considered these challenging landscape constraints and developed engineered solutions to protect water quality. Given the information provided in PCGP's Transportation Management Plan, DEQ anticipates PCGP will seek a road permit or similar authorizations to use Federal roads to build and operate the pipeline. These road permits or authorizations will contain conditions specifying how PCGP will use and maintain these existing roads. For example, Federal road permits may contain conditions specifying design standards for road improvements, road reconstruction, and/or road maintenance

[32] Presidential Executive Order. August 15, 2017. Establishing Discipline and Accountability in the Environmental Review and Permitting Process for Infrastructure

[33] USDA Forest Service. Obtaining a Special-Use Authorization with the Forest Service – The Application Process

			standards from handbooks, manuals, or other technical documents these Federal agencies use to implement their Water Quality Restoration Plans (Forest Service and BLM) or will use to implement their TMDL Implementation Plans (BOR). Federal agencies develop these plans to meet allocations for Total Maximum Daily Loads. Federal agencies may require in a road permit that PCGP address specific maintenance standards prior to, during, and after pipeline construction.[34] Many of these standards will protect water quality while preparing the road for its intended use as noted elsewhere in DEQ's review of PCGP's response to AIR-1. For example, the Forest Service provides the following direction in its Forest Service Handbook regarding the required road maintenance work prior to using National Forest road: *Prehaul work must be accomplished prior to commercial hauling to make a road suitable and safe for commercial use as well as any other anticipated traffic, such as recreation use. Prehaul maintenance includes such activities as surface blading, ditch and drainage maintenance, slide and slough removal, brush removal, and road opening. It does not include reconstruction work.*[35] Prehaul work that establishes, for instance, a durable surface on nonpaved roads will protect water quality and, therefore, are relevant to the development of DEQ's Certification Decision. This handbook also addresses road damage and extraordinary repairs as follows: *Commercial road users are responsible for repairing road damage caused by their operations or by their failure to perform proper or timely maintenance. The Forest Service is responsible to repair damage caused by noncommercial use, provided the commercial user has complied with contract or permit requirements for placement and operation of traffic control devices.* *Extraordinary repairs involve physical blockage or loss of the roadbed or its structures, damage that cannot be corrected by routine maintenance equipment (such as end loaders, graders, backhoes, and dump trucks) operating from the level of the roadbed. This is work that is outside the scope of maintenance specifications or that requires additional engineering drawings or design. To this, forests may add further definitions that fit their particular situations. Extraordinary repairs will generally be handled as reconstruction.* Such road repairs are critical to protect water quality as noted elsewhere in DEQ's review of PCGP's response to AIR-1. These road repairs will help ensure compliance with water quality standards while PCGP uses access roads for pipeline construction and operation. Consequently, in developing its Certification Decision, DEQ needs assurances that the road maintenance and reconstruction standards and specifications are required when PCGP uses a Federal access road. As a condition of using a federal road, DEQ also wants assurances in PCGP's submittal that PCGP will execute site-specific

[34] Ruiz, Leo. 2005. Guidelines for Road Maintenance Levels. USDA Forest Service. Technology & Development Program 7700-Transportation Management o577 1205-SDTDC

[35] USDA Forest Service. 2003. Chapter 10 – Maintenance of Forest Development Roads. Forest Service Handbook 7709.58 (Transportation System Maintenance Handbook. R6 Supplement FSH-7709.58-2003-1

			actions to prevent and, if necessary, quickly address road damage as it arises. Moreover, for example, the Forest Service Handbook in Section 12.42 (Region 6 Supplement) on Maintenance Standards references performance-based road maintenance specifications covering maintenance issue relevant to water quality protection such as: • Surface maintenance • Surface stabilization • Drainage Structure installation or removal • Roadway drainage system maintenance • Disturbed area treatment • Roadway vegetation maintenance[36] At minimum, such specifications provide verifiable indicators or measures of compliance with the Forest Service's road maintenance standards. As documented in this DEQ review of PCGP's response to AIR-1, road maintenance is critical for water quality protection. Consequently, DEQ is seeking these verifiable measures of compliance as it develops its Certification Decision. More importantly, these specifications provide DEQ assurance the Forest Service – a Designated Management Agency under a TMDL – can enforce compliance with maintenance standards and, if needed, suspend work until the permitted or authorized entity such as PCGP achieves compliance when using a Forest Service road. In its effort to ensure compliance with the conditions of a Certification Decision, for example, DEQ may request that the Forest Service use their authority to suspend work until PCGP restores the condition of the Federal road to protect water quality. As PCGP is revising its submittal to provide DEQ with more specific information regarding PCGP's practices on access road and in the pipeline right-of-way, DEQ is requesting the level of detail in PCGP's response provided in the examples above for all proposed maintenance and reconstruction actions on Federal, County, and private roads. If PCGP chooses to revise Table A.2-6 from Appendix A.2 of Resource Report 2 in response to Comment 17, then DEQ anticipates receiving from PCGP the level of detail highlighted in DEQ's review above regarding right-of-way or access grants and road permits. Moreover, as noted elsewhere in DEQ's review, DEQ will not accept PCGP's arbitrary decision to focus BMPs on waterbodies crossed by or within 100 feet of the pipeline. PCGP must apply all BMPs to protect water quality to all access roads and the pipeline's construction and permanent right-of-way hydrologically connected to water bodies. To determine objectively hydrologic connectivity of access roads and the right-of-way, PCGP can use Geomorphic Road Analysis and Inventory Package (GRAIP) or a comparable analytical tool approved by DEQ.
18	Provide for DEQ's review and approval all proposed easements, agreements, and access or right-of-way permits for non-federal lands.	PCGP is working with private stakeholders to secure proposed easement and access or right-of-way permits. PCGP will provide a revised Table	**Summary Statement: OAR 340-048-0020(3) authorizes DEQ to request and receive information necessary to review and evaluate applications for section 401 water quality certification. DEQ considers access to all locations of the proposed project both reasonable and necessary to fulfill our Clean Water Act obligations. For this reason and as more fully discussed in the following section, DEQ is requesting copies of all proposed easements, agreements, and access or right-of-way permits for non-federal lands.**

[36] USDA Forest Service. 2007. Performance Based Road Maintenance Specifications. Transportation System Operations and Maintenance. Pacific Northwest Region

		A.2-6 from Appendix A.2 of Resource Report 2 that will identify BMPs for waterbodies crossed by or within 100 feet of the pipeline. Private agreements are not prerequisites for issuing a 401 WQ Certification.	As discussed elsewhere, DEQ will require a site-specific analysis of existing water quality, project-related effects, and a technically supported analysis of proposed engineering measures to mitigate for project-related effects. Revisions to Table A.2-6 must provide site-specific support for these proposed measures. Moreover, DEQ questions PCGP's proposal to focus BMPs on water bodies crossed by or within 100 feet of the pipeline. BMPs are required to protect water quality from impervious surfaces throughout all portions of the construction and permanent right-of-way that are hydrologically connected to water bodies. To determine the hydrologic connectivity of access roads and the right-of-ways, PCGP can use Geomorphic Road Analysis and Inventory Package (GRAIP) or a comparable analytical tool approved by DEQ. DEQ requires review and approval of all private easement agreements to assess potential impacts to water quality. DEQ seeks information how PCGP will use and maintain non-federal access roads and manage stormwater as well as other sources of pollutant discharge during construction and operation of the pipeline under all easements, agreements, and access/right-of-way permits on non-federal lands. DEQ is making this information request Comment 18 to ensure that all proposed easements, agreements, and access or right-of-way permits for both non-Federal and Federal lands will implement PCGP's proposed BMPs included in its submittal comply – for example – with TMDLs. To date, PCGP has not provided DEQ with the conditions, engineering designs/specifications, and/or requirements attached to private agreements to secure access to private lands for pipeline construction and operation. To develop a Certification Decision, DEQ must review and – if needed – request changes/additions to these conditions, engineering designs/specifications, and/or requirements in its efforts to evaluate compliance with water quality standards.
19	This compliance assessment must also include a summary of the steps taken to first avoid and then minimize impacts to the Designated Management Agency's riparian buffer protection areas prior to: • Siting Temporary Extra Work Areas for the pipeline construction • Siting of the construction and the permanent right-of-way for the pipeline.	PCGP will provide a response to DEQ in Q4 of 2018.	DEQ anticipates PCGP's response in Q4 2018.

	DEQ is requesting this information in response to Pacific Connector Gas Pipeline's proposal to locate TEWAs 50 feet from a waterbody and wetland boundary (see page 25 of Resource Report 1 for the gas pipeline). For example, this setback will not comply with the Forest Service's and Bureau of Land Management's riparian buffer protection requirements as presented in their Water Quality Restoration Plans which serve as their TMDL Implementation Plans. In Resource Report 1 noted above, PCGP notes that there are 922.64 acres of TEWAs. Please identify the location of each TEWA that PCGP will locate within one and two potential tree heights away to 50 feet from waters of the state. For streams, please indicate the distance of each TEWA from the ordinary high water mark of the stream or riverine wetland. Additionally, please note the land ownership where each TEWA is located. In addition, on page 58 of Resource Report 1 for the gas		

	pipeline, PCGP indicates that the pipeline – in some places – will impact riparian vegetation while paralleling streams. Specifically, this report notes that the "proposed route will avoid paralleling a waterbody within 15 feet or less, where feasible." In this report, PCGP notes that this placement is consistent with the Section V.B.2.a of FERC's Wetland and Waterbody Procedures. However, 15 feet of riparian buffer would violate DMA riparian buffer protection requirements. Moreover, based on the literature, a 15-foot riparian buffer for thermal regulation of streams may result in thermal gain to the adjacent water body. As result, please identify each segment of the pipeline's construction right-of-way and permanent right-of-way that is parallel to waters of the state and within two site potential tree heights from waters of the state. Please provide the location and a detailed rationale for siting TEWAs closer to streams than authorized by a DMA's riparian buffer protection requirements and when siting sections of the construction and permanent		

	right-of-way. For example, the PCGP's rationale in Resource Report 1 (page 58) for not proposing setbacks larger than 50 feet in Riparian Reserves is that larger setbacks "would render the TEWA useless for the stream crossing." PCGP should justify its proposal for non-standard riparian buffer protections by providing the following information: • A description of the specific constraints at each site preventing the use of a TEWA in an area. • The specific rationale why the TEWA must be closer to the stream crossing. Without this specific information, DEQ cannot determine that Pacific Connector Gas Pipeline attempted to first avoid and minimize riparian impacts to the maximum extent practicable before seeking to mitigate these impacts.		
20	This compliance assessment must also identify other locations where PCGP will not comply with Designated Management Agencies' riparian protection areas when siting the following:	PCGP will provide a response to DEQ in Q4 of 2018.	DEQ anticipates PCGP's response in Q4 2018.

	• Temporary and Permanent Access Roads, • Staging areas, • Material storage areas, and • Other components (e.g., compressor stations, metering stations) of the pipeline.		
21a	Please include a detailed justification for seeking alternative riparian buffer protection requirements when siting these facilities within riparian areas.	PCGP will provide a response to DEQ in Q4 of 2018.	DEQ anticipates PCGP's response in Q4 2018.
21b	Pacific Connector Gas Pipeline must evaluate the thermal impacts from all noncompliance with DMA riparian protection requirements requested above where PCGP has provided and DEQ has approved the following information: • Detailed information demonstrating it considered all actions to first avoid or then minimize impacts to riparian areas to the maximum extent practicable. • Detail rationale for proposing nonstandard widths for riparian buffer protections.	PCGP will provide a response to DEQ in Q4 of 2018.	DEQ anticipates PCGP's response in Q4 2018.

	This evaluation must be included in PCGP's Thermal Impacts Assessment noted in the comments below on compliance with state water quality standards.		
22	There is no information presented in Pacific Connector Gas Pipeline's Appendices for Timber Removal and Construction in the Transportation Management Plan (Part 2, Appendix E-8). Please provide the location of the approximately 660 miles of existing public and private roads that PCGP proposes to use to construct the gas pipeline and/or support its operation. In this updated plan, please delineate these existing public and private roads by ownership as follows: • Private road on land zoned for forest use • Private road on land zoned for agricultural use • Private road on land zoned residential, commercial, and industrial use by Coos, Douglas, Jackson, and Klamath County • Public road owned and operated by Coos, Douglas, Jackson, Klamath County	Maps of access roads proposed for use for construction of the pipeline are included in Appendix B to Part 2 of the JPA (see pdf page 183 and 661 – please note that the same set of maps are provided twice, as their own attachment and as an appendix to the overall Project Description). A list of the roads is included in Table A.8-1 on pdf page 143. Table A.2-6 is in Appendix A.2 to Resource Report 2 (Attachment C of the PCGP JPA package) lists waterbodies crossed by or within 100 feet of temporary and permanent access roads or existing access roads where improvements will be required prior to use. PCGP will provide a revised table A.2-6 is in Appendix A.2 to Resource Report 2 (Attachment C of the PCGP JPA package) that will identify best management practices for waterbodies crossed by or within 100 feet of temporary and permanent access roads.	**<u>Statement Summary</u>: PCGP's response to Comment 22 did not identify the ownership of all the access roads PCGP proposes to use. In the section below, DEQ provides specific examples where ownership is unknown. DEQ requires site-specific, detailed information on road maintenance and road improvement actions PCGP will need to perform to protect water quality when using the more than 660 miles of access roads. DEQ provides the rationale for this information request in the section below as well as examples of the level of required detail. In particular, DEQ refers PCGP to a tool to identify roads that are hydrologically connected to water bodies. Please provide responses to Comment 22 using the examples and guidance provided below.** Information in submittal documents do not include all the information requested in Comment 22 of AIR-1. For example, on Sheet 1 of 55 of Drawing No. 3430.31-Y-Map 1, the specific ownership of the following roads as well as others is not identified: • Logging Spur 6.64R – 7.34R • Carlson Heights Road 7.34R – 7.44R • Willanch Slough 8.44R • Logging Spur 8.17R These are just a few examples among many on PCGP's drawings. Without information on the specific ownership of each road, DEQ cannot evaluate compliance with TMDL allocations as required in OAR 340-048-0042(2). As requested in AIR-1, please delineate these public and private roads by ownership where ownership is unclear. Additionally, PCGP provides only limited information in Table A.8-1 regarding the improvements needed for PCGP to use various access roads for pipeline construction and/or operation. For example, PCGP provides only the following information: requires pothole filling, blading/grading, brush limbing, widening and/or turnouts. As explained using an example in DEQ's review of PCGP's response to Comment 23 below, this information does not tell DEQ that PCGP evaluated these roads for their potential impact to water quality. DEQ is most interested in an assessment of the roads with dirt, gravel, bituminous, and rock surfaces for their potential impact to water quality under different levels of use noted in Table A.8-1. Moreover, given the information provided in PCGP's submittal, many of these road these access roads will experience loads from the following activities: • Haul heavy equipment for road building and improvements to support forest harvesting.

	• Public road on the Umpqua, Rogue-Siskiyou, and Winema-Fremont National Forest • Public road on land in the Bureau of Land Management Coos Bay District, Roseburg District, Medford District, Klamath Resource Area • Public road on Bureau of Reclamation land DEQ will use this information to evaluate compliance with the Section 303 of the Clean Water Act as noted above.	PCGP anticipates submitting the revised table to ODEQ in Q4 2018.	• Provide access to the approximately 300 miles of pipeline alignment for logging trucks and logging equipment to clear the construction right-of-way of vegetation. • Haul logs from the construction right-of-way. • Provide access for truck traffic for reforestation of the construction ROW. • Haul stumps as well as a portion of the slash that will not be left in the 30-foot swath of the 50-foot permanent right-of-way as this right-of-way needs to be clear for periodic vegetation management and future pipeline repairs. • Haul heavy equipment to construct a construction right-of-way that will require the removal of mountain ridgetops in the Coastal and Cascade Mountain Ranges. • Haul rock and soil to disposal sites that PCGP removed from ridgetops to create the permanent right-of-way. • Haul heavy equipment for laying the pipeline. • Haul heavy equipment to rip/subsoil or scarify compacted soil during the restoration of the construction right-of-way. To develop its Certification Decision, DEQ requested and must receive in response to Comment 22 the following: • An evaluation of each access road segment's current condition relative to applicable standards and specifications. • An evaluation of needed improvements to protect water quality as requested in Comment 23 below. This information is critical for DEQ to evaluate PCGP's compliance with Total Maximum Daily Load Implementation Plans of Designated Management Agencies as requested in Comments 15 and 16 noted above. In fact, the Oregon Department of Forestry – a Designated Management Agency – developed a Technical Note 8 to guide the implementation of Forest Practices Act rule that states: *Road drainage must be improved when there is the likelihood of substantial sediment delivery if the drainage system is not upgraded. Inspection of the road drainage on inactive roads prior to active road use is essential. Evidence of potential sediment delivery include the following conditions:* *ROAD USE CHANGING - LIKELY SEDIMENT DELIVERY* • *No cross drain structure (for filtering) within 200 feet of a stream crossing* • *Streams running in roadside ditches* *ROAD USE NOT CHANGING - LIKELY SEDIMENT DELIVERY ON ANY ROAD* • *When gullies (over 100 feet in length) exist in a ditch, or below a cross drain* • *Surface drainage waters flow into cracks on the outside edge of the road*

			• *When more than 30 percent of the road system draining directly to streams or into gullies (a goal for a superior road is 15 percent)* *REPAIRS FOR OLDER ROADS* *When repairing older roads, streams running down ditches need to be put back into the original channel. Other common repairs are adding cross drains for filtering above stream crossings, and installing new cross-drains where gullies have formed in the ditch or at culvert outlets. In general, the information on drainage of new roads as described earlier in this Technical Note are also appropriate for maintenance of older roads. Use any technique that efficiently fixes the problem.* As discussed in more detail in the review of PCGP's response to Comment 15, this information is necessary to ensure compliance Oregon Administrative Rule 629-625-0600. Oregon Department of Forestry uses this Forest Practices Act rule regarding road maintenance to protect water quality by requiring the timely maintenance of all active and inactive roads. ODF uses this rule to comply with Total Maximum Daily Loads and water quality standards as noted elsewhere in DEQ's review. The information request in Comment 22 is essential for evaluating PCGP's practices to protect water quality on PCGP's proposed private access roads as well as proposed public access roads. In Section 2.1.1 of the Transportation Management Plan, PCGP states only the following: *PCGP will obtain landowner agreements for any use of private roads. All conditions agreed to with the landowner must be met by the Contactor for continued use of the road. Where access is not available to Agency lands or Roads, and in cases of private roads of mutual interest, PCGP will coordinate with the appropriate Agency(ies) in the identification and acquisition of access rights related to the right-of-way locations for the Grant and TUP.* At minimum, to formulate a Certification Decision, DEQ must receive and review all private landowner agreements for use of private roads to ensure compliance with Forest Practices Act rules administered to comply with water quality standards as noted above and in DEQ's review of PCGP's response to Comment 15. To protect water quality, these private agreements must include: • PCGP's evaluation of the current conditions of these roads to protect water quality. • PCGP's reconstruction plan – if needed to protect water quality/comply with the Forest Practices Act – to prepare these private forest roads for their proposed use. • PCGP's maintenance plan for these roads once PCGP makes needed improvements to protect water quality.

			To develop the Certification Decision, DEQ requires PCGP to provide specific information on where PCGP will apply specific maintenance actions and when PCGP will apply these actions. This information is required for all the private and public access roads. In preparing AIR-1, DEQ reviewed Table A.2-6 in Appendix A.2 of Resource Report 2. The information in this table does not provide DEQ with a detailed maintenance and improvement plan for the approximately 660 miles of access roads to construct and/or operate this pipeline requested in Comment 24. As noted in the University of Nebraska's/USDA Forest Service's review of forest roads entitled Protecting Soil and Water in Forest Management, road maintenance is critical to protecting water quality. Given the research on roads and water quality, DEQ is most concerned with the dirt, gravel, bituminous, and rock surfaced access roads given their high potential to discharge sediment to waters of the state when under use for forest clearing and pipeline construction as documented elsewhere in DEQ's review of PCGP's response. Additionally, PCGP's table referenced in its response only identifies access road segments within 100 feet of waterbodies. Road conditions and their use beyond 100 feet of waterbodies can affect these waterbodies. PCGP must address all roads hydrologically connected to waterbodies in its pursuit of a Section 401 Water Quality Certification for its proposed activities. To identify objectively these hydrologically connected roads, PCGP may use Geomorphic Road Assessment and Inventory Package (GRAIP) or a comparable analytical tool approved by DEQ. DEQ is very skeptical that PCGP will provide the level of detail DEQ is requesting in AIR-1 in PCGP's update to the information presented in Table A.2-6. For an example of the detail that DEQ is expecting, please see DEQ's review of PCGP's response to Comments 23 and 24 below. This review provides examples of the level of detail DEQ is requesting and expecting to receive from PCGP to develop the Certification Decision.
23	Provide documentation demonstrating that PCGP inventoried these existing roads to identify necessary maintenance actions and needed improvement to protect water quality. The documentation should include (1) the results for the inventory for each road segment and recommended maintenance prescription and (2) the road assessment protocols used to perform this inventory, and (3) the evaluation tool used to assess the surface erosion risk, gully	PCGP will provide a revised Table A.2-6 from Appendix A.2 of Resource Report 2 that will identify best management practices for waterbodies crossed by or within 100 feet of temporary and permanent access roads.	**Summary Statement: Revising the table of proposed BMPs for waterbodies crossed or within 100 feet of temporary and permanent access roads does not address the central concerns expressed in Comment 23. Please refer to DEQ's Summary Statement for Comments 4 and 5. BMPs are a tool to reduce water quality impairment but do not represent a strategy to ensure water quality protection. DEQ requires a comprehensive inventory of temporary and permanent access roads, road inventory assessment protocols, and – most importantly – an analysis of surface erosion, gully formation, landslide potential, crossing failure, and other risks associated with predicted use of temporary and permanent roads. The section below describes a tool to identify roads hydrologically connected to water bodies and examples of detail required to adequately address project impacts. Please address the data request in Comment 23 based on the analysis and examples provided below.** DEQ does not believe PCGP's proposed additions to Table A.2-6 in Appendix A.2 of Resource Report 2 will provide DEQ with the level of detail regarding road maintenance prescriptions as well as road improvements needed to ensure the use of existing access roads will protect water quality. First, the road segments presented in the table reference in PCGP's response (i.e., Table A.2-6) includes only those segments within 100 feet of a waterbodies. DEQ is requesting PCGP's inventory evaluate all existing access roads hydrologically connected to waterbodies. To identify objectively these hydrologically connected roads, PCGP may use Geomorphic Road Assessment and Inventory Package (GRAIP) or a comparable analytical tool approved by DEQ.

	risk, landslide risk, and stream crossing failure risk.		Including these access roads will allow PCGP to assess all the potential impacts on receiving water quality. Secondly, in Comment 23, DEQ did not request that PCGP identify BMPs. DEQ is requesting documentation demonstrating that PCGP conducted an inventory of all existing access roads to evaluate their potential impact to water quality when used by heavy equipment and large truck traffic to construct and operate the gas pipeline. Please provide this information for all access roads hydrologically connected to water bodies. PCGP's evaluation of water bodies crossed by or within 100 feet of access roads is too narrow to protect water quality. To identify objectively these hydrologically connected roads, PCGP may use Geomorphic Road Assessment and Inventory Package (GRAIP) or a comparable analytical tool approved by DEQ To evaluate the effectiveness of PCGP's inventory of existing access roads for potential water quality impacts, DEQ requests the road assessment protocols and the evaluation tool used by PCGP to perform this inventory (e.g., USDA Forest Service Water/Road Interaction Field Guide and the Geomorphic Road Analysis and Inventory Package noted in DEQ's AIR-1). Currently, DEQ cannot evaluate the road assessment protocols and evaluation tool PCGP used to identify road maintenance treatment and road improvements needed for the approximately 660 miles of access roads. PCGP's Table A.8-1 in Part 2 of Appendix B in the Joint Permit Application provides only the following footnotes regarding maintenance needs along the approximately 660 miles of access roads: • Footnote 1: requires potholing filing • Footnote 2: blading/grading • Footnote 3: brush limbing • Footnote 4: widening and/or turnouts These footnotes do not indicate to DEQ that PCGP has inventoried all the access roads or evaluated their potential for water quality impacts. DEQ's goal with this information request is to determine if PCGP is taking proactive measures to protect water quality prior to using access roads. The scientific literature concerning the water quality impacts associated from forest roads is extensive as noted elsewhere in DEQ's review, and there are tools to evaluate the potential for water quality impacts from forest roads. DEQ requires assurance that roads conditions are fully evaluated to identify structural deficiencies that may lead to water quality impairment because of heavy industrial use. Non-paved roads will be a source of sediment delivery to stream unless, if needed, PCGP designs their construction and maintenance to support this proposed level of use.[37] For example, a footnote referring to potential potholes must also address the effect this maintenance action may have on water quality. PCGP must also describe information on the formation of potholes. Did the potholes form due to a soft

[37] Grace III, J.M. and B.D. Clinton. 2007. Protecting Soil and Water in Forest Road Management. USDA Forest Service/University of Nebraska-Lincoln. Faculty Publication Volume 50(5):1579-1584. 2007 American Society of Agricultural and Biological Engineers ISSN 0001-2351

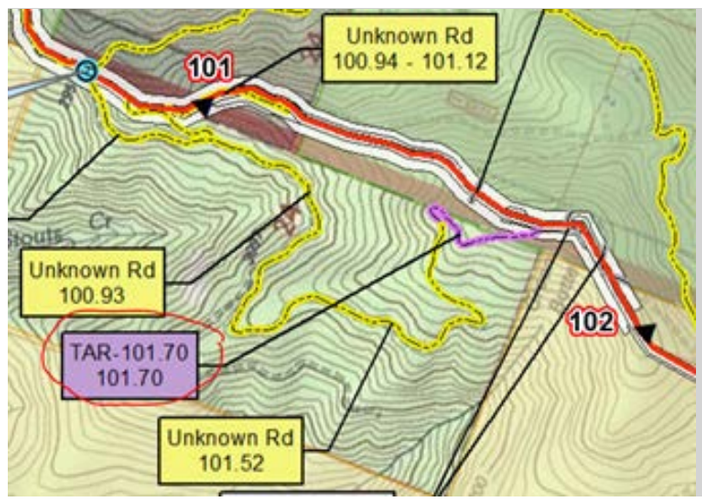
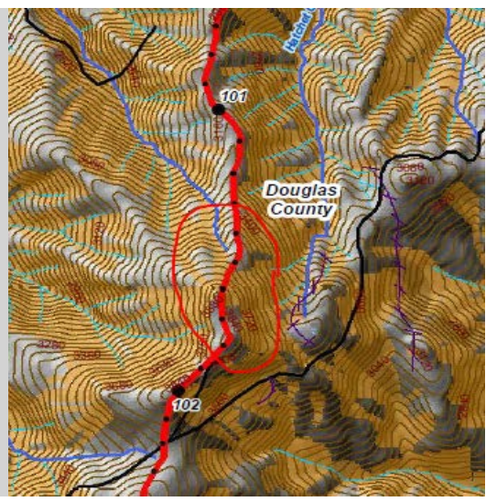
			subgrade and/or poor drainage from a non-paved road surface? Does the gravel road surface need replacement and geotextile fabric reinstalled to improve drainage from the road surface? Further, PCGP should include a strategy for monitoring road conditions, prioritizing maintenance actions, a decision matrix to identify and apply appropriate remedies, post-remedial monitoring, communication, and documentation. The information DEQ is requesting in Comment 23 is essential and necessary to protect water quality and to ensure the construction of this pipeline has the potential to comply with water quality standards. Given the limited budgets in the public and private sectors, deferred road maintenance is common. For example, in its submittal, PCGP notes that certain access roads will need improvements to move equipment into construction right-of-way. If PCGP inventories these access roads using evaluation criteria designed to protect water quality, this inventory will likely identify necessary improvements to achieve the following water quality protections: • Stabilize non-paved road surfaces to prevent sediment discharge into roadside ditches. • Improve stormwater management systems for roads to limit stormwater discharge into water bodies. • Design stable fill and cut slopes particularly for roads experiencing years of deferred maintenance. For example, in PCGP's General Location Map Drawing Number 3430.31-Map 12, Unknown Road 73.70 and Badger Creek Road (BLM 29-5-11) will experience widening in the Tyee Core Area. When these road improvements are evaluated in the context of PCGP's Geologic Hazard Maps (Figures 16 and 17 of 47), DEQ has concerns regarding PCGP's controls for maintaining slope stability when improving these roads. Hearn (2011) summarizes the issues and concerns for improving existing roads on slopes as follows: *Excavation into the hillside may reactivate landslides and trigger new slope failures: widening onto fill will invariably require additional retaining wall construction with considerations of bearing capacity and foundation stability. There may also be issues with stability of previous uncompacted construction spoil that has since become vegetated, giving the appearance of being in situ ground.* *On Balance, if suitable foundations and adequate compaction can be achieved it is preferable to widen onto fill, but each section of road will require its own assessment. If there is any uncertainty over the bearing capacity and foundation stability for walls or stability of natural slopes and fill slopes below the road, then it is preferable to widen into cut. A balance of cut and fill, either in cross-section or over relatively short alignment lengths, is the preferred solution if the cut material is suitable as fill (Section C2). On low-cost improvement schemes, the ease of excavation and the costs and difficulties associated with fill and retaining wall construction usually mean that widening takes place as cut to spoil, frequently to the detriment of slope stability. Engineering geological assessments and ground investigations will be required (Section B) before such important decisions are made.*

			The information PCGP provides in its submittal does not indicate to DEQ that PCGP has considered these complex issues. PCGP provided DEQ their proposed site-specific designs for these road segments in steep and potentially unstable slopes and the technical support for these designs. PCGP will need to provide DEQ information on where specifically (e.g., geo coordinates) PCGP will perform road maintenance actions and when PCGP will perform these actions. Once the inventory requested above is performed, PCGP will also need to provide DEQ with information on where specifically (e.g., geo coordinates) PCGP will improve access roads to protect water quality.
24	Provide a detailed maintenance and improvement plan for the approximately 660 miles of existing roads. This plan must demonstrate that PCGP will implement all maintenance actions and improvements necessary to protect water quality – identified during the road inventory – prior to road use for pipeline construction or operation. This plan must also (1) implement Designated Management Agencies' DEQ-approved TMDL Implementation Plans and (2) comply with maintenance standard, requirements, and/or other design standards developed and used by DMAs to implement these TMDL Implementation Plans.	PCGP is currently working with USFS, BLM, and BOR to provide the necessary information for the federal agencies to issue right-of-way grants for federal lands. An operations and maintenance plan will be prepared if required by the agencies during that process.	***Summary Statement:*** ***Notwithstanding information required for right-of-way grants on federal lands, DEQ requires PCGP to develop a maintenance and improvement plan to address, as authorized by OAR 340-041-0007(7) and OAR 340-048-0042(2), to address water quality impairments from access roads on all public and private lands. Please develop and submit a maintenance and improvement plan consistent with the data requested in Comment 24 and the examples provided in the following section.*** DEQ's request for a detailed maintenance and improvement plan is not contingent upon Federal agencies requiring PCGP to develop a plan. DEQ's authority under OAR 340-041-0007(7) and 340-048-0042(2) require PCGP to develop a maintenance and improvement plan for all public and private project-related roads. DEQ presents the scientific basis for this information request in the references included in DEQ's review of PCGP's response to DEQ's comments noted above. DEQ's administration of Section 303 of the Clean Water Act requires Designated Management Agencies operating under a Total Maximum Daily Load address road management activities including road maintenance. For example, DEQ's Memorandum of Understanding with the USDA Forest Service Pacific Northwest Region presents DEQ's and Forest Service's strategy for controlling point and nonpoint source water pollution and addressing Clean Water Act requirements such as TMDLs. This MOU establishes procedures to implement State and Federal water quality rules. These procedures reference a foundation for action for protecting water quality on U.S. Forest Service lands. This foundation is entitled the *National Best Management Practices for Water Quality Management*.[38] These practices include a section on road operations and maintenance. Moreover, Federal agency Water Quality Management Plans also serve as TMDL Implementation Plans as noted elsewhere in this DEQ review of PCGP's response to AIR-1. These plans may identify roads and their management as sources of nonpoint source pollution to be address in Federal agency actions to implement these plans. The Forest Service and BLM document this fact in the *Forest Service and Bureau of Land Management Protocol for Addressing Clean Water Act Section 303(d) Listed Waters* (May 1999, Version 2.0). For example, the BLM's Water Quality Restoration Plan for the South Umpqua (March 2, 2001) identifies sediment from roads and road encroachment as a key issue for protecting water quality on BLM lands. Similarly, the North Fork Coquille River WQRP (November 2001) identifies roads as creating water quality impacts from increasing peak flows in streams and sediment discharge into streams. This plan states the following as a management action for this WQRP:

[38] USDA Forest Service. 2012. National Best Management Practices for Water Quality Management. Volume I: National Core BMP Technical Guide. FS-990A

			…continuing to decommission, improve, or maintain federally administered roads will reduce the potential fine sediment supply and the potential increases in peak flows. Finally, as noted elsewhere in DEQ's review of PCGP's response to AIR-1, the scientific literature is replete with research documenting that road construction and maintenance has a substantial impact on water quality. With Comment 24, DEQ is exercising its authority to ensure compliance with water quality requirements and standards during the process of developing a Certification Decision. DEQ notes below examples of the level of detail DEQ is requesting in Comment 24. Specifically, DEQ is most interested in the current condition of dirt, gravel, bituminous, and rock surfaced access roads prior to use by PCGP for pipeline construction and operation. For the requested maintenance and improvement plans, DEQ is interested in receiving information on the specific location (i.e., delineated by GPS coordinates) for all the road maintenance treatments PCGP proposes to implement to protect water quality on all access roads that are currently hydrologically connected to waterbodies. This geographical information will allow DEQ to evaluate compliance and more effectively exercise its enforcement authority when ensuring compliance with a Certification Decision. Maintenance treatments could include, for example, the following: • Installation of geotextile fabric for soft and weak subgrades • Installation of a durable surface • Gravel road rehabilitation • Application of dust palliatives • Reshape surface and shoulder • Reshaping entire cross section • Re-establish the out-slope • Re-establish the in-slope and ditch • Removal of high shoulders (secondary ditches) • Reshape and vegetate ditch to prevent erosion • Rock ditches to prevent erosion • Installation of check dams in ditch to prevent erosion • Installation of cross drains to prevent gully formation and sediment discharge in ditches • Relocating road drainage discharge away from steep slopes, headwalls, bedrock hollows, active landslides areas, areas with high potential for rapidly moving landslide

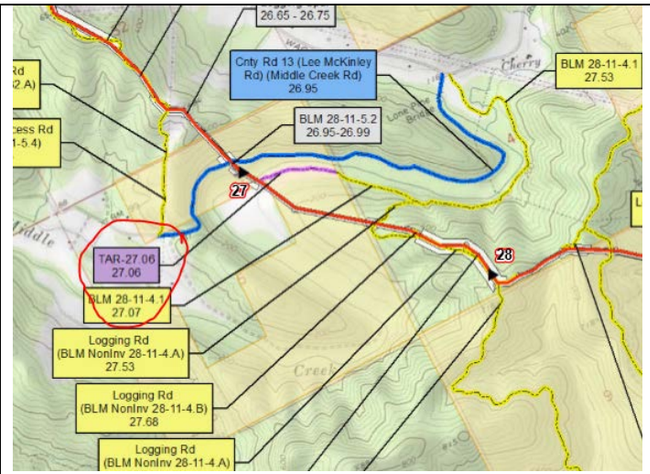
			In issuing treatment prescriptions based on PCGP's road inventory requested in DEQ's review of PCGP's response above, DEQ expects PCGP to provide the detailed maintenance standards and specifications that PCGP will use for all identified treatments.
25	Identify the location of all existing roads that PCGP will use to access the gas pipeline during its operation. Provide a maintenance plan for these existing roads that includes: • A description of the level of use these roads will experience during the pipeline's operation. • A description of the maintenance practices to protect water quality and a schedule for performing these practices and supporting this level of use.	Outside of federal lands, PCGP's use of public roads are not subject to federal licensing or permitting, and therefore no certification is required under Section 401. PCGP is not required under federal or state law to prepare operations and maintenance plans to use public roads. PCGP anticipate employing less than 15 operational staff. The operation traffic will be incidental to the existing traffic on existing road.	DEQ will review all proposed project-related activities that require a federal permit or permits and that may cause or contribute to a discharge to waters of the state. OAR 340-041-0007(7) and 340-048-0042(2) authorize DEQ to require maintenance plans to address discharge from temporary and permanent roadways. This includes permanently maintained access roads to service portions of the pipeline and its aboveground facilities. Given their potential to impact water quality through sediment discharge, DEQ is particularly concerned with the maintenance and operations planning for non-paved PARs when PCGPs uses these roads for pipeline repair and reconstruction given the heavy equipment traffic associated with these activities.
26, 27	Comment 26: Please provide the location of the proposed 25 miles of new Temporary and Permanent Access Roads and the selection criteria used to site these new roads to avoid minimize impacts to water quality. Please delineate these new roads by land ownership (e.g., private ownership on land zoned for forest use) so DEQ can evaluate compliance with Section 303 of the Clean Water Act. Comment 27:	Appendix B in Part 2 (Table 1.2-2 on pdf page 329) provides a table of the ten (10) temporary and 15 permanent access roads by milepost and landownership. There are not 25 miles of Temporary and Permanent access roads; the roads total approximately 2.2 miles (and 5.96 acres), not 25 miles as stated in the comment. They are shown on the maps included in the PCGP JPA (beginning on pdf page 660). Table 2.2-5 (pdf page 1104) lists those temporary and permanent access roads within 100 feet of waterbodies, all of which are located on private	**Summary Statement: DEQ requests that PCGP provide the selection criteria used to evaluate and choose road segments proposed in their application. In particular, DEQ wishes to review the decision-making criteria used to ensure road development would avoid conflicts with streams, wetlands, and waterbodies to the maximum extent practicable. DEQ further requests PCGP conduct an analysis to determine hydraulic connectivity of road surfaces and waters of the state using the analytical tools and the design standards addressed in the following section.** DEQ located the 25 (10 temporary and 15 permanent) segments of new road building proposed for the construction and operation of the pipeline in the maps included in PCGP's Joint Permit Application on pdf page 660. As discussed elsewhere in DEQ's review of PCGP's response to AIR-1, DEQ is requesting the level of detail provided in the examples below to evaluate the impacts of PCGP's proposed new roads to build and operate the pipeline. As noted elsewhere in DEQ's review of PCGP's response, new roads or existing roads do not have to be within 100 feet of a water body to have a potential impact on water quality. PCGP refers DEQ to Table A.2-6 in Appendix A.2 of Resource Report 2 for temporary and permanent access roads crossed by or within 100 feet waterbodies. This scope of analysis and the limited information provided in Table 2.2-5 is inadequate for DEQ to evaluate the potential impacts to water quality. PCGP must evaluate all Temporary and Permanent Access Roads hydrologically connected to water bodies. To evaluate objectively evaluate the impact of these Temporary and Permanent Access Roads on water quality, PCGP may use X-DRAIN or a comparable analytical tool approved by DEQ.

	To ensure these roads will not serve as a source of sediment to and hydromodification of waters of the state and as a source of debris flows into streams from road-related landslides, please include the design standards and specifications for constructing these roads including their drainage systems, cut-slopes, and fill-slopes. Please identify the proposed designs to stabilize fill slopes and cut slopes and manage stormwater on new temporary and permanent roads located on the steep slopes (i.e., slopes greater than 30%) and engineering support for these designs. This information is necessary for DEQ to evaluate compliance with the statewide water quality criteria for road building and maintenance (OAR 340-041-0007)(7) and for ensuring that PCGP uses the highest and best practicable treatment control (OAR 340-041-0007(1).	lands. Four waterbodies will be crossed by permanent access roads, and three of those waterbodies are ditches. Appendix A in Part 2 of the 401 Water Quality Package issued to DEQ on February 6, 2018 outlines PCGP's compliance with all applicable water quality standards and where plans have been developed for the Pipeline to ensure compliance with those standards, including compliance with requirement for TMDLs on federal and non-federal lands. Table A.2-6 is in Appendix A.2 to Resource Report 2 (Attachment C of the PCGP JPA package) lists waterbodies crossed by or within 100 feet of temporary and permanent access roads. PCGP will revise table A.2-6 (Appendix A.2 to Resource 2 – Attachment C of the PCGP JPA package) to identify best management practices for waterbodies crossed by or within 100 feet of temporary and permanent access roads. PCGP anticipates submitting	Without design details and their technical support, DEQ is unable to determine if PCGP is designing new permanent and temporary roads hydrologically disconnected to water bodies by the design of their drainage system. The Oregon Department of Forestry established rules to address drainage from forest roads as highlighted in DEQ's review of PCGP's response to Comment 15 above. ODF developed these rules to comply with water quality standards. The design of a road drainage system and a non-paved road surface, for example, influences the level of sediment delivery into water bodies as discussed elsewhere in DEQ's review of PCGP's response to AIR-1. Moreover, the location of cut and fill slopes and their design can destabilize slopes and lead to the failure of unstable, landslide prone slopes. As noted elsewhere in DEQ's review of PCGP's response, the literature is replete with information demonstrating that linear infrastructure such as roads can cause slope failures leading to landslides and sending debris flows into stream channels. Human-caused debris torrents impact water quality by changing the natural cycles of sediment delivery to stream systems.[39] PCGP has not provided DEQ with the selection criteria PCGP will use to site proposed new roads to avoid impacts to water quality. For example, PCGP directed DEQ to Table 1.2-2 (Temporary and Permanent Access Roads for the Pipeline). In this table, the Temporary Access Road labeled as TAR 101.70 appears to be on both Private and National Forest Land (Umpqua National Forest). This TAR provides an example of DEQ's concerns regarding the siting of these new roads. As shown in the following map excerpts below, PCGP has located TAR 101.70 in a Potential Rapidly Moving Landslide Hazard Area when DEQ compares PCGP's USGS Quad-Based General Location Maps with PCGP's Geologic Hazards Maps:  

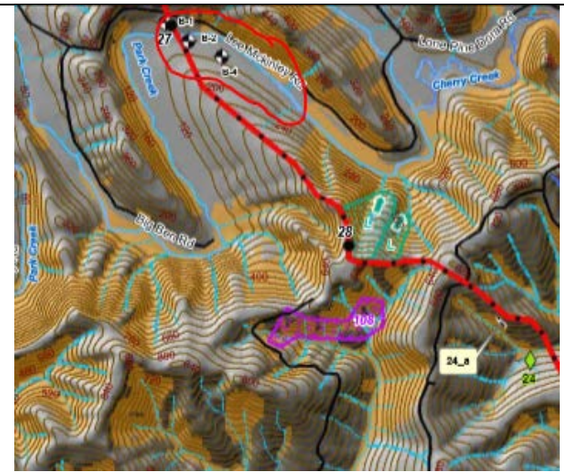
[39] Castro, Janine and Frank Reckendorf. 1995. Effects of Sediment on the Aquatic Environment: Potential NRCS Actions to Improve Aquatic Habitat. Working Paper No. 6. USDA Natural Resources Conservation Service

		the revised table to ODEQ in Q4 2018.	Location of TAR 101.70 near Milepost 102 in Part 2 JPA Appendix B, General Location Maps, Drawing No. 340.31-Y-Map 14, Sheet 27, 55 Area where TAR 101.70 will be located in Resource Report 6, Appendix F, Figure 22 of 47. **Note**: the light brown areas are Potential Rapidly Moving Landslide Hazard As noted in DEQ's review of PCGP's response to Comment 15, the Oregon Department of Forestry uses rules developed under the Oregon Forest Practices Act to comply with Total Maximum Daily Loads and with water quality standards. In ODF's memorandum of understanding with DEQ referenced in DEQ's review above, ODF states that it has adopted water protection rules in the form of BMPs for forest operations "including, but not limited to, OAR Chapter 629, Divisions 635-660." With the limited information that PCGP provides, DEQ is unable to determine if PCGP is complying with the following Forest Practices Act rule (OAR 629-625-0200): ***Road Location*** *(1) The purpose of this rule is to ensure roads are located where potential impacts to waters of the state are minimized.* *(2) When locating roads, operators shall designate road locations which minimize the risk of materials entering waters of the state and minimize disturbance to channels, lakes, wetlands and floodplains.* *(3) Operators shall avoid locating roads on steep slopes, slide areas, high landslide hazard locations, and in wetlands, riparian management areas, channels or floodplains where viable alternatives exist.* *(4) Operators shall minimize the number of stream crossings.* *(5) To reduce the duplication of road systems and associated ground disturbance, operators shall make use of existing roads where practical. Where roads traverse land in another ownership and will adequately serve the operation, investigate options for using those roads before constructing new roads.* Moreover, PCGP has not provided DEQ with any information indicating that it has investigated the constraints associated with the proposed site for TAR 101.70. PCGP has not developed engineering solutions – with associated technical support – to avoid debris flows into East Fork Stouts Creek or the intermittent streams below the fill slope of this proposed road sited in an area identified as hazard for Rapidly Moving Landslides. Hearn 2011 provides techniques for planning new road construction on steep mountainous terrain and include the following as stated in his book: *B1.2.1 New Road Construction* *The techniques listed in Table B1.3 are variously applicable to all project phases, but they offer the greatest application to new road construction projects as an aid to route corridor selection and*

			the development of the engineering design. The order in which the techniques are listed in the table, and described in Section B2-F5, is the approximate order in which they should be applied. *B1.2.4 Road Operation and Maintenance* *During road operation and maintenance, the focus of attention will be directed towards existing cut and fill slopes and the management of drainage. Systematic routine observation, slope monitoring and condition surveys will form the basis of the records necessary for ongoing assessment of slope stability. Field mapping, cross-section survey and ground investigation or monitoring at high-risk site may be required for the reinstatement and remedial works for slopes and section of road that have failed (Part D).* Hearn's recommendations for road construction, operation, and maintenance serve as one of several reasons for DEQ's request for additional information in Comment 26 and 27. Such recommendations and applicable regulatory requirements also serve as the basis for DEQ's information request in Comment 24. Hearn's recommendations provide examples of the information DEQ expects PCGP to provide DEQ when furnishing information on its maintenance plans for both Permanent Access Roads and existing access roads. Since PCGP needs access roads for PCGP's operation of the pipeline and the controlling authorities for these access roads cannot decommission these roads to avoid their associated water quality risks, these roads present potential impacts to water quality that PCGP must address in it 401 Water Quality Certification submittal. As a result, for access roads on steep and/or unstable slopes necessary for pipeline operation, PCGP must provide a maintenance plan that periodically evaluates the influence of these access roads on slope stability and evaluates the need to adjust the road design to help maintain the stability of the slope below and above the PAR. For another example of the lack of information provided by PCGP for proposed PARs and TARs, PCGP proposes to build Temporary Access Road labeled TAR 27.06. This TAR parallels the stream Park Creek and would extend a BLM road (BLM 29.11-4.1 27.53) when County Road 13 is also available to reach the temporary extra work area near Milepost 27. PCGP does not provide information detailing how PCGP will manage drainage from this proposed new access road and the extent, condition, or existence of a vegetated buffer between TAR 27.06 and Park Creek. PCGP does not provide information on the design of the cut slope for this TAR nor indicate with designs and technical support how PCGP will stabilize this cut slope to prevent small slides into the roadside stormwater conveyance system or perhaps prevent larger slides conveying debris flows into Park Creek directly. PCGP does not provide a discussion of the other alternatives to reach this TEWA. PCGP does not provide the rationale for building this new access road nor does PCGP provide the design details for DEQ to evaluate if this design has the potential to protect water quality.

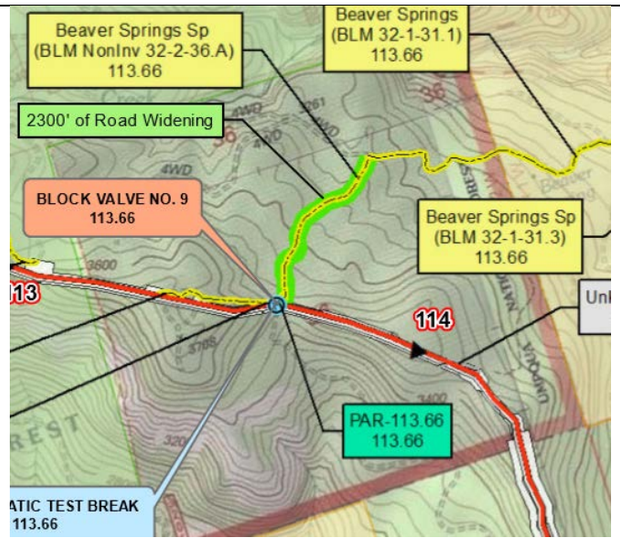


Location of TAR 27.06 near Milepost 27 on the General Location Maps. Drawing No. 3430.31-Y-Map 5, Sheet 6 of 55

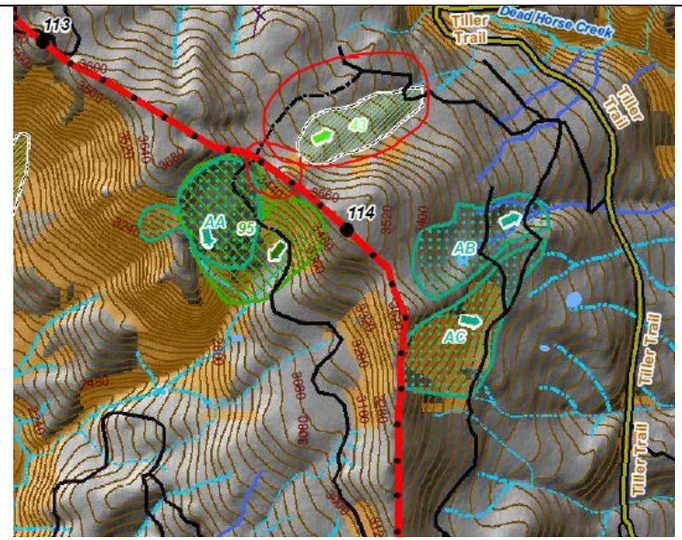


Location of TAR 27.06 near Milepost 27 on the Geologic Hazards Maps. Figure 8 of 47. **Note**: the light brown areas are Potential Rapidly Moving Landslide Hazard

PCGP is proposing to site another proposed new road labeled as PAR-132.66 and shown in the map excerpt below. PCGP proposes to locate this PAR in a Potential Rapidly Moving Landslide Hazard Area. This proposed PAR is also near landslides identified from Aerial Photos and from LiDAR. Moreover, PCGP is proposing to reconstruct BLM's Beaver Springs road (BLM Noninv 32-2-36.A) by widening it. According to PCGP's Geologic Hazard Map, this BLM road identified for widening is located above a landslide area that drains to intermittent stream discharging into Dead Horse Creek. PCGP has not provided DEQ with design information regarding the need for the creation of fill slopes for this proposed new road in an area with unstable slopes. PCGP has not provided DEQ with design information for the reconstruction of the BLM road above unstable slopes. Has PCGP conducted a geotechnical investigation of this road-widening project? If performed, does this geotechnical investigation indicate the need for reinforced fill for this road-widening project? Where will PCGP discharge the post-construction stormwater for this PAR? Given the lack of design details, these questions surface for DEQ while reviewing PCGP's submittal.



Location of PAR-113.66 and the reconstruction of BLM Noninv 32-2-36.A. Drawing No. 340.31-Y-Map 14, Sheet 32, 55



Location of PAR-113.66 and Proposed Road Reconstruction relative to landslide features. Figure 25 of 47. **Note**: the light brown areas are Potential Rapidly Moving Landslide Hazard

As discussed in DEQ's review of PCGP's response to Comment 15, the management of stormwater discharge and the design of cut and fill slopes are important engineering considerations when constructing roads on steep and unstable slopes. The intent of DEQ's request for information on PCGP's selection criteria is to evaluate PCGP's efforts to minimize impacts to water quality from debris flows during new road construction. As noted below, PCGP should analyze the various options for accessing sections of the pipeline alignment for construction and operation as part of its efforts to address the National Environmental Protection Act requirements and, based on this analysis required by NEPA, determine the need to build new roads such as TAR 101.70 discussed above. To evaluate PCGP's efforts to avoid and minimize impacts to water quality, DEQ is requesting that PCGP provide its selection criteria for determining the need and location of TARs and PARs that PCGP used in its alternative analyses to comply with NEPA.

DEQ is highlighting the information below to provide PCGP with an example of the level of detail DEQ is anticipating in PCGP's revision of Table A.2-6. DEQ requests this detailed information to evaluate PCGP's compliance with Clean Water Act requirements such as Total Maximum Daily Loads. For example, as noted above, the Forest Service and Bureau of Land Management use Water Quality Restoration Plans to comply with Clean Water Act requirements concerning nonpoint source pollution and Total Maximum Daily Loads. The BLM's Water Quality Restoration Plan for the Elk Creek

			Watershed applies to a portion of the pipeline where PCGP is proposing to place the pipeline alignment. Forest Service and BLM Roads are within the Elk Creek Watershed. In its WQRP, BLM identifies sediment input from roads as the primary human-caused sediment source from BLM-administered lands in the plan area and an influence on channel morphology with effects on stream temperature. BLM's restoration goals in this plan include: • Reduce road densities. • Maintain and improve road surfacing. • Minimize future slope failures through stability review and land reallocation if necessary. To achieve their restoration goals when roads are an element, BLM and the Forest Service have manuals and handbooks for locating new roads, engineering road construction/reconstruction, and conducting road maintenance. These technical manuals and references are the tools and strategies the Forest Service and BLM use to implement their WQRPs and, consequently, comply with TMDLs issued by DEQ. As noted elsewhere in this review, TMDLs are DEQ's plan to ensure a water body impaired by pollutant discharge ultimately achieves water quality standards. For example, the Forest Service Manual states: *Perform route or site selection, location, geotechnical investigation, survey, and design to a technical level sufficient for the intended use of the facility, the investment to be incurred, and the affected resource values.* *Ensure that road preconstruction activities receive peer reviews, and that the adequacy of road designs and cost estimates is attested to in writing by qualified engineers.*[40] In the Forest Service Handbook 7709.56 on Section 22.2 (Location Marking), the Forest Service provides the following directive for determining the location of a proposed road: *22.1 - Initial Field Examination* *Make an on-the-ground examination of the corridor in which the road is to be located.* *Verify the control points, critical areas, and resource and management direction identified in the applicable environmental, logging system, travel analysis, and transportation analysis documents and during the office location studies. Identify and document features within or adjacent to the corridor that would affect previous and subsequent decisions.*

[40] USDA Forest Service. 2014. Chapter 7720 – Transportation System Development. Forest Service Manual 7700 on Transportation Management

			If possible, document these features on maps and photos. Consult with appropriate specialists and land managers to resolve conflicts or address specific problems. *22.2 - Location Marking* *Using information from the office location studies and the initial field examination, mark road locations on the ground that conform to those identified on the maps and photos that are compatible with the design criteria and other management direction. It may be necessary to mark more than one location of a road or road segment, especially in the vicinity of critical areas such as topographic features affecting logging systems, landing locations, riparian areas, intersections, switchbacks, and private land. If a new NEPA document is being produced, these alternative locations will be analyzed for effects, according to FSH 1909.15, section 15.41* As noted in this reference, the National Environmental Policy Act influences the selection of the road location and this influence by NEPA is detailed in the Forest Service Handbook as follows: *15 - ESTIMATE EFFECTS OF EACH ALTERNATIVE* *Effects and impacts as used in these regulations are synonymous. Effects includes ecological (such as the effects on natural resources and on the components, structures, and functioning of affected ecosystems), aesthetic, historic, cultural, economic, social, or health, whether direct, indirect or cumulative. Effects may also include those resulting from actions which may have both beneficial and detrimental effects, even if on balance the agency believes that the effect will be beneficial. (40 CFR 1508.8(b))* *For each alternative considered in detail, analyze and document the environmental effects, including the effectiveness of the mitigation measures that would result from implementing each alternative, including the no-action alternative*.[42] This required analysis for locating a new road on National Forest Land would provide DEQ with specific BMPs and the level of detail DEQ is seeking to evaluate PCGP's selection a location for a TAR and PAR. DEQ is seeking this information to evaluate PCGP's efforts to protect water quality and comply with TMDL and other Clean Water Act requirements. This represents the level of detail DEQ is expecting from PCGP as they respond to Comment 26 and 27. DEQ's request for more detail on the practices PCGP will employ and engineering PCGP will use to protect water quality is consistent with and supportive of the NEPA process. PCGP should be supporting this NEPA process during its

[41] USDA Forest Service. 2011. Chapter 20 – Road Location. Forest Service Handbook 7709.56 on Road Preconstruction Handbook WO Amendment 7709.56-20111-1

[42] USDA Forest Service. 2012. Chapter 10 – Environmental Analysis. Forest Service Handbook 1909.15 on National Policy Act Handbook 1909.15-2012-3

			application to Federal Energy Regulatory Commission to construct and operate this gas pipeline. Given this NEPA requirement, PCGP should have developed selection criteria for choosing both the need for and the location of new access roads for pipeline construction and operation to minimize impacts to water quality among other concerns as discussed above in DEQ's review of PCGP's response to Comment 26.
28	Additionally, please provide detailed best management practices and design standards for decommissioning the Temporary Access Roads.	Best management practices for construction of temporary and permanent access roads are contained in the Erosion Control and Revegetation Plan in Attachment A, Appendix B.1 of the PCGP JPA package.	**<u>Summary Statement</u>:** The **Erosion Control and Revegetation Plan does not provide site-specific plans describing how PCGP will decommission temporary roads. PCGP should also address how road closures will comply with applicable TMDL Implementation Plans. Please provide site-specific plans for achieving these objectives as described more fully in the following section.** Unused and unmaintained roads are a source of sediment and debris flows into waterways.[43, 44, 45] For this reason, DEQ is requesting that PCGP provide DEQ with the specific road decommissioning treatments for each Temporary Access Road. DEQ reviewed PCGP's Erosion Control and Revegetation Plan and can find no design details and technical support these details in this plan. PCGP has not clearly detailed how PCGP will specifically decommission the 10 segments of Temporary Access Roads. Moreover, DEQ can find no discussion of how PCGP will treat closed Forest Service, BLM, Bureau of Reclamation, Private, and/or County roads that PCGP's project activated for the sole purpose of constructing the pipeline. The Forest Service, BLM, and ODF's Forest Practices Act Program have specific requirements concerning road decommissioning developed, in part, to address water quality impairments from nonpoint source pollution and comply with Total Maximum Daily Loads. In reviewing their requirements along with PCGP's Erosion Control and Revegetation Plan, PCGP has not clearly addressed the decommissioning or closing requirements of these TMDL Designated Management Agencies. To develop its Certification Decision, PCGP must provide DEQ the site-specific details for how it will decommission all Temporary Access Roads as well as close access roads that PCGP's project opened to build this pipeline. Evaluating compliance with Section 303 of the Clean Water Act is a requirement for developing DEQ's Certification Decision. PCGP must demonstrate that a road no longer in use for pipeline construction and/or operation will not become a source of sediment and debris flows into water bodies. As noted above in DEQ's review of PCGP's response to Comment 24, 26, and 27, road closures are often a goal of an agency Total Maximum Daily Load Implementation Plan. The Forest Service defines road decommissioning as "activities

[43] Swanston, D.N. and Frederick J. Swanson. 1976. *Timber Harvesting, Mass Erosion, and Steepland Forest Geomorphology in the Pacific Northwest*. In Geomorphology and Engineering. Dowden, Hutchinson and Ross Editors.

[44] Wolfe, Mitchell Dean. 1982. *The Relationship between Forest Management and Landsliding in the Klamath Mountains of Northwestern California*. Earth Resources Monograph 11, USDA Forest Service Region 5

[45] Elliot, William J. and Laurie M. Tysdal. 1999. *Understanding and Reducing Erosion from Insloping Roads*. Journal of Forestry. 97(8):30-34

			that result in the stabilization and restoration of unneeded roads to a more natural state.[46] As noted in DEQ's review above, the Forest Service uses the Forest Service Manual and Handbook to implement Water Quality Restoration Plans in its efforts to comply with TMDLs. According to this manual, the only road management option for temporary roads is decommissioning. The Forest Service Manual identifies the following five road decommissioning treatments that may be used in combination depending on the particular site: • Blocking entrance • Revegetation and water barring • Removing fills and culverts • Establish drainage ways and remove unstable road shoulders • Full obliteration by recontouring and restoring natural slopes[47] For private forest roads regulated under Forest Practices Act rules, the requirements for vacating these roads are as follows: ***Vacating Forest Roads*** *(1) The purpose of this rule is to ensure that when landowners choose to vacate roads under their control, the roads are left in a condition where road related damage to waters of the state is unlikely.* *(2) To vacate a forest road, landowners shall effectively block the road to prevent continued use by vehicular traffic, and shall take all reasonable actions to leave the road in a condition where road related damage to waters of the state is unlikely.* *(3) Reasonable actions to vacate a forest road may include removal of stream crossing fills, pullback of fills on steep slopes, frequent cross ditching, and/or vegetative stabilization.* *(4) Damage which may occur from a vacated road, consistent with Sections (2) and (3) of the rule, will not be subject to remedy under the provisions of the Oregon Forest Practices Act.*[48] As noted elsewhere in this DEQ review, the Oregon Department of Forestry uses the Forest Practices Act rules to comply with Total Maximum Daily Loads and water quality standards. Jordan Cove must provide DEQ with the site-specific designs and specification for each segment of road that Jordan Cove will decommission after terminal and pipeline construction.
29	DEQ has not completed this review at this time but will consult in the future with other	JCEP and PCGP are actively working with the respective agencies to obtain approvals	**<u>Summary Statement</u>: PCGP's Resource Report 1 describes excess material generated during development as "construction debris", which meets the definition of "demolition and construction materials" found in ORS 459.005(24).**

[46] 36 Code of Federal Regulations §212.1
[47] USDA Forest Service. 2001. 7712.11 – Exhibit 01, Chapter 7710 – Transportation Atlas, Records, and Analysis. Transportation System, FSM 7710-2001-3
[48] Oregon Administrative Rules 629-625-0650

	DEQ programs and other state agencies concerning compliance with other state statutory requirements such as: • Oregon Revised Statute 468B.035 and 105 (Enabling Legislation for Implementing the Coastal Zone Amendments and Reauthorization Act) • ORS 783.620 through 640 and 783.990 through 992 (Ballast Water Management Law) • ORS 466.020, 075, 105, and 195 (Hazardous Waste Management Law) • ORS 196.795 through 990 (Removal-Fill Law) • ORS 496.172 – 496.192 (Oregon Threatened and Endangered Species Act) • ORS 496.012, 496.138, and ORS 506.109 o Fish and Wildlife Habitat Mitigation Policy o In-water Timing and In-water Blasting Permits o ORS 509.585 (Fish Passage Requirements) o ORS 498 (Fish Screening)	outlined to the extent required by law. There are no landfills associated with the PCGP, therefore, ORS 459.005 is not applicable.	PCGP's submittal for a Section 401 Water Quality Certification references in several locations PCGP's plan to identify several disposal sites along the pipeline right-of-way. DEQ is providing PCGP excerpts below of these references to disposal sites. Please review your submittal and revise it to reflect PCGP's most current intent on managing the solid waste from the pipeline construction and operation. Without these revisions, DEQ will assume PCGP will develop and use disposal sites for construction debris. References to proposal sites in PCGP's submittal will require a Construction and Demolition Landfill Permit during the development of DEQ's Certification decision. **1. Overburden and Excess Material Disposal Plan, page 2 and Attachment A, Table 1** **2.3 PERMANENT DISPOSAL LOCATIONS** At permanent disposal sites, excess material will be deposited and treated in a manner that will be agreed upon with the corresponding federal land-managing agencies. PCGP will provide a Site Development and Reclamation Plan that will include surveyed drawings of the permanent disposal sites that identify the storage location of material based on material type and material size for agency approval. The disposal drawings will also show any temporary and/or permanent erosion control measures that may be required. Attachment B – Typical 1 shows the information that would be included in the sample quarry drawing for permanent disposal sites. **Attachment A** **Table 1** **Rock Source and Disposal Sites Identified for Construction of the Pipeline Project on Federal Lands**

Rock Source and/or Permanent Disposal Sites	Size (acres)	Pipeline MP location	Purpose	Jurisdiction	Land Use	Permanent/ Temporary Use	Vegetation	Access
Douglas County								
Signal Tree Road Quarry – Sec. 3 (3430.26-X-0004)	1.22	45.86	Rock source and overburden disposal; spoil storage, staging	BLM-Roseburg district	Quarries	Permanent or Temporary	Industrial, Douglas fir-W, Hemlock W., red cedar (regenerating)	Upper Signal Tree (BLM 28-9-35) 45.85 - 45.92 (3430-31-Y-008)
Signal Tree Road Quarry – Sec. 35 (3430.26-X-0002)	1.09	47	Rock source and overburden disposal	BLM-Coos Bay district	Quarries	Permanent or Temporary	Industrial, Douglas fir-W, Hemlock W., red cedar (regenerating)	Upper Signal Tree (BLM 28-9-35) 45.85 - 45.92 (3430-31-Y-008b)
Weaver Road Quarry Site 1 (3430.26-X-0003)	1.62	47	Rock source and overburden disposal	BLM-Coos Bay district	Quarries	Permanent or Temporary	Industrial, Douglas fir-W, Hemlock W., red cedar	Weaver Road (BLM 28-8-18) 42.03 – 42.50 (3430-31-Y-008b)
Weaver Road Quarry Site 2 (3430.26-X-0003)	1.30	47	Rock source and overburden disposal	BLM-Coos Bay district	Quarries	Permanent or Temporary	Industrial, Douglas fir-W, Hemlock W., red cedar	Weaver Road (BLM 28-8-18) 42.03 – 42.50 (3430-31-Y-008b)
Signal Tree Quarry Site – Sec. 15 (3430.26-X-0005)	1.75	47	Rock source and overburden disposal	BLM-Roseburg district	Quarries	Permanent or Temporary	Industrial, Douglas fir-W, Hemlock W., red cedar	Lower Signal Tree (BLM 29-9-36.0) 46.51 (3430-31-Y-008)
TEWA 79.85-N (BLM Quarry Site) [1]	3.61	79.85	Overburden disposal, PI, spoil storage, log landing, steep slope staging	BLM-Roseburg district	Transportation, communication, utilities corridors, regenerating evergreen forest land; quarries	Permanent or Temporary	Roads, corridors, Douglas fir dominant - mixed conifer	Pack Saddle Road (BLM 29-4-17) 79.89 - 80.42 & Construction Right-of-Way (3430-31-Y-013)
Hatchet Quarry MP 102.30 (3430.26-X-0018)	2.00	102.30	Log (mitigation) storage	FS-Umpqua	Strip mines, quarries, gravel pit and evergreen	Permanent	Industrial	FS 3220000 (3430-31-Y-016c)

	o ORS 497.298 (Scientific Taking Permit) • ORS 537 (Water Rights Law) • ORS 197 (Oregon Land Use Planning Law) • ORS 390.235 (Permits for Removal of Archaeological or Historical Material) • ORS 569 (Weed Control Law) • ORS 527 (Forest Practices Act) At this time, please provide applications for Construction and Demolition Landfill Permits required under Oregon Revised Statute 459.005 through 418 (Solid Waste Management Law) for the several proposed disposal sites associated with the construction or operation of the gas pipeline.		**2. Sanitation and Waste Management Plan, page 4** **8.0 ROCK REMOVAL/EXCESS OVERBURDEN** FERC's Upland Plan requires the removal of excess rock from the top 12 inches of soil to the extent practicable in all rotated and permanent croplands, hayfields, pastures, residential areas, and other areas as agreed between landowner and PCGP. In these areas, PCGP will clean up excess rock to a condition similar to adjacent portions of the construction right-of-way (e.g., size, density, and distribution of rock) unless the landowner and PCGP negotiate different stipulations. Excess rock and spoil materials will be redistributed along the construction right-of-way in upland areas during restoration regrading in a manner that reflects the original contours and preconstruction drainage patterns. Excess materials will be disposed of in existing quarries and in permanent disposal sites that have been identified along the construction right-of-way. Appendix Q to the POD provides PCGP's Overburden and Excess Material Disposal Plan which describes how these materials will be stored and disposed of on federal lands. (Table A.8-4 in Appendix A.8 to Resource Report 8 of PCGP's Certificate application also identifies the permanent disposal areas that will be located on private lands.) Large rock may be provided to the federal land-managing agencies to be used for instream restoration projects and habitat features. Large rocks and boulders may also be used as OHV barriers along the right-of-way and at road crossings to block access at OHV points to restrict traffic on the right-of-way as described in the Recreation Management Plan (Appendix S to the POD). Additionally, large rocks and boulders may be piled in upland areas along the construction right-of-way to create habitat diversity features where approved by the EI or PCGP's authorized representative and the landowner or land-managing agency. The use of alternate disposal locations will be approved by FERC and, if on federal lands, the respective land-managing agency. **3. Resource Report 1, General Project Description, page 61**

			Excess Rock Removal. FERC's Upland Plan (see Section V.A.3) requires the removal of excess rock from the top 12 inches of soil in cultivated or rotated croplands, hayfields, pastures, residential areas, and other areas at the landowner's request. PCGP will comply with FERC's Upland Plan. In these areas, PCGP will clean up excess rock to a condition (size, density, and distribution) similar to adjacent portions of the construction right-of-way. In rangeland, forestlands, or other non-agricultural or residential lands where shallow bedrock is encountered and rock excavation is required, excess rock will be buried in cuts during restoration to reestablish approximate original contours and scattered across the right-of-way and TEWAs according to landowner agreements. Where excess rock requires disposal, PCGP will consider this material construction debris. The disposal sites have been identified in Resource Report 8, and PCGP will obtain the appropriate approvals prior to use. As noted above, excess rock may be incorporated into habitat diversity structures and stacked or piled along the right-of-way to provide wildlife habitat diversity features to benefit mammals, birds, reptiles, amphibians, and the prey base they depend upon. These habitat features would be created within the Pipeline's certificated construction limits where approved by the EI or PCGP's authorized representative and the landowner or land management agency. These features are also included in Section 10.14 of the ERCP (see Appendix B.1).
31	In compliance with OAR 340-041-0007(8), please provide for DEQ review and approval the resource and land management plans, guidance, design standards, design manuals, access permits or grants, and other programs from the U.S. Bureau of Reclamation that Pacific Connector Gas Pipeline will use to protect water quality during the following: • Siting Temporary and Permanent Access Roads and the construction/permanent right-of-way on U.S. Bureau of Reclamation land, over BOR water-bearing infrastructure (e.g.,	Please refer to the Response to #17. The Klamath Project Facilities Crossing Plan (Appendix E.3 to Part 2 of JPA), which is specific to BOR facilities, is under review as part of the POD and, once approved, would be implemented as part of the Right-of-Way Grant. PCGP is currently working with BOR to provide the necessary information for the federal agencies to issue right-of-way grants for federal lands. An operations and maintenance plan will be prepared if required by the agencies during that process. Proposed amendments and changes to existing BOR resource and land management plans are not	**<u>Summary Statement</u>: Amendments to federal plans that authorize new or modify existing discharge to waters of the state are considered federal authorizations and are, therefore, subject to review by states under Section 401(a) of the Clean Water Act. DEQ requests PCGP identify any proposed amendments and changes to existing BOR resource and land management plans as more fully described in the following section.** See also DEQ's response to Comment 18, above, for related responses to Comment 31. The U.S. EPA is currently reviewing DEQ's Upper Klamath and Lost River Total Maximum Daily Load first issued in May 2010. In this TMDL, DEQ address the impairment of a number of creeks segments by sedimentation and impairment of water bodies by nutrients including nutrient discharge via sediment as follows as follows: *DEQ is not developing a TMDL for a number of creek segments impaired by sedimentation or for biological criteria (Table 1-3). At the time of the writing of this TMDL, DEQ is in the process of developing a sedimentation assessment methodology that could be used for implementing the narrative sedimentation standard and possibly the biological criteria impairment, as well. When the methodology and associated guidance is completed, the agency will establish sedimentation TMDLs for those waterways on the 303(d) list. (page 11)* Given these pending TMDL actions, DEQ is requesting specific information from PCGP in the form of road design standards and specifications, road maintenance standards and specification, and – if appropriate – the technical support for these engineering designs. DEQ is requesting specific information from PCGP in the form of design standard and specification and engineering designs with their technical support for treating stormwater discharge from the pipeline's permanent right-of-way to BOR operated water conveyance structures connected to waters of the state.

	canals), or paralleling this infrastructure. • Maintaining both Temporary and Permanent Access Roads for pipeline construction and operation. • Siting other components necessary to construct and operate such as staging areas, material storage areas, and other components (e.g., compressor stations, metering stations) of the pipeline. • Installing the construction and permanent right-of-way for the gas pipeline. • Operating the permanent right-of-way for the pipeline. Please identify any proposed amendments and changes to existing BOR resource and land management plans and other documents noted that are necessary to construct, use, or maintain access roads and the permanent right-of-way on BOR land.	prerequisites for issuing a 401 Water Quality Certification.	DEQ reviewed the Klamath Project Facilities Crossing Plan referenced in PCGP's response to Comment 31 and finds the following information gaps relevant to DEQ's Comment 31: • Information on how PCGP will manage all BOR access roads (including the 25 Permanent and Temporary Access Roads) while in use to construct and operate the pipeline such as the: o Inventory method PCGP uses to evaluate the current condition of existing BOR roads and current capacity to protect water. o Need for maintenance treatments prior to use by PCGP based on the inventory discussed above. o Design standards and specifications for reconstruction that PCGP will use to ensure PCGP improves these access roads if the above inventory identifies needed improvements to protect water quality under the proposed use (e.g., durable surfacing for non-paved roads, cross drains etc.). o If applicable, design standards and specifications that PCGP will use to ensure PCGP constructs proposed Permanent Access Roads and Temporary Access Roads to protect water quality. o Standards and specifications for maintenance that PCGP will use to ensure existing and proposed new BOR. • Information on the selection criteria PCGP used to site the proposed PARs and TARs on BOR land if applicable. • Information provided to BOR in a Use Authorization Application and the Application for Transportation and Utility Systems and Facilities on Federal Lands as described in the directions for this application and highlighted below in DEQ's review of PCGP's response to Comment 31.[49, 50, 51] • Information referenced in Section 6.0 (Environmental Considerations) of the Crossing Plan that is relevant to Plans of Development (e.g., Transportation Management Plan, Erosion Control and Revegetation Plan) but lacking sufficient information for DEQ to use in its Certification decision as noted above in DEQ's review of PCGP's response to DEQ's comments in AIR-1 (e.g., Comment 15). • Information on the designs standards and specifications as well as engineering designs PCGP will use to construction stormwater treatment controls for the post-construction stormwater discharge to the BOR water conveyance structures connected to waters of the state. DEQ needs to review all easements, agreements, access/right-of-way grants, authorizations, and permits that are established to construct and operate this pipeline on all federal and nonfederal land. DEQ's receipt of this requested information and its evaluation by DEQ is required under OAR 340-048-0042(2) while developing a Certification Decision. DEQ will review and evaluate all final designs as well as standards and specifications – such as those referenced in the Klamath Project Facilities Crossing Plan and associated design package – as part of the required Certification Decision.

[49] Standard Form 7-2540 (09/30/2015). Bureau of Reclamation Use Authorization Application. OMB Control No.: 1006-0003

[50] Standard Form 299 (Revised 5/2009). Application for Transportation and Utility System and Facilities on Federal Lands. Prescribed by DOI/USDA/DOT under Public Law 96-487 and Federal Register Notice 5-22-95

[51] USDI Bureau of Reclamation Website. Last Updated 10/18/17. What do I have to do to apply?

			At minimum, DEQ anticipates receiving the information PCGP provides in response to the application requirements in BOR's use authorization application and the application for transportation and utility systems and facilities. DEQ provides examples below of the minimum level of detail DEQ is seeking from PCGP that BOR initially requires when an entity seeks to use BOR land, resources, and facilities. Depending on the potential level of impact to water quality, this minimum level of information may not be sufficient to develop a Certification Decision. However, the information provided in PCGP's submittal to date lacks the level of detail required for a BOR use authorization application and an application for transportation and utility system and facilities. For timber harvesting, removal of commercial forest products, and use of BOR roads, the BOR Use Authorization Application requests the following information: *4. Location of the proposed use. Submit two copies of all maps or drawings and other information clearly demonstrating the location for the proposed use, including township, range, and section. Under 43 CFR 429.13(a), Reclamation may request additional information needed to process your application, such as legal land descriptions and detailed construction specifications.* 5. *Description of the proposed use. Examples of additional information to provide, depending upon the use, are as follows:* *• maximum number of anticipated participants/spectators/crew;* *• number and types of vehicles to be on site;* *• description of props, tents, tractors, trailers, and other equipment;* *• description of facilities you intend to provide, such as sanitation facilities, emergency personnel, food services or vendors, or other applicable information (attach plans); and* *• description of your intended use of Reclamation on-site roads or trails.* In its Application for Transportation and Utility System and Facilities on Federal Lands, for example, BOR will require or has required the following from PCGP for its proposed pipeline and roads: *7. Project description (describe in detail): (a) Type of system or facility, (e.g., canal, pipeline, road); (b) related structures and facilities; (c) physical specifications (Length, width, grading, etc.); (d) term of years needed: (e) time of year of use or operation; (f) Volume or amount of product to be transported; (g) duration and timing of construction; and (h) temporary work areas needed for construction (Attach additional sheets, if additional space is needed.).* *13. a. Describe the reasonable alternative routes and modes considered.* *b. Why were these alternatives not selected?*

			SPECIFIC INSTRUCTIONS (Items not listed are self-explanatory) *7. Attach preliminary site and facility construction plans. The responsible agency will provide instructions whenever specific plans are required.* *13. Providing information on alternate routes and modes in as much detail as possible, discussing why certain routes or modes were rejected and why it is necessary to cross Federal lands will assist the agency(ies) in processing your application and reaching a final decision. Include only reasonable alternate routes and modes as related to current technology and economics.* Consistent with DEQ's comments in AIR-1 and its review of PCGP's response to AIR-1, DEQ will need to know if PCGP inventoried/investigated the current condition of BOR roads for their proposed use. As noted elsewhere in this review, this inventory is important to evaluate potential impacts to water quality from this proposed use. PCGP can use the Geomorphic Road Inventory and Assessment Package (GRAIP) or a comparable analytical tool if approved by DEQ to perform this inventory. DEQ will also need to know that PCGP uses this inventory/investigation to identify maintenance treatments or road improvements necessary to protect water quality. Finally, DEQ anticipates that BOR will provide PCGP with the design standards and specifications applicable to BOR road maintenance, reconstruction, and construction projects. If DEQ provides these design standards and specifications, DEQ will review and – if needed – make modifications and addition to these during the development of a Certification Decision. If BOR does not provide these standards and specifications, DEQ expects PCGP to propose road maintenance, reconstruction, and construction standards and specification for DEQ review and approval.
32	The scope of work in Pacific Connector Gas Pipeline's August 31, 2017 Thermal Impacts Assessment suggests that PCGP evaluated only stream crossings for their potential to influence or regulate thermal properties of streams. • An analysis of the impacts from the 50-foot setbacks from waterbodies in riparian areas currently	The most recent version of the Draft Thermal Impact Assessment plan was provided to ODEQ as Attachment C / Appendix Q.2 of 404-10 JPA Part 2 provided as Appendix B of 2/6/18 401 WQ Package. PCGP is assessing all areas that may fall within riparian areas (one site potential tree height) that are outside the stream crossings listed in the Thermal Impact Assessment. Following receipt of ODEQ's comments on the Thermal	Please provide DEQ with an estimated schedule for the revision to the thermal analysis. PCGP should identify all the impacts to riparian vegetation that PCGP did not consider in its August 31, 2017 draft Thermal Impact Assessment. PCGP should also account for the effects of all cleared areas (e.g., TEWA, parallel stream-pipeline alignment, etc.) that were not previously included in the thermal load analysis.

	proposed for the Temporary Extra Work Areas. • An analysis of the impacts from siting the pipeline alignment within riparian areas as close as 15 feet from streams as currently proposed when paralleling these waterbodies. • An analysis of the impacts from siting Temporary and Permanent Access Roads, Staging Areas, material storage area, and other pipeline components (e.g., compressor stations, metering stations) within riparian areas. DEQ is requesting this clarification because the scope of work from the Thermal Impacts Assessment suggests that the estimate of solar loading for stream crossings under both the construction (i.e., 75-95 foot wide) corridor and the permanent (i.e., 30-foot wide) corridor using the Shade-A-Lator tool did not consider the impact of these TEWAs. The use of TEWAs during pipeline construction extends the construction corridor beyond 75 and 95 feet. Currently, the Pacific Connector Gas Pipelines	Impacts Assessment, updates or revisions to the assessment will be completed at that time.	

	proposes to site TEWAs 50 feet from waterbodies as noted in the comment above. In addition, the scope of work in this assessment does not indicate PCGP evaluated the influence on stream thermal properties when the pipeline's construction and permanent corridor closely parallels streams and comes within 15-feet or less of these streams. For a comprehensive analysis of PCGP's compliance with the temperature standard, PCGP's Thermal Impact Assessment must also evaluate these impacts as well as other impacts (e.g., roads, staging areas etc.) as requested in the comments above on compliance with Section 303 of the Clean Water Act.		
33, 34, 35, 36	Comment 33: In compliance with OAR 340-041-0007(1) and (7), please provide a post-construction stormwater management plan addressing DEQ's *Section 401 Water Quality Certification Post-Construction Stormwater Management Plan Submission Guidelines* for all the road	The JCEP 401 Water Quality Memorandum (Part 1) and PCGP 401 Water Quality Summary Table (Part 2, Appendix A) in the application specifically address project compliance with Oregon water quality standards.	**Summary Statement: The responses provided by PCGP do not fully address the information requested by DEQ. Please provide the information requested in Comments 33 through 36 and more fully described in the following section. See also DEQ's Summary Statements related to Comments 4, 5, and 15 for additional guidance.** **Comment 33 of DEQ's AIR-1 (Road Stream Crossings PCGP Will Improve)** In its response to Comment 33, PCGP has not address guidance materials found in DEQ's Section 401 Water Quality Certification Post-Construction Stormwater Management Plan Submission Guidelines. DEQ requested this information to evaluate fully PCGP's actions to treat the discharge from roads at stream crossings such as culverts and bridges. DEQ is requesting this information since these stream crossings serve as a discharge point for sediment arising from the travel ways, cut slopes, and in-slope ditches of non-paved roads.[52] The information regarding the

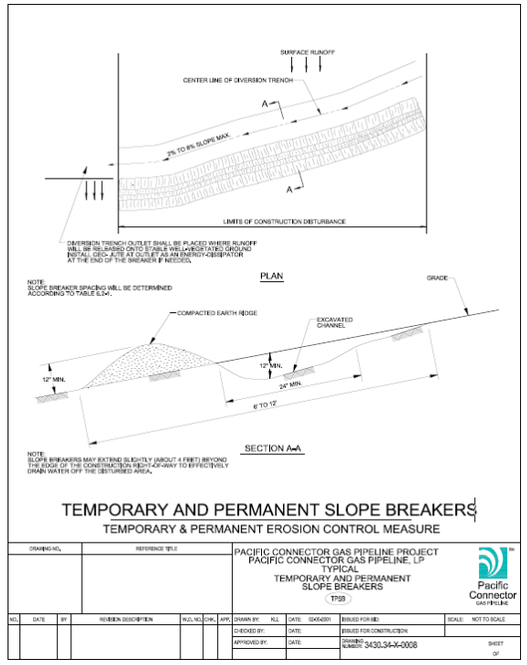
[52] Holley, A. Gordon, A. Gordon; Conner, Kristina F.; Haywood, James D., eds. 2015. *Sediment Deposition from Forest Roads at Stream Crossings as Influenced by Road Characteristics*. Proceedings of the 17th Biennial Southern Silvicultural Research Conference. General Technical Report. SRS-203. Asheville, NC: U.S. Department of Agricultural Forest Service, Southern Research Station. 551 p.

	stream crossings that Jordan Cove Energy Project and Pacific Connector Gas Pipeline will: • Replace or improve to construct and/or operate the gas pipeline and • Result in an increase in impervious surface area during the replacement/improvement process. This information is necessary [see OAR 340-048-0042(2)(a)] to determine whether the stormwater discharge from the pipeline's road stream crossings will contribute to or cause violations of water quality standards. Comment 34: In compliance with OAR 340-041-0007(1) and (7), please provide a post-construction stormwater management plan addressing DEQ's *Section 401 Water Quality Certification Post-Construction Stormwater Management Plan Submission Guidelines* for all stream crossings for the pipeline. The focus of this plan	Details pertaining to post-construction stormwater management for the pipeline are provided in the PCGP Erosion Control and Revegetation Plan (Part 2 Attachment A / Appendix B.1 of 404-10 JPA Part 2 provided as Appendix B of 2/6/18 401 WQ Package). The general location maps showing proposed access roads are referenced in Appendix G.1 to Resource Report 1 (Part 2 Attachment A of 404-10 JPA provided as Part 2 Appendix B of 2/6/18 401 WQ Package, see pdf pages 183 and 661). The waterbodies within 100 feet of existing roads needing improvement are detailed in Table A.2-6 in Appendix A.2 of Resource Report 2 (Part 2 Attachment C / Appendix A.2 of 404-10 JPA provided as Part 2 Appendix B of 2/6/18 401 WQ Package). Table A.2-6 will be updated to include the water quality BMPs for each crossing and provided to ODEQ in Q4 2018. Further, impacts associated with vegetation removal are detailed in the PCGP Revised	design of these stormwater treatment systems requested in these submission guidelines enables DEQ to evaluate the efficacy of PCGP's proposed stormwater treatment controls. Given the potential for pollutant discharge at stream crossings, DEQ is requesting the engineering designs and technical support for each water quality BMP proposed for each stream crossing that PCGP proposes to identify in a future update to Table A.2-6 in Q4 2018. DEQ will not accept a qualitative description of a treatment practice in lieu of these engineering designs and their technical support. Even for a simple stormwater treatment control such as a grass swale, several design variables influence the performance of a grass swale. For example, a simple statement that PCGP will use a grass swale to treat the roadside ditch runoff prior to discharge to a stream provides DEQ no information regarding the pollutant removal performance for this swale. As an illustration for PCGP's consideration in preparing to submit information to DEQ, Minton 2005 provides a brief discussion of these design variables for a grass swale in the following excerpt: *Although grass swales are commonly viewed as filters (biofiltration), they are properly classified as shallow basins or biosettlers. Flow-through grass swales function as treatment devices if vegetation remains erect. Erect grass reduces shear stress in the channel, reducing its capacity to carry sediment. Careful selection of the Manning's n is critical to proper sizing (Chapter 5).* *Length was first established at 200 feet (60 m) based on a study of a grass-lined freeway ditch. 60 percent of the TSS was removed in 100 feet and 80 percent in 200 feet. More recently, others have specified a minimum length of 100 feet combined with a minimum hydraulic residence time of 9 minutes. The specified residence time results in lengths considerably greater than 100 feet.* *…Swales and strips designed for treatment appear to give reasonable performance, on the order of 70 to 80 percent TSS removal if the hydraulic residence time is on the order of 10 minutes.*[53] A table of water quality BMPs employed at stream crossing without corresponding engineering analysis and its technical support will not allow DEQ to evaluate the potential water quality impacts from the stormwater discharge at these stream crossings. In developing the Certification Decision, DEQ must evaluate all proposed activities that would either contribute to or cause violations of water quality standards from road drainage discharged at stream crossings [OAR 340-048-0042(2)(a)]. To perform this evaluation, DEQ needs PCGP to submit a quantitative assessment using, for example, models and/or engineering designs and the technical support for these designs.

[53] Minton, Gary. 2005. *Stormwater Treatment – Biological, Chemical and Engineering Principles*. Sharidan Books, Inc.

	should be the drainage area for the right-of-way approaches that discharge stormwater into the stream crossing. To ensure compliance with OAR 340-048-0042(2)(a), please evaluate if the discharge from the pipeline's permanent 30-foot right-of-way at all stream crossings for the pipeline will contribute to or cause violations of water quality standards. In compliance with OAR 340-048-0042(2)(a), please propose the analytical model(s) (e.g., X-DRAIN) that Pacific Connector Gas Pipeline will use to evaluate if the stormwater discharge from the permanent 30 foot right-of-way with its 10 feet of compacted soil overlying the gas pipeline will contribute to or cause violations of water quality standards. In compliance with OAR 340-041-0002(1), this evaluation must also consider the impact of the change in stormwater volume discharged to receiving waters from the vegetation conversion (i.e., from forest canopy to herbaceous vegetation) during pipeline	Draft Thermal Impact Assessment (Part 2 Attachment C / Appendix Q.2 of 404-10 JPA provided as Part 2 Appendix B of 2/6/18 401 WQ Package).	**<u>Comment 34 of DEQ's AIR-1 (Permanent Right-of-Way Post-construction Discharge at Stream Crossings)</u>** In its response to Comment 34, PCGP did not provide DEQ with the information requested in DEQ's *Section 401 Water Quality Certification Post-Construction Stormwater Management Plan Submission Guidelines*. As discussed in DEQ's review of PCGP's response to DEQ's Comment 16 and again emphasized below, the permanent right-of-way for the pipeline will have areas of compacted soil particularly over the gas pipeline. Given this, the permanent right-of-way is essentially functioning as primitive road as the compacted soil above the pipeline is serving as a travel way. Compacted soil will limit stormwater infiltration and promote surface runoff. As a result, PCGP must treat the stormwater at the crossing of each pipeline right-of-way prior to its discharge into streams. As noted elsewhere in DEQ's review of PCGP's response to AIR-1, road stream crossings are a source of pollutant discharge. The proposed slope breakers or water bars noted below are serving as this primitive road system's cross drains for stormwater. Given this fact, DEQ draws upon the numerous studies on the impact of roads on receiving water quality to anticipate the potential water quality impacts from PCGP's proposed right-of-way. One of these studies, referenced elsewhere in DEQ's review of PCGP's proposal, summarizes DEQ's concerns as follows: *If there is a moderate distance between the road and stream, then mitigation to reduce both road erosion and channel erosion may decrease sediment delivery. Channel treatment options include lining the channel with rock or similar materials, establishing vegetation, or installing control structures. These mitigation techniques are expensive and may be ineffective during severe runoffs.* (Elliot 1999). PCGP is proposing the use slope breakers discussed and presented below to manage stormwater on the permanent right-of-way for the gas pipeline. A slope breaker is essentially a stormwater ditch (see drawing below) with a berm to control the direction of stormwater flow. Slope breakers represent a potential hydrological connection between streams and the permanent right-of-way when these slope breakers are located near stream crossings. PCGP must propose to DEQ a defensible approach to treating any pollutants mobilized in the permanent right-of-way, transported in the ditches of slope breakers, and discharged near stream crossings. Unless PCGP can provide the engineering analysis to demonstrate otherwise, DEQ considers the proposed slope breakers near stream crossings to be stormwater conveyance systems rather than stormwater treatment systems. As noted above, compacted soil will limit the infiltration of stormwater. Raindrop splash erosion on bare soil and stormwater moving downslope will mobilize sediment where soil is exposed and/or compacted and vegetation is limited due to this compaction around the pipeline. Moreover, PCGP's proposed vegetation maintenance for pipeline right-of-way will limit the extent vegetation types allowed in the right-of-way particularly above and adjacent to the gas pipeline. PCGP's response to Comment 34 did not address DEQ's request to evaluate the discharge from this permanent 30-foot right-of-way with its 10-feet, at minimum, of compacted soil overlying the pipeline. During its

	construction. The evaluation of this impact is necessary to determine if pipeline's permanent right-of-way will cause bed and bank erosion and, therefore, violate Oregon's biocriteria water quality standard (i.e., OAR 340-041-0011).
	
	Comment 35: In compliance with OAR 340-041-0007(1) and (7), please provide a post-construction stormwater management plan addressing DEQ's Section 401 Water Quality Certification Post-Construction Stormwater Management Plan Submission Guidelines for the 30-foot permanent right-of-way for the approximately 117 miles of the proposed pipeline right-of-way traversing steeps slopes (i.e., slopes greater than 30%). This information is necessary before Pacific Connector Gas Pipeline, in compliance with OAR 340-048-0042(2)(a), can determine whether the discharge from the pipeline right-of-way will contribute to or cause violations of water quality standards.
	
	The information provided in PCGP's documents (e.g., 401 Application Submittal, drafts of
			review of proposed federal resource and land management plans, DEQ confirmed its concern regarding post-construction stormwater discharge from slope breakers at stream crossings carrying sediment from compacted soil. DEQ documents this concern in DEQ's review of PCGP's response to Comment 16 presented above. PCGP will need these amendments to federal soil compaction standards to build the gas pipeline.
			
			The application of a model such as X-DRAIN will help PCGP estimate the level of sediment discharge from the proposed permanent right-of-way. In AIR-1, DEQ requested from PCGP this quantitative evaluation to develop DEQ's Certification Decision. However, PCGP has not indicated in its response to AIR-1 that this evaluation is forthcoming. In formulating a Certification Decision, DEQ must determine if the potential alterations to water quality would either contribute to or cause violations of water quality standards [OAR 340-048-0042(2)(a)]. As noted above, a slope breaker installed near stream crossings is a stormwater conveyance component rather than a stormwater treatment component unless PCGP provides the engineering analysis to demonstrate otherwise. Moreover, DEQ does not see how PCGP's updating Table A.2-6 with brief, qualitative descriptions of water quality BMPs will provide the engineering design and its technical support that DEQ is requesting from PCGP.
			
			In PCGP's response to Comment 34, PCGP refers DEQ to PCGP's proposed Erosion Control and Revegetation Plan. In this plan, PCGP provides a description of its permanent post-construction stormwater control referred to a "permanent slope breakers (waterbars)." Below, DEQ provides an excerpt of this description as well as design details for slope breakers. This description and design details do not provide the information to answer the following questions:
			
			• Is PCGP proposing to install slope breakers/water bars in floodplains?
			  o Will these installations trigger local government floodplain regulations and, if yes, will these installations comply with these land use regulations or prevent the signing of a required Land Use Compatibility Statement.
			  o If PCGP does not intend to use slope breakers in floodplains, how is PCGP proposing to manage post-construction stormwater in floodplains.
			• What is PCCP's proposed setback from the Army Corps of Engineer's and Oregon Department of State Land's ordinary high water mark for permanent slope breakers?
			  o How will PCGP infiltrate (i.e., treat) the discharge from the slope breaker installed above this setback during periods of rainfall, high groundwater table, saturated soil conditions reducing infiltration of runoff, and a limited vegetation buffer to treat surface runoff?
			  o How will PCGP manage post-construction stormwater and provide treatment for this stormwater within this setback?
			  ▪ Is PCGP proposing to infiltrate (i.e., treat) the runoff within the setback during periods of high rainfall, high groundwater table, and saturated soil conditions or will this runoff discharge into streams untreated as surface runoff into streams?

	Resource Reports) – made available to DEQ – only provides generic diagrams and erosion controls practices. DEQ can find no information on PCGP's field investigations or remote sensing for these areas to evaluate slope stability when siting the pipeline alignment. DEQ can find no information on the specific designs and practices that PCGP will use on cut slopes and fill slopes located on these steep slopes. In developing this plan in compliance with OAR 340-041-0007(1) and (7), please provide information on the designs and engineering support for these designs for the permanent controls Pacific Connector Gas Pipeline proposes to stabilize cut-slopes and fill slopes for the right-of- way sited along the steep slopes. The purpose of these controls is to prevent sediment discharge in stormwater and debris flows from landslides discharging into streams. Please note these on the post-construction stormwater plan in the information request above. Additionally, please identify where the 117 miles of proposed pipeline noted above		• If PCGP will setback slope breakers from the ordinary high water mark to comply with Corps and DSL permit requirements, how will the discharge from these slope breakers prevent hydromodication of smaller streams and, therefore, bed and bank erosion in these streams with its effect on Oregon's biocriteria? **4.2.2 Permanent Slope Breakers** Permanent slope breakers (waterbars) will be installed across the right-of-way on slopes. The purpose of these structures is to minimize erosion by reducing runoff velocities by shortening slope lengths, preventing concentrated flow, and by diverting water off the right-of-way. Slope breakers are also intended to prevent sediment deposition into sensitive resources. Slope breakers will be constructed with a two to eight percent outslope so that water does not pool or erode behind the breaker. Outflow will be diverted to a stable area off the right-of-way consistent with FERC's Upland Plan. Slope breakers may extend slightly (about 4 feet) beyond the edge of the construction right-of-way to effectively drain water off the disturbed area. If a stable area is not present, a temporary energy-dissipating device will be installed at the end of the slope breaker. Slope breakers will be installed along the right-of-way based on slope gradient and soil characteristics (see Table 4.2-2). The frequency of slope breakers will be installed based on a combination of FERC's Upland Plan (see Attachment A) and input from the Forest Service and BLM. Because of the range in variation between agency recommendations and because of the complex landownership pattern, a single slope breaker spacing was developed based on slope gradient and soil type to ensure installation practicality across the various private and federal lands. The permanent slope breakers will be installed in all areas except agricultural fields, hayfields, pastures, and lawns. A typical drawing of a slope breaker is provided in Attachment C as Drawing 3430.34-X-0008. **Table 4.2-2** **Permanent Slope Breaker Spacing** **Spacing Based on Soil Characteristics[1]** **Slope Percent** / **Highly Erosive Granitic Soils[2] (feet)** / **Moderate/Low Erosion Soil Types (feet)** 0-5 / None Required / None Required >5-15 / 100 / 200 to 300 >15-30 / 50 to 75 / 75 to 100 >30 / 50 / 50 [1] Actual spacing will 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 crosses the historic Thomason cinnabar claim group, waterbars are to be installed at 50-foot intervals as recommended by the Forest Service (see the Contaminated Substances Discovery Plan/Appendix E of the POD). [2] Granitic formations are crossed by the alignment between about: MPs 79.1 to 80.5; 81.6 to 82.2; 87 to 88.8; 97.0 to 101.2; 103.0 to 105.4; and 114.8 to 115. Section 4.2.2 on Slope Breakers from PCGP's Erosion Control and Revegetation Plan  Drawing Number 3430.34-X-0008 of Slope Breakers DEQ is seeking answers to the questions above because PCGP has provided limited information on its proposed post-construction stormwater controls at the stream crossings of the permanent right-of-way. In Comment 34, DEQ requested PCGP use DEQ's Section 401 Water Quality Certification Post-Construction Stormwater Management Plan Submission Guidelines. Using these guidelines would provide DEQ with information needed to evaluate the efficacy of PCGP's proposed use of slope breakers at stream crossings. For example, PCGP is proposing to discharge stormwater from slope breakers and, presumably, infiltrate this discharge into the surrounding soils for treatment. According to DEQ submission guidelines for a post-construction stormwater management plan, the PCGP should design structural controls for any conditions that warrant special water quality considerations such as:

	coincide with the 94 miles of the proposed pipeline that would be located in soils that PCGP has identified as having a high or severe erosion potential. Please provide the designs and engineering support for these designs for the permanent controls in these areas of high/severe erosion potential and steep slopes. In compliance with OAR 340-041-0007(1) and (7), the engineering support must indicate that these permanent controls are sufficient to: • Manage stormwater to prevent erosion on the permanent right-of-way, its cut-slope, and its fill-slope. • Prevent debris flows into streams from landslides from cut-slope and fill-slope failures. On the post-construction stormwater management plan requested above, please also provide the location for these controls along the 117 miles of pipeline on steep slopes (>30%).		• *Size infiltration structural stormwater controls such that there is sufficient depth to groundwater to facilitate drainage (e.g., soil pore storage volume ≥ volume of stormwater designed to infiltrate (Table 2, page 19).* • *The bottom of the structural stormwater control should be sufficiently above the highest anticipated seasonal groundwater to facilitate drainage. Generally, the volume of the post-construction stormwater runoff the structural control is designed to infiltrate should not exceed the storage volume within the soil pores of the subgrade (Section E.7.2.1, page 20).* PCGP's references the proposed Erosion Control and Revegetation Plan in its response to Comment 34. However, this plan does not provide any details regarding the natural area or structural controls PCGP intends to install to infiltrate stormwater discharged from slope breakers near stream crossings. PCGP does not provide any infiltration testing for the area receiving the slope breaker discharge as requested in Section E.3 of DEQ's submission guidelines. PCGP does not provide DEQ with any design criteria such as those suggested by Pazwash 2016. For example, Pazwash provides the following example criteria for a filtering system: *…the entire treatment system (including pretreatment) hold at least 75% of the WQ_v prior to infiltration. Minimum filter bed thickness is typically 18 in (45cm) for infiltration basins and 12 inches (30 cm) for sand filters. e. Swales: Swales are designed to treat the full WQ_v and may be dry swale or wet swale…Dry swale is basically a vegetated open channel, and wet swale has an expanded basin with wetland vegetation and constricted outlet. Figure 5.6 shows a schematic plan view of a wet swale. Design criteria for swales (open channel) area:* 1. *Swales shall be designed for the 10-year storm.* 2. *The peak flow velocity for the 10-year storm shall be nonerosive.* 3. *Channels will have moderate side slopes (flatter than 3:1) – in no case, steeper than 2:1.* 4. *A minimum ponding time of 30 minutes is recommended for WQv treatment. The maximum allowable ponding time shall be less than 48 hours. An underdrain system shall be provided in dry swales to meet the maximum ponding time requirement.*[54] PCGP provides none of the detailed information provided in the example above for how PCGP will manage and treat the stormwater discharge from slope breakers at stream crossings. Without additional information, PCGP is essentially asking DEQ to accept – without any engineering analysis or technical support – that the soils and vegetation in between the slope breaker's discharge point and the stream will treat this stormwater discharge. Additionally, when the permanent right-of-way is in operation, PCGP does not provide DEQ with the water quality

[54] Pazwash, Hormoz. 2016. *Urban Storm Water Managemen*t (Second Edition). CRC Press

	Comment 36: In compliance with OAR 340-041-0007(1) and (7), please provide post-construction stormwater management plans for the proposed 25 miles of new permanent and temporary roads addressing DEQ's Section 401 Water Quality Certification Post-Construction Stormwater Management Plan Submission Guidelines. This information is required before Pacific Connector Gas Pipeline can determine whether the discharge from these new roads will contribute to or cause violations of water quality standards. In compliance with OAR 340-048-0042(2)(a), please propose the analytical model(s) (e.g., X-DRAIN) that Pacific Connector Gas Pipeline will use to evaluate if the stormwater discharge from these 25 miles of proposed new roads will contribute to or cause violations of water quality standards.		design storm that the proposed slope breaker collection system and/or natural area will treat. Moreover, PCGP does not demonstrate that the natural area (i.e., buffer area) between stream and the slope breaker's discharge point is capable of adequately treating the discharge from the water bar. In the absence of this detailed information, DEQ can only assume that PCGP does not sufficiently treat the runoff from the permanent right-of-way at stream crossings once discharged from the slope breaker to the stream. In Comment 34, DEQ requested that PCGP evaluate the water quality impacts from this discharge by using a model such as X-DRAIN. PCGP has not provided this evaluation in its response nor indicated it will provide this information to DEQ in the near future. **Comment 35 of AIR-1 (Post-construction Stormwater Discharge from ROW to Steep/Unstable/Erosive Slopes** In PCGP's response to DEQ's Comment 35, PCGP refers DEQ to the Erosion Control and Revegetation Plan. As noted in DEQ's Comment 35, PCGP only provides generic diagrams for certain erosion control practices. This information does not provide site-specific information for how PCGP will avoid discharging post-construction stormwater to unstable slopes such as headwalls, Areas of Potential Rapidly Moving Landslide Hazards, and mapped landslides along the entire pipeline alignment. In DEQ's review of PCGP's response to Comment 15 noted above, DEQ provides the regulatory and technical basis for avoiding post-construction discharges to steep, unstable slopes from the pipeline's right-of-way. For example, in its Erosion Control and Revegetation Plan, PCGP indicates that it will use permanent slope breakers (i.e., water bars) across the right-of-way on slopes to: *…minimize erosion by reducing runoff velocities by shortening slope lengths, preventing concentrated flow, and by diverting water off the right-of-way. Slope breakers are also intended to prevent sediment deposition into sensitive resources*. DEQ addresses the deficiencies of this plan excerpt from the ECRP in DEQ's review of PCGP's response to Comment 34 above. This represents all the information PCGP provided to DEQ in its submittal. The information that PCGP has provided in its submittal, to date, lacks site-specific information regarding the discharge points for these slope breakers. Also, without additional information, DEQ is unable to determine if these discharge points will: • Add additional water to unstable slopes (e.g., headwalls, high Rapidly Moving Landslide Hazard Potential Areas, mapped landslides) • Produce positive soil pore pressures that may cause landslides that impact water quality. As noted PCGP's submittal, slope breakers are specialized drainage ditches to prevent stormwater from eroding the right-of-way and creating rills and gullies in this right-of-way. PCGP's response did not provide DEQ with a post-construction stormwater management plan for the management of stormwater for the approximately 117 miles of the proposed pipeline right-of-way traversing steeps slopes (i.e., slopes greater than 30%).

			Technical Basis for DEQ's Information Request In a discussion of slope stability and linear infrastructure such as roads, Benda et al. 2007 notes the following: *Surface runoff that is concentrated and diverted through ditches onto steep slopes can saturate soils or road fills much more than natural intense precipitation events (Megahan, 1972; Sidle et al., 1985), thus increasing the potential for landsliding and/or gully initiation (e.g., Montgomery, 1994; see Figure 31).* *Road drainage that is diverted onto hillslopes is a major factor in landslide initiation (Figure 32 and Table 2). Ditch water that is diverted into naturally landslide-prone bedrock hollows (such as is shown in Figure 1) can trigger shallow landslides and initiate debris flows.* *…Figure 34 illustrates how the design of road drainage can lead either to landsliding or reduce the likelihood of landsliding.* Moreover, drawing on geotechnical experts, research, and references, the USDA Forest Service stresses the role of water in the cause and mitigation of landslides as follows: *There are two categories of water with which we will be concerned: surface water and ground water. Concentrations of surface water, seeps, springs, and vegetation changes indicate topographic changes that can provide critical clues about what may be happening with the ground water.* *Water plays a very important role in the cause and mitigation of most landslides. It is important to learn as much as possible about surface water and ground water because changes in ground water levels and pore water pressures alter effective normal stress and, as a result, modify shear strength.* *It is therefore critical that the source of ground water, changes in ground water levels, and the relationships among surface water, ground water, and the local geology be understood if landslide activity is to be managed.*[55]

[55] Hall, David E., Michael T. Long, and Michael D. Remboldt (Editors). 1994. Slope Stability Reference Guide for National Forests in the United States Volume III. USDA Forest Service EM-7170-13. Washington, DC

			PCGP is proposing to clear ridgetops of trees and other vegetation in Tyee Core Area, other locations with mapped landslide features, steep slopes, and slopes with soil that has a high erosion potential. PCGP is also proposing to level these ridgetops to install a gas pipeline. These activities dramatically alter the interception of rainfall from trees and the movement of stormwater on these ridgetops. These alterations will result in a substantial increase in stormwater generated on these ridgetops relative to their undisturbed condition. However, PCGP has not provided DEQ with specific information for how PCGP will manage the stormwater generated on these ridgetops supporting the permanent right-of-way. As highlighted in references DEQ presented above, stormwater discharge has the potential to cause landslides. Landslides caused by stormwater discharge from pipeline construction activities and the operation of the permanent pipeline right-of-way have the potential to migrate into stream channels affecting water quality. As discussed in DEQ's review above, the permanent right-of-way for the pipeline is functioning as a primitive road. To ensure compliance with OAR 340-041-0007(1) and (7), DEQ is requesting additional information that PCGP would generate during the development of a post-construction stormwater management plan for its permanent right-of-way. DEQ provides guidelines for the development of a post-construction stormwater management plan. For example, in Section E.2.2 of DEQ's *Post-Construction Stormwater Management Plan Submission Guidelines*, DEQ requests that applicants seeking a 401 Water Quality Certification perform the following actions: *Check the topography and Oregon Department of Geology and Mineral Industries' Statewide Landslide Information Database (http://www.oregongeology.org/sub/slido/index.htm). Consult with an Oregon-registered geotechnical engineer or engineering geologist in areas with steep slopes or landslide risk to see if excavation and/or infiltration should be avoided.* Since stormwater discharge may cause a landslide as noted above, DEQ provides the above post-construction stormwater plan guidelines to project proponents in DEQ's effort to administer statewide narrative criteria OAR 340-041-0001(1). PCGP has not demonstrated to DEQ that it has selected appropriate discharge points for its slope breakers/water bars to avoid stormwater discharge to unstable slopes. In the limited field investigations for landslides that PCGP has performed (i.e., PCGP's Submittal, Part 2, Appendix C) and discussed in DEQ's review below, PCGP's focus was primarily on the potential risk to the pipeline and did not include a comprehensive evaluation of the risk to water quality. Moreover, the limited field investigations only evaluated the risk of deep-seated landslides and not shallow rapidly moving landslides. PCGP did not perform field investigations for landslide risks for constructing and operating this gas pipeline along the many miles of potential rapidly moving landslide hazards particularly in the Tyee Core Area. ***Examples of Information Lacking in PCGP's Erosion Control & Revegetation Plan***

			PCGP has not provided DEQ with a post-construction stormwater management plan as requested in Comment 35 addressing the plan submission guidelines noted above. PCGP has not demonstrated in its ECRP that it will strategically divert stormwater from the right-of-way to stable and non-convergent slopes. In DEQ's Comment 35, DEQ requested that PCGP develop a post-construction stormwater management plan by providing engineering designs and their technical support for permanent controls for cut and fill slopes. However, PCGP has not provided DEQ this information. In fact, PCGP notes the following in Resource Report 6 for Geologic Resources for BMPs on slopes steeper than 30%: *Steep side slope Pipeline construction segments will be identified during the final design phase of the Pipeline project. Fill slope construction details and specifications will be designed for the identified steep side slope Pipeline segments.* As indicated in DEQ's comments, the purpose of DEQ's request for engineered designs for these controls is to evaluate PCGP's efforts to prevent sediment discharge in stormwater and to prevent debris flows from landslides discharging into streams. Although PCGP refers DEQ to its Erosion Control and Revegetation Plan for this information, the ECRP does not provide this level of detail as noted elsewhere in DEQ's review. In the Erosion Control Revegetation Plan, PCGP provides DEQ with Section 11 on Seep and Rugged Terrain. This section provides no information regarding the discharge points for stormwater relative to unstable slope features. In this section, PCGP provides no information on how it will store construction spoils (e.g., root wads, soil, rock, slash) and logs to avoid adding additional weight to the top of unstable slopes (e.g., headwalls, rapidly moving landslide areas, mapped landslides). The following is what PCGP provides DEQ in its ECRP: *A significant portion of the Pipeline crosses rugged topography as it traverses the Coast and Cascade Mountain Ranges and foothills. Where the Pipeline passes through the dissected Coast Range and foothills between the Coos River and Myrtle Creek (MPs 9.00 to 81.00) most of the ridgelines run in the opposite direction of the proposed alignment. The orientation of the ridges requires the Pipeline, in numerous areas, to descend and ascend steep ridge slopes to cross stream drainages so that the alignment can proceed in a southeasterly direction toward Myrtle Creek and ultimately the terminus of the pipeline near Malin, Oregon. This similar condition also occurs between MPs 81.00 and 121.00 where the Pipeline traverses the Cascade Range and foothills. During routing, PCGP optimized the alignment along ridgelines, where feasible, to minimize crossing steep slopes and potential geologic hazards, to minimize waterbody crossings, and to minimize the amount of cuts and fill slopes that would be required which reduces the erosion hazard. Areas of steep side slopes (greater than 50% grade) were also avoided as much as practical during routing to minimize the complications associated with construction in these areas as well as potential long-term slope instability hazards.*

			The Geohazards and Mineral Resources Report (see Resource Report 6) provides a geotechnical hazards review that was conducted during routing and describes the avoidance mitigation measures that were implemented (i.e., minor reroutes) to avoid potential high risk geological hazards areas. Resource Report 7 of PCGP's FERC Certificate application also identifies the miles of soils crossed by the Pipeline which are associated with steep slopes and high erosion hazards. PCGP has noted areas where the proposed route traverses steep, narrow ridges and where it will be infeasible to return these ridges to their original preconstruction contours during final grading. Drawing 3430.34-X-0018 in Attachment C provides a typical construction right-of-way configuration in these sharp ridgeline areas. This drawing shows the construction techniques that will be utilized to ensure safe and feasible construction; minimize overall construction disturbance; and ensure the long-term safety, stability, and integrity of the pipeline. Avoidance of these areas is not feasible because stable alternate pipeline routes were not present along the alignment, except for other similar ridgeline features that would have the same conditions. *During construction across rugged topography, PCGP will utilize the same construction procedures outlined in this ECRP to minimize construction, geologic, and erosion hazards as well as to ensure the integrity of the pipeline. In summary these procedures include:* *• routing the pipeline to ensure safety and integrity of the pipeline;* *• identifying adequate work areas to safely construct the pipeline;* *• utilizing appropriate construction techniques to minimize disturbance and to provide a safe working plane during construction (i.e., two-tone construction; see Drawing 3430.34-X-0019 in Attachment C);* *• Spoil storage during trench operations on steep slopes (greater than the angle of repose) will be completed using appropriate BMPs to minimize loss of material outside the construction right-of-way and TEWAs. Examples of BMPs that may be used include the use of temporary cribbing to store material on the slope or temporarily end-hauling the material to a stable upslope area and then hauling and replacing the material during backfilling;* *• optimizing construction during the dry season, as much as practicable;* *• utilizing temporary erosion control measures during construction (i.e., slope breakers/waterbars);* *• installing trench breakers in the pipeline trench to minimize groundwater flow down the trench which can cause in-trench erosion;* *• backfilling the trench according to PCGP's construction specifications;*

			• restoring the right-of-way promptly to approximate original contours or to stable contours after pipe installation and backfilling; *• installing properly designed and spaced permanent waterbars;* *• revegetating the slope with appropriate and quickly germinating seed mixtures;* *• providing effective ground cover from redistributing slash materials, mulching, or installing erosion control fabric on slopes, as necessary; and* *• monitoring and maintaining right-of-way as necessary to ensure stability.* From the information PCGP provides above, the following - for example - is missing: • The design details for BMPs used to stabilize spoil storage on steep slopes to address the geotechnical concerns associated with adding additional weight to the head of unstable slopes. • The use of reinforced fill slopes on steep unstable slopes where PCGP notes that "the proposed route traverses steep, narrow ridges" as recommended in technical manuals for linear infrastructure projects. • The location of construction and post-construction stormwater discharge points relative to unstable landscape features/steep slopes/mapped landslides/Potential Rapidly Moving Landslide Hazards. • The location the discharge points for the hydrostatic test water, trench dewatering, and vehicle/equipment wash water relative to unstable landscape features/steep slopes/mapped landslides/Potential Rapidly Moving Landslide Hazards. • The stormwater management system for the construction right-of-way, for Temporary Extra Work Areas, and for other areas cleared of vegetation relative to unstable landscape features/steep slopes/mapped landslides/Potential Rapidly Moving Landslide Hazards. DEQ requests this additional information to determine if the location of construction and post-construction stormwater discharge, other discharge (i.e., hydrostatic, trench dewatering, and equipment wash water), and construction spoil/log storage have the potential to cause a landslide that flow into streams. DEQ also needs information from a geo-engineer's field investigations to identify suitable locations for discharging stormwater to minimize their potential to cause landslides. The limited filed investigations performed by PCGP and highlighted in DEQ's review below do not provide the information necessary to site the discharge of construction stormwater, post-construction stormwater, hydrostatic test water, trench water, and equipment washwater. PCGPs limited investigation of landslide risks focus only on deep-seated landslide risks for only mapped landslides. PCGPs *Potential Deep-Seated Landslide Evaluation Forms* did not include evaluations of risks associated with discharging stormwater to areas identified as rapidly moving landslides hazards and other unstable landscape features such as headwalls. As noted in the excerpt below, these filed investigation forms and their conclusions focused primarily on the potential risk to the pipeline. PCGP did not

evaluate the risks to water quality, for example, from rapidly moving landslides or deep-seated landslides from pipeline construction and operation.

Below is an excerpt from *Potential Deep-Seated Landslide Evaluation Form* for Landslide 34. Landslide 34 is an identified landslide from a published map. PCGP notes this landslide in Figure 24 of 47 in PCGP's Geologic Hazard Maps along Milepost 108.86 - 109.44 of the proposed gas pipeline.

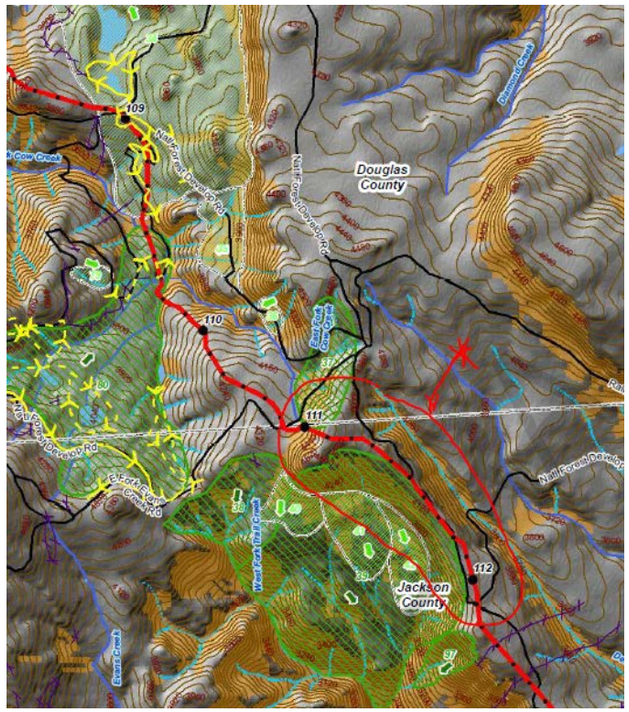
CONCLUSIONS BASED ON SURFACE OBSERVATIONS

Factors Contributing to Cause of Landslide (natural, anthropogenic):
Volcanic and tectonic activity.

Potential Risk to Pipeline: **Low**
We developed a geologic cross section through LS-34. Based on the location of the inferred slide plane and existing slope geometry, it is our interpretation that the failure plane for this very large landslide feature occurs approximately 100 feet below the ground surface at the location of the proposed pipeline. Excavation for pipeline construction will be typically less than 10 feet in depth and is not anticipated to encounter the inferred basal slide plane of LS-34. The volume of earthwork and depth of excavation required for the pipeline construction is small relative to the size of the landslide and likely depth of the slide plane. For this reason, it is our opinion that there is a low risk of construction adversely impacting the stability of this dormant-mature landslide.

The observations noted in the excerpt above do not address the additional stormwater discharge to this unstable landscape feature particularly above East Fork Cow Creek.

Moreover, PCGP's field investigation in this area as well as many other areas was limited in scope. For example, PCGP did not investigate the steep slopes surrounding the propose pipeline locations between Mile Posts 109 and 109.8 and between Mile Posts 111 and 112.2 (see the Geologic Hazard Map excerpt below). At these two sections of the proposed gas pipeline, PCGP has not indicated how PCGP will manage stormwater from the pipeline's construction and post-construction operations nor stabilize the fill slopes or the cut slopes. PCGP's proposed pipeline at Mile Post 109.4 and 109.5 is altering the toe of slope in areas identified as mapped Landslide 34 and as an Area of Rapidly Moving Landslide Hazard. However, PCGP does not provide DEQ with information regarding its design for loading the toe of this cut slope in these areas to prevent destabilizing it and causing a debris torrent to discharge into the East Fork Cow Creek.

			As documented in DEQ's review above, water plays a key role in the cause and mitigation of landslides. Referring to the map excerpt below, PCGP has not provided DEQ with information on how it will manage stormwater to avoid causing a debris flow below the pipeline in the rapidly moving landslide hazards on each side of the pipeline from Mile Post 111 to Mile Post 112.2. These Areas of RML also coincide with Landslides 37, 38, 42, and 80. Landslide 37, 38, 42, and 80. These are identified landslides from aerial photos. However, PCGP did not include them as part of its field evaluations of landslide risks. PCGP has not provided DEQ with engineering designs to stabilize the proposed pipeline's fill slopes for Landslides 37 and 42 as well as the cut and fill slopes for Landslide 38 and 80. There are numerous other areas of landslide risks where PCGP has provided no field evaluations or engineering analysis for protecting water quality from debris flows potentially precipitated by: • Loading additional stormwater at the top of unstable slopes when constructing and operating the gas pipeline. • Cutting into an unstable slope when constructing and operating the gas pipeline.  Geologic Hazard Map (Figure 24 of 47) from Resource Report 6 featuring several identified landslides including 34, 37, and 42 discussed

			In addition to PCGP's typical construction methods noted in the Erosion Control and Revegetation Plan excerpt above, PCGP identifies steep side slopes requiring restoration. PCGP provides the fill slope specifications below to ensure slope stability: *Fill slopes will be constructed in order to return the site to the approximate pre-construction topography. Fill slopes which exceed a gradient of 3H:1V (Horizontal:Vertical), will be constructed in accordance with the following specifications under the supervision of PCGP's qualified representative:* *<u>Materials</u>* *1. Fill materials used for constructing slopes exceeding 3H:1V will be considered structural fill.* *2. Materials used as structural fill should be free of roots, organic matter, and other deleterious materials.* *3. Fill materials will be at a moisture content suitable for compaction.* *4. If on-site soils are unsuitable for use as structural fill, imported structural fill will consist of pit or quarry run rock, crushed rock, crushed gravel and sand, or sand that is fairly well graded between coarse and fine, contains no clay balls, roots, organic matter or other deleterious materials, and has less than 5 percent passing the U.S. No. 200 Sieve.* *<u>Slope Preparation</u>* *1. Slopes to receive fills will be prepared by stripping the existing organic material and topsoil.* *2. Construct steps or benches on existing slopes to receive fills that exceed 3H:1V. The bench height to width ratio will be adjusted to match the existing slope gradient.* *<u>Fill Placement and Compaction</u>* *1. Fill soils will be compacted at a moisture content that is suitable for compaction. The maximum allowable moisture content varies with the soil gradation, and will be evaluated during construction. Silt and clay and other fine granular soils may be difficult or impossible to compact during persistent wet conditions.* *2. Fill material will be placed in uniform, horizontal lifts. Minimum lift thickness will vary based on material compacted and the type of compaction equipment used.* *3. Compact each lift by operating, hauling, and spreading equipment uniformly over the full*

			width of each layer until there is no visible deflection under the load of the hauling and spreading equipment. If each lift of fill cannot be accessed by the hauling and spreading equipment to achieve compaction, then other suitable compaction equipment will be used to obtain the required compaction. Alternative compaction equipment and methods may include tamping with a trackhoe bucket, vibratory plate compactors (hoe-pack) or rollers. Based on a review of available technical manuals for slope stabilization, PCGP's generic specifications presented above do not implement the recommendations in several technical guides on stabilizing slopes. PCGP does not provide need site-specific engineering analysis or technical support for the proposed fill slope specifications referenced above to demonstrate these practices are sufficient for each site where PCGP needs to stabilize fill slopes. As noted in PCGP's Resource Report 6 and 7, the alignment for the gas pipeline will traverse the Tyee Core Area an area known for its landslide activity as well as areas with steep slopes and highly erosive soils. The following information is missing from PCGP's specifications for the placement of the alignment on or above steep unstable slopes that are common along a substantial portion of the proposed alignment: • Information (i.e., engineering designs and their technical support) for the application of reinforced fill (embankments), retaining walls, buttresses or other techniques designed to stabilize unstable slopes along the gas pipeline alignment such as Areas of Rapidly Moving Landslide Hazards, Headwalls, and Mapped Landslides. • Information (i.e., engineering designs and technical support) on how PCGP will manage stormwater and groundwater on cut slopes into unstable slopes along the gas pipeline such as Areas of Rapidly Moving Landslide Hazards, Headwalls, and Mapped Landslides. • Information (i.e., engineering designs and technical support) on how PCGP will manage runoff onto fill slopes and manage stormwater on terraces constructed on unstable slopes such as Areas of Rapidly Moving Landslide Hazards, Headwalls, and Mapped Landslides.[56, 57] Moreover, for steep slopes with erosive soils and/or with landslide features, PCGP's proposed revegetation BMPs highlighted in the Erosion Control Revegetation Plan may not be sufficient practices. DEQ reviewed the information presented in PCGP's ECRP and found it lacking in engineering designs and their technical support. PCGP's proposed update to address DEQ's Comment 35 must contain engineering designs and their technical support. These engineering designs and technical support must address site-specific

[56] Hall, David E., Michael T. Long, and Michael D. Remboldt (Editors). 1994. *Slope Stability Reference Guide for National Forests in the United States Volume III*. USDA Forest Service EM-7170-13. Washington, DC

[57] Chatwin, S.C., D.E. Howes, J.W. Schwab, and D.N. Swanston. 1994. *A Guide for Management of Landslide-Prone Terrain in the Pacific Northwest* (2nd Edition). Research Branch of the Ministry of Forests. British Columbia.

constraints encountered as PCGP prepares the erosion and sediment control plan for a NPDES 1200-C Permit and the post-construction stormwater control plan for this proposed gas pipeline. In the development of the Certification Decision, DEQ will not accept qualitative descriptions of BMPs in an updated table as an adequate response to Comment 35.

DEQ photographed an Electrical Power Line right-of-way featured in the October 2, 2018 photo below that is close to the PCGP's proposed pipeline alignment. Within the right-of-way for this power line, two small slides developed after the operators established herbaceous and woody vegetation in the right-of-way. PCGP's BMPs for this area are simply to revegetate the slope with herbaceous vegetation following specifications designed for particular land ownership (i.e., Forest Service, BLM, etc.). This power line right-of-way is just east of the proposed gas pipeline alignment in the Tyee Core Area. The power line right-of-way featured in the photo below is on a slope in an area identified as a mapped landslide in the Statewide Landslide Information Database for Oregon. The power line right-of-way is also located in an area identified as an Area of Rapidly Moving Landslide Hazard in PCGP's Geologic Hazard Map Figure 2 of 27 (See Aerial Photo and Map Figure below). The area where this power line is exhibiting small slope failures and where the proposed gas pipeline alignment is proposed has the following soil types with the following erosion hazard rating:

Dominant soil type(s)

Soil Type	Erosion Hazard Rating	Hydric Rating	Percent Area
Salander silt loam, 50 to 75 percent slopes	Severe	No	32.07 %
Templeton silt loam, 30 to 50 percent slopes	Severe	No	17.97 %
Millicoma-Templeton complex, 50 to 75 percent slopes	Severe	No	9.94 %
Templeton silt loam, 50 to 70 percent slopes	Severe	No	7.96 %
Geisel silt loam, 12 to 30 percent slopes	Severe	No	7.27 %
Templeton-Millicoma complex, 12 to 50 percent slopes	Severe	No	7.00 %
Templeton silt loam, 30 to 50 percent slopes	Severe	No	6.73 %
Nestucca-Willanch complex	Slight	Yes	4.47 %
Geisel silt loam, 12 to 30 percent slopes	Severe	No	2.73 %
Templeton silt loam, 7 to 30 percent slopes	Severe	No	1.22 %

Results from Oregon Explorer's Oregon Rapid Wetland Assessment Protocol and Stream Function Assessment Method Map Viewer for soils in area containing the Electrical Power Line Right-of-Way and a section of PCGP's proposed gas pipeline west of the power line ROW.

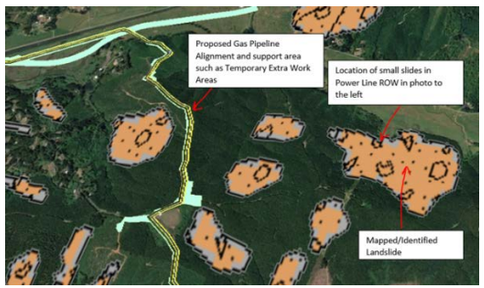


Photo to the left taken by DEQ on October 2, 2018 showing two small slides on a revegetated slope of an Electrical Power Line Right-of-Way. Aerial photo in the middle shows this power line right-of-way featured in the photo to the left relative to identified landslides. The topographical map to the right is PCGP's Geologic Hazard Map of this same area delineating the Areas of Rapidly Moving Landslide Hazards in light brown. This topographical map shows that the Electrical right of way moves down an unstable landscape feature referred to as a convergent headwall discussed in DEQ's review of PCGP's response to Comment 15. This unstable landscape feature also contains soils with a severe erosion potential as noted above.

PCGP is proposing to construct and operate a right-of-way for a gas pipeline at many locations with similar site constraints without providing DEQ with engineering designs developed to address site constraints presenting real risks to water quality over time. DEQ's request for the detailed information noted above is essential to demonstrate that PCGP will construct and operate this gas pipeline preventing sediment discharge in stormwater and preventing landslides discharging debris flows into streams.

Comment 36 of AIR-1 (Post-construction Stormwater Plan for Access Roads/Modeling WQ Impact)

For DEQ's review of PCGP's response to Comment 36, please see DEQ's review of PCGP's response to Comments 26 and 27 provided above. This review for Comment 26 and 27 is also applicable to PCGP's response to Comment 36. Additionally, DEQ does not believe that PCGP's additions to Table A.2-6 in Appendix A.2 of Resource Report 2 will provide DEQ with the level of detail regarding maintenance prescriptions as well as road improvements needed to ensure the use of existing access roads will protect water quality.

First, the road segments presented in the table PCGP references in its response (i.e., Table A.2-6) include only those segments within 100 feet of a water body. DEQ is requesting that PCGP's inventory evaluate all existing access roads hydrologically connected to water bodies. The use of an arbitrary distance of 100 feet

			does not provide DEQ reasonable assurance that PCGP's proposed measures will protect water quality. In AIR-1, DEQ requested the use of a model such as the Geomorphic Road Analysis and Inventory Package (GRAIP) to inventory roads for surface erosion, gully risk, and landslide risk. Using an analytical tool such as GRAIP is a more objective approach rooted in knowledge gained from evaluating the impact of roads on water quality. GRAIP can also identify road segments hydrologically connected to water bodies. To develop its Certification Decision, DEQ will not accept PCGP's focus on only roads within 100 feet of water bodies and a listing of qualitative BMPs in the proposed updated table without the following information: • Objective and quantitative support using a model (e.g., GRAIP or comparable model approved by DEQ) to identify the need for BMPs on road segments hydrologically connected to water bodies. • Engineering designs and their technical support addressing the concerns identified employing this model or analytical tool. • A plan requested in DEQ's *Section 401 Water Quality Certification Post-Construction Stormwater Management Plan Submission Guidelines* identifying where these BMPs are located on the landscape, their proposed design, and technical support accompanying this design. Finally, PCGP's response to Comment 36 does indicate that PCGP will propose and, once approved, use an analytical model such as X-DRAIN to evaluate siting alternatives for roads and their potential impact to water quality. This is particularly important for the construction of access roads of significant length in locations with steep slopes, unstable slopes, and erosive soils such as Temporary Access Road 101.70 between Mile Posts 101 and 102 discussed in more detail in DEQ's review of PCGP's response to Comment 26 and 27.
37	Please provide an evaluation of compliance with water quality standards if Jordan Cove Energy Project and Pacific Connector Gas Pipeline will use dredged material in the construction of facilities in uplands and drainage from this dredge material will discharge to waters of the state. This request is to expand upon the Portland Sediment Evaluation	The management of water quality during the construction of the LNG Terminal, APCO 2, and Kentuck, where dredge material characterized in the referenced 2016 PSET letters, will be addressed in respective 1200-C permits. As noted above, JCEP and PCGP are currently preparing respective 1200-C application materials and anticipate submitting	DEQ anticipates PCGP's response in Q4 2018.

	Team's assessment (PSET Letters, January 19, 2016) that considered these constructed upland facilities to be outside federal Clean Water Act jurisdiction for the dredged material suitability determination. However, upland constructed facilities using dredged material are not outside the effects considered in a 401 Water Quality Certification of a FERC application for the construction of a gas pipeline.	applications to DEQ in Q4 2018.	
38	Please provide a post-construction stormwater management plans addressing DEQ's *Section 401 Water Quality Certification Post-Construction Stormwater Management Plan Submission Guidelines* for North Point Workforce Housing Project noted in the Part 1, Section 404 Permit Application, Attachment F, Portland Sediment Evaluation Team Letters, Section 404 Permit Application. (If this site is not going to be used for the North Point Workforce Housing, please provide the post-construction stormwater plans for the proposed uses.) In addition, please provide the results of the Phase II	The location of workforce housing has changed from the North Spit (a.k.a. APCO Sites 1 and 2) to the South Dunes site to minimize overall project impacts. The nature of existing soil and groundwater conditions for South Dunes has been characterized in a report titled Data Gaps Investigation Report which was provided to ODEQ in August 2018. JCEP is currently preparing a 1200-Z permit application for the LNG terminal which will include South Dunes and anticipates submitting to ODEQ in Q4 2018.	DEQ anticipates PCGP's response in Q4 2018.

	environmental assessments evaluating the potential for contaminated soils summarized in the "FEIS, Section 4.3.1.3 (Soil Limitations) as noted in these PSET Letters.		
39, 40, 41, 43	Comment 39: The 401 Water Quality Submittal package provides insufficient information concerning the dredging operations for the Marine Slip, Access Channel, and Material Offloading Facility. DEQ used a copy of Resource Report 1 (Section 1.5.5.2) for the development of an environmental Impact Statement to obtain general information on the dredging operation. To direct the reader to additional information, this resource report references to the Dredge Material Management Plan and Resource Report 7 (Section 7.3.2.5). These two additional references provide few details regarding the water pollution control practices in the Marine Slip and Access Channel dredging operations. In compliance with OAR 340-041-0007(1) and -0036, please provide for DEQ review and approval a detailed pollution control plan for constructing the Access Channel and Marine	Additional details regarding the construction of the Marine Slip, Access Channel and Material Offloading Facility is provided in the following areas: • Construction Methodology: Part 1, Attachment A.1 of the 404-10 Application (included as Appendix M of the 401 Water Quality Package, issued to ODEQ on 2/6/18). • Dredge Disposal Location at Roseburg Forest Products: Enclosures 19 - 22 of Part 1, Appendix N-5 of the 401 Water Quality Package issued to ODEQ on 2/6/18. • Section 2.1.1.2, Dredging and Shore Protection at 2-21 - 2-26 of the Applicant Prepared Draft Biological Assessment (APDBA), Submitted 9/14/18. • Sections 3.5.1.3 and 3.5.4.3, Turbidity Effects from Dredging in Coos	**Summary Statement: DEQ anticipates JCEP will submit additional dredging information, including a pollution control plan, in Q1 2019. Please incorporate responses to the questions in the following section in JCEP's pollution control plan.** As JCEP is developing the advanced engineering details regarding dredging execution for Q1 2019, DEQ is providing JCEP with several examples of the questions that arose during DEQ's review of its Section 401 Water Quality submittal and the references JCEP provided in its response to Comments 39, 40, 41, and 43. The information provided in JCEP's response does not change DEQ's request in AIR-1 for a detailed pollution control plan for constructing the Access Channel and Marine Slip. Additionally, in JCEP's response to Comment 43, JCEP must provide information concerning the characterization of dredged material that JCEP proposes to use as fill in various locations. In developing additional information for Q1 2019. DEQ requests JCEP provide this information to ensure that dredged material used as fill does not contaminate the identified disposal sites and lead to pollutant discharge to waters of the state via decant water. In reviewing the recently provided references, DEQ is unable to locate Enclosures 19-22 of Part 1 (Appendix N-5 of the 401 Water Quality Package) that JCEP references in its response to Comment 39, 40, 41, and 43. The references JCEP provided in its response do not provide the detailed pollution control plan requested in AIR-1. To ensure compliance with Oregon's turbidity standard (OAR 340-041-0036), JCEP must demonstrate in the pollution control plan requested in Comment 39 that "all practicable turbidity controls have been applied" during JCEP's dredging activities. JCEP's information in the references noted in its response provide a conceptual approach to minimize turbidity and other pollutant discharges. JCEP has not fully developed the details of all its proposed controls and this creates uncertainty regarding their efficacy. For example, PCGP's proposed pollution control plan for dredging must clearly identify: • The type of pollution controls JCEP will use including its design and specifications. • The specific applications for these controls. • The specific location where JCEP will employ these controls relative to sensitive sites as well as other landscape features (e.g., drainage pattern, vegetation, etc.). • The maintenance schedule for each control. • A monitoring plan for evaluating the efficacy of all proposed controls and compliance with the turbidity standard.

	Slip that provides at least the following information: • A detailed description of the sequencing of all construction dredging activities associated with the in-water Marine Slip construction, Access Channel construction, and Material Offloading Facility construction. <u>Comment 40</u>: • A site map of these construction actions and location of all structural controls to protect water quality. The site maps must include the following information: o A delineation of the areas in the Marine Slip that Jordan Cove will dry excavate and dredge. o Please include the pollution controls for the dry excavation activities in response to the request above in an Erosion and Sediment Control Plan for a NPDES 1200-C Permit Application. o The location of the natural earthen berm	Bay on North American Green Sturgeon at 3-316 – 3-320) of the APDBA, Submitted 9/14/18. • Section 3.5.4.3, Turbidity Effects from Dredging in Coos Bay on Oregon Coast Coho Salmon at 3-522 – 3-525 of the APDBA, Submitted 9/14/18. Further advanced engineering details regarding dredging execution will be provided to ODEQ in Q1 2019.	For example, the Construction Methodology in Part 1 (Attachment A.1) of JCEP's submittal notes the following: *To the extent feasible, dredging of the access channel and slip will be performed with a CS dredge to minimize turbidity.* *The hydraulic dredge transport pipeline for hydraulic transportation of excavated materials (including the decant water return line) will follow the shoreline of the site of the Roseburg Forest Products chip loading facility and will not result in additional land disturbance.* *At all points along the pipeline route where the slurry pipeline could rupture and the contents could potentially enter the waters of Coos Bay, secondary containment will be provided around the slurry pipeline.* *Eelgrass and estuarine habitat disturbances resulting from the pipeline will be minimized by spanning these eelgrass areas or avoidance through the use of temporary structures or floats.* *Material removed by the hydraulic CS dredges will be sent via a submerged and/or floating pipeline to approved disposal sites, where dewatering would occur.* *Dredged or other excavated material will be placed on areas having stable slopes, and will be prevented from eroding back into waterways and estuarine wetlands.* This information raises the following questions for DEQ that must be addressed in a detailed pollution control plan as DEQ develops its Certification Decision: • When a Construction Suction (CS) dredge is not feasible, what other dredge will JCEP use as an alternative? • What control(s) will JCEP use to minimize pollutant discharge when using various dredging equipment? What are the designs and specifications for these controls? How and where will JCEP employ these controls? How will JCEP monitor their effectiveness for complying with the turbidity standard? • What controls – including designs and specifications – will JCEP use to prevent a spill from the hydraulic dredge transport pipeline? Where specifically will JCEP locate these controls on the landscape? What is their containment capacity? Is this capacity sufficient for anticipated spills? Does JCEP have contingency controls to protect sensitive resource should the proposed containment fail?

	separating the upland area of the Marine Slip that Jordan Cove will dry excavate from the remaining portion of the Marine Slip adjacent to the bay that Jordan Cove will dredge. o The location of the in-water dredging for the Access Channel and Material Offloading Facility. o The location of the slurry/hydraulic transport pipeline(s) for the transportation of the dredged material. o The location of all containment systems and/or spill response materials. <u>Comment 41</u>: • A construction dredging plan providing the following: o Dredging schedule for the Marine Slip, Access Channel, and Material Offloading Facility. o Type (e.g., cutter-suction dredging) and number of dredging plants that Jordan Cove		• What controls does JCEP propose as a contingency should the control for spanning the eelgrass and estuarine habitat fail? • If JCEP uses temporary structures or floats to minimize eelgrass and estuarine habitat disturbances, what are these structures/floats, what are their designs and specifications? Does JCEP have contingency controls should the temporary structures/floats fail? • What is the secondary containment including its designs and specifications for the submerged and/or floating pipeline for material removed by the hydraulic CS dredges? • Where is the specific location of the containment system for the placement of dredge material including information on key landscape features such as drainage patterns and the location of freshwater and estuarine wetlands, freshwater streams, salt-tolerant and non-salt tolerant vegetation? Where is the drainage system and the discharge points for decant water? Is the decant water saline or non-saline? What are the receptors for this decant water? For example, in JCEP's response, JCEP refers DEQ to Section 2.1.1.2 (Dredging and Shore Protection) from the Applicant Prepared Draft Biological Assessment for additional information. The draft Biological Assessment notes the following: *Dredging and Shore Protection* *For the capital dredging, about 5.7 million cubic yards (mcy) of material would be removed to create the slip basin and access channel. Of this, about 1.4 mcy would be dry excavated and about 4.3 mcy would be wet dredged. It is proposed that excavated and dredged material be distributed between Ingram Yard, the Roseburg site, the South Dunes site, and the Kentuck Project site.* *During the "fresh water" construction phase of the slip about 2.2 mcy of material would be dredged in the pocket behind a temporary construction berm. During the "salt water" construction phase of the slip, about 0.7 mcy (slip and berm) of material would be dredged during removal of the temporary construction berm and finish dredging of the marine slip, of which about 0.3 mcy may be used for the Kentuck Project. It is also possible that the 0.3 mcy required to facilitate the Kentuck Project could be sourced from the salt water dredge taken from the access channel between the FNC and the proposed LNG Terminal marine slip. A total of about 1.4 mcy of material would be dredged from the bay during construction of the access channel.*

	will use during the dredging of the Marine Slip, Access Channel, and the Material Offloading Facility. o A description of water pollution controls (operational controls, structural such as floating turbidity curtain etc.) that Jordan Cove will use in dredging and transporting dredged material. o Detailed spill response procedures including all emergency shut-off procedures and procedures for a spill associated with the hydraulic transport pipeline. o A description of all operational and structural water pollution controls for breaching and removing the natural earthen berm noted in Section 1.5.5.4 of the Jordan Cove's Resource Report 1. o A dredging monitoring plan for DEQ review and approval to evaluate the		*The northern slip face would be armored after the slip is dredged but before the earthen barrier berm is removed. The barrier berm would remain unarmored, because it would be removed during the later stages of slip construction.* *The estimated excavated and dredged material volumes and their proposed placement location are summarized in table 2.1.1-1 and further discussed in subsequent sections below.* This information raises the following questions for DEQ that must be addressed in a detailed pollution control plan as DEQ develops its Certification Decision: • Where specifically are the disposal sites for the dredged material deposited in the following locations: o Ingram Yard Site. o Roseburg Site. o South Dunes Site. o Kentuck Project Site. o And all other sites. • How will JCEP manage the fresh and/or saline decant water if discharged from these sites to the surrounding landscape? • How will the management of the decant water comply with Oregon's biocriteria (OAR 340-041-0011) if this decant water is discharged to waters of the state such as fresh or estuarine wetlands? • What specific controls will JCEP use to remove the temporary construction berm to ensure compliance with the Oregon's turbidity standard (OAR 340-041-0036) and how will JCEP monitor compliance with this standard? • What controls will JCEP use to prevent no more than a ten percent increase in turbidity when the temporary construction berm is removed and JCEP dredges the Access Channel? • Where specifically will JCEP locate the structural controls during the dredging of the Access Channel? In the development of AIR-1, DEQ reviewed the information related to the dredging of the Marine Slip, Access Channel, and Material Offloading Facility in the Dredge Material Management Plan. This information also does not provide DEQ with the level of detail to evaluate the efficacy of JCEPs proposed practices to ensure compliance with the turbidity standard. For example, this plan identifies the Ingram Yard as a disposal site for the dredge material as follows:

	effectiveness of all proposed controls. Comment 43: In compliance with OAR 340-041-0007(1) and -0036, please provide for DEQ review and approval a detailed water pollution control plan presenting all practicable operational and structural control techniques that Jordan Cove Energy Project will employ when constructing the Material Offloading Facility east of the opening for the slip at the Liquefied Natural Gas Terminal. Please include in this plan a characterization of the fill material Jordan Cove will use to construct this facility that evaluates this fill material for contamination.		*Section 4.4.4 Ingram Yard* *Disposal Methods* *Excavated and dredged material from the slip and access channel will be transported to the site in dump trucks. Material will be placed and compacted to meet project specifications. Additionally, hydraulically dredged material may be transported via pipeline and discharged within temporary containment berms, allowing material to settle and dewater. The berms will be constructed using existing on-site material initially, followed by incoming dredge material. The disposal methodology will be similar to that listed in Section 4.4.1 above. Decant water will be returned to the dredge as needed pending final design.* *Availability* *The Ingram Yard disposal site is within the JCEP project area and, therefore, availability of the site for dredged material disposal can be confirmed. JCEP also has access to the Roseburg Site and will manage the placement of material at this site.* The sampling of information in this plan raises the following questions for DEQ that JCEP must address in a detailed pollution control plan: • Will JCEP include the access roads for the dump trucks hauling dredged material and any needed erosion and sediment controls in the plan required for a NPDES 1200-C Permit? • Will JCEP place dredged material from a pipeline conveying dredged material to Ingram Yard and, if so, will JCEP provide secondary containment for this pipeline conveying dredged material? • Where will JCEP locate the containment berms for decanting water from dredged material? How will JCEP manage decant water from dredging to protect non-salt or salt tolerant vegetation in fresh and estuarine wetlands and water ways to comply with the Oregon's biocriteria (OAR 340-041-0011)? The above questions represent a sample of the detailed information DEQ is seeking from JCEP as it develops a detailed pollution control plan for DEQ's review and approval during the development of a Certification Decision.

42	• A maintenance dredging plan providing the following: o A site map containing the following: ▪ The location of all areas Jordan Cove will dredge. ▪ The location of the slurry/hydraulic transport pipeline(s) for the transportation of the dredged material. ▪ The location of all containment systems and/or spill response materials. o Dredging schedule. o Type (e.g., cutter-suction dredging) and number of dredging plants that Jordan Cove will use during the maintenance dredging. o A description of water pollution controls (operational controls, structural controls such as floating turbidity curtain etc.) that Jordan Cove will use and the location of all structural controls to minimize the migration	The JCEP Project detailed in the 404-10 application encompasses the dredging required for the Project (Appendix M of the 401 Water Quality Package, submitted to ODEQ on 2/6/18). Any future maintenance dredging activities will be requested under a separate 404-10/401 permit application and will be subject to a separate certification from ODEQ for compliance with section 401 of the CWA, if and when, such activities are required.	Maintenance dredging for the slip and access channel is estimated at 115,000 cy every three years for the first 10 years of operation and about 160,000 cy every five years thereafter. DEQ expects JCEP to apply for and receive authorization from the Army Corps of Engineers and section 401 water quality certification from DEQ prior to undertaking maintenance dredging activities.

	of turbid water from maintenance dredging activities, o Detailed spill response procedures including all emergency shut-off procedures and procedures for a spill associated with the hydraulic transport line. o A dredging monitoring plan for DEQ review and approval to evaluate the effectiveness of all proposed controls		
44	DEQ will perform this review upon the receipt of information requested above. In addition to these requests for information, please provide to DEQ an application for an Individual Industrial Water Pollution Control Facility Permit for the proposed discharges of the hydrostatic testing wastewater. Please provide the location of each point of discharge. If Jordan Cove Energy Project or Pacific Connector Gas Pipeline expects to discharge washwater to the ground from vehicle and equipment washing, please provide an application for a Water Pollution Control Facility Individual Permit for these	PCGP is currently preparing a Water Pollution Control Facility permit application for hydrostatic test water discharges during the construction of the pipeline and will submit to ODEQ in Q4 2018. PCGP is also preparing a 1200-C permit application for the construction of the pipeline. PCGP anticipates submitting the application to ODEQ in Q4 2018. The Erosion Control and Revegetation Plan (ECRP) provides details for equipment cleaning in Section 12.4 (pdf page 499 in Attachment A to Appendix B to Part 2 of the JPA) and a BMP typical for	**Summary Statement: PCGP cannot use an NPDES 1200-C General Permit and any plan associated with this stormwater permit to cover the discharge of wash water during pipeline construction. In the section below, DEQ includes a strategy for PCGP to manage wastewater discharges during pipeline construction in compliance with state rules. State rules for developing a Certification Decision require that PCGP's submittal demonstrate compliance with the effluent limitations of the NPDES 1200-C Permit. In the section below, DEQ identifies three potential wastewater discharges from PCGP's proposed actions that will require wastewater permit(s).** NPDES 1200-C Permit does not allow discharge of wastewater to waters of the state or to land. The NPDES 1200-C General Permit contains the following condition from Schedule A.6: *6. Prohibited Discharges* *Discharges of the following are not authorized by this permit:* *a. Wastewater from washout and cleanout of stucco, paint, form release oils, curing compounds and other construction materials;* *b. Fuels, oils, or other pollutants used in vehicle and equipment operation and maintenance;* *c. Soaps or solvents used in vehicle and equipment washing.* *d. Concrete truck wash-out, hydro-demolition water, and saw-cutting slurry.*

	discharges. Please provide the location of each point of discharge.	these types of operations as depicted and described in Drawing 3430.34-X-0020 in Attachment C to the ECRP). Note #8 in the drawing states, "Water used for cleaning shall not be allowed to flow into any waterbody, wetland or irrigation canal/ditch."	To manage the following discharges in compliance with state rules and permit requirements, PCGP must seek coverage for these discharges under a separate application for a Water Pollution Control Facility Individual Permit: • Hydrostatic test water • Vehicle and Equipment wash water • Trench dewatering DEQ is currently researching the feasibility of covering these three discharges under one WPCF Individual Permit.
45	DEQ will perform this review upon the receipt of information requested elsewhere in this matrix. In addition to these requests for information, please provide a copy of the results from the first phase (i.e., desktop data review with maps) of the Shallow Groundwater Study (Revised August 24, 2017 by GeoEngineers) showing suspected locations of shallow groundwater along the pipeline right-of-way. Please expand the maps proposed in this study to include suspected locations of shallow groundwater along the proposed route for the 25 miles of Temporary or Permanent Access Roads. When complete, please provide the results from the implementation of the subsurface exploration plan proposed for phase two of this study with an analysis of how the construction and permanent right-of-way will impact	The purpose of this plan was to aid pipeline design to account for buoyancy in areas of shallow groundwater. Please see the ECRP for how trench dewatering in shallow groundwater areas will be filtered and released for infiltration to minimize offsite sedimentation.	**<u>Summary Statement</u>: DEQ provides the rationale for the information requested below. As discussed in DEQ's review of PCGP's response to Comment 44, PCGP will need to submit a WPCF Permit Application to cover the trench dewatering discharge.** As noted in DEQ's review matrix from AIR-1, the intent of DEQ's Comment 45 is to determine compliance with OAR 340-048-0042(2)(e) when reviewing PCGP's proposed activities. The goal of DEQ's review is to determine if PCGP's proposed actions have the potential to modify groundwater quality and how these potential modifications affect surface water quality. Given the presence of Temperature Total Maximum Daily Loads and the influence of the pipeline's construction on compliance with these TMDLs, DEQ has concerns regarding PCGP's approach to mitigate the capture of shallow groundwater in the trench for the pipeline. DEQ will need this information to determine compliance with OAR 340-048-0042(2) (e.g., Section 303 of the Clean Water Act). In its response to Comment 45, PCGP indicates that the purpose of the Shallow Groundwater Study was to aid in pipeline design to account for buoyancy in areas of shallow groundwater. PCGP submitted this study in its 401 Water Quality Certification package to support the certification of the pipeline's construction and operation. When studies are included in a submittal, DEQ expects these studies to encompass water quality concerns in addition to, for example, pipeline stability concerns noted in PCGP's response. Both are important, and PCGP must address both in its submittal package. PCGP's referral to the submittal's Erosion Control and Revegetation Plan does not provide DEQ with sufficient detail to evaluate PCGP's effort to mitigate the capture of shallow groundwater during pipeline construction. DEQ requires the following information from PCGP: • Please provide a copy of the results from the first phase of the Shallow Groundwater Study showing suspected locations of shallow groundwater along the pipeline right-of-way. • Indicate if these areas of suspected shallow groundwater are in areas where PCGP proposes Temporary and Permanent Access Roads and, if so, propose mitigation measures to manage shallow groundwater.

	shallow groundwater as well as the construction of any proposed new roads. Moreover, please propose practices for how Pacific Connector Gas Pipeline will avoid, minimize, and, if necessary, mitigate the impacts identified in the Shallow Groundwater Study noted above.		• Provide an analysis demonstrating that the evapotranspiration losses from PCGP's two proposed mitigation approaches will not be significant to affect surface water quality (i.e., temperature) and will not require a third mitigation option such as discharging to an underground injection control device. • Identify PCGP's criteria for using the proposed mitigation measure of filter fabric/hay bales and the mitigation measure using a filter bag. • Provide the specific location for where PCGP will site all trench-dewatering measures. • Provide performance standards for mitigation measures to avoid overflow, prevent runoff, etc. In further reviewing PCGP's submittal, DEQ also has concerns about compliance with Oregon Water Rights Law and Division 33 rules (OAR 690-033) to administer this statute. As discussed above in DEQ's review of PCGP's response to AIR-1, DEQ is concerned that PCGP's proposed trench dewatering approach may cause landslides on unstable slopes by its effect on soil pore pressure depending on its location of discharge. To develop a Certification Decision, DEQ needs the following information from PCGP: • Please provide the geo-engineering analysis indicating that the discharge from the trench dewatering measure will not cause a landslide/debris flow when these measures are located above or on unstable landscape features such as headwalls, Areas of Potential Rapidly Moving Landslide Hazard, mapped landslides, steep slopes (greater than 30%), and highly erosive soils. Additionally, PCGP must submit a Water Pollution Control Facility Individual Permit Application to DEQ to cover the discharge from trench dewatering as required by OAR 340-045-0015(1)(a). DEQ considers this groundwater seepage into the pipeline's trench wastewater once it contacts one or more of the following: • Sediment from trench construction and potential pollutants (heavy metals such as arsenic, nutrients). • Pollutants arising from construction operations (e.g., oil and grease, welding slag, chemical coatings, etc.).
46	Please provide signed Land Use Compatibility Statements from Coos, Douglas, Jackson, and Klamath Counties.	Signed LUCS from Coos, Douglas, Jackson, and Klamath Counties will be provided in Q4 of 2018.	DEQ is awaiting PCGP's response.

Other References

Benda, L.E., Veldhuisen, C., Miller, D.J., and Rodgers-Miller, L. 2000. *Slope instability and forest land managers: A primer and field guide*. Seattle, Wash., Earth Systems Institute, 74 p.
Elliot, William J. and Laurie M. Tysdal. 1999. Understanding and Reducing Erosion from Insloping Roads. Journal of Forestry. 97(8):30-34
Hearn, G.J. 2011. Slope Engineering for Mountain Roads. Geological Society Engineering Geology Special Publication No. 24

Oregon
Kate Brown, Governor

Department of Environmental Quality
Western Region Eugene Office
165 East 7th Avenue, Suite 100
Eugene, OR 97401
(541) 686-7838
FAX (541) 686-7551
OTRS 1-800-735-2900

March 11, 2019

Derik Vowels
Jordan Cove LNG, LLC
Consultant, Lead Environmental Advisor
111 SW 5th Ave.,
Suite 1100,
Portland OR 97204

Re: Additional Information Request – Waterbody Crossings
Jordan Cove Energy Project (FERC Project No. CP17-494)
Pacific Connector Gas Pipeline (FERC Project No. CP17-495)
U.S. Army Corps of Engineers (Project No. NWP-2017-41)

Dear Mr. Vowels:

The Oregon Department of Environmental Quality is currently reviewing an application from Jordan Cove LNG, LLC for Clean Water Act Section 401 water quality certification for a Section 404 permit from the U.S. Army Corps of Engineers necessary for construction of the Jordan Cove Energy Project and Pacific Connector Gas Pipeline.

Section 401 of the Clean Water Act bars federal agencies from issuing a license or permit for an action that may result in a discharge to Oregon waters without first obtaining water quality certification from DEQ. DEQ anticipates Jordan Cove's construction and operation will require authorizations from multiple federal agencies, including but not limited to a Section 404 permit from the U.S. Army Corps of Engineers and authorizations from the Federal Energy Regulatory Commission pursuant to the Natural Gas Act. DEQ is conducting a comprehensive section 401evaluation of the project's direct, indirect and cumulative effects on water quality. DEQ expects to develop a single certification decision based on this comprehensive evaluation of the project that will apply to the Corps and FERC decisions on the project.

DEQ is processing the applications pursuant to Section 401 of the Clean Water Act, 33 United States Code §1341, Oregon Revised Statutes 468B.035 through 468B.047, and DEQ's certification rules found in Oregon Administrative Rules 340, Division 048. To certify the project, DEQ must have a reasonable assurance that the proposed project, as conditioned, will comply with Sections 301, 302, 303, 306 and 307 of the Clean Water Act, Oregon water quality standards, and any other appropriate requirements of state law.

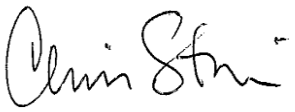
DEQ is reviewing the application submitted Feb. 6, 2018, by David Evans and Associates, Inc. on behalf of Jordan Cove. The information described in the attachments to this correspondence is necessary to complete DEQ's analysis of the project's compliance with applicable standards. Please provide a schedule for a complete response to this additional information request. Please forward your responses to:

Christopher Stine
Oregon Department of Environmental Quality 165
East 7th Avenue, Suite 100
Eugene, Oregon 97401

You may reference previously submitted documents to support your responses to the requests in Attachment A.

DEQ may request additional information as necessary to complete its analysis and fulfill its obligations under state and federal law.

If you have any questions, please contact me directly at 541-686-7810, or via email at stine.chris@deq.state.or.us.



Christopher Stine, PE
Water Quality Engineer

ec: Mike Koski, mkoski@pembina.com
Natalie Eades, neades@pembina.com
Shannon Luoma, sluoma@pembina.com
Keith Andersen, Dave Belyea, Steve Mrazik, Chris Bayham, Mary Camarata, Sara Christensen/DEQ
Tyler Krug, Tyler.J.Krug@usace.army.mil
John Peconom, John.Peconom@ferc.gov
Sean Mole, sean.mole@oregon.gov
FERC Dockets: CP17-494-000, CP17-495-000

ATTACHMENT A

Jordan Cove Energy Project / Pacific Connector Gas Pipeline Additional Information Request

Horizontal Directional Drilling

1. In September 2017, Pacific Connector submitted Horizontal Directional Drilling Feasibility Analysis reports for the proposed Coos Bay East Crossing and Coos Bay West Crossing. According to the reports, the "conclusions should be considered preliminary pending completion of a subsurface exploration program." Please provide a status update on geotechnical drilling and a schedule for finalizing the reports.
2. Pacific Connector describes two options (i.e., single Horizontal Directional Drilling Option and a Dual Horizontal Directional Drilling Option) to accomplish the Coos Bay East Horizontal Directional Drilling crossing. DEQ expects the design criteria supporting the selected procedure will be presented in the final design report. DEQ requests Pacific Connector address the following considerations in determining their proposed methodology.

   <u>Single Horizontal Directional Drilling Option</u>

   a) The single option places the bottom tangent at elevation -190 feet mean sea level. Pacific Connector expects the underlying geology at this depth will consist of competent bedrock, which is deemed critical to the feasibility of the single option. Please describe whether alternate design measures would allow use of the single option if the geotechnical investigation concludes the underlying geology does not consist of competent bedrock.

   <u>Dual Horizontal Directional Drilling Option</u>

   A final Horizontal Directional Drilling design report that proposes the Dual Horizontal Directional Drilling Option should address the following issues.

   b) The dual option relies on a shared tie-in workspace located in a tidal flat area south of Glasgow Point. Describe how the workspace will be isolated from open water during Horizontal Directional Drilling installation.

   c) The likelihood of inadvertent surface returns of drilling fluid is highest near entry points where drilling pressures can exceed the shear strength and pressure from overburden soils. Describe what special contingency measures will be employed to contain drilling fluids in this inter-tidal environment.

   d) What is the proposed final depth below surface of the installation at the tie-in location? What measures, if any, are proposed to ensure the pipeline remains buried for the life of the project?

   e) Describe the scope of open-water activities such as inter-tidal dredging for barge access to the shared tie-in workspace.

   f) Describe what procedures Pacific Connector will employ to avoid, minimize, or

mitigate the effects of this option on water quality.

3. The Horizontal Directional Drilling Mud Contingency Plan states a berm may be built around the drilling site and hay bales or silt fences may be placed on the river side of the drilling area. Because inadvertent surface returns may reasonably be expected near entry locations, Pacific Connector should identify measures that will be employed and maintained to contain fluids during installation.
4. Inadvertent fluid returns to surface waters are unacceptable. Pacific Connector must develop and implement an Horizontal Directional Drilling plan to continuously monitor engineering conditions during installation and provide for a rapid response in the event fluid loss is confirmed or suspected. The plan should establish procedures to monitor drilling pressure, fluid circulation, pilot hole location, axial loads, visual monitoring or other parameters deemed appropriate to interpret formational or surface loss of drilling fluid.

Waterbody Crossing Plans

The effects of pipeline construction across waterbodies can affect the physical, biological and chemical integrity of the aquatic environment. Pacific Connector will utilize dry open cut methods (fluming, dam and pump, or diverted open cut) on most of the proposed 326 waterbody crossings. Open cutting of streambeds can have direct, indirect and cumulative effects on water quality, habitat and stream hydrology. Changes to channel geometry may cause streams to reestablish equilibrium. These actions can increase sedimentation, reduce water quality, decrease habitat complexity and modify channel hydrology. Because, the effects of open trench waterbody crossings can propagate upstream, downstream, and laterally these impacts, may not be confined to the project area.

Waterbody crossing plans must describe site-specific construction procedures that Pacific Connector will undertake at each proposed crossing. The plans should identify the proposed crossing methodology, dewatering procedures, dewatering discharge sites, spoils placement locations, mobilization and demobilization, and monitoring procedures. The plans should be developed in consideration of local characteristics such as anticipated flow, local, geology, gradient, sensitive environmental conditions, slope stability at dewatering discharge points or other environmental factors that may influence the design and implementation of waterbody crossings. Pacific Connector should describe procedures for crossings that may require unique or challenging procedures (e.g., blasting consolidated rock). Last, site-specific crossing plans must address the removal of dams, dewatering locations, temporary bridges, or other temporary construction elements and include procedures to avoid or minimize sediment mobilization or turbidity

Waterbody crossing plans must also describe site-specific plans to restore each of the proposed waterbody crossings. Each plan must include sufficient local-scale information to provide an accurate baseline assessment of pre-construction environmental and ecological conditions to guide the design of the post-construction restoration. Each stream restoration plan must contain

site-specific designs and specifications to ensure PCGP fully mitigates the impact of open cut trenching in each stream and protects the beneficial uses. The data generated from the information requested below will support the development of site-specific waterbody crossing plans.

To develop a waterbody crossing plan for each open trench cut stream crossing, Pacific Connector must document and use the site-specific field data described below.

Hydraulic Assessment

Pacific Connector must conduct a hydraulic analysis on each proposed waterbody crossing. Site-specific information of local discharge is required to demonstrate that proposed pumping and fluming designs can adequately bypass anticipated flows. Pre-development local hydrology must also be characterized to inform stream restoration actions.

Pacific Connector should conduct the analysis using one of the following methods:

- Rational Method (for drainages up to 200 acres)
- NRCS Peak Flow Method using HydroCAD (for drainages larger than 200 acres)
- USGS StreamStats for Oregon

The hydraulic analysis should provide the following information:

- Drainage area above each proposed crossing
- Peak flow estimate at the time of construction
- Bankfull width, stage, and corresponding discharge
- Average gradient within the temporary crossing easement
- Mean two-year, five-year and 10-year discharge and velocity at the proposed crossing

Based on the hydraulic conditions at each crossing, Pacific Connector should confirm the design pumping capacity of the proposed fluming or pumping bypass system can sufficiently transfer maximum anticipated flows around the work area. Pacific Connector should further describe alternate or contingency methods in the event field conditions prevent successful dewatering. Waterbody crossing plans must include engineering data to support design criteria of proposed conveyance structures based on gradient, bypass length and anticipated flow.

Pacific Connector must also measure bankfull width, stage, and corresponding discharge at each crossing. Recognizing the bankfull width at each crossing is critical in designing and implementing restoration plans that maintain the geomorphological function of the stream segment.

Topographic Survey of Stream Channel

Restoring a stream's natural form and function requires a topographic survey of the pre-construction stream channel and floodplain form.[1] Pacific Connector provided this information for the South Umpqua Number 2 River crossing. However, this information is lacking for other crossings involving open trench cutting. This survey information will assist in the reconstruction of the natural stream channel. At minimum, Pacific Connector should include in each topographic survey a longitudinal survey of the stream profile, top and bottom of banks, and the top and bottom floodplain slopes. This topographic information should also include geometric data downstream and upstream of the pipeline crossing to assist the restoration design and to identify potential interactions with adjacent reaches.

Stream Function Assessment

Trenched waterbody crossings can alter stream function in ways that negatively affect aquatic habitats and ecosystems. Potential effects may include modified stream channel geometry, reduced habitat complexity, reduced streambank stability, impaired benthic production and increased sedimentation.

Pacific Connector must conduct a pre-construction ecological assessment of each waterbody crossing using the methodology presented in Stream Function Assessment Method for Oregon Version 1.0.[2] SFAM was developed jointly by EPA and Oregon Department of State Lands. The method provides a scientifically supported rapid assessment tool for gathering information on the functions and values associated with wadeable streams that may be subject to regulatory jurisdiction under Section 404 of the Clean Water Act and Oregon's Removal-Fill Law.

The assessment is needed to establish a pre-development ecological baseline and to inform site-specific practices necessary to mitigate the environmental effects of the action. Pacific Connector can also use this assessment method for post-construction monitoring of Pacific Connector's stream restoration actions over time.

More information can be found at:
https://www.oregon.gov/dsl/WW/Pages/Resources.aspx#assessment.

Biological Assessment

Oregon water quality rules prevent discharges to waters of the state that may reduce support for beneficial uses or cause changes in residential biological communities. To establish pre-construction conditions, Pacific Connector must conduct a benthic macroinvertebrate assessment to comply with the Biocriteria water quality standard (Oregon Administrative Rule 340-0410-0011). Benthic communities form the basis for food webs that support aquatic life and are susceptible to changes in sedimentation. Oregon DEQ has developed procedures to characterize

[1] Yokum, S.E. 2018. Guidance for Stream Restoration. Technical Note TN-102.4. National Stream Aquatic Ecology Center. USDA Forest Service

[2] Stream Function Assessment Method for Oregon Version 1.0. June 2018. U.S. Environmental Protection Agency and Oregon Department of State Lands. EPA 910-D-18-001.

the health of benthic communities to comply with this standard. Using procedures found in Methodology for Oregon's 2018 Water Quality Report and List of Water Quality Limited Waters,[3] Pacific Connector must perform pre-development benthic surveys using to the PREDictive Assessment Tool for Oregon (PREDATOR). The results of the PREDATOR surveys will enable DEQ to evaluate the direct, indirect, and cumulative effects of the action caused by stream channel modification, habitat loss, sedimentation or other potential project effects.

Streambed Material Assessment

Pacific Connector must characterize bed material composition at each trenched waterbody crossing. Substrate composition is critical to stream hydrology and provides interstitial refuge for egg incubation. Characteristics can vary considerably based on gradient, stream channel geometry, watershed hydrology and other factors. For this reason, site-specific knowledge of local bed material characteristics are necessary to inform restoration and mitigation actions following construction.

For streambeds characterized by unconsolidated substrates, Pacific Connector must conduct a pre-construction quantitative assessment of substrate material. The assessment should address the particle size, sorting, vertical variability and distribution of material.

Open cut trenches in bedrock-dominated stream channels are susceptible to upstream propagation of knickpoints created by joints in the stream's bedrock.[4] Knickpoint propagation in bedrock-dominated streams can cause changes in stream geomorphology and, potentially, barriers to fish migration. Pacific Connector should describe in detail how bedrock-dominated stream channels will be restored to prevent the creation of a joint in the bedrock that leads to the formation and propagation of a knickpoint in these channels.

Habitat Assessment

Naturally occurring material such as large wood and boulders provide gravel recruitment, cover for juvenile fish, thermal refugia, and hydraulic control. Pacific Connector must conduct a detail inventory of aquatic habitat features within the project area of each proposed crossing. Habitat features identified during this predevelopment inventory should be used to ensure restoration efforts result in no net loss of habitat function or complexity. In its Stream Crossing Risk Analysis document, Pacific Connector provides only general descriptions to address, for example, the reinstallation of boulders to maintain an existing bed profile and cascade/pool morphology during the stream restoration process. However, Pacific Connector's habitat assessments must capture such habitat features as noted above in sufficient design detail so that the construction contractor has clear direction in site-specific drawings to restore these habitat

[3] Methodology for Oregon's 2018 Water Quality Report and List of Water Quality Limited Waters, November 2018. Oregon Department of Environmental Quality: https://www.oregon.gov/deq/FilterDocs/ir2018assessMethod.pdf.
[4] Selander, Jacob. 2004. Processes of Knickpoint Propagation and Bedrock Incision in the Oregon Coast Range. Department of Geologic Sciences. University of Oregon

features during the stream restoration process.

Water Quality

Site-specific water body crossing plans should address the following water quality issues at each crossing proposed:

- Oregon DEQ may issue a section 401 water quality certification that allows the numeric turbidity criteria to be exceeded provided all practicable turbidity control techniques have been applied. Please identify what engineering controls (e.g., settling, filtration, flocculation, etc.) are proposed to reduce turbidity in streams during mobilization and removal of construction equipment.

- Describe procedures to backfill trenches in a manner that maintains predevelopment streambed material and habitat function. For example, backfilling procedures must clearly address how Pacific Connector will prevent the restored stream flow from moving completely into the subsurface of restored streambed material and creating a fish passage barrier. Additionally, crossing plans should clearly describe how fill material will be placed to prevent streambed and bank scour, sedimentation, and channel modification.

- For trench dewatering structures, please identify how sediment and fines removed from the isolated work area will be permanently managed following work completion.

Comments

1. Appendices C.2 and D.2 (Stream Fluming Procedures, Dam and Pump Procedures) of Resource Report 2 state, "Turbidity sampling will be conducted during all . . . crossings in accordance with the Stormwater Pollution Prevention Plan." DEQ cannot find the Stormwater Pollution Prevention Plan in Pacific Connector's application submittal to evaluate the proposed turbidity sampling.
2. Fluming and dam and pump procedures rely on upstream and downstream dams to isolate temporarily work areas during construction activities. Oregon's fish passage requirements found in Oregon Revised Statute 509.585 prevent activities that impede the volitional movement of fish. Pacific Connector should describe how proposed fluming and dam and pump procedures will comply with Oregon fish passage law.
3. Stream Classifications in Table A.2-2 in Resource Report 2 reference methods established by Oregon Department of Forestry and the Northwest Forest Plan. DEQ's biologically based numeric criteria are based on fish distribution maps developed by Oregon Department of Fish and Wildlife. Please consult with ODFW to identify fish use and classifications at the proposed waterbody crossing locations.
4. Appendix C.2 of Resource Report 2 (Fluming Procedures) indicates that scrap metal pipe may be used to construct flumes and that pipes may be steam-cleaned to remove oil and grease. Please identify on the crossing plans where Pacific Connector will discharge this wash water. DEQ expects that Pacific Connector will apply for and obtain coverage under the appropriate permit (i.e., either Water Pollution Control Facility or National

Pollutant Discharge Elimination System) based on the proposed activity.

5. Figure 8 of Appendix C.2 of Resource Report 2 (Fluming Procedures) illustrates procedures to divert stormwater runoff from the construction easement into the isolated stream section. Please note that NPDES 1200-C General Permit does not authorize the discharge of stormwater to waterways. Pacific Connector must control runoff from upland work areas to prevent discharge to stream channels.

Oregon
Kate Brown, Governor

Department of Environmental Quality
Western Region Eugene Office
165 East 7th Avenue, Suite 100
Eugene, OR 97401
(541) 686-7838
FAX (541) 686-7551
TTY 711

March 13, 2019

Derik Vowels
Jordan Cove LNG, LLC
Consultant, Lead Environmental Advisor
111 SW 5th Ave., Suite 1100,
Portland OR 97204

Re: Additional Information Request #4
Jordan Cove Energy Project (FERC Project No. CP17-494)
Pacific Connector Gas Pipeline (FERC Project No. CP17-495)
U.S. Army Corps of Engineers (Project No. NWP-2017-41)

Dear Mr. Vowels:

The Oregon Department of Environmental Quality is currently reviewing an application from Jordan Cove LNG, LLC for Clean Water Act section 401 water quality certification for a Section 404 permit from the U.S. Army Corps of Engineers necessary to construct the Jordan Cove Energy Project and Pacific Connector Gas Pipeline (collectively, "the Project"). DEQ is evaluating the land use compatibility statements and application materials related to land use to determine if they meet state law requirements.

DEQ requests the following supplemental information on land use.

1. Provide a map of the Pacific Connector Project showing zoning designations and overlays applicable to the project.
2. In Resource 8, Jordan Cove provided maps with zoning designations. Have these maps been update to reflect any changes to land use and to include supplemental project updates (i.e., worker park and ride locations, rock apron to arrest channel mitigation, eelgrass donor and embayment areas, and mitigation sites)? See Jordan Cove Energy Project, Resource 8, Figures 8.1-3a and -3b.
3. Provide an exhibit that identifies the specific provisions of the local land use plans and implementing regulations applicable to the activity and a discussion of the potential direct or indirect relationship to water quality of each finding or land use provision per OAR 340-048-0020(2)(i).
4. Provide updated analyses for capability determinations that date back to 2015. Pacific Connector provided analyses in 2015 with updates in the Jan. 2019 LUCs submission for Klamath, Jackson, and Douglas County for the non-coastal zone. No updates were provided for Douglas County coastal zone or Coos County. The updated analyses need to affirmatively review whether any project changes since 2015 would affect those prior analyses.
5. Provide analyses for capability determinations for Coos County for Jordan Cove.

Please provide a schedule for a complete response to this supplemental information to:

Mary Camarata
Oregon Department of Environmental Quality
165 East 7th Avenue, Suite 100
Eugene, Oregon 97401

If you have any questions, please contact me directly at (541) 687-7435, or via email at camarata.mary@deq.state.or.us.

Mary Camarata
Project Coordinator

ec: Mike Koski, mkoski@pembina.com
Natalie Eades, Neades@pembina.com
Shannon Luoma, sluoma@pembina.com
Tyler Krug, Tyler.J.Krug@usace.army.mil
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FERC Dockets: CP17-494-000, CP17-495-000