Coos County Planning Department
Land Use Application

Please place a check mark on the appropriate type of review that has been requested.

☑ Administrative Review ☑ Hearings Body Review
☑ Site Plan Review
☒ Variance

An incomplete application will not be processed. Applicant is responsible for completing the form and addressing all criteria. Attach additional sheets to answer questions if needed. Please indicated not applicable on any portion of the application that does not apply to your request.

A. Applicant:

Name: Pacific Connector Gas Pipeline, LP
Telephone: 503.727.2073
Address: c/o Perkins Coie LLP, Attn: Mark D. Whitlow, 1120 NW Couch Street, 10th Floor
City: Portland  State: OR  Zip Code: 97209

B. Owner: See Attached Owner and Property List

Name: 
Telephone: 
Address: 
City:  State:  Zip Code: 

C. As applicant, I am (check one): Please provide documentation.

☑ The owner of the property (shown on deed of record);
☑ The purchaser of the property under a duly executed written contract who has the written consent of the vendor to make such application (consent form attached).
☑ A lessee in possession of the property who has written consent of the owner to make such application (consent form attached).
☑ The agent of any of the foregoing who states on the application that he/she is the duly authorized agent and who submits evidence of being duly authorized in writing by his principal (consent form attached).
☒ N/A See Condition of approval 20(a) & (b) of Final Decision and Order No. 12-03-018PL dated March 13, 2012

D. Description of Property: See Attached Owner and Property List

Township ______ Range _____ Section _____ Tax Lot _______

Tax Account ____________________ Lot Size _________ Zoning District _______

Updated 2013
E. Information (please check off as you complete)

RX 1. Existing Use  See attached list
RX 2. Site Address  N/A
RX 3. Access Road  N/A
RX 4. Is the Property on Farm/Forest Tax Deferral  N/A
RX 5. Current Land Use (timber, farming, residential, etc.)  N/A
RX 6. Major Topography Features (streams, ditches, slopes, etc.)  N/A
RX 7. Letter from Natural Resource Conservation Service (for Forest/Farm dwellings only).  N/A
RX 8. List all lots or parcels that the current owner owns, co-owns or is purchasing which have a common boundary with the subject property on an assessment map.  N/A
RX 9. Identify any homes or development that exists on properties identified in #8.  N/A
RX 10. A copy of the current deed of record.
RX 11. Covenants or deed restrictions on the property, if unknown contact title company.
RX 12. A detailed parcel map of the subject property illustrating the size and location of existing and proposed uses, structures and roads on an 8½” x 11” paper to scale. **Applicable distances must be noted on the parcel map along with slopes.** (See example plot map)

F. Proposed use and Justification

Please attach an explanation of the requested proposed use and findings (or reasons) regarding how your application and proposed use comply with the following the Coos County Zoning and Land Development Ordinance (LDO). Pursuant to the LDO, this application may be approved only if it is found to comply with the applicable criteria for the proposed use. Staff will provide you with the criteria; however, staff cannot provide you with any legal information concerning the adequacy of the submitted findings, there is no guarantee of approval and the burden rests on the applicant. (You may request examples of a finding)

Applicable Criteria: The application requests County approval of another alternate segment alignment for the Pacific Connector Gas Pipeline (PCGP) alignment approval in the Board of Commissions Final Decision and Order No. 10-08-045PL, dated September 8, 2010, as ratified by the Final Decision and Order No. 12-03-018PL, dated March 13, 2012, without amending the prior decisions. The applicable criteria are set forth in the attached application narrative. Please see Condition 20(a) & (b) to Final Decision and Order No. 10-08-045PL regarding the procedural requirement of producing signatures of owners of affected properties.

Updated 2013
G. Authorization:
All areas must be initialed by all applicant(s) prior to the Planning Department accepting any application unless the statement is not applicable. If one of the statements, below is not applicable to your request indicated by writing N/A.

I hereby attest that I am authorized to make the application for a conditional use and the statements within this application are true and correct to the best of my knowledge and belief. I affirm that this is a legally created tract, lot or parcel of land. I understand that I have the right to an attorney for verification as to the creation of the subject property. I understand that any action authorized by Coos County may be revoked if it is determined that the action was issued based upon false statements or misrepresentation.

ORS 215.416 Permit application; fees; consolidated procedures; hearings; notice; approval criteria; decision without hearing. (1) When required or authorized by the ordinances, rules and regulations of a county, an owner of land may apply in writing to such persons as the governing body designates, for a permit, in the manner prescribed by the governing body. The governing body shall establish fees charged for processing permits at an amount no more than the actual or average cost of providing that service. The Coos County Board of Commissioners adopt a schedule of fees which reflect the average review cost of processing and set-forth that the Planning Department shall charge the actual cost of processing an application. Therefore, upon completion of review of your submitted application/permit a cost evaluation will be done and any balance owed will be billed to the applicant(s) and is due at that time. By signing this form you acknowledge that you are response to pay any debt caused by the processing of this application. Furthermore, the Coos County Planning Department reserves the right to determine the appropriate amount of time required to thoroughly complete any type of request and, by signing this page as the applicant and/or owner of the subject property, you agree to pay the amount owed as a result of this review. If the amount is not paid within 30 days of the invoice, or other arrangements have not been made, the Planning Department may choose to revoke this permit or send this debt to a collection agency at your expense.

I understand it is the function of the planning office to impartially review my application and to address all issues affecting it regardless of whether the issues promote or hinder the approval of my application. In the event a public hearing is required to consider my application, I agree I bare the burden of proof. I understand that approval is not guaranteed and the applicant(s) bear the burden of proof to demonstrate compliance with the applicable review criteria.

As applicant(s) I/we acknowledge that is in my/our desire to submit this application and staff has not encouraged or discouraged the submittal of this application.

[Signatures]
Applicant(s) Original Signature
Applicant(s) Original Signature

Attorney On DCCPL.L.P.

Updated 2013
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**ZONING**

F = Forest
EFU = Exclusive Farm Use
CBEMP = Coos Bay Estuary Management Plan
20-CA = 20- Conservation Aquatic
20-RS = 20 - Rural Shoreland

**SPECIAL CONSIDERATIONS**

ARC = Archaeological Sites
FP = Flood Plain
MU = Forest Mixed Use
HZE = Natural Hazards Earthflow & Slump
BGR = Big Game Range
WM = Wet Meadow Wetland
WET = Wetlands
CSB = Coastal Shoreland Boundary
NARRATIVE IN SUPPORT OF LAND USE APPLICATION
PROPOSED BLUE RIDGE ALTERNATE ALIGNMENT
FOR THE PACIFIC CONNECTOR GAS PIPELINE

DECEMBER 6, 2013

Applicant: Pacific Connector Gas Pipeline, LP
295 Chipeta Way
Salt Lake City, UT 84108
(801) 584-6564
Contact: Bob Peacock

Applicant’s Representatives: Edge Environmental, Inc.
405 Urban Street, Suite 310
Lakewood, CO 80228
(303) 988-8844
Contact: Carolyn Last

Perkins Coie LLP
1120 NW Couch Street, 10th Floor
Portland, OR 97209
(503) 727-2000
Contact: Mark D. Whitlow

Request: Approve alternate alignment for segment of the previously approved alignment for the Pacific Connector Gas Pipeline under Board of Commissioners Final Decision and Order No. 10-08-045PL dated September 8, 2010 and Board of Commissioners Final Decision and Order No. 12-03-018PL dated March 13, 2012.
TABLE OF CONTENTS

I. INTRODUCTION .................................................................................................................. 1
   A. Background and Planning History ............................................................................ 2
   B. Procedural Status ..................................................................................................... 3

II. REQUESTED ALTERNATE ALIGNMENT ................................................................. 3
   A. Balance of County Zoning Districts ................................................................. 4
      1. Exclusive Farm Use Zone .............................................................................. 4
      2. Forest Zone .................................................................................................... 5
   B. Special Regulatory Considerations Prescribed by the Coos County Comprehensive Plan – Table 4.7a .............................................................. 9
   C. Coos Bay Estuary Management Plan ............................................................... 22
   D. Zoning District 20-CA ...................................................................................... 25
      20 – Conservation Aquatic (20-CA) .................................................................. 25
   E. Floodplain Overlay Zone ..................................................................................... 27

III. CONCLUSION ............................................................................................................... 30

FIGURES:

Overview Sheet

Sheet 1 Blue Ridge Route Alignment

Sheet 2 Blue Ridge Route Deviation (Comparing Against Prior Brunschmid Route Adjustment & Prior Stock Slough Route Adjustment)
I. INTRODUCTION

Pacific Connector Pipeline Company, LP ("Pacific Connector") submits this application requesting hearings body conditional use approval of the Blue Ridge alternate alignment of the previously approved alignment for the Pacific Connector Gas Pipeline ("PCGP"). See Sheet 1. The previously approved PCGP alignment across 49.72 miles of Coos County ("County") under Final Decision and Order No. 10-08-045PL dated September 8, 2010 and Board of Commissioners Final Decision and Order No. 12-03-018PL dated March 13, 2012 ("Prior Decisions") will remain valid and unmodified. ¹

Following the Prior Decisions, Pacific Connector filed a prior application seeking to amend Miscellaneous Condition No. 25 to the Prior Decisions, and, further, a separate application seeking approval of alternate alignments to the PCGP alignment approved in the Prior Decisions, which prior applications have proceeded through public hearings and are awaiting decisions. The prior applications are herein referred to as Pacific Connector II, with the alternate alignments referred to as the Brunschmid and Stock Slough alternates. This application, referred to as Pacific Connector III, will not seek to modify or amend the Pacific Connector II applications, but will make reference to the Brunschmid and Stock Slough alternate alignments by comparison with the Blue Ridge Route alternate alignment that is the subject of this application. The Pacific Connector III route, starting immediately south of the Coos River, is the route referred to in the FERC Application as the "PCGP Modified Blue Ridge 2013 Route". See Sheet 2.

As noted in the Prior Decisions, the pipeline's alignment requires approval by the Federal Energy Regulatory Commission ("FERC"). While this application proposes an alternate segment alignment for County approval, FERC will make the ultimate selection of the pipeline's alignment. As a practical matter, even though Pacific Connector seeks approval for a minor alternate alignment along the route previously approved by the Prior Decisions, only one continuous alignment for the entire pipeline will be constructed.

This application requests County approval of an alternate segment alignment that would 1) allow the PCGP to avoid the Brunschmid Wetland Reserve, 2) eliminate multiple crossings of Stock Slough and the steep road cut crossing of Stock Slough Road, and 3) reduce the number of miles of crossings on private timberlands. The PCGP alignment approved in the Prior Decisions crossed through five Coos County zoning designations and 14 zones within the CBEMP. The

¹ Since the PCGP alignment was approved in the Prior Decisions, Pacific Connector has conducted a detailed analysis of that alignment. In many instances, the approved PCGP alignment has moved in minor ways to conform to the surveyed centerline or to accommodate small project refinements, without changing the location of the alignment into different ownerships or into a different zone within the same ownership. Based upon consultation with Planning staff, those refinements to the approved alignment do not constitute alternate segments which need additional approval with respect to applicable review criteria.
proposed PCGP alternate segment alignment affects only two Coos County zoning designations and one CBEMP zoning district.

This narrative explains the reasons for the requested Blue Ridge alternate segment alignment approval and demonstrates how the alternate segment alignment satisfies the applicable provisions of the Coos County Zoning and Land Development Ordinance ("CCZLDO"), the Coos Bay Estuary Management Plan ("CBEMP"), and is consistent with the Prior Decisions.

A. Background and Planning History.

Pacific Connector has applied for authorization from the Federal Energy Regulatory Commission ("FERC") under Section 7c of the Natural Gas Act ("NGA") to construct, install, own, operate, and maintain an interstate natural gas pipeline to transport natural gas to the Jordan Cove LNG Terminal in Coos Bay from the existing interstate natural gas transmission pipeline near Malin, Oregon. The 36-inch diameter pipeline will be approximately 232 miles in length and will provide natural gas for liquefaction by Jordan Cove Energy Project LP to be marketed domestically and throughout the Pacific Rim. Through this application to Coos County, the applicant is seeking a determination from Coos County that the requested alternate alignment to a segment of the previously approved 49.72-mile segment of the PCGP located within Coos County is consistent with all applicable Coos County land use regulations.2

As discussed in the original application and recognized in the Prior Decisions, because of the linear nature of the proposed interstate gas pipeline, it will traverse numerous zoning districts within the County, with slightly different use descriptions between one zone and the other:

(a) within the Forest (F) zone, the pipeline use is characterized as a new gas distribution line with no greater than a 50-foot right of way;

(b) within the Agricultural (EFU) zone, the pipeline use is characterized as a utility facility necessary for public service; and

(c) within the Coos Bay Estuary Management Plan (CBEMP), the pipeline is characterized in the respective management units as a low intensity utility.

As established in the Prior Decisions, the subsurface nature of the proposed PCGP minimizes pipeline impacts following construction. Construction impacts will be minimized through appropriate methodologies and technologies. As was also established in the Prior Decisions, Pacific Connector proposes to utilize a standard 95-foot wide temporary construction easement, with a 50-foot permanent right-of-way and associated temporary extra work areas ("TEWAs"). Other forms of temporary construction areas will be utilized, all of which have been designed to disturb the minimum area necessary in order to safely construct the pipeline and minimize the total overall project disturbance.

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2 By submitting this application, the applicant is seeking to comply with applicable land use regulations and the consistency requirements of the Coastal Zone Management Act. However, submittal of this application is not a waiver of any federal jurisdiction over the Coos County segment of the PCGP.
B. Procedural Status.

As stated above, Pacific Connector previously received land use approval in the Prior Decisions from Coos County for the 49.72-mile segment of the PCGP located within Coos County.

This application does not seek to modify or amend the Prior Decisions, but references will be made to them for a number of reasons including the characterization of the use in the various zoning districts, and regarding references to interpretations and findings in the Prior Decisions that are equally applicable to this application.

As stated above, this new application does not seek to modify or amend the PCGP alignment approved in the Prior Decisions, nor does it seek to modify or amend the related conditions. Accordingly, this application is not subject to the provisions of Section 5.0.350.

The Prior Decisions determined that Section 5.0.150 requiring that a property owner or contract purchaser sign the application is merely a procedural requirement that can be deferred to a later stage in the approval process. Pacific Connector proposes to handle that procedural issue as it is being handled through Condition of Approval No. 20 to the County's Final Decision and Order No. 12-03-018PL dated March 13, 2012. Pacific Connector requests that the same condition of approval be imposed by the County as part of the County's approval of this application.

II. REQUESTED ALTERNATE ALIGNMENT

As stated above, Pacific Connector requests approval of another alternate segment alignment in two Coos County zoning designations: Forest (F) and Exclusive Farm Use (EFU), and one Coos Bay Estuary Management Plan (CBEMP) zoning district: Conservation Aquatic (20-CA). The alternate segment alignment proposed by this application will not introduce the PCGP into any zoning district beyond those previously subject to the approved alignment in the Prior Decisions, and will affect different ownerships only in relatively few instances. As discussed above, the proposed alternate segment alignment is described as the Blue Ridge Route, which has the following benefits over the previously approved alignment in 2009:

1. this alternate alignment will avoid the National Resources Conservation Service's (NRCS's) Brunschmid Wetland Reserve Program easement;

2. this alternate alignment will avoid the multiple Stock Slough crossings and will avoid crossing the steep road cut of Stock Slough Road; and

3. this alternative alignment will avoid crossing multiple tracts of privately owned timberlands, and is the alternate now preferred by FERC.

The remainder of this section summarizes the applicable approval criteria and Pacific Connector's responses for the requested alternate segment alignment. The proposed Blue Ridge alternate segment alignment is shown in attached Sheets 1 and 2, which will be referenced in the following sections.
A. Balance of County Zoning Districts

1. Exclusive Farm Use Zone.

The Prior Decisions approved the PCGP to cross approximately 3.72 miles of properties zoned Exclusive Farm Use (EFU), all of which are privately owned. During the FERC review process, Pacific Connector was informed by FERC that another alternate alignment is needed for FERC's consideration. Of necessity, the new alternate alignment will also cross EFU zoned parcels. See Sheets 1 and 2.

As demonstrated below, Pacific Connector's requested approval for an alternate alignment for a segment of the approved PCGP alignment in the EFU zone is consistent with the requirements of ORS Chapter 215, OAR 660, Division 33, and the applicable approval criteria of the CCZLDO.

CCZLDO Section 4.9.450 Hearings Body Conditional Use

The following uses and their accessory uses may be allowed as hearings body conditional uses in the "Exclusive Farm Use" zone and the "Mixed Use" overlay subject to the corresponding review standard and development requirements in Section 4.9.600 and 4.9.700.

C. Utility facilities necessary for public service, except for the purpose of generating power for public use by sale and transmission towers over 200 feet in height. A facility is necessary if it must be situated in an agricultural zone in order for the service to be provided.

By following the steps outlined above, the applicant and planning staff determined that the utility facility use is allowed in both of the EFU and Mixed Use zones, subject only to General Conditions. As determined in the Prior Decisions, CCZLDO Section 4.9.450 is more or less a direct codification of ORS 215.283(1)(c). Accordingly, under state law, utility facilities sited on EFU lands are subject only to ORS 215.275, as well as the administrative rules adopted by LCDC. See Final Decision and Order, No. 10-08-045PL, page 116.

As determined in the initial Prior Decisions, the PCGP is a utility facility under CCZLDO Section 4.9.450.C. in that, due to its linear nature and the points of connection it must make, it is necessary for some segments of the PCGP to be situated in agricultural land, in satisfaction of this review criterion and the companion criterion of ORS 215.275(1). Final Decision and Order, No. 10-08-045PL, pp. 115-23. The same is true of the selection of any alternate segment alignment. As recognized in the Prior Decisions, ORS 215.275(6) exempts interstate natural gas pipelines from the provisions of ORS 215.275(2)-(5) and OAR 660-33-0130 has a similar exemption.

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3 ORS 215.283(1) provides, in relevant part:
(i) the following uses may be established in any area zoned for Exclusive Farm Use: * * *
(ii) utility facilities necessary for public service, including wetland waste treatment systems but not including commercial facilities for the purpose of generating electrical power for public use by sale or transmission towers over 200 feet in height. A utility facility necessary for public service may be established as provided in ORS 215.275.
As referenced above, the reasons for the requested Blue Ridge alternate segment alignment affecting EFU lands is as follows:

1. This proposed alternate segment alignment would avoid an approved mitigation site on the north side of the Coos River (e.g., the Brunschmid Wetland Reserve Project, which has an easement held by the USDA Farm Services Agency).

2. This proposed alternate segment alignment avoids the multiple crossings of Stock Slough previously approved in the Prior Decisions, without crossing any greater area of EFU land. Further, it avoids crossing Stock Slough Road (County Road 54) in an area of a steep road cut as the alignment descends a steep ridge slope. See Sheet 2.

3. This alternate segment alignment was proposed to FERC by an affected landowner for the purpose of reducing the number of miles of crossings of private timberlands.

In sum, the PCGP is a locationally dependent linear facility and even the proposed Blue Ridge alternate alignment must cross some EFU land in order to achieve a reasonably direct route to achieve the benefits of the proposed alternate alignment. It is important to note that placing the pipeline under EFU land does not take cropland out of production. The pipeline easement agreement allows full use of the landowner's property by the landowner for crop production once the pipeline is constructed.

CCZLDO Section 4.9.600 Siting Standards for Dwellings and Structures in the EFU Zone

The siting criteria of this section apply to dwellings and structures within the EFU zone. No dwellings are proposed and, under the County's prior interpretation in the Prior Decisions, a subsurface interstate gas pipeline is not a "structure," so the provisions of this code section are not applicable to the proposed PCGP alternate segment alignment or its necessary components. See Final Decision and Order, No. 10-08-045PL, pp. 108-12.

CCZLDO Section 4.9.700

As stated above, the proposed alternate segment alignment in the EFU zone subsurface does not constitute a "structure" as above described. Accordingly, Section 4.9.700 which is applicable to "all dwellings and structures" does not apply to this application.

2. Forest Zone.

The Prior Decisions approved the PCGP alignment to cross approximately 39.47 miles of Forest-zoned lands within Coos County, 10.76 miles of which are on BLM-managed lands, with the remaining segments located on privately owned lands. The Blue Ridge alternate alignment would reduce the miles of private timber lands crossed from 9.32 miles to 5.31 miles (4.01 miles less) and will increase the number of BLM timber lands crossed from 1.43 miles to 7.64 miles (6.21 miles more).
The proposed alternate alignment segment affects less privately-owned Forest-zoned land than the PCGP alignment previously approved by the Prior Decisions. As discussed above, the changes in alignment within the Forest zone, as shown on Sheets 1 and 2, are occasioned by the need to avoid the Brunschmid Wetland Reserve Program (WRF) easement, the need to avoid multiple Stock Slough crossings and the steep road cut crossing of Stock Slough Road, and to cross fewer private timber land holdings. The alternate segment alignment crosses other ownerships of Forest-zoned land than the previously approved PCGP alignment did, including the land owned by the owner requesting the Blue Ridge alternate alignment. Otherwise, the applicable review criteria for the proposed PCGP alternate segment alignment in the Forest-zoned land are the same as for the approved PCGP alignment in the Prior Decisions.

CCZLDO Section 4.8.300 Administrative Conditional Uses

The following uses and their accessory uses may be allowed as administrative conditional uses in the "Forest" zone subject to applicable requirements in Section 4.8.400 and applicable siting criteria set forth in this Article and elsewhere in this Ordinance.

F. New electrical transmission lines with right-of-way widths of up to 100 feet as specified in ORS 772.210. New distribution lines (e.g. gas, oil, geothermal) with right-of-way 50 feet or less in width.

The PCGP is a new gas line with a permanent easement width of 50 feet. Therefore, the PCGP and its associated facilities are classified as an administrative conditional use within the Forest zone. See Final Decision and Order, No. 10-08-045PL, p. 87.

As detailed below, the proposed PCGP alternate segment alignment in the F zone satisfies all of the applicable review criteria for a Hearings Body conditional use in the F zone.

CCZLDO Section 4.8.400 Review Criteria for Conditional Uses in Section 4.8.300 and Section 4.8.350

A use authorized by Section 4.8.300 and Section 4.8.350 may be allowed provided the following requirements are met. These requirements are designed to make the use compatible with forest operations and agriculture and to conserve values found on forest lands.

A. The proposed use will not force a significant change in, or significantly increase the cost of, accepted farming or forest practices on agriculture or forest lands; and

As detailed in the Prior Decisions, this criterion is limited to regulation of "significant" impacts and cost increases. The criterion does not require that there be no impacts on farming and forest practices. Final Decision and Order, No. 10-08-045PL, p. 91. As explained in the Prior Decisions, accepted forest practices in the vicinity of the pipeline corridor include timber production and harvesting, hauling harvested timber, logging road construction and maintenance, application of chemicals, and disposal of slash. The pipeline project will have effects on the
timbered areas located in the Forest zone both during and after construction in the form of a cleared corridor. In the Prior Decisions, the Board found that the PCGP's limited impacts will not force a "significant" change in the accepted forest practices in the vicinity of the pipeline. Final Decision and Order, No. 10-08-045PL, p. 94. For the same reasons discussed in the Prior Decisions, the proposed alternate segment alignment for the subsurface interstate gas pipeline and its associated facilities in the F zone will not force a significant change in, or significantly increase the cost of, accepted farming or forest practices on agricultural or forest lands. As with the original PCGP alignment, the remaining 20 feet of permanent right-of-way for the alternate segment alignment, as well as the temporary construction areas, will be replanted in a manner consistent with Pacific Connector's Erosion Control and Revegetation Plan ("ECRP"). Both during and following construction, forestry activities will be able to continue on the forest lands nearby or adjoining the PCGP.

**CCZLDO Section 4.8.600  Mandatory Siting Standards Required for Dwellings and Structures in the Forest Zone**

*The following siting criteria shall apply to all dwellings, including replacement dwellings, and structures in the Forest and Forest Mixed Use zones.*

No dwellings are proposed by this application. As detailed in the EFU section above, the Board previously determined that the PCGP is not a "structure" as that term is defined in CCZLDO Section 2.1.200 because the PCGP will be located under, rather than on top of, the land which it crosses. Final Decision and Order, No. 10-08-045PL, pp. 108-12. Consequently, the siting standards at CCZLDO Section 4.8.600 are not applicable to the proposed subsurface PCGP alternate segment alignment or its necessary components or associated facilities in the F zone.

**CCZLDO Section 4.8.700  Fire Siting Safety Standards**

*All new dwellings and permanent structures and replacement dwellings and structures shall, at a minimum, meet the following standards.*

As discussed above, the PCGP is neither a structure nor a dwelling. Consequently, the fire siting and safety standards of this Section are not applicable to this application.

**CCZLDO Section 4.8.750  Development Standards**

*All development and structures approved pursuant to Article 4.8 shall be sited in accordance with this Section.*

A. *Minimum Lot Size:*

The proposed PCGP alternate segment alignment in the F zone will not require or create any land divisions. Consequently, the minimum lot size standard is not applicable.
B. Setbacks: All buildings or structures with the exception of fences shall be set back a minimum of thirty-five (35) feet from any road right-of-way centerline or five (5) feet from any right-of-way line, whichever is greater.

The PCGP is a linear, underground utility facility that crosses several property lines, but is not a building or structure. Final Decision and Order, No. 10-08-045PL, pp. 108-12. Consequently, the setback standard is not applicable to the proposed PCGP alternate segment alignment in the F zone.

C. Structure Height:

D. Lot Coverage:

There are no requirements for either of these standards in the F zone.

E. Fences, Hedges and Walls: No requirement, except for vision clearance provisions in Section 3.3.400 and Fire Siting and Safety Standards in Section 4.7.700.

The PCGP is not a hedge, fence or wall, and therefore this standard does not apply to the proposed PCGP alternate segment alignment in the F zone or its necessary components.

F. Off-Street Parking and Loading: See Chapter X.

The off-street parking and loading standards are not applicable to the proposed PCGP alternate segment alignment use in the F zone.

G. Minimum Road Frontage/Lot Width: 20 feet.

The proposed PCGP alternate segment alignment in the F zone will not impact the existing configuration of the parcels it crosses. Therefore, this standard is not applicable.

H. Minimizing Impacts:

This standard only applies to dwellings within the F zone. No dwellings are proposed by this application. Therefore, this standard is not applicable to the proposed PCGP alternate segment alignment application in the F zone.

I. Riparian Vegetation Protection.

1. Riparian vegetation within 50 feet of a wetland, stream, lake or river, as identified on the Coastal Shoreland and Fish and Wildlife habitat inventory maps shall be maintained except that:

   e. Riparian vegetation may be removed in order to site or properly maintain public utilities and road rights-of-way; or
The PCGP is a public utility project within the state of Oregon. Therefore, the proposed PCGP alternate segment alignment in the F zone is not subject to the 50-foot riparian protection vegetation zone, and riparian vegetation may be removed in order to site the PCGP pursuant to the exemption cited above. Nonetheless, the proposed PCGP alternate segment alignment in the F zone will comply with all FERC requirements for wetland and waterbody protection and mitigation both during and after construction.

For the reasons set forth above, the proposed PCGP alternate segment alignment should be approved as a conditional use within the F zone.

B. Special Regulatory Considerations Prescribed by the Coos County Comprehensive Plan – Table 4.7a

The CCZLDO provides special regulations for the use and development of land situated within resource or hazard areas identified on the Special Considerations Maps for the Balance of County as set forth on Table 4.7a of the CCZLDO. The following sections identify the special regulatory considerations prescribed by the Coos County Comprehensive Plan for each protected resource (Phenomenon) listed in the left-hand column of Table 4.7a, which indicates, by reference to APPENDIX I, the applicable Strategies which apply to the applicable special regulatory considerations regarding each of the stated Phenomenon.

Mineral and Aggregate

Considerations:

1a. Preserve these in their original character until mined.

1b. Agriculture and forestry uses are acceptable per zone and use district requirements

1c. Allow new conflicting uses within 500 ft. subject to ESEE findings through the conditional use process.

Strategy No. 1:

Coos County shall manage its identified mineral and aggregate resources (except black sand prospects) in their original character until mined, except where conflicting uses are identified during implementation of the Plan, and such uses are justified based on consideration of the economic, social, environmental, and energy consequences of the conflicting uses, or where existing uses have been grandfathered.

Conflicting uses include dwellings and any other structure within 500 feet of the resource site. Where no conflicts are identified, agriculture, forest, or similar open space zoning shall be used to implement this strategy.

When a conflicting use is proposed at a given site, the decision about allowing development of the proposed use or the development or protection of the aggregate resource shall be made through a conditional use process where findings are developed which address the economic, environmental, social, and energy consequences of allowing the proposed conflicting use,
development of the aggregate resource, or both at the site. The following guidelines must be considered as part of the conditional use process:

**Consideration 1a:**
Non-exploratory mining operations are conditional uses, where allowed.

The pipeline is not located within 500 feet of any mapped resource sites, with the exception of coal basin areas surrounding two ownerships within the Stock Slough area. However, under the provisions of Strategy 1, the mapped coal basin is described as commercially unviable and, accordingly, not designated as a Goal 5 resource. There is no conflicting use. This strategy is satisfied.

**Strategy No. 2:**
Coos County shall regulate new recovery operations by designating such activities as conditional use in appropriate zones, except where permitted outright in forest zones, to ensure compatibility with adjacent uses.

Site restoration shall conform to the requirements of ORS 517.750 to 517.900, "Reclamation of Mining Lands.

This strategy recognizes that project review by the Hearings Body is necessary to minimize the adverse impacts that are typically associated with mining operations, and which often make such recovery activities incompatible with adjacent uses.

The proposed PCGP alternate segment alignment is not a mining operation. Therefore, this strategy is not applicable.

**Water Resources**

**Consideration 2a:**
Prohibits new residential and commercial development in rural areas other than committed areas when evidence or irreversible degradation by new withdrawal or septic tanks has been submitted.

**Strategy No. 1:**
Coos County shall not permit further new residential and commercial development in rural areas where the Oregon State Water Resources Department (OSWRD), the Oregon State Environmental Quality commission (EQC), or the Oregon State Health Division (OSHD) has submitted compelling evidence to Coos County that water resources within that area would be irreversibly degraded by new consumptive withdrawal or by additional septic tank or other waste discharges.

The proposed PCGP alternate segment alignment is neither a residential nor commercial development. Therefore, this strategy is not applicable.
Historical/Archeological Sites and Structures

*Consideration 3a:* 
*Manage these for their original resource value.*

*Strategy No. 1:*
*Coos County shall manage its historical, cultural and archeological areas, sites, structures and objects so as to preserve their original resource value.*

*This strategy recognizes that preservation of significant historical, cultural and archeological resources is necessary to sustain the County's cultural heritage.*

Pacific Connector will utilize several steps to ensure appropriate identification and preservation of historical and archaeological resources prior to and during the construction of the PCGP Project as directed by FERC and Oregon SHPO.

Pacific Connector has consulted with the Confederated Tribes of the Coos, Lower Umpqua, and Siuslaw Indians and the Coquille Indian Tribe regarding cultural resources issues throughout the life of the project. Throughout all of the archaeological and historical studies necessary, Pacific Connector will continue to consult with appropriate Tribes, Oregon SHPO and the FERC regarding the proposed alternate segment alignment, to ensure their continuing cooperation and concurrence.

Pacific Connector proposes that Condition No. 24 to the Prior Decisions be imposed as a condition of approval to this application, with appropriate revisions to reflect the different area of the County where the condition will apply.

*Consideration 3b:*
*Develop proposals in identified archeological areas must have a “sign-off” by qualified person(s).*

*Strategy No. 3:*
*Coos County shall continue to refrain from wide-spread dissemination site-specific inventory information concerning identified archeological sites. Rather Coos County shall manage development in these areas so as to preserve their value as archeological resources.*

*This strategy shall be implemented by requiring development proposals to be accompanied by documentation that the proposed project would not adversely impact the historical and archaeological values of the project’s site. "Sufficient documentation" shall be a letter from a qualified archaeologist/historian and/or a duly authorized representative of a local Indian tribe(s). The Coos County Planning Department shall develop and maintain a list of qualified archaeologists and historians. In cases where adverse impacts have been identified, then development shall only proceed if appropriate measures are taken to preserve the archaeological value of the site. "Appropriate measures" are deemed to be those, which do not compromise the integrity of remains, such as: (1) paving over the sites; (2) incorporating cluster-type housing design to avoid the sensitive areas; or (3) contracting with a qualified*
archaeologist to remove and re-inter the cultural remains or burial(s) at the developer's expense. If an archaeological site is encountered in the process of development, which previously had been unknown to exist, then, these three appropriate measures shall still apply. Land development activities found to violate the intent of this strategy shall be subject to penalties prescribed by ORS 97.745.

This strategy is based on the recognition that preservation of such archaeologically sensitive areas is not only a community's social responsibility but is also a legal responsibility pursuant to Goal #5 and ORS 97.745. It also recognizes that historical and archaeological sites are non-renewable, cultural resources.

Pacific Connector proposes that a condition similar to Condition No. 24 to the Prior Decisions be imposed as a condition of approval to the application.

Consideration 3c:
Historical structures and sites can only be expanded, enlarged or modified if Coos County finds the proposal to be consistent with the original historical character of the structure or site.

Strategy No. 2:
Coos County shall permit the expansion, enlargement or other modification of identified historical structures or sites provided that such expansion, enlargement or other modification is consistent with the original historical character of the structure or site;

This strategy shall be implemented by requiring Planning Director review of site and architectural plans to ensure that the proposed project is consistent with the original historical character of the site and structure.

The proposed alternate alignment for the pipeline will not involve the expansion, enlargement, or modification of any historical structures or sites. Therefore, neither Consideration 3c nor the corresponding Comprehensive Plan Strategy No. 2 is applicable to this application.

Beaches and Dunes

Considerations:
4a. Permit development within “limited development suitability” only upon establishment of findings. Requires Administrative Conditional Use.

4b. Prohibits residential, commercial, or industrial development within areas “unsuitable for development.” Permit other development only upon establishment of findings. Requires Administrative Conditional Use

4c. Cooperation with agencies to regulate: destruction of vegetation, erosion shore structures and other developments, requires Administrative Conditional Use and agency comments.
The proposed alternate segment alignment to the approved pipeline will not cross through any beach or dune areas outside of the CBEMP districts; therefore these considerations and the corresponding strategies are not applicable.

Non-Estuarine Shorelands Boundary

**Consideration 5a:**
Protection of major marshes (wetlands), habitats, headlands, aesthetics, historical and archeological sites.

**Strategy No. 5:**
Coos County shall provide special protection to major marshes, significant wildlife habitat, coastal headlands, exceptional aesthetic resources, and historic and archeological sites located within the coastal Shorelands boundary of the ocean, coastal lakes and minor estuaries. Coos County shall consider: (a) “major marshes” to include certain extensive marshes associated with dune lakes in the Oregon Dunes National Recreation Area and wetlands associated with New River as identified in the Inventory text and maps, and on the Special Considerations Map; (b) “significant wildlife habitat” to include “sensitive big-game range,” Snowy Plover nesting areas, Bald Eagle, and Osprey nesting areas, Salmonid spawning and rearing areas, and wetlands; (c) “coastal headlands” to include Yoakum Point, Gregory Point, Shore Acres, Cape Arago south to Three-Mile Creek, Five Mile Point, and Coquille Point; (d) “exceptional aesthetic resources” to include the coastal headlands identified above, and other areas identified in the Coastal Shorelands Inventory; and (e) “historical, cultural and archeological sites” to include those identified in the Historical, Cultural and Archeological Sites Inventory and Assessment.

This strategy shall be implemented through plan designations and ordinance measures that limit uses in these special areas to those uses that are consistent with protection of natural values, such as propagation and selective harvesting of forest products, grazing, harvesting wild crops, and low intensity water-dependent recreation.

This strategy recognizes that special protective consideration must be given to key resources in coastal shorelands over and above the protections afforded such resources elsewhere in this plan.

The proposed alternate segment alignment does not cross through any coastal shorelands areas outside of the CBEMP. Therefore, this strategy does not apply.

**Consideration 5b:**
Specify allowed uses within C.S.B.

**Strategy No. 7:**
Coos County shall manage its rural areas within the “Coastal Shorelands Boundary” of the ocean, coastal lakes and minor estuaries through implementing ordinance measures that allow the following uses:
a. farm uses as provided in ORS 215;
b. propagation and harvesting of forest products consistent with the Oregon Forest Practices Act.
c. private and public water dependent recreation developments;
d. aquaculture;
e. water-dependent commercial and industrial uses and water-related uses only upon finding by the Board of Commissioners that such uses satisfy a need, which cannot otherwise be accommodated on shorelands in urban and urbanizable areas;
f. single family residences on existing lots, parcels, or units of land when compatible with the objectives and implementation standards of the Coastal Shorelands goal, and as otherwise permitted by the underlying zone;
g. any other uses, provided that the Board of Commissioners determines that such uses: (1) satisfy a need which cannot be accommodated at other upland locations or in urban or urbanizable areas; (2) are compatible with the objectives of Statewide Planning Goal #17 to protect riparian vegetation and wildlife habitat; and (3) the "other" use complies with the implementation standard of the underlying zone designation.

In addition, the above uses shall only be permitted upon a finding that such uses do not otherwise conflict with the resource preservation and protection policies established elsewhere in this plan.

This strategy recognizes: (1) that Coos County's rural shorelands are a valuable resource and accordingly merit special consideration; and (2) that Statewide Planning Goal #17 places strict limitations on land divisions within coastal shorelands.

The proposed alternate segment alignment does not cross through any coastal shorelands areas outside of the CBEMP. Therefore, this strategy does not apply.

Consideration 5c:
Permits subdivision, major and minor partitions only upon findings.

Strategy No. 8:
Coos County shall permit subdivisions and partitions within the "Coastal Shorelands Boundary" of the ocean, coastal lakes or minor estuaries in rural areas only upon finding by the governing body: (1) that such land divisions will not conflict with agriculture and forest policies and ordinance provisions of the Coos County Comprehensive Plan and would be compatible with the objectives of Statewide Planning Goal #17 to protect riparian vegetation and wildlife and either; (2) that the new land divisions fulfill a need that cannot otherwise be accommodated in other uplands or in urban and urbanizable areas; or, (3) that the new land divisions are in a documented area, "committed" area; or, (4) that the new land divisions have been justified through a goal exception.

This strategy shall be implemented through provisions in ordinance measures that require the above findings to be made prior to the approval of the preliminary plat of a subdivision or partition.
This strategy recognizes that Coos County's rural shorelands are a valuable resource and accordingly merit special consideration under Statewide Planning Goal #17.

The proposed alternate segment alignment will not require or result in a subdivision or partition. Therefore, this strategy is not applicable.

**Consideration 5d:**
Maintain, restore or enhance riparian vegetation as consistent with water dependent uses. Requires Administrative Conditional Use.

**Strategy No. 11:**
Coos County shall maintain riparian vegetation within the shorelands of the ocean, coastal lakes, and minor estuaries, and when appropriate, restore or enhance it, as consistent with water-dependent uses.

Timber harvest, if permitted in the zoning ordinance, shall be regulated by the Oregon Forest Practices Act.

Where the County's Comprehensive Plan identifies riparian vegetation on lands in the coastal shorelands subject to forest operations governed by the FPA, the Act and Forest Practices Rules administered by the Department of Forestry will be used in such a manner as to maintain, and where appropriate, restore and enhance riparian vegetation.

This strategy shall be implemented by County review of and comment on state permit applications for waterfront development.

This strategy is based on the recognition that prohibiting excessive removal of vegetative cover is necessary to stabilize the shoreline and, for coastal lakes and minor estuaries, to maintain water quality and temperature necessary for the maintenance of fish habitat.

The proposed alternate segment alignment does not cross through any coastal shorelands areas outside of the CBEMP. Therefore, this strategy does not apply.

**Significant Wildlife Habitat**

**Consideration 6a:**
Conserve riparian vegetation adjacent to salmonid spawning and rearing areas: density restriction in Big Game Range.

**Strategy No. 1:**
Coos County shall consider as "5c" Goal #5 resources (pursuant to OAR 660-16-000) the following:

- "Sensitive Big-game Range"
- Bird Habitat Sites (listed in the following table)
- Salmonid Spawning and Rearing Areas
Uses and activities deemed compatible with the objective of providing adequate protection for these resources are all uses and activities allowed, or conditionally allowed by the Zoning and Land Development Ordinance, except that special care must be taken when developing property adjacent to salmonid spawning and rearing areas so as to avoid to the greatest practical extent the unnecessary destruction of riparian vegetation that may exist along streambanks. The Oregon Forest Practices Act is deemed adequate protection against adverse impacts from timber management practices.

This policy shall be implemented by:

a. County reliance on the Oregon Forest Practices Act to ensure adequate protection of "significant fish and wildlife habitat" against possible adverse impacts from timber management practices; and
b. The Zoning and Land Development Ordinance shall provide for an adequate riparian vegetation protection setback, recognizing that "virtually all acknowledged counties have adopted a 50 foot or greater standard" (DLCD report on Coos County, November 28, 1984); and
c. Use of the "Special Considerations Map" to identify (by reference to the detail inventory map) salmonid spawning and rearing areas subject to special riparian vegetation protection; and
d. Stipulating on County Zoning Clearance Letters that removal of riparian vegetation in salmonid spawning and rearing areas shall be permitted only pursuant to the provisions of this policy.
e. Coos County shall adopt an appropriate structural setback along wetlands, streams, lakes and rivers as identified on the Coastal Shoreland and Fish and Wildlife Habitat inventory maps.

The Oregon Department of Fish and Wildlife and the Department of Forestry are working in conjunction with the requirements of this Plan and, are deemed adequate protection against adverse impacts from timber management practices.

Because the PCGP Project is a public utility, Pacific Connector may remove riparian vegetation within 50 feet of a wetland, stream, lake or river in order to site and properly maintain the pipeline. See CCZLDO Section 4.5.180(e). However, Pacific Connector will obtain comments from Oregon Department of Fish & Wildlife (ODFW) for any portion of the proposed alternate segment alignment which will require removal of riparian vegetation within 50 feet of an estuarine wetland, stream, lake or river proximate to inventoried salmonid spawning and rearing areas subject to special riparian vegetation protection. Regarding Big Game Ranges, Pacific Connector obtained GIS data for Big Game Winter Range areas from ODFW and was informed by ODFW that timing restrictions were imposed in Jackson and Klamath Counties, not in Coos and Douglas Counties. Accordingly, the proposed PCGP alternate segment alignment will not negatively impact salmonid spawning and rearing areas or sensitive Big Game Ranges. The proposed PCGP alternate segment alignment does not include a structure or housing component. Therefore, density restrictions associated with Big Game Ranges are not applicable. This strategy is satisfied.
Consideration 6b:
Protect wet meadows for agricultural use.

Strategy No. 4:
Coos County shall protect for agricultural purposes those land areas currently in agricultural use but defined as "wet meadow" wetland areas by the U.S. Fish and Wildlife Service, and also cranberry bogs, associated sumps and other artificial water bodies.

Implementation shall occur through the placement of the plan designation "Agriculture" on such areas.

This strategy recognizes:
a. That agriculture is an important sector of the local economy;
 b. That some of the more productive lands in Coos County's limited supply of suitable agricultural lands are such seasonally flooded areas;
c. That designation of these areas for agricultural use is necessary to ensure the continuation of the existing commercial agricultural enterprise; and
d. That the present system of agricultural use in these areas represents a long-standing successful resolution of assumed conflicts between agricultural use and habitat preservation use, because the land is used agriculturally during months when the land is dry and therefore not suitable as wetland habitat, and provides habitat area for migratory wildfowl during the months when the land is flooded and therefore not suitable for most agricultural uses.

According to the Coos County map entitled "Wet Meadows", the proposed PCGP alternate segment alignment does not cross areas identified as Wet Meadow Wetlands in the Balance of County. This strategy does not apply.

Consideration 6c:
Manage riparian vegetation and non-agricultural wetland areas so as to preserve their significant habitat value, and protect their hydrologic and water quality benefits.

Strategy No. 2:
Coos County shall manage its riparian vegetation and identified non-agricultural wetland areas so as to preserve their significant habitat value, as well as to protect their hydrologic and water quality benefits. Where such wetlands are identified as suitable for conversion to agricultural use, the economic, social, environmental and energy consequences shall be determined, and programs developed to retain wildlife values, as compatible with agricultural use. This strategy is subordinate to Strategy #4, below.

This strategy does not apply to forest management actions, which are regulated by the Forest Practices Act.

This strategy recognizes that protection of riparian vegetation and other wetland areas is essential to preserve the following qualities deriving from these areas:
• natural flood control flow stabilization of streams and rivers
• environmental diversity habitat for fish and wildlife, including fish and wildlife of economic concern
• reduction of sedimentation
• recreational opportunities
• improved water quality
• recharge of aquifers

As stated above, because the proposed PCGP alternate segment alignment is part of a public utility project, Pacific Connector may remove riparian vegetation within 50 feet of an estuarine wetland, stream, lake or river in order to site and properly maintain the pipeline. See CCZLDO Section 4.5.180(e).

To the extent that Pacific Connector is unable to avoid or minimize impacts to wetlands for the proposed alternate segment alignment, Pacific Connector would implement numerous measures to mitigate for wetland impacts and speed the restoration of affected areas. See Resource Report 2, Appendices 2C and 2G for a detailed description of water body crossing methods.

In addition, for the proposed PCGP alternate segment alignment, Pacific Connector would comply with conditions in the section 404 Permit obtained from the COE, in the Removal/Fill permit from ODSL, and in the section 401 Permit obtained from the ODEQ. As part of the permitting process, the agencies would evaluate whether wetlands have been avoided to the maximum extent practicable, and whether the effects have been minimized or rectified to the extent practicable. The agencies also would specify additional requirements as necessary to comply with regulations. Pacific Connector would comply with additional procedures as specified in the permits. This strategy is satisfied.

Consideration 6d:
Restrict conflicting uses on "5c" bird sites except as permitted with ESEE balancing. 300 ft. setback from Bald Eagle nests.

Strategy No. 1A:
Coos County shall consider as Goal #5 "5c" resources the following bird habitat areas:
Location Township Range Section Area

Bald Eagle Nests
23S 13W 23 (Tennille)
23S 11W 05 (Big Creek)
23S 12W 21 (Willow Point)
24S 12W 04 (Palouse)
24S 13W 36 (Mettman)
25S 11W 29 (Bessy Cr.)
25S 11W 33 (Dellwood)
25S 11W 22 (Rachel Cr.)
25S 11W 32 (Morgan Ridge)
26S 14W 14 (So. Slough)
27S 13W 09
28S 10W 09 (Brewster Gorge)
31S 12W 16 (Baker Creek)
29S 14W 31 (Twomile Creek)
28S 14W 11 (Randolph)
Great Blue Heron Colonies
24S 13W 27 SW¼
25S 14W 24 SE¼
23S 13W 26 (Saunders Lake)
24S 13W 23 (North Bay)
25S 11W 15 (Weyerhaeuser)
25S 12W 31 NW¼ (Catching Slough)
25S 14W 24 (North Spit)
26S 14W 11 (So. Slough)
25S 13W 24
26S 14W 14NE¼ , SE¼
27S 14W 35 SE¼ , NW¼ (Sevenmile)
26S 14W 14 NW¼
30S 15W 15 (Muddy Lake)
23S 12W 28 (Templeton Arm)
Band-Tailed Pigeon Mineral Springs
24S 13W 24&25 (Haynes)
25S 13W 24 (Cooston)
26S 13W 01
28S 14W 10 (Prosper)
29S 11W 26
29S 11W 35 (Blueslide)
29S 11W 36 (Rock Quarry)

Special consideration and care must be taken when developing property adjacent to "5c" bird sites so as to avoid, to the greatest practical extent, the unnecessary destruction of, or impact upon, said bird sites. The Oregon Forest Practices Act (FPA) is deemed adequate protection against adverse impacts from timber management practices.

This policy shall be implemented by:

a. County reliance upon the Oregon Department of Forestry and Oregon Department of fish and Wildlife insuring adequate protection of "5c" bird sites from possible adverse impacts of timber management practices thru the Forest Practices Act; and
b. Use of the "Special Considerations Map" and detailed inventories in the Plan to identify "5c" bird sites subject to special protection; and
c. For "5c" bird site protection, stipulating in the Zoning and Land Development Ordinance that conflicting uses shall be reviewed by the Oregon Department of Fish and Wildlife to determine that any proposed use is not expected to produce significant and unacceptable environmental impacts on any of the "5c" bird sites; and
d. Stipulating on County Zoning Clearance Letters that establishment of conflicting uses adjacent to "5c" bird sites shall be permitted only pursuant to the provisions of this policy.
Coos County shall require a location map for any development activity (except grazing) within its regulatory scope that is determined to be within a "5c" bird habitat. The location map shall be referred to the Oregon Department of Fish and Wildlife requesting an opinion within 10 days as to whether the development is likely to produce significant and unacceptable impacts upon the "5c" resource, and what safeguards it would recommend to protect the resource. ODFW's determination shall be reviewed by the Coos County Planning Director, who shall consider the ODFW findings and approve, approve with conditions, or deny an Administrative Conditional Use for the matter (ACU) based upon sound principles of conservation and appropriate balancing of the ESEE consequences so if conflicting uses are allowed the resource site is protected to some extent. The ACU will be processed pursuant to the Zoning and Land Development Ordinance.

The proposed Blue Ridge alternate alignment segment is not located within "5c" bird sites. For avian species, Pacific Connector obtained biological data from the Oregon Biodiversity Information Center for the route in 2012. As Pacific Connector completes additional biological surveys, that information will be included in the biological survey report and analyzed by FERC as part of the proposed Project. Coos County shall also refer Pacific Connector's location maps for the proposed PCGP alternate segment alignment to ODFW, and shall consider ODFW's determination of potential impacts, as required by this policy. This strategy is satisfied.

Natural Hazards

Consideration 7a:
Comply with floodplain overlay zone set forth in this Ordinance.

Strategy No. 1:
Coos County shall regulate development in known areas potentially subject to natural disasters and hazards, so as to minimize possible risks to life and property. Coos County considers natural disasters and hazards to include stream and ocean flooding, wind hazards, wind erosion and deposition, *critical streambank erosion, mass movement (earthflow and slump topography), earthquakes and weak foundation soils.*

This strategy shall be implemented by enacting special protective measures through zoning and other implementing devices, designed to minimize risks to life and property.

This strategy recognizes that it is Coos County's responsibility: (1) to inform its citizens of potential risks associated with development in known hazard areas; and (2) to provide appropriate safeguards to minimize such potential risks.

* These hazards are addressed under policies for "Dunes and Ocean and Lake Shorelands."

As determined in the Prior Decisions and as mentioned above, the PCGP is not deemed to be a "structure" because it is principally below ground. Accordingly, the provisions of Section 4.6.230.1 do not apply to this application requesting approval of proposed PCGP alternate segment alignment. Based upon the applicant's conversations with Planning staff, Pacific
Connector submits that the PCGP should be characterized as "other development" under Section 4.6.230.4, in that the underground pipeline use is not of the type or magnitude to affect potential water surface elevations or increase the level of insurable damages. Accordingly, this strategy is satisfied.

**Consideration 7b:**
Support structural protection measures for bankline stabilization projects requiring state and federal permits when the applicant establishes that non-structure measures either are not feasible or inadequate to provide the necessary degree of protection.

**Strategy No. 5:**
Coos County shall promote protection of valued property from risks associated with critical streambank and ocean front erosion through necessary erosion-control stabilization measures, preferring nonstructural solutions where practical.

Coos County shall implement this strategy by making "Consistency Statements" required for State and Federal permits (necessary for structural streambank protection measures) that support structural protection measures when the applicant establishes that nonstructure measures either are not feasible or inadequate to provide the necessary degree of protection.

This strategy recognizes the risks and loss of property from unabated critical streambank erosion, and also, that state and federal agencies regulate structural solutions.

The proposed alternate segment alignment is not part of a bankline stabilization project. PCGP is not a bankline stabilization project. Therefore, this strategy is not applicable.

**Consideration 7c:**
Issue zoning clearance letters in known areas potentially subjected to mass movement, including earth flow, slump topography, rock fall and debris flow pursuant to the provisions of natural hazards Strategy #6 in the Comp Plan.

**Strategy No. 6:**
Coos County shall permit the construction of new dwellings in known areas potentially subject to mass movement (earth flow/slump topography/rock fall/debris flow) only:

a. if dwellings are otherwise allowed by this comprehensive plan; and
b. after the property owner or developer files with the Planning Department a report certified by a qualified geologist or civil engineer stipulating:
   i. his/her professional qualifications to perform foundation engineering and soils analysis; and
   ii. that a dwelling can or cannot be safely constructed at the proposed site, and whether any special structural or siting measures should be imposed to safeguard the proposed building from unreasonable risk of damage to life or property.
This strategy recognizes the county is responsible for identifying potential hazard areas, informing its citizens of risks associated with development in known hazard areas, and establishing a process involving expert opinion so as to provide appropriate safeguards against loss of life or property.

Implementation shall occur through an administrative conditional use process, which shall include submission of a site investigation report by the developer that addresses the considerations above.

The proposed PCGP alternate segment alignment does not include proposed dwellings. Therefore, Strategy No. 6 is not applicable.

Airport Surfaces

Consideration 8a:
Comply with Airport Surfaces Overlay Zone set forth in this Ordinance.

Strategy No. 11:
Coos County shall cooperate with the Oregon State Aeronautics Division and the Federal Aviation Administration by developing an Airport Surfaces Overlay Zoning District to prevent the creation or establishment of hazards to air navigation. The Overlay Zoning district shall apply to the Bandon, Lakeside and Powers State Airports and shall encompass the primary surface, approach surface, transitional surfaces, horizontal surface and conical surface as identified in Volume VI, Airport Compatibility Guidelines as formulated by the Oregon Department of Transportation - Aeronautics Division, dated 1981.

The proposed PCGP alternate segment alignment does not cross any of the County's Airport Surfaces Overlay Zoning Districts. Therefore, this strategy is not applicable.

C. Coos Bay Estuary Management Plan.

As discussed above, the Prior Decisions approved the PCGP alignment to cross 14 CBEMP Management Districts. The proposed Blue Ridge alternate alignment segment will cross only one CBEMP zoning district: 20-CA.

The stated purpose of the CBEMP article in the CCZLDO is to provide requirements for individual zoning districts that are consistent with the CBEMP. The consistency of the PCGP with the applicable management unit purpose statement and applicable conditions is discussed below.

Table 4.5 Development Standards

The CBEMP purpose statement further explains that the land development standards of Table 4.5 govern all development within the Coos Bay Estuary Shorelands Districts. The proposed PCGP alternate segment alignment will not alter the lot configurations and do not constitute a structure subject to height restrictions or building setbacks. Consequently, the standards included in
Table 4.5 are not applicable to the PCGP itself nor its necessary components or associated facilities, or to the proposed alternate segment alignment.

**CCZLDO Section 4.5.150  How to Use This Article.**

*This Article contains specific language that implements the Coos Bay Estuary Plan. The main purpose is to clearly stipulate where, and under what circumstances, development may occur.*

Follow the steps below to determine whether or not a proposed use or activity is, or may be, allowed at any specific site within the Coos Bay Estuary Shoreland Boundary.

1. *Locate the subject site on the General Index Map.*

2. *Note the General Location Index Map (i.e. Lower Bay, Upper Bay, etc.) which is referenced on the General Index Map and advance to the General Location Index Map.*

3. *Locate the subject site on the General Location Index Map. Note the numbers and abbreviated district designations (i.e. "UD", "UW", "CS", etc.) for applicable zoning districts. (Note: management segments in the Plan are the same as zoning districts.)*

4. *Turn to the pages in the Ordinance which contain specific zoning district provisions which correspond to the map designations for the subject site.*

5. *For each applicable Shoreland or Aquatic District:*
   
a) *Review the districts Management Objective. This narrative provides general policy guidance regarding uses and activities that are, or may be, allowed in the district.*

b) *Review the district’s Uses, Activities, and Special Conditions Table to determine whether or not a proposed use or activity is allowable outright, allowable with conditions, or conditionally allowable subject to an Administrative or Hearings Body Conditional Use.*

_Symbols denote whether or not the specific use or activity listed in the tables is permitted outright, may be allowed subject to an Administrative Conditional Use, may be allowed subject to a Hearings Body conditional use, or prohibited in the specific district. The following symbols are pertinent:*

_P – means the use or activity is permitted outright subject only to the management objective.*

_S – indicates that the use or activity may be allowed subject to "Special Conditions" presented following the use and activity table. A few of the special conditions are non-discretionary, but most require local judgment and discretion.*

-23-
and the development of findings to support any final decision about whether or not to allow the use or activity.

Some uses and activities may be identified as being subject to a special condition that is not discretionary or may not apply to a site-specific request. If such is the situation, the Planning Director shall make such determination and if "General Conditions" are not applicable regard the use or activity as permitted outright. Such determination shall consist of a statement of facts supporting the decision.

G – indicates the use or activity may be allowed subject to "General Conditions" presented following the use and activities table. "General Conditions" provide a convenient cross-reference to applicable Baywide Policies which may further limit or condition the uses and activities.

A few "General Conditions" may not apply to a site specific request. If such is the situation, the Planning Director shall make such determination and if "Special Conditions" are not applicable, regard the use or activity as permitted outright. Such determination shall consist of a statement of facts supporting the decision.

ACU – means the use or activity may be permitted as provided above or subject to "Special" or "General" conditions pursuant to an Administrative Conditional Use.

HB – means the use or activity may be permitted except as provided above or subject to "Special" or "General" conditions pursuant to a Hearings Body Conditional Use.

N – means the use or activity is prohibited.

N/A – means Not Applicable; the use or activity is not realistic considering the physical character of the district and therefore does not apply.

c) Review the designations which accompany each use and activity listed in the Table to determine what is allowed, what is not allowed and what conditions may apply. (The Table may list a use as conditionally allowable but a condition may negate the Table's designation).

By following the steps outlined above, the applicant determined the use is allowed in the zone, subject only to General Conditions. The application satisfies all related conditions and CBEMP policies, as described below.

CCZLDO Section 4.5.175 Site-Specific Zoning Districts

The Coos County Development Ordinance divides the lands affected by the CBEMP into specific zoning districts. Each zoning district contains a "use and activities" table and "management objectives." Pursuant to CCZLDO Section 4.5.175, the use and activity tables for
each district are subordinate to the management objectives, and, therefore, the uses and activities must be consistent with the applicable management objective. As stated above, the proposed alternate segment alignment will only traverse CBEMP zoning districts 20-CA. As demonstrated below, the proposed alternate alignment segment is consistent with the management objective, the allowed use and activities, and the applicable general and specific conditions of the 20-CA zoning district.

D. Zoning District 20-CA.

20 – Conservation Aquatic (20-CA)

The proposed Blue Ridge alternate segment alignment crosses the 20-CA zoning district. The 20-CA district is aligned with the Coos River.

**CCZLDO Section 4.5.550 Management Objective:** This aquatic district shall be managed to allow log transport while protecting fish habitat. Log storage shall be allowed in areas of this district which are near shoreland log sorting areas at Allegany, Shoreland District 20C, and Dellwood, Shoreland District 20D, as well as in areas for which valid log storage and handling leases exist from the Division of State Lands.

Pacific Connector will use the HDD method to install the pipeline below the Coos River. Using this crossing method, the Blue Ridge alternate segment alignment will be installed beneath the bottom of the Coos River and will not impact log transport and will not impact fish habitat. Upon successful HDD completion, impacts to aquatic species, sensitive resources and water quality can be avoided. Additional details on the HDD process are included in Resource Report 2, Appendix 2G. Construction will use appropriate measures to minimize impacts. All impacts will be mitigated as demonstrated in the Prior Decisions. The Board previously found that the HDD construction method and mitigation met this management objective. Final Decision and Order, No. 10-08-045PL, pp. 70-72. Likewise, development of the proposed PCGP alternate segment alignment in 20-CA will not preclude log transport or interfere with fish habitat.

**CCZLDO Section 4.5.551 Uses, Activities and Special Conditions**

The proposed PCGP alternate segment alignment is permitted, subject to general conditions, as a low intensity utility in the 20-CA district. The 20-CA General Condition states that inventoried resources requiring mandatory protection in the district are subject to Policies #17 and #18. As addressed under the CBEMP Policy section below, the proposed Blue Ridge PCGP alternate segment alignment is consistent with each of those policies.

**Appendix 3 – CBEMP Policies**

As detailed above, the proposed PCGP alternate segment alignment crosses through the 20-CA zoning district. As also discussed above, those crossings trigger CBEMP Policies #s17 and 18 in zoning district 20-CA. As discussed below, the proposed PCGP alternate segment alignment complies with the applicable CBEMP Policies for zoning district 20-CA as described below.
20 – Conservation Aquatic (20-CA)

The proposed PCGP alternate segment alignment complies with the applicable policies in zoning district 20-CA as described below.

Policy #17 Protection of "Major Marshes" and "Significant Wildlife Habitat" in Coastal Shorelands

Local governments shall protect from development, major marshes and significant wildlife habitat, coastal headlands, and exceptional aesthetic resources located within the Coos Bay Coastal Shorelands Boundary, except where exceptions allow otherwise.

I. Local government shall protect:

a. "Major marshes" to include areas identified in the Goal #17, "Linkage Matrix", and the Shoreland Values Inventory map; and

b. "Significant wildlife habitats" to include those areas identified on the "Shoreland Values Inventory" map; and

c. "Coastal headlands"; and

d. "Exceptional aesthetic resources" where the quality is primarily derived from or related to the association with coastal water areas.

Based on Coos County's maps, the proposed PCGP alternate segment alignment in the 20-CA zoning district does not cross identified major marshes, coastal headlands, or exceptional aesthetic resources. This policy is satisfied.

II. This strategy shall be implemented through:

a. Plan designations, and use and activity matrices set forth elsewhere in this Plan that limit uses in these special areas to those that are consistent with protection of natural values; and

b. Through use of the Special Considerations Map, which identified such special areas and restricts uses and activities therein to uses that are consistent with the protection of natural values. Such uses may include propagation and selective harvesting of forest products consistent with the Oregon Forest Practices Act, grazing, harvesting wild crops, and low-intensity water-dependent recreation.

c. Contacting Oregon Department of Fish and Wildlife for review and comment on the proposed development within the area of the 5b or 5c bird sites.

This strategy recognizes that special protective consideration must be given to key resources in coastal shorelands over and above the protection afforded such resources elsewhere in this Plan.

The proposed PCGP alternate segment alignment does not cross areas of special consideration identified under this strategy in zoning district 20-CA. This strategy is satisfied.
Policy #18   Protection of Historical, Cultural and Archaeological Sites.

Local government shall provide protection to historical, cultural and archaeological sites and shall continue to refrain from widespread dissemination of site-specific information about identified archaeological sites.

I. This strategy shall be implemented by requiring review of all development proposals involving a cultural, archaeological or historical site, to determine whether the project as proposed would protect the cultural, archaeological and historical values of the site.

II. The development proposal, when submitted shall include a Site Plan Application, showing, at a minimum, all areas proposed for excavation, clearing and construction. Within three (3) working days of receipt of the development proposal, the local government shall notify the Coquille Indian Tribe and Coos, Siuslaw, Lower Umpqua Tribe(s) in writing, together with a copy of the Site Plan Application. The Tribe(s) shall have the right to submit a written statement to the local government within thirty (30) days of receipt of such notification, stating whether the project as proposed would protect the cultural, historical and archaeological values of the site, or if not, whether the project could be modified by appropriate measures to protect those values.

III. Upon receipt of the statement by the Tribe(s), or upon expiration of the Tribe(s) thirty day response period, the local government shall conduct an administrative review of the Site Plan Application and shall:
   a. Approve the development proposal if no adverse impacts have been identified, as long as consistent with other portions of this plan, or
   b. Approve the development proposal subject to appropriate measures agreed upon by the landowner and the Tribe(s), as well as any additional measures deemed necessary by the local government to protect the cultural, historical and archaeological values of the site. If the property owner and the Tribe(s) can not agree on the appropriate measures, then the governing body shall hold a quasijudicial hearing to resolve the dispute. The hearing shall be a public hearing at which the governing body shall determine by preponderance of evidence whether the development project may be allowed to proceed, subject to any modifications deemed necessary by the governing body to protect the cultural, historical and archaeological values of the site.

The proposed PCGP alternate segment alignment does not cross areas of potential cultural, archeological or historical sites in zoning district 20-CA. This strategy is satisfied.

E. Floodplain Overlay Zone.

The proposed PCGP alternate segment alignment will cross through the Coos County Floodplain Overlay zone. As described below, the proposed PCGP alternate segment alignment satisfies each of the applicable floodplain approval criteria.

CCZLDO SECTION 4.6.205. Designation of Flood Areas.

a. The area of Coos County that is within a special flood hazard area identified by the Federal Insurance Administration in a scientific and engineering report entitled "The Flood Insurance
Study for Coos County, Oregon and Incorporated Areas”, dated September 25, 2009, with accompanying Flood Insurance Map (FIRM) is hereby adopted by reference and declared to be part of this ordinance. The Flood Insurance Study and the FIRM are on file at the Coos County Planning Department.

The County has indicated that the Flood Insurance Rate Map (FIRM) is consistent with the Federal Emergency Management Agency’s (FEMA) flood hazard map for Coos County. As addressed below, the proposed PCGP alternate segment alignment is consistent with the applicable floodplain approval criteria for all areas identified on the FEMA flood hazard map/FIRM as a designated flood area. The FEMA maps identify the 100-year floodplain, which is typically a larger area than the floodplain\(^4\) and floodway\(^5\) areas defined in the Floodplain Overlay standards.

**CCZLDO SECTION 4.6.210. Permitted Uses.**

In a district in which the /FP zone is combined, those uses permitted by the underlying district are permitted outright in the /FP FLOATING ZONE, subject to the provisions of this article.

**CCZLDO SECTION 4.6.215. Conditional Uses.**

In a district with which the /FP is combined, those uses subject to the provisions of Article 5.2 (Conditional Uses) may be permitted in the /FP FLOATING ZONE, subject to the provisions of this article.

As detailed above, the proposed PCGP alternate segment alignment is permitted either outright or conditionally in each of the base zones that it crosses. As described in this section of the narrative, it also satisfies each of the applicable Floodplain Overlay standards. Therefore, it is also a permitted use in the Floodplain Overlay zone.

**CCZLDO SECTION 4.6.230. Procedural Requirements for Development within Special Flood Hazard Areas.**

The following procedure and application requirements shall pertain to the following types of development:

4. Other Development. "Other development" includes mining, dredging, filling, grading, paving, excavation or drilling operations located within the area of a special flood hazard, but does not include such uses as normal agricultural operations, fill less than 12 cubic yards, fences, road and driveway maintenance, landscaping, gardening and similar uses which are excluded from definition because it is the County's determination that such uses are not of the type and

\(^4\) "Floodplain" is defined by the Coos County Zoning and Land Development Ordinance (CCZLDO) as "the area adjoining a stream, tidal estuary or coast that is subject to periodic inundation from flooding."

\(^5\) "Floodway" is defined by the CCZLDO as "the normal stream channel and that adjoining area of the natural floodplain needed to convey the waters of a regional flood while causing less than one foot increase in upstream flood elevations." Pursuant to CCZLDO Sections 4.6.205 and 4.6.270 "floodways" are identified as special flood hazard areas in a Federal Insurance Administration report entitled "Flood Insurance Study for Coos County, Oregon and Incorporated Areas" and accompanying maps.
magnitude to affect potential water surface elevations or increase the level of insurable damages.

Review and authorization of a floodplain application must be obtained from the Coos County Planning Department before "other development" may occur. Such authorization by the Planning Department shall not be issued unless it is established, based on a licensed engineer's certification that the "other development" shall not:

A natural gas pipeline is not expressly included in the specified list of "other development." However, because the PCGP construction process will involve the removal and replacement of soil and recontouring activities that are similar to the listed development activities, the following demonstrates that the proposed PCGP alternate segment alignment is consistent with the "other development" standards.

a. result in any increase in flood levels during the occurrence of the base flood discharge if the development will occur within a designated floodway; or,

b. result in a cumulative increase of more than one foot during the occurrence of the base flood discharge if the development will occur within a designated flood plain outside of a designated floodway.

The proposed PCGP alternate segment alignment will be installed below existing grades and no permanent structures will be placed above existing grades within the FEMA 100-year floodplain. In addition, at the completion of the proposed PCGP alternate segment alignment installation, all construction areas will be restored to their pre-construction grade and condition. Therefore, development of the pipeline will not result in any increase in flood levels or result in a cumulative increase of more than one foot. These standards are met. Flood plain compliance will be verified prior to construction and the issuance of a zoning compliance letter.

**CCZLDODE SECTION 4.6.235. Sites within Special Flood Hazard Areas.**

1. If a proposed building site is in a special flood hazard area, all new construction and substantial improvements (including placement of prefabricated buildings and mobile homes), otherwise permitted by this Ordinance, shall:

All new construction associated with the proposed PCGP alternate segment alignment satisfies the following special flood hazard area criteria.

a. be designed (or modified) and adequately anchored to prevent flotation, collapse, or lateral movement and shall be installed using methods and practices that minimize flood damage. Anchoring methods may include, but are not limited to, use of over-the-top or frame ties to ground anchors (Reference FEMA "Manufactured Home Installation in Flood Hazard Areas" guidebook for additional techniques);

Installation methods and mitigation measures will avoid and/or minimize flotation, collapse, or lateral movement hazards and flood damage. This criterion is satisfied.
b. be constructed with materials and utility equipment resistant to flood damage;

The entire proposed PCGP alternate segment alignment will be constructed with corrosion-protected steel pipe. Where deemed necessary, the proposed PCGP alternate segment alignment will be installed with a concrete coating to protect against abrasion and maintain negative buoyancy. This criterion is satisfied.

c. be constructed by methods and practices that minimize flood damage; and

The proposed PCGP alternate segment alignment will be constructed by methods and practices that minimize flood damage. This criterion is satisfied.

d. electrical, heating, ventilation, plumbing, and air conditioning equipment and other service facilities shall be designed and/or otherwise elevated or located so as to prevent water from entering or accumulating within the components during conditions of flooding.

The proposed subsurface PCGP alternate segment alignment does not include electrical, heating, ventilation, plumbing, or air conditioning components. Therefore, this criterion is not applicable.

III. CONCLUSION

For the reasons set forth above, the requested approvals for the Blue Ridge alternate alignment for a relatively short segment of the previously approved PCGP alignment in Coos County satisfies all of the applicable approval criteria within the requested zones. Consequently, the applicant requests that the County approve the requested alternate segment alignment addressed in this application, with the conditions of approval proposed by Pacific Connector in the application.
Resource Report No. 2

Water Use and Quality

Pacific Connector Gas Pipeline Project

June 2013
Table of Contents

2.1 Introduction .................................................................................................................. 1

2.2 Surface Water Resources ............................................................................................. 1
   2.2.1 Surface Water Standards and Classifications ......................................................... 1
   2.2.2 Pacific Northwest Hydrography Framework (PNWHF) .......................................... 5
   2.2.3 PCGP Project Waterbody Crossings ...................................................................... 5
   2.2.4 Sensitive and Protected Public Watershed Areas .................................................. 11
   2.2.5 Contaminated Surface Water or Sediments ............................................................ 16
   2.2.6 Waterbodies that Contain Threatened or Endangered Species ............................... 17
   2.2.7 Nationwide Rivers Inventory .................................................................................. 18
   2.2.8 Waterbody Crossing Methods .............................................................................. 19
   2.2.9 Surface Water Construction Impacts and Mitigation .............................................. 32
   2.2.10 Required Surface Water Construction Permits ....................................................... 50

2.3 Wetlands ......................................................................................................................... 50
   2.3.1 Wetlands Summary ............................................................................................... 55
   2.3.2 Wetland Crossings ............................................................................................... 63
   2.3.3 Wetland Construction and Operation Impacts and Mitigation ............................... 69
   2.3.4 Wetland Crossing Permits ...................................................................................... 76

2.4 Groundwater Resources ............................................................................................... 77
   2.4.1 Regional Aquifers .................................................................................................... 77
   2.4.2 Groundwater Wells ............................................................................................... 78
   2.4.3 Groundwater Quality ............................................................................................ 80
   2.4.4 Groundwater Construction and Operation Impacts and Mitigation ....................... 81

2.5 References ..................................................................................................................... 84

List of Tables

Table 2.2-1 Designated Beneficial Uses for Basins Crossed by the PCGP Project ................... 2
Table 2.2-2 Sub-basins and Fifth Field Watersheds Crossed by the PCGP Project ................ 6
Table 2.2-3 Fifth Field Watersheds Crossed by the PCGP Project on Federally-Managed Lands 7
Table 2.2-4 Key Watersheds Crossed by the PCGP Project ................................................. 8
Table 2.2-5 TARs and PARs within 100 Feet of Waterbodies ............................................... 10
Table 2.2-6 Public Drinking Water Surface Water Source Areas Crossed by the PCGP Project 12
Table 2.2-7 Public Drinking Water Surface Water Intakes within 3 Miles Downstream of  
   Waterbody Crossings for the PCGP Project ..................................................................... 13
Table 2.2-8 Rock Source and Disposal Sites within Public Drinking Water Surface Water 
   Source Areas ................................................................................................................... 14
Table 2.2-9 Contractor and Pipe Storage Yards within Public Drinking Water Surface Water 
   Source Areas ................................................................................................................... 14
Table 2.2-10 Temporary and Permanent Access Roads within Public Drinking Water Surface 
   Source Areas ................................................................................................................... 15
Table 2.2-11 Aboveground Facilities within Public Drinking Water Surface Water Source Areas 16
Table 2.2-12 Potential Dust Control Water Sources for the PCGP Project ............................ 40
Table 2.3-1 Wetland Survey Status for the PCGP Project .................................................... 52
Table 2.3-2 Privately-Owned Contractor and Pipe Storage Yards that may be used during 
   Construction of the PCGP Project .................................................................................. 66
Table 2.3-3 Potential Impacts to Water Quality (Temperature) from Clearing Vegetation in 
   Wetlands ......................................................................................................................... 69
Table 2.4-1 Public Drinking Water Groundwater Protection Source Areas Crossed by the PCGP 
   Project .............................................................................................................................. 79
Table 2.4-2 Potential Private Wells within 200 Feet of the PCGP Project ............................... 79
## List of Appendices

### Appendix 2A

<table>
<thead>
<tr>
<th>Tables</th>
</tr>
</thead>
<tbody>
<tr>
<td>Table 2A-1</td>
</tr>
<tr>
<td>Table 2A-2</td>
</tr>
<tr>
<td>Table 2A-3</td>
</tr>
<tr>
<td>Table 2A-4</td>
</tr>
<tr>
<td>Table 2A-5</td>
</tr>
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<td>Table 2A-6</td>
</tr>
<tr>
<td>Table 2A-7</td>
</tr>
<tr>
<td>Table 2A-8</td>
</tr>
<tr>
<td>Table 2A-9</td>
</tr>
<tr>
<td>Table 2A-10</td>
</tr>
<tr>
<td>Table 2A-11</td>
</tr>
</tbody>
</table>

### Appendix 2B

- Spill Prevention, Containment, and Countermeasures Plan

### Appendix 2C

- Stream Fluming Procedures

### Appendix 2D

- Dam and Pump Procedures

### Appendix 2E

- Waterbody Crossing Plans and Figures

### Appendix 2F

- Groundwater Monitoring and Mitigation Plan

### Appendix 2G

- HDD Feasibility Analyses (Coos, Rogue, and Klamath rivers)

### Appendix 2H

- HDD Drilling Mud Contingency and Failure Mode Procedure

### Appendix 2I

- Direct Pipe – Technology Overview Memo
- I-5/South Umpqua River Direct Pipe Feasibility Evaluation

### Appendix 2J

- BLM and Forest Service Tables
  - Table 2J-1 | Waterbodies Crossed by the PCGP Project on Federally-Managed Lands
  - Table 2J-2 | Wetlands Impacted by the PCGP Project on Federally-Managed Lands
  - Table 2J-3 | Irrigation Canals and Ditches Impacted by the PCGP Project on Federally-Managed Lands

### Appendix 2K

- Compensatory Wetland Mitigation Plan (Kentuck Slough)

## List of Stand Alone Documents

(provided electronically)

- Wetland Delineation Report
- Geologic Hazards and Mineral Resources Report (Resource Report 6) (hard copy provided)
- Plan of Development (supporting BLM, Forest Service, Reclamation Federal Right-of-Way Grant)
- Compensatory Mitigation Plan
- Joint Permit Application Document (the following will be appended to the Joint Permit Application)
  - 1-JPA DEQ-R36 | Turbidity-Nutrients-Metals Water Quality Impacts Analysis
  - 2-JPA DEQ-R15 | Stream Crossing Risk Analysis
  - 3-JPA DEQ-R29 | Stream Crossing Hyporheic Analysis
  - 4-JPA DEQ-R33 | Sediment Characterization – Haynes Inlet
  - 5-JPA DEQ-R26 | Revised Draft Thermal Impacts Assessment
  - 6-JPA DEQ-R35 | Mine Hazards Evaluation and Mercury Testing at the Red Cloud, Mother Lode, Nivinson, and Elkhorn Mining Groups
  - 6-JPA DEQ-R35 | Addendum to Mine Hazards Evaluation and Mercury Testing at the Red Cloud, Mother Lode, Nivinson, and Elkhorn Mining Groups
<table>
<thead>
<tr>
<th>Reference</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>6-JPA_DEQ-R35</td>
<td>Potential for natural-occurring mercury mineralization to enter the aquatic</td>
</tr>
<tr>
<td></td>
<td>environment between M.P. 109 and East Fork Cow Creek</td>
</tr>
<tr>
<td></td>
<td>and Pacific Connector Gas Pipeline Coastal Engineering Modeling and Analysis</td>
</tr>
<tr>
<td></td>
<td>and Pacific Connector Gas Pipeline Coastal Engineering Modeling and Analysis</td>
</tr>
<tr>
<td>7-JPA-DEQ-R5a</td>
<td>Technical Memorandum – Coastal Engineering Modeling Scenarios for</td>
</tr>
<tr>
<td></td>
<td>Jordan Cove Energy Project and Pacific Connector Gas Pipeline</td>
</tr>
<tr>
<td>7-JPA-AppendixH</td>
<td>Technical Report – Pacific Connector Gas Pipeline Project Coos Bay Crossing</td>
</tr>
<tr>
<td></td>
<td>Scour Evaluation</td>
</tr>
<tr>
<td>8-JPA</td>
<td>Channel Migration and Scour Analysis</td>
</tr>
<tr>
<td>9-JPA</td>
<td>Report on Preliminary Pipeline Study Haynes Inlet Water Route</td>
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<td>10-JPA-AppendixI</td>
<td>Estuarine Wetland Mitigation Plan</td>
</tr>
<tr>
<td>11-JPA-AppendixN</td>
<td>HGM Report</td>
</tr>
<tr>
<td>12-JPA</td>
<td>Technical Memorandum for Water Temperature Impacts Assessment</td>
</tr>
</tbody>
</table>

**List of Abbreviations and Acronyms**

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>°C</td>
<td>degrees centigrade</td>
</tr>
<tr>
<td>°F</td>
<td>degrees farenheit</td>
</tr>
<tr>
<td>ACS</td>
<td>Aquatic Conservation Strategy</td>
</tr>
<tr>
<td>amsl</td>
<td>above mean sea level</td>
</tr>
<tr>
<td>BLM</td>
<td>Bureau of Land Management</td>
</tr>
<tr>
<td>BMPs</td>
<td>Best Management Practices</td>
</tr>
<tr>
<td>BVA</td>
<td>block valve assembly</td>
</tr>
<tr>
<td>CMP</td>
<td>Compensatory Mitigation Plan</td>
</tr>
<tr>
<td>COE</td>
<td>Corps of Engineers</td>
</tr>
<tr>
<td>CWA</td>
<td>Clean Water Act</td>
</tr>
<tr>
<td>CWM</td>
<td>compensatory wetland mitigation</td>
</tr>
<tr>
<td>DOT</td>
<td>U.S. Department of Transportation</td>
</tr>
<tr>
<td>DP</td>
<td>Direct Pipe</td>
</tr>
<tr>
<td>DWSA</td>
<td>drinking water source area</td>
</tr>
<tr>
<td>ECRP</td>
<td>Erosion Control and Revegetation Plan</td>
</tr>
<tr>
<td>ECSI</td>
<td>Environmental Cleanup Site Information</td>
</tr>
<tr>
<td>EPA</td>
<td>U.S. Environmental Protection Agency</td>
</tr>
<tr>
<td>ESA</td>
<td>Endangered Species Act</td>
</tr>
<tr>
<td>FEIS</td>
<td>Final Environmental Impact Statement</td>
</tr>
<tr>
<td>FERC</td>
<td>Federal Energy Regulatory Commission</td>
</tr>
<tr>
<td>Forest Service</td>
<td>USDA Forest Service</td>
</tr>
<tr>
<td>FPA</td>
<td>Forest Practices Act</td>
</tr>
<tr>
<td>FWS</td>
<td>U.S. Fish and Wildlife Service</td>
</tr>
<tr>
<td>GIS</td>
<td>Geographic Information Systems</td>
</tr>
<tr>
<td>GWMA</td>
<td>Groundwater Management Area</td>
</tr>
<tr>
<td>HDD</td>
<td>Horizontal Directional Drill</td>
</tr>
<tr>
<td>HGM</td>
<td>Hydrogeomorphic</td>
</tr>
<tr>
<td>HUC</td>
<td>Hydrologic Unit Code</td>
</tr>
<tr>
<td>JPA</td>
<td>Joint Permit Application</td>
</tr>
<tr>
<td>LiDAR</td>
<td>Light Detection and Ranging</td>
</tr>
<tr>
<td>LRMP</td>
<td>Land Resource and Management Plan</td>
</tr>
<tr>
<td>LSRs</td>
<td>Late Successional Reserves</td>
</tr>
<tr>
<td>LWD</td>
<td>large woody debris</td>
</tr>
<tr>
<td>mg/L</td>
<td>milligrams per liter</td>
</tr>
<tr>
<td>MOU</td>
<td>Memorandum of Understanding</td>
</tr>
<tr>
<td>Acronym</td>
<td>Description</td>
</tr>
<tr>
<td>----------</td>
<td>--------------------------------------------------</td>
</tr>
<tr>
<td>MP</td>
<td>milepost</td>
</tr>
<tr>
<td>NFS</td>
<td>National Forest System</td>
</tr>
<tr>
<td>NMFS</td>
<td>National Marine Fisheries Service</td>
</tr>
<tr>
<td>NPDES</td>
<td>National Pollutant Discharge Elimination System</td>
</tr>
<tr>
<td>NPS</td>
<td>National Park Service</td>
</tr>
<tr>
<td>NRCS</td>
<td>Natural Resources Conservation Service</td>
</tr>
<tr>
<td>NRI</td>
<td>Nationwide Rivers Inventory</td>
</tr>
<tr>
<td>NWFP</td>
<td>Northwest Forest Plan</td>
</tr>
<tr>
<td>NWI</td>
<td>National Wetland Inventory</td>
</tr>
<tr>
<td>OAR</td>
<td>Oregon Administrative Rules</td>
</tr>
<tr>
<td>ODEQ</td>
<td>Oregon Department of Environmental Quality</td>
</tr>
<tr>
<td>ODF</td>
<td>Oregon Department of Forestry</td>
</tr>
<tr>
<td>ODFW</td>
<td>Oregon Department of Fish and Wildlife</td>
</tr>
<tr>
<td>ODLCD</td>
<td>Oregon Department of Land Conservation and Development</td>
</tr>
<tr>
<td>ODNR</td>
<td>Oregon Department of Natural Resources</td>
</tr>
<tr>
<td>ODSL</td>
<td>Oregon Department of State Lands</td>
</tr>
<tr>
<td>OHA</td>
<td>Oregon Health Authority</td>
</tr>
<tr>
<td>OHWL</td>
<td>ordinary high water line</td>
</tr>
<tr>
<td>OHWM</td>
<td>ordinary high water mark</td>
</tr>
<tr>
<td>OWRD</td>
<td>Oregon Water Resources Department</td>
</tr>
<tr>
<td>PARs</td>
<td>permanent access roads</td>
</tr>
<tr>
<td>PCGP</td>
<td>Pacific Connector Gas Pipeline</td>
</tr>
<tr>
<td>PCS</td>
<td>Project Consulting Services, Inc.</td>
</tr>
<tr>
<td>PNHFC</td>
<td>Pacific Northwest Hydrography Framework Clearinghouse</td>
</tr>
<tr>
<td>PNWHF</td>
<td>Pacific Northwest Hydrography Framework</td>
</tr>
<tr>
<td>POD</td>
<td>Plan of Development</td>
</tr>
<tr>
<td>ppm</td>
<td>parts per million</td>
</tr>
<tr>
<td>PWS</td>
<td>public water system</td>
</tr>
<tr>
<td>RMP</td>
<td>Resource Management Plan</td>
</tr>
<tr>
<td>SDWA</td>
<td>Safe Drinking Water Act</td>
</tr>
<tr>
<td>SPCC</td>
<td>Spill Prevention, Containment, and Countermeasures</td>
</tr>
<tr>
<td>T&amp;E</td>
<td>threatened and endangered</td>
</tr>
<tr>
<td>TARs</td>
<td>temporary access roads</td>
</tr>
<tr>
<td>TEWA</td>
<td>temporary extra work area</td>
</tr>
<tr>
<td>TMDLs</td>
<td>Total Daily Maximum Loads</td>
</tr>
<tr>
<td>TMP</td>
<td>Transportation Management Plan</td>
</tr>
<tr>
<td>TMNFL</td>
<td>Transportation Management Plan for Non-Federal Lands</td>
</tr>
<tr>
<td>USDA</td>
<td>U.S. Department of Agriculture</td>
</tr>
<tr>
<td>USGS</td>
<td>U.S. Geological Survey</td>
</tr>
<tr>
<td>WBD</td>
<td>Watershed Boundary Dataset</td>
</tr>
<tr>
<td>WQD</td>
<td>Water Quality Division</td>
</tr>
<tr>
<td>Water Use and Quality</td>
<td>Section</td>
</tr>
<tr>
<td>--------------------------------------------------------------------------------------</td>
<td>--------------------------</td>
</tr>
<tr>
<td>Location of Information to Satisfy Minimum Filing Requirements</td>
<td></td>
</tr>
<tr>
<td>Identify all perennial surface waterbodies crossed by the proposed project and their water quality classification.</td>
<td>Table 2A-2</td>
</tr>
<tr>
<td>Identify all waterbody crossings that may have contaminated waters or sediments.</td>
<td>Section 2.2.5</td>
</tr>
<tr>
<td>Identify watershed areas, designated surface water protection areas, and sensitive waterbodies crossed by the proposed project.</td>
<td>2.2.3</td>
</tr>
<tr>
<td></td>
<td>2.2.4 and Table 2A-2</td>
</tr>
<tr>
<td>Provide a table (based on NWI maps if delineations have not been done) identifying all wetlands, by milepost and length, crossed by the project (including abandoned pipeline), and the total acreage and acreage of each wetland type that would be affected by construction.</td>
<td>Table 2A-3</td>
</tr>
<tr>
<td>Discuss construction and restoration methods proposed for crossing wetlands, and compare them to staff's Wetland and Waterbody Construction and Mitigation Procedures.</td>
<td>2.3.2 and Table 1A-1</td>
</tr>
<tr>
<td>Describe the proposed waterbody construction, impact mitigation, and restoration methods to be used to cross surface waters and compare to the staff's Wetland and Waterbody Construction and Mitigation Procedures.</td>
<td>2.2.8 and Table 1A-1</td>
</tr>
<tr>
<td>Provide original National Wetlands Inventory (NWI) maps or the appropriate state wetland maps, if NWI maps are not available, that show all proposed facilities and include milepost locations for proposed pipeline routes.</td>
<td>Provided in the Certificate application</td>
</tr>
<tr>
<td>Identify all U.S. Environmental Protection Agency (EPA) – or state-designated aquifers crossed.</td>
<td>2.4.1.2</td>
</tr>
</tbody>
</table>
2. WATER USE AND QUALITY

2.1 INTRODUCTION

This report describes existing surface waterbodies, water supplies, watersheds, wetlands, and groundwater resources potentially affected by the PCGP Project. It provides information to determine the expected impact of the PCGP Project on water quality and use and on the measures that will be used to mitigate the impacts. Most of the information in this Resource Report discussing surface water and groundwater in the PCGP Project area was provided by the State of Oregon Department of Environmental Quality - Water Quality Division (ODEQ-WQD), the Oregon Department of Natural Resources - Oregon Water Resources Department (ODNR-OWRD), the Oregon Department of Forestry (ODF), and the Oregon Department of Fish and Wildlife (ODFW). The Pacific Northwest Hydrography Framework Clearinghouse (PNHFC) is one of the sources of hydrography data layers used for project analysis.

Wetland and waterbody information in this Resource Report summarizes the results of field surveys conducted between 2006 and 2008. The wetland delineation report has been submitted to FERC as a stand alone document. Wetlands and waterbodies directly affected by or adjacent to PCGP Project facilities are shown on the Environmental Alignment Sheets (submitted under separate cover).

In addition to the information provided in this Resource Report, Resource Reports 1 and 3 contain information pertinent to water use and quality. Descriptions of waterbody and wetland construction techniques, including descriptions of how Pacific Connector will comply with FERC's Wetland and Waterbody Construction and Mitigation Procedures (FERC's Wetland and Waterbody Procedures) and FERC's Up'and Erosion Control, Revegetation, and Maintenance Plan (FERC's Upland Plan) are provided in Section 1.6 in Resource Report 1. Erosion control and revegetation/stabilization of disturbed sites are addressed in the project-specific Erosion Control and Revegetation Plan (ECRP - see Appendix 1B to Resource Report 1). Additional construction-related information is provided in Appendix 2B/Appendix X to the Plan of Development (POD - provided as a stand alone document) - Spill Prevention, Containment, and Countermeasures (SPCC) Plan; Appendix 2C - Stream Fluming Procedures; and Appendix 2D - Dam and Pump Procedures. Fishery resources are discussed in detail in Resource Report 3.

2.2 SURFACE WATER RESOURCES

2.2.1 Surface Water Standards and Classifications

This section describes the surface water resources that are crossed by the PCGP Project, regulations that apply to those resources, and measures proposed by Pacific Connector to mitigate impacts to those resources.

2.2.1.1 Oregon Water Quality Standards

Section 303(c) of the Clean Water Act (CWA) requires states to establish, review, and revise water quality standards for all surface waters. To comply with these standards, the ODEQ has developed its own unique classification system to describe the highest
beneficial use(s) and associated minimum water quality standards of identified surface waterbodies within the state. The Oregon Water Quality Standards include beneficial use(s), fish use designations (see Table 2A-1 in Appendix 2A), narrative and numeric criteria to support the beneficial use(s), and antidegradation policies. The purpose of the Antidegradation Policy is to guide decisions that affect water quality such that unnecessary further degradation from new or increased point and nonpoint sources of pollution is prevented, and to protect, maintain, and enhance existing surface water quality to ensure the full protection of all existing beneficial uses (Oregon Secretary of State, 2012). The state-designated beneficial use classifications for the basins (as defined by ODEQ) crossed by the proposed pipeline are shown in Table 2.2-1. Table 2A-1 in Appendix 2A provides specific water quality regulatory standards for sub-basins (as defined by USGS hydrologic unit boundaries) crossed by the PCGP Project. A detailed list of the waterbodies crossed by the PCGP Project is provided in Table 2A-2 in Appendix 2A.

<table>
<thead>
<tr>
<th>Beneficial Use</th>
<th>South Coast</th>
<th>Umpqua</th>
<th>Rogue</th>
<th>Klamath</th>
</tr>
</thead>
<tbody>
<tr>
<td>Estuaries and Adjacent Marine Waters</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>All Streams and Tributaries Thru Tieto</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>South Umpqua River Main Stem</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>All Other Tributaries to Umpqua, North and South Umpqua Rivers</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Rogue River Main Stem From Estuary to Lost Creek Dam</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Rogue River Main Stem above Lost Dam and Tributaries</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>All Other Tributaries to Rogue River and Bear Creek</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Klamath River from Klamath Lake to Keno Dam</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Lost River and Lost River Diversion Channel</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

Source: ODEQ, 2013a.

Detailed information is provided in Resource Report 3 and Appendix 3B.

2.2.1.2 State of Oregon 2010 Integrated Report

Biennially, each state is required, under Section 305(b) of the CWA, to submit a report to the U.S. Environmental Protection Agency (EPA) describing the status of surface waters in the state. Waterbodies are assessed to determine if their use is “fully supported,” “fully supported but threatened,” “partially supported” or “not supported” in accordance with the water quality standards. A use is said to be “impaired” when it is not supported
or only partially supported. A list of waters that are impaired is required by Section 303(b) of the CWA and included in the 305(b) report. To restore a waterbody to its use classification, a state may elect to impose restrictions more stringent than those normally required by the National Pollutant Discharge Elimination System (NPDES) or other permitting programs or even deny a permit for activities that adversely affect an "impaired" waterbody.

States are also required to develop TMDLs (Total Daily Maximum Loads) for the impaired waterbodies. TMDLs describe the amount of each pollutant a waterbody can receive and not violate water quality standards. To comply with EPA requirements, the State of Oregon produced a combined report entitled Oregon's 2010 Integrated Report on Water Quality (Integrated Report). The report includes an assessment database containing information on the water quality status of waters in Oregon, the assessment methodology used to evaluate data, the 2010 303d list, and a schedule for developing TMDLs for waters on the Section 303(d) list (ODEQ, 2012a and b). The report was approved by EPA on March 15, 2012.

The Integrated Report designates waterbodies according to five Water Quality Assessment Categories, which are:

1. All standards are met (This category is not used).
2. Attaining - Some of the pollutant standards are met.
3. Insufficient data to determine whether a standard is met.
   3a. Potential concern - Some data indicate non-attainment of a criterion, but data are insufficient to assign another category.
4. Water quality is limited but a TMDL is not needed. This includes:
   4a. TMDL approved - TMDLs needed to attain applicable water quality standards have been approved.
   4b. Other pollution control requirements are expected to address all pollutants and will attain water quality standards.
   4c. Impairment is not caused by a pollutant (e.g., flow or lack of flow is not considered a pollutant).
5. Water quality is limited (303d list) and a TMDL is required.

The GIS coverage for the 2010 Integrated Report was reviewed to determine the locations of the water quality limited waters for both Water Quality Assessment Categories 4 and 5 and to determine if they are in the vicinity of the pipeline crossing.

2.2.1.3 Oregon Department of Forestry Stream Typing

ODF is the designated management agency for regulation of water quality on non-federal forest lands. The Board of Forestry has adopted water protection rules, including but not limited to Oregon Administrative Rules (OAR) Chapter 629, Divisions 635-660, which describe Best Management Practices (BMPs) for forest operations. These rules are implemented and enforced by ODF and monitored to assure their effectiveness. The Oregon Environmental Quality Commission, Board of Forestry, ODEQ, and ODF have agreed that these pollution control measures will be relied upon to achieve state water quality standards. ODF provides on-the-ground field administration of the Forest Practices Act (FPA); for each administrative rule, guidance is provided to field research.
administrators to insure proper, uniform, and consistent application of the FPA (ODF, 2013).

ODF and ODEQ are involved in several statewide efforts to analyze the existing FPA measures and to better define the relationship between the TMDL allocations and the FPA measures designed to protect water quality. As the designated management authority for water quality management on non-federal forest lands, ODF is working with ODEQ through a Memorandum of Understanding (MOU) signed in June 1998. The MOU was designed to improve the coordination between ODF and ODEQ in evaluating and proposing possible changes to the forest practice rules as part of the TMDL process.

ODF classifies waterbodies based on physical characteristics and beneficial uses to set appropriate protection measures. The ODF beneficial use categories are Type F for streams that have fish use; Type D for streams with domestic water use but not fish use; and Type N for all other streams. Finally, streams are classified by size: small, medium or large based upon water volume. Small streams have an average annual flow of 2 cubic feet per second or less. Additionally, any stream with a drainage area of less than 200 acres is a small stream. Medium streams have an average annual flow greater than 2 and less than 10 cubic feet per second. Large streams have an average annual flow of 10 cubic feet per second or greater (ODF, 2010).

2.2.1.4 Northwest Forest Plan Standards and Guidelines

Under the Northwest Forest Plan (NWFP) (Forest Service and BLM, 1994a), the Aquatic Conservation Strategy (ACS) was developed to restore and maintain the ecological health of watersheds and aquatic ecosystems contained within them on public lands. The goal of the strategy is to protect salmon and steelhead habitat on federal lands managed by the U.S. Department of Agriculture (USDA) Forest Service (Forest Service) and the Bureau of Land Management (BLM).

One of the components of the Aquatic Conservation Strategy is Key Watersheds which are watersheds that provide high quality water and are crucial to at-risk fish species and stocks. Tier 1 Key Watersheds consist primarily of watersheds directly contributing to anadromous salmonid, bull trout, and resident fish species conservation. Tier 2 watersheds do not necessarily contain at-risk fish stocks, but are important sources of high quality water. Watershed analysis is required in Key Watersheds, for roadless areas in non-Key Watersheds, and Riparian Reserves prior to determining how proposed land management activities meet ACS objectives (Forest Service and BLM, 1994b). Section 3.2.1.5 and Table 3C-9 in Resource Report 3 provide discussion and analysis for Riparian Reserves affected by the PCGP Project.

The Standards and Guidelines for Key Watersheds include:
- Reduce existing system and non-system road mileage. If funding is insufficient to implement reductions, there will be no net increase in the amount of roads in Key Watersheds;
- Key Watersheds are the highest priority for watershed restoration;
- Watershed analysis is required prior to management activities, except minor activities such as those Categorically Excluded under the National Environmental Policy Act (and not including timber harvest); and
- Watershed analysis is required prior to timber harvest.
Pacific Connector developed an Aquatic Conservation Strategy Consistency Evaluation for the 2009 Final Environmental Impact Statement (FEIS) Route. This document provided the design measures and BMPs that Pacific Connector incorporated into the PCGP Project to assist the Forest Service and the BLM in making a consistency determination for each of the nine ACS objectives. The evaluation presented project effects to Riparian Reserves and Key Watersheds, assessed area watershed analyses, and identified mitigation projects for watershed restoration. It described the Project's short-term and long-term effects to the nine ACS objectives at the site- and watershed- and landscape-scale, as well as the justification for the Project's consistency with the ACS objectives under the 1994 NWFP Record of Decision. The BLM and Forest Service will make the final determinations regarding consistency of the project with the ACS objectives and their consistency determinations will be included in the NEPA analysis for the project.

2.2.2 Pacific Northwest Hydrography Framework (PNWHF)

The Pacific Northwest Hydrography Framework (NWHF) comprises a centralized hydrography dataset and Watershed Boundary dataset (WBD) for Washington, Oregon, and Northern California, which has been developed cooperatively by many federal, state, and local agencies and tribal and private organizations. It uses a nationally recognized set of standards which describe hydrologic unit boundaries based on defined size and composition characteristics established through the U.S. Geological Survey (USGS) and the Natural Resources Conservation Service (NRCS) at the national level in coordination with hydrologists from the Pacific Northwest (Pacific Northwest Hydrography Framework Clearinghouse - PNHFC, 2013a).

The WBD uses a hierarchical surface water boundary system to define the areal extent of surface water drainage to a point. Hydrologic Unit Codes (HUCs) are based upon size classifications. The largest subdivision is a two-digit Hydrologic Unit and the smallest is a 12-digit Hydrologic Unit. This report deals with HUC 2/Region, HUC 4/Subregion, HUC 6/Basin, HUC 8/Sub-basin, and HUC 10/Watershed (PNHFC, 2013b).

To be consistent with the Northwest Forest Plan, the term Fifth Field Watershed refers to the HUC 10 boundary. Table 2A-2 in Appendix 2A lists the waterbodies crossed by the PCGP Project and provides the associated HUCs.

2.2.3 PCGP Project Waterbody Crossings

Pipeline Facilities

HUC 10/Fifth Field Watersheds. The PCGP Project will cross six sub-basins including the Coos, Coquille, South Umpqua, Upper Rogue, Upper Klamath, and Lost River. Within the six sub-basins, 19 HUC 10/Fifth Field Watersheds will be crossed (see Table 2.2-2). The watershed boundary was selected in the 1995 Federal Guide for Watershed Analysis as the consistent size for analysis. It is the first subdivision of a sub-basin and considered the most appropriate to provide the context for management through description and understanding of specific ecosystem conditions and capabilities and to offer a consistent format for reporting results of analysis (Forest Service and BLM, 2003).
Table 2.2-2  
Sub-basins and Fifth Field Watersheds Crossed by the PCGP Project

<table>
<thead>
<tr>
<th>Sub-basin</th>
<th>Watershed Name</th>
<th>HUC10</th>
<th>Miles Crossed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coos</td>
<td>Coos Bay-Frontal Pacific Ocean</td>
<td>1710030403</td>
<td>20.40</td>
</tr>
<tr>
<td>17100304</td>
<td>Coquille (Middle Main) River</td>
<td>1710030505</td>
<td>2.03</td>
</tr>
<tr>
<td></td>
<td>North Fork Coquille River</td>
<td>1710030504</td>
<td>8.35</td>
</tr>
<tr>
<td></td>
<td>East Fork Coquille River</td>
<td>1710030503</td>
<td>10.21</td>
</tr>
<tr>
<td></td>
<td>Middle Fork Coquille River</td>
<td>1710030501</td>
<td>15.46</td>
</tr>
<tr>
<td>South Umpqua</td>
<td>Olallia Creek-Lookingglass Creek</td>
<td>1710030212</td>
<td>8.87</td>
</tr>
<tr>
<td>17100302</td>
<td>Clark Branch-South Umpqua River</td>
<td>1710030211</td>
<td>13.34</td>
</tr>
<tr>
<td></td>
<td>Myrtle Creek</td>
<td>1710030210</td>
<td>8.74</td>
</tr>
<tr>
<td></td>
<td>Days Creek-South Umpqua River</td>
<td>1710030205</td>
<td>19.71</td>
</tr>
<tr>
<td></td>
<td>Elk Creek</td>
<td>1710030204</td>
<td>3.42</td>
</tr>
<tr>
<td></td>
<td>Upper Cow Creek</td>
<td>1710030206</td>
<td>5.15</td>
</tr>
<tr>
<td>Upper Rogue</td>
<td>Trail Creek</td>
<td>1710030706</td>
<td>10.60</td>
</tr>
<tr>
<td>17100307</td>
<td>Shady Cove-Rogue River</td>
<td>1710030707</td>
<td>8.14</td>
</tr>
<tr>
<td></td>
<td>Big Butte Creek</td>
<td>1710030704</td>
<td>5.00</td>
</tr>
<tr>
<td></td>
<td>Little Butte Creek</td>
<td>1710030708</td>
<td>32.90</td>
</tr>
<tr>
<td>Upper Klamath</td>
<td>Spencer Creek</td>
<td>1801020601</td>
<td>15.13</td>
</tr>
<tr>
<td>18010206</td>
<td>John C. Boyle Reservoir-Klamath River</td>
<td>1801020602</td>
<td>5.38</td>
</tr>
<tr>
<td>Lost River</td>
<td>Lake Ewauna-Upper Klamath River</td>
<td>1801020412</td>
<td>16.44</td>
</tr>
<tr>
<td>18010204</td>
<td>Mills Creek-Lost River</td>
<td>1801020409</td>
<td>22.54</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td><strong>231.81</strong></td>
</tr>
</tbody>
</table>

The PCGP Project will affect 400 waterbodies in 18 of the 19 Fifth Field Watersheds; 63 of these are not crossed by the centerline (37 streams and 26 ditches) but are within the right-of-way or workspaces. Of the 400 waterbodies affected, 101 are perennial, 164 are intermittent, 128 are ditches, 6 are stock ponds, and 1 is an estuary (Haynes Inlet in the Coos Bay).

In Coos County, the PCGP Project will affect 57 perennial and 48 intermittent waterbodies, 8 ditches, 1 stock pond, and the estuary. In Douglas County, the PCGP Project will affect 28 perennial and 36 intermittent waterbodies and 11 ditches. In Jackson County, the PCGP Project will affect 13 perennial and 60 intermittent waterbodies, 13 ditches and 2 stock ponds. In Klamath County, the PCGP Project will affect 3 perennial and 20 intermittent waterbodies, 96 ditches and 3 stock ponds.

Table 2A-2 in Appendix 2A provides a listing of all waterbodies affected by the PCGP Project and includes: 1) waterbody name; 2) milepost location (centerline of the waterbody); 3) waterbody identification number; 4) PNWHF identification number; 5) approximate width at the crossing location; 6) excavated volume at crossing; 7) proposed crossing method; 8) FERC classification; 9) Cowardin Classification; 10) stream flow type (perennial or intermittent); 11) ODF water quality classification/Northwest Forest Plan Designation; and 12) status of water quality limited streams. The list of waterbodies was developed as a result of field investigations conducted between 2006 and 2008 where survey access was provided and review of USGS topographic maps, aerial photographs, Light Detection and Ranging - LiDAR Data, and the PNHFC information, where survey access was denied. Additional field investigations to delineate wetlands along proposed reroutes where survey access is
Key Watersheds. Table 2J-1 in Appendix 2J provides a list of the waterbodies crossed on federal lands. The alignment crosses 72.49 miles of federal lands within 18 of the Fifth Field Watersheds. Table 2.2-3 provides a list of the Fifth Field Watersheds crossed by the PCGP Project according to federal jurisdiction (BLM, Forest Service, or Bureau of Reclamation). It also indicates the miles crossed within each Fifth Field Watershed and the status of the respective Watershed Analysis.

Table 2.2-3
Fifth Field Watersheds 1 Crossed by the PCGP Project on Federally-Managed Lands

<table>
<thead>
<tr>
<th>Jurisdiction</th>
<th>Watershed (Name)</th>
<th>Miles Crossed</th>
<th>Watershed Analysis Complete</th>
</tr>
</thead>
<tbody>
<tr>
<td>BLM – Coos Bay</td>
<td>Coos Bay-Frontal Pacific Ocean 1</td>
<td>0.29</td>
<td>June 2010</td>
</tr>
<tr>
<td>District</td>
<td>Coquille (Middle Main) River</td>
<td>0.06</td>
<td>September 1997</td>
</tr>
<tr>
<td></td>
<td>North Fork Coquille River</td>
<td>2.86</td>
<td>July 2001</td>
</tr>
<tr>
<td></td>
<td>East Fork Coquille River</td>
<td>2.78</td>
<td>May 2000</td>
</tr>
<tr>
<td></td>
<td>Middle Fork Coquille River</td>
<td>4.84</td>
<td>October 2007</td>
</tr>
<tr>
<td>BLM – Roseburg</td>
<td>Middle Fork Coquille River</td>
<td>1.91</td>
<td>October 2007</td>
</tr>
<tr>
<td>District</td>
<td>Olalla Creek-Lookingglass Creek</td>
<td>1.29</td>
<td>April 1999</td>
</tr>
<tr>
<td></td>
<td>Clarks Branch-South Umpqua River 2</td>
<td>0.57</td>
<td>November 1999</td>
</tr>
<tr>
<td></td>
<td>Myrtle Creek</td>
<td>2.50</td>
<td>October 2002</td>
</tr>
<tr>
<td></td>
<td>Elk Creek</td>
<td>0.09</td>
<td>March 2004</td>
</tr>
<tr>
<td></td>
<td>Days Creek-South Umpqua River</td>
<td>6.56</td>
<td>March 2001</td>
</tr>
<tr>
<td>BLM – Medford District</td>
<td>Trail Creek</td>
<td>3.88</td>
<td>June 1999</td>
</tr>
<tr>
<td></td>
<td>Shady Cove-Rogue River</td>
<td>4.38</td>
<td>March 2011</td>
</tr>
<tr>
<td></td>
<td>Big Butte Creek 3</td>
<td>0.69</td>
<td>September 1999</td>
</tr>
<tr>
<td></td>
<td>Little Butte Creek</td>
<td>5.97</td>
<td>November 1997</td>
</tr>
<tr>
<td></td>
<td>Clarks Branch-South Umpqua River 2</td>
<td></td>
<td>November 1999</td>
</tr>
<tr>
<td>BLM – Lakeview District</td>
<td>Spencer Creek</td>
<td>1.04</td>
<td>August 1995</td>
</tr>
<tr>
<td>District</td>
<td>Mills Creek - Lost River</td>
<td>0.26</td>
<td>N/A 4</td>
</tr>
<tr>
<td>FS – Umpqua</td>
<td>Days Creek-South Umpqua River</td>
<td>1.56</td>
<td>March 2001</td>
</tr>
<tr>
<td></td>
<td>Elk Creek</td>
<td>2.86</td>
<td>September 1995 5</td>
</tr>
<tr>
<td></td>
<td>Upper Cow Creek</td>
<td>4.36</td>
<td>September 1995 5</td>
</tr>
<tr>
<td></td>
<td>Trail Creek</td>
<td>2.09</td>
<td>September 1995 5</td>
</tr>
<tr>
<td>FS – Rogue River-Siskiyou</td>
<td>Little Butte Creek</td>
<td>13.69</td>
<td>November, 1997</td>
</tr>
<tr>
<td></td>
<td>Spencer Creek</td>
<td>6.06</td>
<td>August, 1995</td>
</tr>
<tr>
<td>Bureau of Reclamation</td>
<td>Lake Ewauna-Upper Klamath River</td>
<td>0.65</td>
<td>N/A 8</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>71.24</td>
<td></td>
</tr>
</tbody>
</table>

1 The Catching Beaver Watershed Analysis covers three subwatersheds within the Coos Bay-Frontal Pacific Ocean – Isthmus Slough, Catching Slough, and Coos River.

2 Middle South Umpqua Watershed analysis encompasses the BLM lands within the Clarks Branch-South Umpqua River watershed.

3 The Lower Big Butte Creek Watershed Analysis encompasses the BLM lands within the Big Butte Creek Watershed.

4 Outside the range of the Northern Spotted Owl; therefore no watershed analysis required under the NWFP.

5 The Cow Creek Watershed Analysis (1995) encompass the Umpqua National Forest lands crossed by the PCGP Project.

Four watersheds crossed by the PCGP Project are designated as Key Watersheds: 1) South Umpqua River (Tier 1); 2) North and South Forks Little Butte Creek (Tier 1); 3) Spencer Creek (Tier 1); and 4) Clover Creek (Tier 2). North and South Forks Little Butte Creek is a Key Watershed within the Little Butte Creek Fifth Field Watershed, and Spencer Creek (Tier 1) and Clover Creek (Tier 2) are Key Watersheds within the
Spencer Creek Fifth Field Watershed. Table 2.2-4 provides the miles crossed and acres affected in each of the Tier 1 and Tier 2 Key Watersheds on both federal and private lands.

The proposed pipeline alignment crosses the South Umpqua River Key Watershed between MPs 82.75 and 108.97 in Douglas County; the Little Butte Creek Key Watershed in Jackson County between MPs 145.38 and 168.01; the Spencer Creek Key Watershed between MPs 168.01 and 177.05 as well as between MPs 180.51 and 183.00 and the Clover Creek Watershed between MPs 177.05 and 180.51 in Klamath County (see Table 2.2-4).

<table>
<thead>
<tr>
<th>Key Watershed</th>
<th>Jurisdiction</th>
<th>Miles Crossed</th>
<th>Construction Disturbance (acres)</th>
<th>Operational Easement (acres)</th>
</tr>
</thead>
<tbody>
<tr>
<td>South Umpqua River (Tier 1)</td>
<td>BLM Roseburg District</td>
<td>6.50</td>
<td>113.13</td>
<td>23.66</td>
</tr>
<tr>
<td>MPs 82.75-108.97</td>
<td>Umpqua National Forest</td>
<td>4.07</td>
<td>53.84</td>
<td>14.93</td>
</tr>
<tr>
<td></td>
<td>Private</td>
<td>12.08</td>
<td>232.76</td>
<td>43.86</td>
</tr>
<tr>
<td>North and South Forks Little Butte Creek (Tier 1)</td>
<td>BLM Medford District</td>
<td>3.89</td>
<td>67.79</td>
<td>14.15</td>
</tr>
<tr>
<td>MPs 145.38-168.01</td>
<td>Rogue River-Siskiyou National Forest</td>
<td>13.70</td>
<td>209.54</td>
<td>49.83</td>
</tr>
<tr>
<td></td>
<td>Private</td>
<td>4.93</td>
<td>77.81</td>
<td>17.94</td>
</tr>
<tr>
<td>Spencer Creek (Tier 1)</td>
<td>Fremont-Winema National Forest</td>
<td>6.04</td>
<td>81.24</td>
<td>21.98</td>
</tr>
<tr>
<td>MPs 168.01-177.05</td>
<td>BLM Lakeview District</td>
<td>0.89</td>
<td>12.96</td>
<td>3.24</td>
</tr>
<tr>
<td>MPs 180.51-183.00</td>
<td>Private</td>
<td>4.72</td>
<td>78.98</td>
<td>17.16</td>
</tr>
<tr>
<td>Clover Creek (Tier 2)</td>
<td>BLM Lakeview District</td>
<td>0.15</td>
<td>1.90</td>
<td>0.54</td>
</tr>
<tr>
<td>MPs 177.05-180.51</td>
<td>Private</td>
<td>3.31</td>
<td>41.53</td>
<td>12.03</td>
</tr>
<tr>
<td><strong>Private Total</strong></td>
<td></td>
<td><strong>25.04</strong></td>
<td><strong>431.08</strong></td>
<td><strong>90.99</strong></td>
</tr>
<tr>
<td><strong>Federal Total</strong></td>
<td></td>
<td><strong>35.24</strong></td>
<td><strong>540.40</strong></td>
<td><strong>128.33</strong></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>60.28</strong></td>
<td><strong>971.48</strong></td>
<td><strong>219.32</strong></td>
</tr>
</tbody>
</table>
Water Quality Limited Waters. Based on the ODEQ 2010 Integrated Report GIS coverage, 35 Category 4 and 5 water quality impaired waterbodies will be crossed by the pipeline (ODEQ, 2012b) (see Table 2A-2 in Appendix 2A). TMDLs for the South Umpqua sub-basin were completed in October 2006. TMDLs for the Upper Rogue sub-basin were completed in December 2008. TMDLs for the Upper Klamath River and Lost River sub-basins were approved in December 2010. TMDLs for the Coos and Coquille sub-basins are in progress. Pacific Connector proposes to cross 29 of these impaired waterbodies using dry/diverted open-cut crossing techniques. Conventional boring, Direct Pipe, or horizontal directional drill (HDD) methods will be used to cross 5 of the impaired waterbodies. Only Haynes Inlet in the Coos Bay estuary will be crossed using wet open-cut trenching.

Pacific Connector prepared a Turbidity-Nutrients-Metals Water Quality Impact Analysis (GeoEngineers, 2011a) that describes the projected impact on instream turbidity, nutrients, and metals resulting from in-water construction work from the proposed Project (provided in the Joint Permit Application - JPA stand alone document/1-JPA_DEQ-R36). This impact analysis was conducted and previously provided to ODEQ as part of the Project’s 2009 JPA for the 401 Water Quality Certification process. The impact analysis was conducted in response to a March 2010 ODEQ information request, which stated:

“Analysis of potential impacts to water quality parameters upstream and downstream [from] each crossing location must [be] undertaken with consideration for the particular characteristics of the stream. This will allow selection of least impactful locations and methods for stream crossings, as well as best management practices that will be effective to minimize specific impacts.”

“This comprehensive analysis should be done in conjunction with the geomorphic risk assessment and must consider turbidity, sedimentation, dissolved oxygen, toxics, pH, nutrients, and any other applicable criteria.”

In addition to the Turbidity-Nutrients-Metals Water Quality Impact Analysis (GeoEngineers, Inc., 2011a), a geomorphic risk assessment was completed by Pacific Connector according to the protocol identified by ODEQ (GeoEngineers, 2011b). Pipeline design, construction, and site restoration measures that are commensurate with the results of the risk assessment are described in that report (provided in the JPA stand alone document/2-JPA_DEQ-R15). An analysis of impacts to the hyporheic zone of each stream crossing was also prepared to assess project impacts on intergravel dissolved oxygen (GeoEngineers, 2010a) (provided in the JPA stand alone document/3-JPA_DEQ-R29).

To evaluate the impact of in-water construction on water quality within Coos Bay, GeoEngineers, Inc. completed an evaluation of sediment quality along the 2.4-mile long segment within Haynes Inlet between MPs 1.7R and 4.1R (GeoEngineers, Inc., 2010b). This report is provided in the JPA stand alone document (4-JPA_DEQ-R33).

Pacific Connector also completed a Thermal Impacts Assessment (GeoEngineers, Inc., 2012a) in response to the ODEQ March 2010 information request, which stated:

“Water quality impairments that can occur in relation to fluvial geomorphological alterations include increased sedimentation and turbidity from bank erosion and
bed scour with potential resultant alterations to pH, toxics, dissolved oxygen (particularly in intergravel areas) and temperature"

The Thermal Impacts Assessment was completed by Pacific Connector and is provided in the JPA stand alone document (5-JPA DEQ-R26).

Construction Access Roads

Six of the 14 proposed temporary access roads (TARs) are located within 100 feet of a waterbody (see Table 2.2-5). One of the 13 proposed (permanent access roads) PARs is located within 100 feet of a ditch (see Table 2.2-5). Existing access roads needing improvement, which are located within 100 feet of waterbodies, are provided in Table 2A-7 in Appendix 2A.

Table 2.2-5
TARs and PARs within 100 Feet of Waterbodies

<table>
<thead>
<tr>
<th>TAR/PAR</th>
<th>Waterbody Name</th>
<th>Waterbody ID</th>
<th>Distance from Road (feet)</th>
<th>Direction</th>
</tr>
</thead>
<tbody>
<tr>
<td>TAR-29.88</td>
<td>East Fork Coquille River</td>
<td>BSP071</td>
<td>85</td>
<td>River is west of access road</td>
</tr>
<tr>
<td>TAR-81.37</td>
<td>Trib to Myrtle Creek</td>
<td>BSP-259</td>
<td>0</td>
<td>Crossed</td>
</tr>
<tr>
<td>TAR-88.63</td>
<td>Days Creek</td>
<td>BSP-233</td>
<td>0</td>
<td>Crossed</td>
</tr>
<tr>
<td>TAR-88.67</td>
<td>Days Creek</td>
<td>BSP-233</td>
<td>0</td>
<td>Crossed</td>
</tr>
<tr>
<td>TAR-128.69</td>
<td>Trib to Indian Creek</td>
<td>ASP-310</td>
<td>0</td>
<td>Crossed</td>
</tr>
<tr>
<td>TAR-212.50</td>
<td>Ditch</td>
<td>EDX054</td>
<td>0</td>
<td>Crossed</td>
</tr>
<tr>
<td>PAR-132.03</td>
<td>Ditch</td>
<td>EDX075</td>
<td>50</td>
<td>West of ditch</td>
</tr>
</tbody>
</table>

One permanent access road to BVA #12 (PAR-150.70) is located within the South Fork/North Fork Little Butte Creek Key Watershed within the Medford BLM District. This permanent access road will be installed within the permanent easement and is located adjacent to Heppsie Mountain Rock Quarry.

Contractor and Pipe Storage Yards

Table 2.3-2 provides the wetland/waterbody survey results for the contractor and pipe storage yards. There are no contractor and pipe storage yards located within Key Watersheds on federal lands.

Rock Source and Disposal Sites

Of the 44 proposed rock source and disposal sites, 26 are either existing or abandoned quarries. There are eight rock source and disposal sites that are located within 100 feet of a waterbody (6 are associated with temporary extra work areas - TEWAs). A perennial tributary to Ross Slough (BSP122) at MP 12.83 is within 100 feet of a disposal site within TEWA 12.53-N. Steele Creek (NSP015) a perennial stream is located within 100 feet of a disposal site within TEWA 20.96. Kent Creek, a tributary to the South Umpqua River, is located within 100 feet of the Kent Creek Commercial Quarry at Milepost - MP 63.90. Willis Creek (BSP168) and a tributary to Willis Creek (BSI169) are located within 100 feet of the DG private rock source and disposal site at MP 67.00. An intermittent tributary to Little Lick Creek (BSI010) is within 100 feet of a rock source and disposal site within TEWA 77.72-N. A tributary to S. Myrtle Creek (SS-100-023) is located within a DG quarry rock source site, TEWA 81.45. An intermittent stream (ESI068) is located within TEWA 110.73 Peavine Quarry site used for staging, parking,
and disposal. Two waterbodies (ESI-50 and ESI-51) are located within 100 feet of the proposed rock source and disposal site at MP 224.95 which is an existing quarry.

There are six rock source and disposal sites located in Key Watersheds on federal lands. Four of the seven sites are in Douglas County, of which three are within the South Umpqua River Watershed, including TEWA 86.98-N, TEWA 91.66-W, and TEWA 93.01 (all in the BLM Roseburg District). All of these sites are located within existing disturbance, clearcut, or regenerating forest and are adjacent to existing roads. The fourth site in Douglas County is the existing C&D Pit at MP 104.12 which is located within the Elk Creek-South Umpqua Watershed (FS-Umpqua). There are two rock source and disposal sites in Jackson County on federal lands, all within the Little Butte Creek Key Watershed. These sites include TEWA 150.31-W (Heppsie Mountain Quarry/BLM-Medford District) and TEWA 160.54-W (Ichabod Rock Quarry or Big Elk Cinder Pit/FS-Rogue River-Siskiyou) which are both existing quarry sites.

**Aboveground Facilities**

The only aboveground facility located on federal lands within a Key Watershed is block valve assembly (BVA) #12 at MP 150.70. This site is located adjacent to Heppsie Mountain Quarry and is not within 100 feet of a waterbody.

**2.2.4 Sensitive and Protected Public Watershed Areas**

The 1996 Federal Safe Drinking Water Act (SDWA) requires Source Water Assessments for all public water systems (PWS) that 1) are community water systems that regularly serve at least 25 year-round residents or serve at least 15 service connections used by year-round residents, or 2) non-transient non-community water systems that regularly serve at least 25 of the same people more than 6 months per year. The Oregon Health Authority (OHA) Drinking Water Program and the ODEQ Drinking Water Protection Program teamed together to address the assessment requirements of the SDWA. ODEQ maintains the Drinking Water Protection database which includes public drinking water source areas (DWSA) for both groundwater and surface water as well as the locations of public water system intakes and public groundwater wells. An inventory of the potential contamination sources for the source areas has also been developed.

**Pipeline Facilities**

The proposed pipeline alignment crosses or travels along the edge of 12 surface water public DWSAs (ODEQ, 2013c) (see Table 2.2-6). In some locations, the alignment is within a particular DWSA for several miles, but in other locations the alignment travels along ridgelines meandering in and out of DWSAs. Where the proposed alignment meanders in and out of DWSAs, two DWSAs are shown in Table 2.2-6 for that length of the proposed alignment.
### Table 2.2-6
Public Drinking Water Surface Water Source Areas Crossed by the PCGP Project

<table>
<thead>
<tr>
<th>Starting Milepost</th>
<th>Ending Milepost</th>
<th>Total Miles Crossed</th>
<th>County</th>
<th>Drinking Water Source Area¹</th>
<th>Public Drinking Water System ID</th>
<th>Source Water</th>
</tr>
</thead>
<tbody>
<tr>
<td>19.86</td>
<td>35.81</td>
<td>15.95</td>
<td>Coos</td>
<td>City of Myrtle Point</td>
<td>4100551</td>
<td>N. F. Coquille River</td>
</tr>
<tr>
<td>35.81</td>
<td>38.42</td>
<td>2.61</td>
<td>Coos</td>
<td>City of Coquille</td>
<td>4100213</td>
<td>Coquille River</td>
</tr>
<tr>
<td>38.42</td>
<td>42.48</td>
<td>4.06</td>
<td>Coos</td>
<td>City of Myrtle Point</td>
<td>4100551</td>
<td>N.F. Coquille River</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>City of Coquille</td>
<td>4100213</td>
<td>Coquille River</td>
</tr>
<tr>
<td>42.48</td>
<td>52.98</td>
<td>10.5</td>
<td>Coos</td>
<td>City of Coquille</td>
<td>4100213</td>
<td>Coquille River</td>
</tr>
<tr>
<td>52.98</td>
<td>64.71</td>
<td>11.73</td>
<td>Douglas</td>
<td>Winston-Dillard Water District</td>
<td>4100957</td>
<td>S. Umpqua River</td>
</tr>
<tr>
<td>64.71</td>
<td>70.67</td>
<td>5.96</td>
<td>Douglas</td>
<td>Roseburg Forest Products-Dillard</td>
<td>4194300</td>
<td>S. Umpqua River</td>
</tr>
<tr>
<td>70.67</td>
<td>74.86</td>
<td>4.19</td>
<td>Douglas</td>
<td>Clarks Branch Water Association Roseburg Forest Products-Dillard</td>
<td>4100548</td>
<td>4194300</td>
</tr>
<tr>
<td>74.86</td>
<td>82.75</td>
<td>7.89</td>
<td>Douglas</td>
<td>Clarks Branch Water Association Roseburg Forest Products-Dillard</td>
<td>4100548</td>
<td>4194300</td>
</tr>
<tr>
<td>82.75</td>
<td>86.38</td>
<td>3.63</td>
<td>Douglas</td>
<td>Tri-City Water District Clarks Branch Water Association Roseburg Forest Products-Dillard</td>
<td>4100549</td>
<td>4100548</td>
</tr>
<tr>
<td>86.38</td>
<td>95.42</td>
<td>9.04</td>
<td>Douglas</td>
<td>Tri-City Water District</td>
<td>4100549</td>
<td>S. Umpqua River</td>
</tr>
<tr>
<td>95.42</td>
<td>101.83</td>
<td>6.41</td>
<td>Douglas</td>
<td>Milo Academy Tri-City Water District Roseburg Forest Products-Dillard</td>
<td>4100250</td>
<td>4100549</td>
</tr>
<tr>
<td>101.83</td>
<td>102.81</td>
<td>0.98</td>
<td>Douglas</td>
<td>Tiller Elementary SD #15 Tri-City Water District Roseburg Forest Products-Dillard</td>
<td>4192139</td>
<td>4100549</td>
</tr>
<tr>
<td>102.81</td>
<td>110.76</td>
<td>7.95</td>
<td>Douglas</td>
<td>City of Glendale Tiller Elementary SD #15 Tri-City Water District Roseburg Forest Products-Dillard</td>
<td>4100323</td>
<td>4192139</td>
</tr>
<tr>
<td>110.76</td>
<td>111.11</td>
<td>0.35</td>
<td>Jackson</td>
<td>Country View Mountain Home Estates City of Glendale Roseburg Forest Products-Dillard</td>
<td>4100808</td>
<td>4100323</td>
</tr>
<tr>
<td>111.11</td>
<td>124.61</td>
<td>13.5</td>
<td>Jackson</td>
<td>Country View Mountain Home Estates Roseburg Forest Products-Dillard</td>
<td>4100808</td>
<td>Rogue River</td>
</tr>
<tr>
<td>124.61</td>
<td>135.04</td>
<td>10.43</td>
<td>Jackson</td>
<td>Anglers Cover/SCHNC Country View Mountain Home Estates Roseburg Forest Products-Dillard</td>
<td>4101483</td>
<td>4100808</td>
</tr>
<tr>
<td>135.04</td>
<td>168.01</td>
<td>32.97</td>
<td>Jackson</td>
<td>Medford Water Commission</td>
<td>4100513</td>
<td>Rogue River</td>
</tr>
</tbody>
</table>

¹ The proposed alignment meanders in and out of DWSAs for the length of the proposed alignment where there are two DWSAs listed.

Section V.A.2 in FERC's Wetland and Waterbody Procedures requires that potable water intakes within 3 miles downstream of waterbody crossings be identified. A GIS shape file containing locations of public water system surface water intakes was provided by ODEQ (2013c). Additionally, the summary reports for each source water assessment were reviewed to determine the current location of the surface water intake for each DWSA (ODEQ, 2013d). Table 2.2-7 lists the public water systems that have surface water intakes within 3 miles downstream of waterbodies crossed by the PCGP Project. The downstream distance from the waterbody crossing to the intake is also provided in Table 2.2-7, in addition to the source water. The surface water intake for
Roseburg Forest Prod – Dillard (4194300) on the S. Umpqua River is 0.81 mile downstream of the crossing of Rice Creek at MP 65.76 and 1.82 miles downstream of the crossing of Willis Creek at MP 66.95. The surface water intake for Country View Mountain Home Estates (4100808) on the Rogue River is 1.44 miles downstream of the crossing of the Rogue River at MP 122.65, and the surface water intake for Anglers Cove Subdivision (4101483) is approximately 3 miles downstream of the crossing of the Rogue River at MP 122.65. Pacific Connector will provide written notification to the authorities of the surface water supply intakes at least one week before beginning in-water work or as otherwise specified by the appropriate authorities.

<table>
<thead>
<tr>
<th>Intake</th>
<th>Public Water System</th>
<th>Source Water for Intake</th>
<th>Waterbody Crossing</th>
<th>Distance Downstream</th>
<th>County</th>
</tr>
</thead>
<tbody>
<tr>
<td>4194300</td>
<td>Roseburg Forest Prod – Dillard</td>
<td>S. Umpqua River</td>
<td>Rice Creek – MP 65.76 Tributary to S. Umpqua River</td>
<td>0.81 mile</td>
<td>Douglas</td>
</tr>
<tr>
<td>4194300</td>
<td>Roseburg Forest Prod – Dillard</td>
<td>S. Umpqua River</td>
<td>Willis Creek MP 66.95 Tributary to S. Umpqua River</td>
<td>1.82 miles</td>
<td>Douglas</td>
</tr>
<tr>
<td>4100808</td>
<td>Country View Mountain Home Estates</td>
<td>Rogue River</td>
<td>Rogue River MP 122.65</td>
<td>1.44 miles</td>
<td>Jackson</td>
</tr>
<tr>
<td>4101483</td>
<td>Anglers Cove Subdivision</td>
<td>Rogue River</td>
<td>Rogue River 122.65</td>
<td>Approx. 3 miles</td>
<td>Jackson</td>
</tr>
</tbody>
</table>

The OWRD water rights database includes both surface and groundwater rights. Potable surface water rights (labeled domestic) in the OWRD water rights database that are within 3 miles downstream of waterbodies crossed by the PCGP Project are provided in Table 2A-6 in Appendix 2A. These water rights are potentially for water intakes but could also be for other uses. In the event of an inadvertent spill, or a disruption of flow in which sediments are introduced into these waters, Pacific Connector would notify potable water intake users of the conditions so that necessary precautions could be implemented. Prior to construction, Pacific Connector will consult with all surface water intake operators listed in Table 2.2-7 with active intakes located within three miles downstream from a stream crossing location and will establish a process for advanced notification of instream work. A summary of the consultations will be filed with FERC prior to construction of the pipeline.

**Rock Source and Disposal Sites**

Ten rock source and disposal sites are within Public Drinking Water Surface Water Source Areas (see Table 2.2-8).
## Table 2.2-8
Rock Source and Disposal Sites within Public Drinking Water Surface Water Source Areas

<table>
<thead>
<tr>
<th>MP</th>
<th>Rock Source and Disposal Site</th>
<th>Drinking Water Source Area</th>
<th>Public Drinking Water System ID</th>
<th>Source Water</th>
</tr>
</thead>
<tbody>
<tr>
<td>45.86</td>
<td>Signal Tree Road Quarry</td>
<td>City of Coquille</td>
<td>4100213</td>
<td>Coquille River</td>
</tr>
<tr>
<td>47.00</td>
<td>Weaver Road Quarry Site</td>
<td>City of Myrtle Point</td>
<td>4100551</td>
<td>N. Fork Coquille River</td>
</tr>
<tr>
<td>56.75</td>
<td>Private Quarry Benedict Road</td>
<td>Winston-Dillard Water District</td>
<td>4100957</td>
<td>S. Umpqua River</td>
</tr>
<tr>
<td>61.64</td>
<td>Nichol Bros</td>
<td>Winston-Dillard Water District</td>
<td>4100957</td>
<td>S. Umpqua River</td>
</tr>
<tr>
<td>63.90</td>
<td>Kent Creek Commercial Quarry</td>
<td>Winston-Dillard Water District</td>
<td>4100957</td>
<td>S. Umpqua River</td>
</tr>
<tr>
<td>67.00</td>
<td>Private Quarry</td>
<td>Roseburg Forest Prod-Dillard</td>
<td>4194300</td>
<td>S. Umpqua River</td>
</tr>
<tr>
<td>72.61</td>
<td>Roth Source 1 &amp; 2 Quarry</td>
<td>Clarks Branch Water Association</td>
<td>410054</td>
<td>S. Umpqua River</td>
</tr>
<tr>
<td>81.43</td>
<td>PCT Quarry DG</td>
<td>Clarks Branch Water Association</td>
<td>410054</td>
<td>S. Umpqua River</td>
</tr>
<tr>
<td>104.12</td>
<td>C&amp;D Pit</td>
<td>Tiller Elementary SD #15</td>
<td>4192139</td>
<td>S. Umpqua River</td>
</tr>
<tr>
<td>119.51</td>
<td>Rock Source and Disposal MP 119.51</td>
<td>Country View Mountain Home Estates</td>
<td>4100808</td>
<td>Rogue River</td>
</tr>
</tbody>
</table>

### Contractor and Pipe Storage Yards

Table 2.2-9 lists the 26 contractor and pipe storage yards that are located within Public Drinking Water Surface Water Source Areas. All but four are existing disturbed industrial lots or sites, three are pastures and hayfields and one site is an undeveloped lot in an industrial park.

## Table 2.2-9
Contractor and Pipe Storage Yards within Public Drinking Water Surface Water Source Areas

<table>
<thead>
<tr>
<th>Yard</th>
<th>Drinking Water Source Area</th>
<th>Public Drinking Water System Id</th>
<th>Source Water</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green District</td>
<td>City Of Elkton</td>
<td>4100276</td>
<td>Umpqua River</td>
</tr>
<tr>
<td>Green #1</td>
<td>City Of Elkton</td>
<td>4100276</td>
<td>Umpqua River</td>
</tr>
<tr>
<td>Sutherlin Central Avenue</td>
<td>Umpqua Basin Water Association</td>
<td>4100719</td>
<td>North Umpqua River</td>
</tr>
<tr>
<td>Sutherlin John Murphy</td>
<td>Umpqua Basin Water Association</td>
<td>4100719</td>
<td>North Umpqua River</td>
</tr>
<tr>
<td>Old Highway 99</td>
<td>Umpqua Basin Water Association</td>
<td>4100719</td>
<td>North Umpqua River</td>
</tr>
<tr>
<td>Fairview Yard</td>
<td>City Of Myrtle Point</td>
<td>4100551</td>
<td>North Fork Coquille River</td>
</tr>
<tr>
<td>Hult Chip Yard Parking</td>
<td>Winston-Dillard Water District</td>
<td>4100957</td>
<td>South Umpqua River</td>
</tr>
<tr>
<td>Hult Chip Yard 1</td>
<td>Winston-Dillard Water District</td>
<td>4100957</td>
<td>South Umpqua River</td>
</tr>
<tr>
<td>Hult Chip Yard 2</td>
<td>Winston-Dillard Water District</td>
<td>4100957</td>
<td>South Umpqua River</td>
</tr>
<tr>
<td>Coquille Sawmill Yard</td>
<td>City Of Coquille</td>
<td>4100213</td>
<td>Coquille River</td>
</tr>
<tr>
<td>Gravel Pit S. Winston</td>
<td>Roseburg Forest Products – Dillard</td>
<td>4194300</td>
<td>South Umpqua River</td>
</tr>
<tr>
<td>Milo Yard</td>
<td>Tri-City Water District</td>
<td>4100549</td>
<td>South Umpqua River</td>
</tr>
<tr>
<td>Weaver Road Yard</td>
<td>Tri-City Water District</td>
<td>4100549</td>
<td>South Umpqua River</td>
</tr>
<tr>
<td>Highway 99 Hay Field</td>
<td>Tri-City Water District</td>
<td>4100549</td>
<td>South Umpqua River</td>
</tr>
<tr>
<td>Days Creek Yard 2</td>
<td>Tri-City Water District</td>
<td>4100549</td>
<td>South Umpqua River</td>
</tr>
<tr>
<td>Green Diamond Pipe</td>
<td>City Of Riddle</td>
<td>4100706</td>
<td>Cow Creek</td>
</tr>
<tr>
<td>Riddle Pasture 4</td>
<td>City Of Riddle</td>
<td>4100706</td>
<td>Cow Creek</td>
</tr>
<tr>
<td>Yard 1</td>
<td>Drinking Water Source Area 1</td>
<td>Public Drinking Water System Id</td>
<td>Source Water</td>
</tr>
<tr>
<td>-------</td>
<td>-----------------------------</td>
<td>---------------------------------</td>
<td>--------------</td>
</tr>
<tr>
<td>Riddle Main Street</td>
<td>City Of Riddle</td>
<td>4100706</td>
<td>Cow Creek</td>
</tr>
<tr>
<td>Glendale Yard 2</td>
<td>City Of Glendale/City Of Riddle</td>
<td>4100323/4100706</td>
<td>Cow Creek</td>
</tr>
<tr>
<td>Glendale Yard 1</td>
<td>City Of Glendale/City Of Riddle</td>
<td>4100323/4100706</td>
<td>Cow Creek</td>
</tr>
<tr>
<td>Ave F &amp; 11th Street</td>
<td>Medford Water Commission</td>
<td>4100513</td>
<td>Rogue River</td>
</tr>
<tr>
<td>Oregon Opportunities</td>
<td>Medford Water Commission/City of Gold Hill</td>
<td>4100513/4100333</td>
<td>Rogue River</td>
</tr>
<tr>
<td>Ave C &amp; 7th St 3</td>
<td>Medford Water Commission/City of Gold Hill</td>
<td>4100513/4100333</td>
<td>Rogue River</td>
</tr>
<tr>
<td>Medford Ind. Park</td>
<td>Medford Water Commission</td>
<td>4100513</td>
<td>Rogue River</td>
</tr>
<tr>
<td>Burrill Lumber</td>
<td>Medford Water Commission</td>
<td>4100513</td>
<td>Rogue River</td>
</tr>
<tr>
<td>Rogue Aggregates</td>
<td>City Of Gold Hill</td>
<td>4100333</td>
<td>Rogue River</td>
</tr>
</tbody>
</table>

1 All sites are existing disturbed sites except as noted in footnotes 2 and 3.
2 Pastures or hayfields.
3 Undeveloped/vacant lot in industrial park.

Access Roads

Nine of the proposed TARs and 10 of the proposed PARs are located within Public Drinking Water Surface Water Source Areas (see Table 2.2-10). Table 2A-5 in Appendix 2A provides a list of the existing access roads needing improvements which are located within Public Drinking Water Surface Water Source Areas.

**Table 2.2-10**

<table>
<thead>
<tr>
<th>Road Name</th>
<th>Purpose</th>
<th>Drinking Water Source Area</th>
<th>Public Drinking Water System ID</th>
<th>Source Water</th>
</tr>
</thead>
<tbody>
<tr>
<td>TAR-27.06</td>
<td>Access to TEWA 27.06-W</td>
<td>City Of Myrtle Point</td>
<td>4100551</td>
<td>North Fork Coquille River</td>
</tr>
<tr>
<td>PAR-29.48</td>
<td>BVA #3</td>
<td>City Of Myrtle Point</td>
<td>4100551</td>
<td>North Fork Coquille River</td>
</tr>
<tr>
<td>TAR-29.88</td>
<td>Access</td>
<td>City Of Myrtle Point</td>
<td>4100551</td>
<td>North Fork Coquille River</td>
</tr>
<tr>
<td>PAR-48.41</td>
<td>BVA #4</td>
<td>City Of Coquille</td>
<td>41000213</td>
<td>Coquille River</td>
</tr>
<tr>
<td>PAR-59.58</td>
<td>BVA #5</td>
<td>Winston-Dillard Water District</td>
<td>4100957</td>
<td>South Umpqua River</td>
</tr>
<tr>
<td>TAR-71.10</td>
<td>Access to S. Umpqua Direct Pipe Laydown Area</td>
<td>Clarks Branch Wtr. Association</td>
<td>4100548</td>
<td>South Umpqua River</td>
</tr>
<tr>
<td>PAR-71.36</td>
<td>BVA #6 and Clarks Branch MS</td>
<td>Clarks Branch Wtr. Association</td>
<td>4100548</td>
<td>South Umpqua River</td>
</tr>
<tr>
<td>TAR-81.37</td>
<td>Access To TEWA 81.22-W</td>
<td>Clarks Branch Wtr. Association</td>
<td>4100548</td>
<td>South Umpqua River</td>
</tr>
<tr>
<td>TAR-88.63</td>
<td>Access To TEWA 88.62-N</td>
<td>Tn-City Water District</td>
<td>4100549</td>
<td>South Umpqua River</td>
</tr>
<tr>
<td>TAR-88.67</td>
<td>Access To TEWA 88.62-W</td>
<td>Tn-City Water District</td>
<td>4100549</td>
<td>South Umpqua River</td>
</tr>
<tr>
<td>PAR-60.03</td>
<td>BVA #7</td>
<td>Tn-City Water District</td>
<td>4100549</td>
<td>South Umpqua River</td>
</tr>
<tr>
<td>TAR-94.81</td>
<td>Access To S. Umpqua River</td>
<td>Tn-City Water District</td>
<td>4100549</td>
<td>South Umpqua River</td>
</tr>
<tr>
<td>PAR-94.66</td>
<td>BVA #6</td>
<td>Tn-City Water District</td>
<td>4100549</td>
<td>South Umpqua River</td>
</tr>
<tr>
<td>PAR-112.10</td>
<td>BVA #9</td>
<td>Country View Mh Estates</td>
<td>4100086</td>
<td>Rogue River</td>
</tr>
<tr>
<td>PAR-122.18</td>
<td>BVA #10 - Avista Ms</td>
<td>Anglers Cover/SCHWC</td>
<td>4101483</td>
<td>Rogue River</td>
</tr>
<tr>
<td>TAR-128.69</td>
<td>Access To R-O-W</td>
<td>Anglers Cover/SCHWC</td>
<td>4101483</td>
<td>Rogue River</td>
</tr>
<tr>
<td>PAR-132.03</td>
<td>BVA#11</td>
<td>Country View Mh Estates</td>
<td>4100086</td>
<td>Rogue River</td>
</tr>
<tr>
<td>TAR-141.10</td>
<td>Access To TEWA 140.98</td>
<td>Medford Water Commission</td>
<td>4100513</td>
<td>Rogue River</td>
</tr>
<tr>
<td>PAR-150.70</td>
<td>BVA #11</td>
<td>Medford Water Commission</td>
<td>4100513</td>
<td>Rogue River</td>
</tr>
</tbody>
</table>

Aboveground Facilities

Table 2.2-11 provides a list of the aboveground facilities located within Public Drinking Water Surface Water Source Areas.
### Table 2.2-11
Aboveground Facilities within Public Drinking Water Surface Water Source Areas

<table>
<thead>
<tr>
<th>MP</th>
<th>Aboveground Facility</th>
<th>Drinking Water Source Area</th>
<th>Public Drinking Water System ID</th>
<th>Source Water</th>
</tr>
</thead>
<tbody>
<tr>
<td>28.42</td>
<td>BVA #4 – Dora Ridge Road</td>
<td>City of Myrtle Point</td>
<td>4100551</td>
<td>North Fork Coquille River</td>
</tr>
<tr>
<td>48.41</td>
<td>BVA #5</td>
<td>City of Coquille</td>
<td>4100213</td>
<td>Coquille River</td>
</tr>
<tr>
<td>59.58</td>
<td>BVA#6 – South of Olalla Creek</td>
<td>Winston-Dillard Water District</td>
<td>4100957</td>
<td>South Umpqua River</td>
</tr>
<tr>
<td>69.70</td>
<td>Clarks Branch MS</td>
<td>Roseburg Forest Prod-Dillard</td>
<td>4194300</td>
<td>South Umpqua River</td>
</tr>
<tr>
<td>75.00</td>
<td>BVA #7</td>
<td>Clarks Branch Water Association</td>
<td>4100548</td>
<td>South Umpqua River</td>
</tr>
<tr>
<td>94.60</td>
<td>BVA #8 – Hwy 227</td>
<td>Tri-City Water District</td>
<td>4100549</td>
<td>South Umpqua River</td>
</tr>
<tr>
<td>113.35</td>
<td>BVA #9 – BLM Road 33-2-12</td>
<td>Country View MH Estates</td>
<td>4100808</td>
<td>Rogue River</td>
</tr>
<tr>
<td>132.10</td>
<td>BVA #10</td>
<td>Country View MH Estates</td>
<td>4100808</td>
<td>Rogue River</td>
</tr>
<tr>
<td>150.70</td>
<td>BVA #11</td>
<td>Medford Water Commission</td>
<td>4100513</td>
<td>Rogue River</td>
</tr>
</tbody>
</table>

#### 2.2.5 Contaminated Surface Water or Sediments

The ODEQ Environmental Cleanup Site Information Database (ECSI) was reviewed to assess the presence of known or potential surface water contamination within 0.25 mile of the proposed pipeline construction (ODEQ, 2013e). No known contaminated sites will be crossed by the pipeline, so contact with contaminated soil from pipeline construction is not anticipated; however, the chance for unanticipated discover of contaminated sediments remains. In rural areas, potential sources for contamination of sediments in waterbodies are agricultural fields containing fertilizers and pesticides, and leachate from feed lots and sanitary fields. In urban areas, contaminated stormwater runoff, wastewater discharges, erosion or leachate from industrial sites such as mineral processing or mining, petroleum refining, treatment plants, or landfills may contribute to the sediment contamination in waterbodies.

Pacific Connector, in consultation with the BLM and Forest Service, developed a Contaminated Substances Discovery Plan (see Appendix E to the POD, provided as a stand alone document). This Plan outlines practices to protect human health and worker safety and to prevent further contamination in the event of an unanticipated discovery of contaminated soil, water or groundwater during construction of the PCGP Project.

#### Mercury in Soil and Sediments

The Forest Service expressed concerns for the potential for naturally occurring mercury to reach the aquatic environment during construction of the PCGP Project near the historic Thomason claim group (near MP 109). To address this concern, Pacific Connector conducted a mine hazard evaluation and mercury testing study for the proposed 2007 route on the Umpqua National Forest at the crossing of East Fork Cow Creek which crossed the Thomason claim group (GeoEngineers, Inc., 2009 and 2007). The soil samples were collected along the proposed alignment in an area believed to be outside the zone of mineralization where mercury deposits occur, in the stream system in the vicinity of the East Fork of Cow Creek, and from mine workings in proximity to the PCGP right-of-way in 2007. GeoEngineers, Inc. compared the detected mercury concentrations to the human health risk screening criteria set by the EPA, and the ecological health risk screening criteria set by the ODEQ. The samples did not contain
concentrations of mercury that exceeded human health risk screening criteria. Mercury was detected in soil and stream samples at relatively low concentrations that exceed ecological risk screening criteria at each of the sampling locations; however, the proposed construction should not alter or adversely affect ecological health at the site or downstream areas because appropriate erosion and sediment control measures at upland and in-stream areas will be rigorously implemented in accordance with the PCGP Erosion Control and Revegetation Plan and the site-specific erosion and sediment control plan.

Subsequent to the GeoEngineers, Inc. (2009 and 2007) mine hazard evaluation, the proposed 2007 route was relocated to the east to avoid a Northern Spotted Owl nest site. GeoEngineers, Inc. (2009 and 2007) conducted an additional assessment of the relocated route, approximately 3,300 feet upstream and east of the original crossing to address the continued concerns of the Forest Service regarding the potential for naturally-occurring mercury within the East Fork Cow Creek Drainage. Based on the geologic mapping of the Richter Mountain 7.5 minute quadrangle (Murray and Kay, 2001), the geology at the original site was underlain by mercury bearing bedrock mapped as Metaserpentinite (msp) and Amphibolite (am). The 2009 report concluded that based on the mapped bedrock at the new crossing location, which is mapped as Volcanic and Volcanogenic Rocks (Toev), and the distribution/location of historic mercury mines, the soils underlying the current proposed crossing of East Fork Cow Creek are unlikely to have concentrations of naturally-occurring mercury exceeding those measured in samples obtained from the previous 2007 crossing location and most likely will have lower levels than those reported in GeoEngineers’ (2009 and 2007) mine evaluation.

The Forest Service contracted with a geologist consultant Broeker (2009) to collect soil and stream sediment samples for analytical testing and reporting of mercury and other naturally-occurring minerals along a 2,000 foot section of the proposed pipeline route between MP 109 and the East Fork Cow Creek (see Attachment 1 to Appendix E/Contaminated Substances Discovery Plan to the POD). Geochemical analysis of the soil and stream sediment samples determined that they have very low to nominal concentrations of naturally-occurring mercury mineralization. The mercury level at one of the stream sediment sites was 0.29 ppm which was above the Level II screening level value of 0.1 ppm for invertebrates (ODEQ, 1998). In order to prevent this naturally-occurring mercury from mobilizing during and after construction, additional erosion control measures and monitoring will be conducted at these sites. The report in Attachment 1 to Appendix E to the POD concludes that proposed pipeline construction activities by Pacific Connector within the upper East Fork Cow Creek watershed are not anticipated to disturb and expose soils and bedrock strata that contain more than low amounts of naturally-occurring mercury mineralization; and any sediment that is generated is not likely to reach the aquatic environment due to implementation of short-term and permanent mitigation measures outlined in Pacific Connector's Erosion Control and Revegetation Plan (see Appendix 1B to Resource Report 1/Appendix l to the POD).

GeoEngineers’ mine evaluations (2009 and 2007) and Broeker's (2009) report are provided in the JPA stand alone document (6-JPA_DEQ-R35).

2.2.6 Waterbodies that Contain Threatened or Endangered Species

Waterbodies crossed by the proposed pipeline alignment that contain threatened or endangered species are addressed in Resource Report 3.
2.2.7 Nationwide Rivers Inventory

The Nationwide Rivers Inventory (NRI) is a listing of more than 3,400 free-flowing river segments in the United States that are believed to possess one or more "outstandingly remarkable" natural or cultural values judged to be of more than local or regional significance. Under a 1979 Presidential directive, and related Council on Environmental Quality procedures, all federal agencies must seek to avoid or mitigate actions that would adversely affect one or more NRI segments (http://www.nps.gov/nccr/programs/rta/nri/hist.html#ceq). The NRI is a source of information for statewide river assessments and federal agencies involved with stream-related projects. For any group concerned with ecosystem management, the inventory can provide the location of the nearest naturally-functioning system which might serve as a reference for monitoring activities. It also serves as a listing of plant and animal species for restoration efforts on a similar section of river. For the recreationalist, it provides a listing of free-flowing, relatively undisturbed river segments (National Park Service - NPS, 2013).

Three rivers crossed by the proposed pipeline alignment are listed on the NRI (NPS, 2013):

- The North Fork of the Coquille from its headwaters in Section 16, T. 26 S., R. 10 W. to the confluence with the South Fork Coquille River in Section 5, T. 29 S., R. 12 W. It was listed in 1993 for outstanding remarkable fish, wildlife, and cultural (prehistoric Indian sites) values. The proposed PCGP Project alignment crosses this section of river at MP 23.06. Pacific Connector developed a site-specific crossing plan for the North Fork Coquille River, which was requested by ODFW during interagency task force meetings (Waterbody Crossing Methodologies Subgroup) on ESA-related issues for the PCGP and JCE projects (see Appendix 2E).

- The East Fork of the Coquille River from its headwaters in Sec. 18, T. 28 S., R. 8 W. to the confluence with the North Fork of the Coquille River in Sec. 36, T. 28 S., R. 12 W. It was listed in 1993 for outstanding remarkable fish, wildlife, boating and fishing. The proposed PCGP Project alignment crosses this section of river at MP 29.88. Appendix 2E includes a site-specific plans for this crossing.

- The South Umpqua River from Tiller (Section 33, T. 30 S., R. 2 W.) to the confluence with the North Umpqua River at River Forks (Sections 31 and 32, T. 26 S., R. 6 W.) was listed in 1993 for outstanding and remarkable fish and historical values. It supports outstanding fishery-related recreation. The PCGP Project alignment crosses this section of river twice at MP 71.30 and MP 94.73. Originally (2007 FERC Certificate application), Pacific Connector proposed utilizing the two river channels on either side of the gravel bar at the South Umpqua River crossing at MP 69.02 to facilitate the diverted open cut river crossing. During interagency Waterbody Crossing Methodologies Subgroup meetings on ESA-related issues for the PCGP and Jordan Cove Energy Project (JCEP) projects, ODFW requested that Pacific Connector consider alternative crossing plans to minimize disturbance to the west channel, which provides important refuge habitat for coho salmon. Pacific Connector developed a site-specific diverted open-cut crossing plan for the South Umpqua River that minimized disturbance to the west channel for the 2009 FEIS Route. However, in Pacific Connector's January 2013 pre-filing application the Preferred Alternative (Reroute 67.6) was a reroute south of the 2009 FEIS Route using a single HDD crossing of I-5 and the South Umpqua River. Following geotechnical investigation, the HDD was determined to be infeasible. Reroute 67.6 (January 2013
Preferred Alternative) was still favored over the 2009 FEIS Route because it provided a superior location for the bored crossing of I-5 and avoided numerous residences. However, a diverted open cut crossing of the South Umpqua River was determined to be problematic because of channel characteristics; therefore, to minimize in-water work, a wet open cut crossing was proposed. Pacific Connector continued to investigate alternative alignments and has incorporated a route south of Reroute 67.6 that utilizes Direct Pipe (DP) technology (see Appendix 2I) to cross both I-5 and the South Umpqua River in a single operation (see Resource Report 10, Appendix 10H). As described in Resource Report 10 (see Section 10.6.8), Pacific Connector incorporated this reroute because it provides an efficient/single crossing of I-5, the South Umpqua River, Dole Road, and a railroad and eliminates the open cut river crossing. Appendix 2I provides the site-specific plans for Direct Pipe crossings of the South Umpqua River at MP 71.3. Appendix 2E provides a site-specific crossing plan for the diverted open-cut crossing of the South Umpqua River Crossing at MP 94.73.

2.2.8 Waterbody Crossing Methods
This section describes proposed waterbody crossing methods. All methods will comply with FERC's Wetland and Waterbody Procedures, except as otherwise described in Table 1A-1 in Appendix 1A to Resource Report 1. The construction method proposed for each waterbody is listed in Table 2A-2 in Appendix 2A.

2.2.8.1 Non-Flowing Intermittent Streams and Ditches
Pacific Connector proposes to use several different waterbody crossing methods, depending on site-specific conditions. Many of the waterbodies crossed by the PCGP Project are minor intermittent streams or ditches that are expected to be dry or non-flowing at the time of construction. For all intermittent waterbodies without flow at the time of construction, Pacific Connector will utilize standard upland, cross-country construction methods. At these crossings, the depth of cover will be 5 feet (from the top of pipe to the bottom of streambed). If any waterbody is flowing at the time of construction, a dry crossing technique will be used (i.e., flume, dam and pump).

2.2.8.2 Waterbodies and Flowing Streams
For perennial and intermittent waterbodies that are flowing at the time of construction, Pacific Connector has proposed the crossing methods listed in Table 2A-2 in Appendix 2A, and Table 3B-4 in Appendix 3B to Resource Report 3 provides the rationale for the proposed crossing methods. Descriptions of the proposed crossing methods are provided below. These construction methods, along with FERC's Wetland and Waterbody Procedures, are designed to maintain water flow and minimize changes in waterbody flow characteristics.

Wet Open Cut Crossing Method
This crossing method is proposed within the Coos Bay Estuary which would be crossed from the Jordan Cove Meter Station at MP 1.47R, proceed east across Haynes Inlet, pass under Highway 101 at MP 2.70R, and come ashore at about MP 4.10R. The Proposed Route is aligned through in-water work areas of Coos Bay and shallow water and tidally exposed mud flats of Haynes Inlet. A construction plan for the Coos Bay Estuary crossing is provided in the JPA stand alone document (9-JPA). The wet open
cut method is typically used to cross flowing waterbodies. It involves trench excavation, pipeline installation, and backfilling through a waterbody without controlling or diverting streamflow (i.e., the stream flows through the work area throughout the construction period). With this method, the trench is excavated across the waterbody using trackhoes or draglines working within the waterbody on equipment bridges and/or from the streambanks or from barges depending on the size of the waterbody. On smaller streams, the trench spoil is typically stored in an upland area adjacent to the stream. On larger waterbodies where excavated spoil cannot be easily cast/stored in an upland area, excavated trench material is often stored within the stream on the downstream side of the trench. This reduces additional handling or relaying of the spoil and minimizes the duration of instream activities. The stream substrate influences the stability of the trench walls and directly affects the time required to adequately excavate the trench and complete the crossing.

Pacific Connector conducted an engineering evaluation of the original pre-filing land route (WC-1) using a new technology, Direct Pipe technology (see Appendix 2I), that may offer the potential to cross Haynes Inlet rather than an HDD, which was previously analyzed. Although the HDD crossing along WC-1 is considered technically infeasible, DP installation is a developing trenchless technology that can overcome problematic issues associated with the HDD crossing method because it provides a continuously supported hole during the excavation process; reduces pressure of drilling mud; and eliminates the bore hole reaming and pullback requirements of an HDD. Resource Report 10 provides the DP feasibility evaluation for the Haynes Inlet crossing (see Appendix 10H). The feasibility evaluation concluded that a DP crossing of Haynes Inlet may be feasible, but the crossing location is approximately 5,718 feet in length, which is beyond the current capabilities using a single DP drive. GeoEngineers, Inc. provided two potential options to complete the installation using DP technology, but because of the technical challenges under the current DP technology capability, Pacific Connector's proposed open cut crossing of Haynes Inlet remains the preferred crossing method. A comparison of the proposed Haynes Inlet crossing with the DP crossing along the WC-1 route is provided in Section 10.6.1 of Resource Report 10 as a potential future alternative as DP technology continues to develop.

Coast and Harbor Engineering (2010a, 2010b, and 2011) conducted hydrodynamic and sediment transport modeling studies for the JCEP and PCGP Project, which are provided in the JPA stand alone document (7-JPA_DEQ-R1d, R1e, R5a, JPA-Appendix H). The study was completed as requested by ODEQ for a number of purposes including determining:

- Potential impact of pipeline construction through Haynes Inlet on increase of turbidity;
- Potential impact of pipeline construction through Haynes Inlet on dispersal of trenched and stockpiled bottom sediment;
- Potential impact of pipeline construction through Haynes Inlet on geomorphologic instability;
- Potential impact of pipeline stream crossings of Coos Bay tributaries on fluvial geomorphology and water quality.
Pacific Connector also completed a sediment characterization assessment for the proposed alignment across Haynes Inlet (GeoEngineers, Inc., 2010b), which is provided in the JPA stand alone document (4-JPA_DEQ-R33). The assessment concluded that contaminants of concern have not been identified near the project area within Coos Bay at concentrations greater than Sediment Evaluation Framework screening levels; therefore, it is unlikely that the project activities will present unacceptable risks to the receptors of concern identified in the model.

Suspension of sediment, increases in turbidity, and exposure of new sediment surfaces are expected to be short-term, temporary and localized to the immediate vicinity of the project activities. BMPs such as the use of silt curtains and excavation methods that reduce sediment disturbance can be implemented where needed during construction to minimize turbidity and control the sediment plume.

**Diverted Open Cut Crossing Method**

Pacific Connector is proposing a diverted open cut at the second crossing of the South Umpqua River at MP 94.73 because the river is too wide to utilize other dry crossing methods (flume or dam and pump). For example, water levels at the crossing were sufficiently low in August during the ODFW-recommended in-water work periods (July 1 to August 31) that a diverted open cut crossing method could easily have been utilized at this crossing location. The South Umpqua River channel at MP 94.73 is sufficiently flat, wide, and shallow to divert all of the river flow to one side or bank of the river while work is proceeding in the dry on the opposite bank.

This crossing method will require TEWAs to be located in the river and will require equipment to work in the river to place the diversion structures or dams to divert the river flow from one side of the river and then to the other. The diversion could be constructed using imported riprap, concrete jersey barriers, water bladder portadams, and/or sand bags to divert the river's flow temporarily away from the work area in order to minimize contact between stream flow and the excavation and backfill activities. This would require Pacific Connector to place equipment within the stream to install, maintain, and ultimately remove the diversion structures. The crossing would take a minimum of 14 days to complete including 3 to 4 days of instream work to install, rearrange, and remove the diversion structures.

Some turbidity will result during instream activities and when the water is diverted to the backfilled areas. GeoEngineers, Inc., (2011a) evaluated the potential risk of turbidity during construction across waterbodies. The qualitative evaluation was based on each affected waterbody's hydroperiod, presence of erodible clay and loam soils in streambanks, presence of clay in streambed (suspended clay contributes to turbidity), long-term stability of stream channels, and level/duration of construction effort and stabilization measures likely added at the time of construction. The turbidity risk was scored from 1 (low) to 5 (high). Of 420 canals, ditches, and waterbodies evaluated, 150 were scored with a low risk (score of 1 or 2) of turbidity increase over a 24-hour period and 270 were scored with a moderate risk (score of 3 or 4), generally due to soil erosion potential, presence of clay or mud, and/or the presence of steep slope or an incised channel that would require construction of a deep trench (GeoEngineers, Inc., 2011a). The second crossing of the South Umpqua was given a turbidity score of 4 – moderate. The evaluation concluded that turbidity generated during construction may exceed the Oregon water quality standard for short distances and short durations downstream from each crossing, either coinciding with construction across perennial waterbodies or in
intermittent streams coincidental with autumn precipitation. Section 3.2.3 in Resource Report 3 discusses potential impacts to fisheries resources including effects from suspended sediment that might be generated during the Project’s waterbody crossings.

The diverted open cut crossing method at this location would require an instream tie-in, but it would be made in the dry behind the diversion structure. During the crossing, initial trenching would first occur on the dry side of the river; however, depending on the water levels during the season it may be necessary to install a diversion to push or divert the flow to at least the middle of the river. Once the construction right-of-way has been isolated by the diversions and/or sediment control devices, trenching would proceed to approximately the middle of the river. Trench spoil would be stored within the stream channel behind the diversion or sediment control structures to ensure that sedimentation from saturated materials does not flow back into the river. After the trench has been completed, a section of pipe would be placed in the trench. Trench boxes or another marker form would be placed at the end of the pipe section in the middle of the riverbed for the tie-in. The trench would be backfilled and the streambed restored to the original contour configuration, except for the immediate area around the tie-in.

The diversion structure would then be removed and rearranged to divert the flow temporarily to the other side or dry side of the river in order to minimize contact between stream flow and the excavation and backfill activities. This would again require Pacific Connector to place equipment within the stream in order to rearrange the diversion structures. Once the diversion structures have been properly reconfigured and extended beyond the tie-in location and the river flow diverted to the opposite side of the river, excavation for the other section of pipe would begin. Trenching would proceed across the river bed to the tie-in point in the middle of the river where it would be uncovered. Once the excavation is complete, the second pipe section would be carried in and tied-into the first section. After the tie-in has been made, the streambed would be restored to its original contours and configuration and the diversions structures would be removed. Streambanks would be reestablished and stabilized.

During the diverted open cut, multiple discharge pumps would be required to keep the tie-in area dry while the welds are being made and to control any flow seepage in the work areas. The discharge from this activity would occur to a straw bale discharge structure located in an upland area as far away from the river as possible to prevent any silt-laden water from flowing into the river.

A site-specific crossing plan was developed for this crossing during the interagency Waterbody Crossing Methodologies Subgroup meetings in 2008 and is provided in Appendix 2E. The ODFW-recommended in-water construction window for the South Umpqua River is July 1 to August 31, which is when this crossing will be scheduled.

Dry Open Cut Crossing Methods

Flume. The flume method typically is used to cross small to intermediate flowing waterbodies that are either fish-bearing or non-fish-bearing streams. The flume technique involves diversion of stream flow into a carefully positioned steel pipe of suitable diameter to convey the maximum flow of the stream across the work area, and ensures that stream flow rate is not interrupted.

The flume pipe is inspected to ensure it is free of dirt, grease, oil or other pollutants prior to installation. Excessive dirt is removed from the flume pipe and it is steam-cleaned, if necessary, to remove oil or grease present on the pipe before placement in the stream.
Instream activities associated with flume installation are generally limited to:

- placement of sandbags at the inlet and outlet points to divert the flow into the flume pipe and prevent backflow into the trench area;
- placement of baffle structures to dissipate flow energy at the flume pipe outlet; and
- some instream movement of rocks and boulders for proper alignment of the flumes and dams.

Typically three rows of sandbags are laid on the streambed to support the upstream and downstream ends of the flume pipe. Short-term elevated levels of turbidity are expected to occur. Measures which minimize these increases, include: 1) all instream work will be carried out on foot and no equipment will operate in the streambed; 2) sandbags will be filled with a non-leachable material such as clean, pre-washed sand; 3) sandbags will be tied securely before they are installed; and 4) sheets of plastic will be interwoven between the layers of sandbags to ensure an effective seal.

The flume pipe will not be pushed or pulled over the banks and into the water. After the flume is laid on the sandbags, construction on the upstream dam will immediately begin, followed by installation of the downstream dam.

The stream will be dammed/diverted at both the inlet (upstream) and the outlet (downstream) of the flume pipe with sandbags. Depending on the site, the distance between the dams is expected to be about 50-75 feet. The reason for damming the downstream end of the flume is to create a contained area between dams where turbid water is trapped or confined, and to prevent downstream water from backflow into the streambed and flooding the pipeline trench.

After fish and other aquatic life have been salvaged and relocated from the confined work area between the flume dams, water between the dams will be pumped out, as will any seepage of water into the area between the dams as a result of sub-surface flow and/or some leakage around and under the dams. Water that is pumped out of the work area will be released to an upland dewatering structure for retention until the sediment settles out and/or the water percolates into the ground.

All erosion and sediment control measures will be inspected daily by Pacific Connector Environmental Inspectors. FERC will have designated third-party Environmental Inspectors inspecting the installation and condition of erosion and sediment control measures and all BMPs during pipeline construction and work area reclamation to ensure compliance with FERC’s Upland Plan and Wetland and Waterbody Procedures. BLM/Forest Service/Reclamation personnel and/or representatives will be allowed to visit and monitor any location of the PCGP Project on the public lands they respectively manage and consult with Pacific Connector Environmental Inspectors. BLM/Forest Service/Reclamation fish biologists will be allowed to conduct fish removal/relocation activities at waterbody crossings on the public lands they respectively manage that require fish passage as directed by ODFW.

Following pipe installation and backfilling, which includes replacing appropriately sized washed spawning gravels to the streambed, the streambanks are re-established to approximate pre-construction contours and are stabilized. Erosion and sediment control
measures are installed across the construction right-of-way to reduce streambank and upland erosion and sediment transport into the waterbody.

The flume method has proven to be an effective technique for constructing a pipeline through a waterbody. Because the streamflow is carried across the construction work area through flume pipe(s), the sediments generated from trench excavation and backfilling operations are isolated within the construction work area between the upstream and downstream dams, and only limited amounts of suspended sediment or turbidity could leave the work area. Typically, larger volumes of water can be carried through flume pipes than by the pumps used in a dam and pump crossing. For this reason, larger streams are generally crossed using the flume method rather than the dam and pump method. In addition, the flume method allows for continued fish passage downstream (and potentially upstream) through the construction work area during the crossing.

A detailed description of fluming procedures is provided in Appendix 2C.

**Limitations of the Flume Crossing Method.** Some limitations are associated with the flume method. The flume remains in place for the duration of installation so if the construction equipment excavating the trench or installing the pipe hits the flume pipes, a leak may occur between the flumes or in the dam, allowing additional water to bypass the dams. As a result, water leaking past the upstream dam can enter the disturbed construction work area and possibly transport sediment downstream of the crossing if the downstream dam cannot be adequately sealed or if dewater pumps are not sufficiently sized to pump out the water entering the work area. Furthermore, construction equipment (e.g., trackhoes) must reach under the flume(s) to excavate the trench to the appropriate depth. Use of numerous flume pipes required to carry higher flow volumes may prevent the equipment from fully excavating the trench. This limitation often restricts the size of stream which may be flumed. Additionally, if hard bedrock is exposed or encountered in the streambed and blasting is required to achieve the design depth at the crossing, the flume may restrict blasting activities, which would be eliminated by the dam and pump crossing method, which is the preferred dry-open crossing method where blasting is required.

Activities associated with the flume method that may produce sedimentation and turbidity include:

- installation and removal of the upstream and downstream dams;
- movement of instream rocks and boulders to allow proper alignment and installation of the flume and dams;
- water leaking through the upstream dam, flowing across the work area (picking up sediments), and leaking past the downstream dam; and
- a short pulse of sedimentation and turbidity when streamflow is returned to the construction work area after the crossing is complete and the dams and flume are removed.

Compared to the wet open cut crossing method, the flume method requires additional time for installation of the flume and dams, construction of the crossing, and removal of instream fluming structures. Construction of a flume crossing can take up to 7 days (4 days to install and remove the structures and 3 days to install the pipeline). This extended construction period increases the potential for higher stream flows to
compromise the crossing, for the dams to develop significant leaks or for the trench to collapse, requiring additional excavation.

**Dam-and-Pump.** The dam-and-pump method is an alternative to fluming and has similar objectives to those noted above for fluming. With the dam and pump method, stream flow is diverted around the work area by pumping water through hoses over or around the construction work area. The goal of this technique is to create a relatively "dry" work area to avoid or minimize the transportation of heavy sediment loads and turbidity downstream of the crossing. This crossing method may be used on all waterbodies where stream flow can be diverted by pumping around the work area. Pacific Connector proposes to cross streams using this method within ODFW recommended in-water construction windows to minimize potential impacts to aquatic species and potential fish passage issues because fish passage is temporarily obstructed while the dams are being put in place. This method is the preferred crossing method where hard bedrock occurs in the streambed and blasting is required to excavate the trench because it eliminates the need for in-water blasting.

The dam and pump method involves installation of two instream dams with the intent of stopping the volume of water flowing through the crossing. In some instances, the terrain of the stream channel does not provide a positive seal and some water may seep through the area. One dam is placed upstream of the construction work area, while the other dam is installed downstream of the construction work area. Dams can be constructed of sandbags with a plastic liner, sheet piling, steel plates, jersey barriers with sandbags, aquadams, portadams, and a variety of other materials. Some instream movement of rocks and boulders may be necessary to enhance the seal at the dam. While the dams are being installed, appropriately sized pumps and hoses begin transporting upstream water around the construction area. Pump intakes are appropriately screened to prevent entrainment of aquatic species. An energy-dissipation device is used to prevent scouring of the streambed at the discharge location.

After the dam and pump operation is set up to effectively bypass streamflow around the construction area, the area between the dams (work area) is dewatered to the extent possible using acceptable dewatering techniques. The trench is then excavated through the stream using trackhoes or draglines operating from the banks, from within the streambed, or on equipment bridges. Spoil removed from the trench is generally placed in, or relayed to, an upland area adjacent to the stream crossing. In some cases, trench spoil is stored in the stream channel between the two dams.

As with the wet open cut crossing method, trench plugs are maintained between the upland trench and the waterbody crossing until the pipe is ready for installation. Once the trench is fully excavated, the pipeline is carried into place, and the trench is backfilled. Restoration of the streambed to original contours and initial restoration and stabilization of streambanks is completed. Once construction reaches this stage, the downstream dam is removed (by hand or with tracked equipment), followed by the upstream dam. After the dams have been removed, the pumping operation is halted, and the pumps are removed.

A detailed description of dam and pump procedures is provided in Appendix 2D.

**Limitations of the Dam and Pump Method.** The dam and pump method is an effective method for reducing potential sediment and turbidity impacts associated with construction activities. Although it is not always possible to completely seal the
upstream and downstream dams, the majority of streamflow is routed around the construction work area, effectively isolating sediments generated from construction to the area within the dams and significantly reducing the amount of sedimentation and turbidity leaving the construction work area.

Certain limitations are associated with dam and pump operations. These include limits on the volume of water that can be transported around the work area by the pumps; potential difficulties with isolating the streamflow; and potential difficulties with obtaining an effective seal on the upstream and downstream dams to reduce water moving across the work area.

Turbidity and sedimentation impacts associated with the dam and pump method are generally minor. Activities associated with the dam and pump method that may produce sedimentation and turbidity include:

- installation and removal of the upstream and downstream dams;
- if needed, excavation of a sump or basin to withdraw water upstream of the pipeline crossing;
- water leaking through the upstream dam, flowing across the work area (picking up sediments), and leaking past the downstream dam; and
- a short pulse of sedimentation and turbidity that occurs when streamflow is returned to the construction work area after the crossing is complete.

The dam and pump method limits movement of fish up and downstream through the construction work area during the crossing period.

**Horizontal Directional Drilling (HDD).** The HDD method involves drilling under a feature and pulling the pipeline into place through the drillhole that has been reamed to accommodate the diameter of the pipeline. This procedure involves three main phases, pilot hole drilling, subsequent reaming passes, and pipe pullback. HDD typically is used for the crossing of major waterbodies (greater than 100 feet wide). Pacific Connector is proposing to use the HDD method for the crossing of the Coos River (MP 11.13R), the Rogue River (MP 122.65), and the Klamath River (MP 199.38).

**Pilot Hole.** The pilot hole establishes the ultimate position of the installed pipeline. For this operation, an initial hole is drilled from the entry point to the exit point on the opposite side of the crossing. The head of the pilot drill string contains a pivot joint to provide directional control of the drill string. By altering or steering the drill head, the operator can control the direction as the drill progresses. Thus, the pilot hole can be directed downward at an angle until the proper depth is achieved, then turned and directed horizontally for the required distance, and finally angled upward to the surface. Tracking and steering of the HDD drill head is generally guided using a two-wire system. The system consists of two insulated wires (approximately 0.25-inch in diameter) that are laid on the ground and are charged with an electrical current. A magnetometer accelerometer probe located behind the drill bit detects the electric current to triangulate the drill bit for steering.

As the pilot drill string is advanced, additional sections of drill pipe are added at the drill rig located at the entry point. High-pressure jetting of drilling fluid at the drill head and, in harder soil formations, rotation of the drill bit, facilitates advancement of the drill string. The drilling fluid (mud) is typically a non-toxic bentonite clay mixed with freshwater to
make a slurry. Once the pilot hole exits in an acceptable location, the reaming operation is initiated.

Reaming. During the reaming phase, a reaming head is attached to the drill pipe and pulled back through the pilot hole to enlarge it. Several reaming passes may be made with incrementally larger reaming heads to enlarge the hole to approximately 1.5 times the diameter of the pipeline. Various reaming heads can be utilized, depending on the substrate encountered. High-pressure drilling fluid is jetted through the reaming head to float out drill cuttings and debris, to cool the drilling head, and to provide a cake wall to stabilize the hole. Once the drill hole is enlarged to the proper diameter, the pipe is pulled back through the reamed hole.

Pullback. The last step to complete a successful installation is the pullback of the prefabricated product pipe into the enlarged hole. The pullback process is the most critical step of the HDD process. A reinforced pullhead is welded to the leading end of the product pipe and to a swivel connected to the end of the drill pipe. The swivel is placed between the drill rig and the product pipe to reduce torsion and prevent rotation from being passed to the product pipe.

During pullback, the pull section is supported with a combination of roller stands and/or product pipe handling equipment to direct the product pipe into the hole at the correct angle, reduce tension during pullback, and prevent the product pipe from being damaged. After the product pipe is in place, the installed crossing is hydrostatically tested, pigged (optional), and tie-in welds on each side of the crossing are completed.

Limitations of the HDD Method. Upon successful HDD completion, impacts to aquatic species, sensitive resources and water quality can be avoided. The HDD pipeline design must consider hoop stresses, bending stresses and tension stresses. The combination of these three stresses cannot exceed the yield strength of the pipe. The bending stresses approach their limit at approximately 1 inch of deflection for every 100 feet in length of pipe. The relative rigidity of the pipe requires long sweeping angles to navigate large elevation changes. Therefore, the minimum length of an HDD is driven by the physical site conditions available at the specific crossing.

Despite its advantage, the HDD method is not always appropriate for installation of a large-diameter pipeline. The success of an HDD crossing can be limited by a combination of technical factors, including but not limited to: diameter of the pipe, length of the crossing, surrounding topography, aboveground structures and geologic substrate at the drill location. Substrates lacking cohesion (i.e., lacking fines) or having significant quantities or voidalities of coarse fragments (e.g., gravel, cobble, or boulders) may contribute to failure of the HDD effort. Gravel/cobble substrate often limits the potential for a successful drilling operation. Failure of the HDD method can result from the inability to keep the hole open or the inability to direct/steer the HDD (common in cobbly/gravely substrates), or from the collapse of the hole around the pipeline during pullback. In such cases, the HDD method may be re-attempted along a different drill path or abandoned in favor of an alternate crossing method. The duration of a large diameter HDD generally takes several weeks or months to complete.

The HDD method has the potential for inadvertent releases of drilling mud into the waterbody. Drilling mud typically is comprised of bentonite clay and water, and can include additional additives specific to each drilling operation. Pacific Connector will approve any additive compounds prior to use by the drilling contractor to ensure
compliance with all applicable environmental and safety regulations. Toxic additives will not be used in the bentonite drilling mud. If a fault or crack in the overburden is encountered, the drilling mud can escape to the surface in an upland and/or waterbody/wetland area. This is referred to as a "frac-out." Frac-outs range from minor releases, which are easily controlled and cleaned up, to major releases (hundreds of thousands of gallons). Major releases may be difficult to clean up and may significantly affect water quality in waterbodies and wetland or upland areas.

HDDs associated with large diameter pipe have a minimum required length and radius angle which is based on several factors including design geometry, diameter of product pipe, minimum radius calculations, installation stresses, and operating stresses. Locating TEWAs large enough to accommodate the drilling activities may also increase the drill length. HDDs do not follow a straight line and there are no bore pits like a conventional bore. The pilot hole bit is capable of making gradual vertical turns as needed to traverse the crossing. The drill generally enters the ground at a 10 degree angle (+ 2 degrees) to the horizontal plane. After reaching the required depth, the drill makes an arc to approximately the horizontal plane and then generally follows that tangent through the crossing area. After passing through the crossing area, the drill then makes another arc upwards to the ground surface and exits, generally at a 10 degree angle (+ 2 degrees). An HDD drill path may have two vertical arcs, one on each side of the crossing, or, if the crossing is short, a single vertical arc at the center of the crossing. The arc (or curve) of the drill path cannot be too sharp because the carrier pipe section is limited by its ability to flex to follow the drill path when it is pulled into the reamed hole.

To insure that unacceptable geometrical deformation or mechanical stress on the pipe does not occur, engineering standards limit the amount of "deflection" to which the pipe can be subjected. Therefore, there is a minimum allowable "arc radius" for the drill path. The "minimum arc radius" is determined by the diameter of the pipe to be installed. The greater the pipe diameter, the greater the arc radius. Based on the design geometry and the diameter of the proposed 36" diameter product pipe, the minimum allowable three joint radius over any consecutive three joint sections should not be less than 2,600 feet. The design radius for the entry and exit curves would be 3,600 feet.

Topography plays a big role in the location of the entry and exit hole sites. A relatively flat area that is large enough for the rig and equipment is needed. TEWAs would be utilized to weld and test the pipe section for the crossing and should be straight and aligned with the drill path and slightly longer than the drill path. It is optimal for the entry and exit holes to be as close to the same elevation as possible. This allows better circulation and return of the drill mud and cuttings and mitigates the risk of drill failure. The rig and all the support equipment require a good access road with large turnouts. Water trucks and mud trucks run 24 hours per day during active drilling operations.

If an inadvertent return occurs, the HDD operation would be stopped temporarily to determine an appropriate response plan. Pacific Connector would attempt to determine the cause of the hydraulic fracture and inadvertent return and would implement procedures, which may reduce the chance of recurrence. One possible corrective measure would be increasing the drilling fluid viscosity in an attempt at sealing the release point. The drilling operation may be suspended for a short period (i.e., overnight) to allow the fractured zone to become sealed with the higher viscosity drilling fluid.
GeoEngineers Inc. has evaluated the feasibility of the HDD crossings of the Coos River, Rogue River, and Klamath River crossings and those reports are provided in Appendix 2G. Pacific Connector has prepared an HDD Contingency Plan and Failure Procedure (see Appendix 2H) that describes the procedures that would be followed if an inadvertent release of drilling mud occurred during the HDD process and the methods that would be used to contain the drilling fluid.

Although GeoEngineers, Inc. (see Appendix 2G) indicates that an HDD of the Coos, Rogue, and Klamath river could be successfully implemented at the proposed crossing locations, in the event of an unsuccessful HDD at these proposed river crossings, the HDD method could be reattempted at the same location, or slightly offset. Pacific Connector could implement a DP crossing at the same location. The DP crossing method is described below and an overview of DP Technology is included in Appendix 2I.

The proposed schedule for HDD crossings allows adequate time to apply for necessary permits, if necessary, within the overall construction schedule in the event that an HDD crossing is unsuccessful.

**Conventional Boring.** Conventional bores of waterbodies are proposed at Kentuck Slough (MP 6.28R), Catching Slough (MP 11.11), and the Medford Aqueduct (MP 133.38). The specific type of bore (i.e., jack and bore, slick bore, hammer, etc.) that would be utilized will be determined during the design phase of the project and depends on construction characteristics, the type of soils present and the contractor's familiarity with the method. The hammer is typically utilized in difficult soils containing consolidated rock, and the slick bore is used in soils with fewer frictional characteristics. Although each type of bore is somewhat different, the requirements and risks associated with each are similar. In all cases, the bore must be completed along a straight pathway; welders and other laborers must work within the confined space of the bore pit; and the presence of water can be problematic.

Boring is frequently utilized at road and railroad crossings. During a standard boring operation, the spoil material is passed into the bore pit. Trackhoes then remove this spoil from the bore pit. Pipe is welded up and eventually pulled through the bore hole. Each section of the pipe is joined using full-penetration welding procedures and 100 percent of the welds are inspected using non-destructive testing procedures (x-ray) to form a continuous pipeline segment. This is a difficult operation, requiring the welders to work in the confined space of the bore pit. Because conventional boring does not limit water migrating into the bore, an important factor in the design of launching and receiving pits is groundwater control. Dewatering systems using deep wells or well points are frequently used. Trench boxes or sheet piling are often used to support the pit walls and to cut off groundwater inflows.

**Limitations of the Conventional Bore Method.** Conventional boring operations can be ineffective in a cobble and gravel substrate and may take anywhere from several weeks to several months to complete. Cobble and gravel make it difficult to control the position of the pipe, and this substrate is not suitable for holding the bore hole open. Unlike an HDD, a conventional bore is pushed through the hole and an auger is used to remove material. Wood debris, large rocks or boulders can cause deflection of the pipe or even create an impassable wall, halting progress altogether. The boring operation requires large work areas, and may require well-points, continuous dewatering
operations, and continuous spoil/slurry processing throughout construction of the crossing.

Excavation of deep pits on either side of the crossing may be required depending on the topography in the area, which poses both technical and safety risks. A conventional bore requires that an operator for the boring machine and several laborers work in the bore pit. The excessive depths of the pits could raise structural engineering and confined space entry issues in regard to Occupational Safety and Health Administration and state regulations. High water tables create pressure from the exterior of the pit walls and can cave in the bore pits, putting personnel in harm’s way.

**Direct Pipe (DP).** DP installation is a developing trenchless technology that can overcome problematic issues associated with the HDD crossing method because it provides a continuously supported hole during the excavation process; reduces pressure of drilling mud; and eliminates the bore hole reaming and pullback requirements of an HDD. Appendix 2I provides an overview of DP technology, including the advantages, limitations, and considerations. The overview includes the current state of DP construction practices, as well as future considerations. As indicated in Resource Reports 1 and 10 Pacific Connector has incorporated an alternative (Southern Reroute) into the proposed route and proposes to cross I-5, the South Umpqua River (MP 71.30), Dole Road, and a railroad using a single direct pipe crossing. The DP feasibility evaluation of this crossing is provided in Appendix 2I. Appendix 2E also provides a site-specific crossing plan for this crossing.

**Aerial Crossing.** Aerial installations involve constructing the pipeline aboveground over a waterbody. Different approaches to aerial crossings can be implemented, including attachment of the pipeline to an existing structure (e.g., railroad or road bridge), development of a structure to support the pipeline (e.g., suspension or host bridge), or simply spanning the waterbody with the pipeline without additional supporting structures. Relatively rare, aerial crossings are utilized primarily where existing bridge systems can support the pipe above the watercourse. There are no existing bridges at any of the PCGP Project’s crossings. During the project design phase, Pacific Connector will determine if there are any locations where a self-supporting span would be feasible (i.e., steeply incised drainages).

**Limitations of the Aerial Crossing Method.** Aerial crossings are more likely to suffer third-party damage than buried crossings. Operations and maintenance costs are also substantially higher for spanned crossings typically due to third-party damage and maintenance of the protective coating. Visual impacts of an aerial pipeline can also be significant, especially in areas where no existing structures span the waterbody. Additionally, aerial installations are generally only practical in select locations. These locations include crossings of narrow deeply incised ravines that can be spanned by the pipeline without additional pipeline supports or in deep, narrow canyons where geologic and topographic conditions restrict other crossing techniques.

### 2.2.8.3 Temporary Construction Bridges

On most waterbodies, a temporary bridge will be installed prior to construction of the crossing to allow equipment and personnel to cross the waterbody. Although the crossings are proposed to be constructed within ODFW recommended in-water construction windows, the temporary bridges will need to be installed outside these recommended in-water construction windows to allow clearing and construction traffic to
travel up and down the construction right-of-way. These temporary bridges will be removed when construction and restoration are completed for the project.

If water is present in streambeds at the time of construction, Pacific Connector will utilize temporary construction bridges during all phases of construction to cross the waterbodies. In general, equipment/temporary bridges will not be installed on intermittent waterbodies which are dry at the time of construction; however, if a storm occurs which results in water in the streambed of the otherwise intermittent waterbody, no equipment will cross the waterbody until the streambed is dry or until a bridge is installed. Pacific Connector will consult with the applicable land management agency (i.e., BLM, Forest Service, or Reclamation) on the type of temporary crossings. All stream crossings on NFS lands (whether intermittent or perennia, wet or dry) will have either: 1) a bridge; 2) a temporary culvert with temporary road fill to be removed after work is completed; or 3) a low water ford with a rock mat. Although FERC's Wetland and Waterbody Procedures (see Section V. B. 5. a.) allow clearing equipment and equipment necessary for installation of the temporary bridges to cross waterbodies prior to bridge installation, Pacific Connector will not allow clearing equipment to cross waterbodies prior to bridge placement. Furthermore, where feasible, Pacific Connector's contractors will attempt to lift, span, and set the bridges from the streambanks. Where it is not feasible to install or safely set the temporary bridges from the streambanks, only the equipment necessary to install the bridge or temporary support pier will cross the waterbody. Any equipment required to enter a waterbody to set a bridge will be inspected to ensure it is clean and free of dirt or hydrocarbons.

These structures will be designed according to FERC's Wetland and Waterbody Procedures as well as according to the U.S. Army Corps of Engineers (COE), Oregon Department of State Lands (ODSL), ODEQ, Forest Service, BLM, and ODFW approvals. To provide equipment and material access up and down the construction right-of-way, it will be necessary to install equipment bridges outside the ODFW recommended in-water construction windows. If the bridges were not allowed to be installed outside of ODFW recommended in-water construction windows for some unforeseen reason, the project would be required to construct a significant number of new roads to access the construction right-of-way on either side of stream crossings. The alternative of constructing roads to access the right-of-way on either side of stream crossings would require significantly more construction disturbance than simply installing temporary bridges outside the ODFW-recommended in-water construction window.

The temporary equipment bridges will be constructed to maintain unrestricted flow and to prevent soil from entering the waterbody. Soil will not be used to stabilize equipment bridges. Bridges will be designed according to FERC's Wetland and Waterbody Procedures (Section V.B.5.B) and will be maintained to withstand and pass the highest flow expected to occur while the bridge is in place. The highest flow expected will be determined during the season of construction and will take into account an evaluation of regional climate and physical conditions as well as existing historic stream flow data and peak discharge statistics from nearby USGS gauging stations.

Where feasible, bridges will be designed to span the entire Ordinary High Water Mark (OHWM) of the waterbody. If it is not possible to span the OHWM with a bridge, a temporary culvert or pier may be required. These culverts/piers would be installed to minimize flow restrictions that may deflect stream flow to banks to prevent streambank erosion or scour. The ECRP in Appendix 1B to Resource Report 1/Appendix I to the POD (see Drawing 3430.34-X-0010) provides additional details for temporary bridges.
Temporary bridges will be set during clearing operations during the first year of construction, as well as during mainline construction. The temporary bridges set during clearing operations will be temporarily removed after clearing is complete and will not be left in place across a waterbody over the winter. During mainline construction, the temporary bridges will be reset and will be removed as soon as possible after permanent seeding. If there will be more than 1 month between final cleanup and the beginning of permanent seeding and reasonable alternate access to the right-of-way is available, equipment bridges will be removed as soon as possible after final cleanup as required by FERC's Wetland and Waterbody Procedures (Section V. B. 5. f).

2.2.8.4 Site-Specific Construction Plan

In addition to the general construction methods described above, FERC requires site-specific drawings for crossings of waterbodies that are greater than 100 feet in width. Based on FERC’s guidelines and agency requests, site-specific drawings and plans were developed for several waterbody crossings (see Appendix 2E), including Catching Slough, Kentuck Slough, East Fork Coquille River, North Fork Coquille River, South Umpqua crossing #1, South Umpqua crossing #2, and the Lost River. Additionally, a site-specific drawing for South Fork Little Butte Creek was requested by the Forest Service.

2.2.9 Surface Water Construction Impacts and Mitigation

Construction activities associated with the contractor and pipe storage yards and off-site rock source and disposal sites will have no impact to waterbodies. The following discussion of impacts and mitigation applies to the project’s pipeline facilities and aboveground facilities (i.e., meter stations, compressor station, and block valves) which are located within the construction right-of-way.

Construction of the PCGP Project may result in minor, short-term impacts to waterbodies. These impacts could occur because of instream construction activities, use of access roads, or construction on slopes and riparian areas adjacent to stream channels. Clearing and grading of streambanks, removal of riparian vegetation, instream trenching, trench dewatering, and backfilling could result in modification of aquatic habitat; increased sedimentation; turbidity; increase in temperature, decreased dissolved oxygen concentrations; releases of chemical and nutrient pollutants from sediments; and introduction of chemical contaminants, such as fuel and lubricants. An increase in soil compaction and vegetation clearing could potentially increase runoff and subsequent stream flow or peak flows. To minimize adverse impacts at waterbody crossings, Pacific Connector proposes to adopt and implement, with requested variances, FERC's Upland Plan and FERC's Wetland and Waterbody Procedures during the construction, post-construction restoration, and operation of the PCGP Project. Pacific Connector has incorporated FERC's Upland Plan and Wetland and Waterbody Procedures into the project-specific ECRP (see Appendix 1B to Resource Report 1/Appendix I to the POD) which has been developed to minimize the potential for erosion and sedimentation.

Construction activities at waterbody crossings will be conducted in accordance with all federal and state regulations and permit requirements. Depending on the overall construction schedule, pipeline construction at waterbody crossings will be conducted during low-flow periods whenever possible and within ODFW recommended in-water construction windows. Construction during low flows will minimize sedimentation and
turbidity, minimize streambank and bed disturbances, and limit the time it takes to complete instream construction. Specific impacts and proposed mitigation measures are discussed further below.

2.2.9.1 Turbidity

ODEQ has been delegated authority under the Clean Water Act to issue a Section 401 Water Quality Certification, and Pacific Connector will comply with the conditions in that certification. To minimize increases in turbidity and suspended sediment at waterbody crossings, Pacific Connector will utilize dry crossing methods (i.e., flume and dam-and-pump) for most of the flowing waterbodies (91 of the 97 perennial waterbodies). The remainder will be crossed by conventional bore, diverted open-cut, HDD, and one instance of wet-open cut through Haynes Inlet in the Coos Bay estuary. Turbidity and sedimentation impacts associated with dry open cut methods are generally minor, lasting typically for only a few hours, and are associated with 1) installation and removal of the upstream and downstream dams used to isolate the construction area; 2) water leaking through the upstream dam and collecting sediments as it flows across the work area and continues through the downstream dam; 3) movement of instream rocks and boulders to allow proper alignment and installation of the flume and dams; and 4) when streamflow is returned to the construction work area after the crossing is complete and the dams and flume are removed. Both “dry” techniques produce much less sediment in the water than alternative “wet” open cut methods (Reid and Anderson 1999; Reid et al. 2002; Reid et al. 2004). Dry methods have been reported to produce at least seven times (1/7) less suspended sediment in streams than “wet” methods (Reid et al. 2002). During construction of Williams’ Northwest Pipeline Corporation’s Capacity Replacement Project in Washington State (completed in 2006), a total of 67 waterbodies were crossed using dry open cut crossing methods (fluming and/or dam and pump). During these crossings there was only one event where state water quality turbidity limits were exceeded. The exceedance occurred through a failure of the pumps during the night when a monitor was not on site to restart the pump.

There would also be short-term turbidity increases for several hours during portions of the installation and removal of the diversion structure(s) for the proposed diverted open cut crossing of the South Umpqua River (MP 94.73). Trenching within Haynes Inlet would result in elevated levels of fine-grained mineral and organic particles, or turbidity plumes for short-term periods during the dredging operations.

Potential cumulative effects from turbidity from construction across closely spaced perennial stream crossings, such as in the headwaters of East Cow Creek drainage on the Umpqua National Forest, are expected to be minor and inconsequential for the following reasons.

- All crossings would be completed using dry-open cut crossing methods to minimize effects.
- The crossings would be completed during ODFW-recommended in-water work periods when the flow volumes and velocities will be low.
- The headwater streams, such as those in the East Cow Fork drainage, are typically dominated by gravel/cobble substrates reducing the potential to generate turbidity during crossings.
- Crossings would be scheduled individually, several days apart and not completed concurrently.
• Erosion control BMPs, as outlined in the ECRP (see Appendix 1B to Resource Report 1), would be implemented to minimize the potential for erosion and sedimentation.

Section 3.2.3 of Resource Report 3 assesses turbidity and suspended sediments in detail that could be generated during pipeline construction across waterbodies and potential effects to resident and anadromous salmonids, other fish species, and aquatic habitats.

The Turbidity-Nutrients-Metals Water Quality Impact Analysis (GeoEngineers, Inc., 2011a – provided in the JPA stand alone document/1-JPA_DEQ-R36) concluded that turbidity may exceed Oregon numerical water quality standards for short distances and short durations downstream from each crossing, either during and shortly after construction (in perennial waterbodies) or after fall rains begin (for intermittent and ephemeral streams). Such exceedances are allowed as part of the narrative turbidity standard if recognized in a 401 Certification as long as every practicable means to control turbidity has been used. Resource Report 3 further describes potential turbidity effects from the project in relation to aquatic resources.

The Coast and Harbor Engineering (2010a, 2010b, and 2011) hydrodynamic and sediment transport modeling study analyzed the potential impact of pipeline construction through Haynes Inlet for turbidity and the dispersal of trenched and stockpiled bottom sediment (provided in the JPA stand alone document/7-JPA_DEQ-R1d, R1e, R5a, and JPA-Appendix H). The GeoEngineers, Inc. (2010b) sediment characterization assessment for the proposed alignment across Haynes Inlet (provided in the JPA stand alone document/4-JPA_DEQ-R33) concluded that suspension of sediment, increases in turbidity, and exposure of new sediment surfaces are expected to be short-term, temporary and localized to the immediate vicinity of the project activities. BMPs, such as the use of silt curtains and excavation methods that reduce sediment disturbance, can be implemented where needed during construction to minimize turbidity and control the sediment plume.

2.2.9.2 Streambank Protection

During construction, clearing and grading of vegetative cover could increase erosion adjacent to streambanks. Alteration of the natural drainage or compaction of soils by heavy equipment near streambanks during construction may accelerate erosion of the banks and the transportation of sediment carried by runoff water into the waterbodies. The extent of the impact would depend on sediment loads, stream velocity, turbulence, streambank composition, streambank vegetation, stream type, scour depth, and sediment particle size. To minimize these impacts, equipment bridges and mats will be used, as necessary, to provide stable work plains. TEWAs for spoil storage and pipe staging will be set back from the bank as discussed below, and temporary sediment barriers will be installed around disturbed areas, where necessary, in accordance with FERC’s Wetland and Waterbody Procedures. The ECRP (see Appendix 1B to Resource Report 1/Appendix I to the POD) provides the proposed measures that will be used to stabilize streambanks.

2.2.9.3 Sedimentation Control

Pacific Connector will install temporary equipment bridges across perennial or intermittent waterbodies flowing at the time of construction to prevent sedimentation
caused by construction and vehicular traffic. Equipment bridges will be constructed of equipment pads and culverts or flexi-float (portable) bridges. If excessively soft soils are encountered in the streambed, or if high-water flows occur, portable bridges may be utilized at minor waterbody crossings in lieu of culverts. Equipment bridges will be maintained throughout construction. Each bridge will be designed to accommodate normal to high stream flow and will be maintained to prevent soil from entering the waterbody and restriction of flow during the period of time that the bridge is in use. Equipment will only cross flowing waterbodies using a bridge.

Trench spoil excavated from within the waterbody will be placed at least 10 feet from the water's edge or in a TEWA. In some streams, native washed streambed boulders, cobbles, and gravels removed from the surface of the trench may be stored within the construction right-of-way in the streambed in areas isolated from stream flow (i.e., within the dammed area for flumes or dam and pump crossing). Storing this material in the streambed will minimize handling and help to ensure the material will be available for backfill and streambed restoration. However, these efforts will require a variance from Section V. B. 4. a. of the FERC Wetland and Waterbody Procedures. Staging areas and additional spoil storage areas will be located at least 50 feet away from waterbody boundaries, where topographic conditions and other site-specific conditions allow. Where topographic conditions do not allow a 50-foot setback, spoil storage areas will be located at least 10 feet from the water's edge. Sediment control devices, such as silt fences and straw bales, will be placed around the spoil piles to prevent spoil flow back into the waterbody.

Resource Report 7 also discusses the potential for erosion and sedimentation effects and the mitigation measures to minimize these effects. The ECRP (see Appendix 1B to Resource Report 1) outlines, in detail, the erosion control and revegetation procedures that Pacific Connector will utilize during construction to minimize erosion and sedimentation and enhance revegetation success on all lands crossed by the project.

In addition, Pacific Connector is in the process of developing a Compensatory Mitigation Plan (CMP) to mitigate for potential effects on BLM and National Forest System (NFS) lands. The BLM and Forest Service have proposed a suite of off-site mitigation projects which are intended to be responsive to BLM Resource Management Plan (RMP) and Forest Service Land and Resource Management Plan (LRMP) objectives that include:

- Compliance with the Aquatic Conservation Strategy of the Northwest Forest Plan;
- Habitat for T&E species including northern spotted owls, marbled murrelets, and coho;
- Mitigation of impacts on Late Successional Reserves (LSRs); and
- Specific resource issues as they occur by watershed.

The CMP provides the BLM and Forest Service mitigation summaries which provide the various offsite mitigation projects as supplemental mitigation to address important issues or land management plan objectives that cannot be mitigated on-site. The BLM's and Forest Service's mitigation summaries list the proposed projects by watershed. The mitigation projects include placement of large woody debris (LWD) in streams, road surfacing and drainage repairs, road decommissioning, terrestrial restoration, fire protection, and fuels reduction. These mitigation projects would benefit the watersheds crossed by the Project by reducing sediment delivery to waterbodies within the watersheds.
Pacific Connector is assessing the BLM’s mitigation projects in relation to Project effects by watershed, along with the Forest Service’s mitigation projects that have been approved in principle by Pacific Connector. The BLM and Forest Service mitigation projects are also being reviewed with respect to the Project’s responsibilities to mitigate for the potential effects to Endangered Species Act (ESA)-listed species and their habitats during the consultation process with the U.S. Fish and Wildlife Service (FWS).

2.2.9.4 Dewatering

During construction, the open trench occasionally may accumulate water either from groundwater intrusion or precipitation. Intermittent streams and ditches that are dry on the surface may contain water below the surface. However, the construction schedule will generally coincide with the period when the soils in these areas are dry, thereby minimizing the amount of trench dewatering. During trench dewatering, water will be pumped from the trench into stable, vegetated areas through a straw bale structure or filter bag. Typically dewatering activities are only necessary in localized high groundwater areas for short-term periods (a few days) to allow access to the trench, such as where tie-in welds are required. Therefore, potential effects from dewatering activities (i.e., erosion/sedimentation effects) to groundwater levels are greatly minimized. No vegetation clearing outside of the approved work spaces will be required. Trench dewatering structure locations will be selected in the field in response to actual conditions encountered. The rate of flow from dewatering pumps will be regulated to prevent erosion from runoff, and dewatering will be conducted in a manner designed to ensure that water is allowed to infiltrate into the ground rather than flow over the surface whenever possible. If trench dewatering does result in surface runoff, it would be conducted to ensure that turbid water does not reach a surface water of the state and does not result in the deposition of sand, silt, and/or sediment. All materials used to filter water from the trench will be cleaned up and the site restored after dewatering is complete. Section 8.0 of the ECRP (see Appendix 1B to Resource Report 1/Appendix I to the POD) provides additional information regarding dewatering and the BMPs that will be implemented to minimize potential sedimentation.

Pacific Connector proposes a winter construction schedule for the Klamath Basin area between approximately MPs 188 and 228.13 to minimize impacts to agricultural activities and to minimize construction across areas of high groundwater due to irrigation activities that would increase the instances of trench dewatering. Potential sedimentation impacts will be reduced due to the dry climate of the area and the cooler winter climate of the area will reduce runoff potential during frozen periods. Additionally, Pacific Connector will utilize BMPs as necessary as discussed in the ECRP to prevent sedimentation into waterbodies or wetlands. Mulch will also be used to apply effective ground cover to minimize erosion potential. Effective ground cover is considered to be the amount of cover necessary for maintaining a disturbed site in a low hazard category for erosion.

2.2.9.5 Blasting

Section 5.2 of the Geologic Hazards and Mineral Resources Report, submitted to FERC as a stand alone report, describes the locations where blasting may be required for pipeline construction in areas where hard, non-rippable bedrock occurs within the trench profile as well as proposed mitigation measures to minimize impacts. In these areas, Pacific Connector will attempt to use other mechanical or hydraulic techniques such as hammering to excavate the trench to design depths. Although not anticipated, where blasting is required in streambeds, Pacific Connector proposes to utilize the dam and
pump crossing method so that blasting activities can be completed in the dry to avoid potential impacts to aquatic species during in-water blasting. Blasting could alter the in-channel characteristics and hydrology of the stream, potentially decreasing flows due to increased infiltration where bedrock would be fractured. To reduce impacts, a site-blasting plan would be developed by the blasting contractor prior to work. Blasting-related operations including obtaining, transporting, storing, handling, loading, detonating, and disposing of blasting material, drilling, and ground-motion monitoring will comply with applicable federal, state, and local regulations and permits. A permit from the ODFW would be required for any blasting in waters of the state. Pacific Connector has developed a Blasting Plan in consultation with the BLM and Forest Service (see Appendix C to the POD). In-water blasting is described in more detail in Section 4.4 of the Blasting Plan.

2.2.9.6 Spills/Hazardous Materials

Equipment fueling and storage of oil, fuel, or other materials near waterbodies could create a potential water quality impact if a spill were to occur. Leaks from equipment and vehicles could also cause potential impacts to surface waters. Degraded water quality could affect downstream water users and aquatic resources. Hazardous materials, chemicals, fuels, and lubricating oils will be stored in accordance with Pacific Connector’s SPCC Plan (see Appendix 2B/Appendix X to the POD) and FERC’s Wetland and Waterbody Procedures. The SPCC Plan describes measures to be implemented by Pacific Connector’s personnel and contractors to prevent and, if necessary, control any inadvertent spill of hazardous materials such as fuels, lubricants, and solvents that could affect water quality (see Appendix 2B). This SPCC Plan will be updated with site-specific information before construction. All Project employees will receive SPCC Plan training.

The SPCC Plan includes a measure to prohibit the storage of hazardous substances, chemicals, fuels, and lubricating oils within 150 feet of waterbody banks or wetlands. Restricted areas for storage of these materials will be clearly marked in the field. These activities would only occur closer if the Environmental Inspector finds, in advance, no reasonable alternative and the contractors have taken appropriate steps (including secondary containment structures) to prevent spills and provide for prompt cleanup in the event of a spill and the procedures outlined in Pacific Connector’s SPCC Plan are followed. Pacific Connector has proposed containment structures for pumps to prevent fuel spills from entering waterbodies. All hazardous materials will be handled in accordance with the SPCC Plan.

All surplus material and equipment will be removed when instream construction and restoration are complete, and all trash, litter, and debris will be collected for disposal in an approved solid waste disposal facility. Under no circumstances will refuse be discarded in waterbodies, in trenches, or along the construction right-of-way and associated work areas.

2.2.9.7 Contaminant Suspension and Migration

No known contaminated sites will be directly crossed by the pipeline, so contact with contaminated soil from pipeline construction is not anticipated; however, the chance for unanticipated discovery of contaminated sediments remains. In rural areas, potential sources for contamination of sediments in waterbodies are agricultural fields containing fertilizers and pesticides, and leachate from feed lots and sanitary fields. In urban areas,
contaminated stormwater runoff, wastewater discharges, erosion or leachate from industrial sites such as mineral processing or mining, petroleum refining, treatment plants, or landfills may contribute to the sediment contamination in waterbodies. In the event of encountering a contaminated site, Pacific Connector would implement the Contaminated Substances Discovery Plan (see Appendix E to the POD).

A records search has not indicated any known hazardous waste sites in Coos Bay that would be crossed by the pipeline, so toxic effects from resuspended sediment should not occur. However much development, including boat painting with toxic compounds (e.g., lead, tributyltin), has occurred in Coos Bay in the past. There are records of elevated levels of tributyltin in the sediment of Catching Slough (Elgethun et al., 2000), which the pipeline will conventionally bore at about MP 11.1. The sediment characterization assessment for the proposed alignment across Haynes Inlet (GecEngineers Inc., 2010b - provided in the JPA stand alone document/4-JPA_DEQ-R33) concluded that contaminants of concern have not been identified near the project area within Coos Bay at concentrations greater than Sediment Evaluation Framework screening levels and, therefore, it is unlikely that the project activities will present unacceptable risks to the receptors of concern identified in the Model.

### 2.2.9.8 Channel Migration and Scour

Fluvial erosion represents a potential hazard to the proposed pipeline where streams are capable of exposing the pipe as a result of channel migration, avulsion, widening, and/or streambed scour. The principal hazard resulting from channel migration and streambed scour is complete or partial exposure of the pipeline within the channel from streambed and bank erosion or within the floodplain from channel migration and/or avulsion. To address this potential hazard, Pacific Connector completed a channel migration and scour analysis (GecEngineers, 2012b - provided in the JPA stand alone document/8-JPA). In this analysis, stream crossings along the proposed PCGP pipeline alignment were evaluated with respect to potential future risk to the pipeline that could result from channel bed scour and/or lateral migration. The evaluation was conducted in two phases: Phase I involved a desk top evaluation and small field investigation in which all stream crossings were ranked for potential risk; Phase II involved detailed field investigation and analyses of those stream crossings that were concluded to pose risk to the pipeline based on the Phase I study.

Minimizing the effects of migration and scour hazards to the pipeline can be accomplished with the following (GecEngineers, 2012b):

1. At each channel crossing, bury the pipe below the estimated depth of streambed scour. Where bedrock is encountered at shallower depths than the estimated scour depth, the elevation of competent bedrock represents the limit of scour.

2. Where feasible, place the pipe into bedrock.

3. Within floodplains adjacent to migrating channels, bury the pipe below the projected depth of the channel thalweg within the 50-year channel migration zone.

The pipeline will be designed to protect the integrity of the pipeline, which may include increasing the depth of cover to more than the 5-foot minimum to accommodate the potential for long-term scour and bank stabilization. At a minimum, Pacific Connector will design all waterbody crossings to meet DOT CFR 49 Part 192 standards. Additional depth will be evaluated and considered based on GeoEngineer's (2012b) Channel Migration and Scour Analysis or other site-specific investigations, considering the final
route alignment. From the results of the Channel Migration and Scour Analysis (provided as a stand alone document/8-JPA), Pacific Connector will design all pipeline crossings for the 50-year condition.

Scour risks associated with Pacific Connector’s original 2007 route through Coos Bay have been reduced by incorporation of the shorter in-water route through Haynes Inlet (see Resource Report 10/Section 10.6.1).

In addition to the Coast and Harbor Engineering (2007, 2010a, 2010b, and 2011 – provided in the JPA stand alone document/7-JPA_DEQ-R1d, R1e, R5a, and JPA-Appendix H) scour and hydrodynamic and sediment transport modeling studies, the Haynes Inlet Pipeline Study (Project Consulting Services, Inc. -PCS, 2012) describes the construction considerations for the PCGP Project’s approximate 2.6-mile route through Coos Bay (provided in the JPA stand alone document/9-JPA). The PCS (2012) study is based on hydrologic, geomorphic, environmental, cultural, geotechnical, geologic and geophysical conditions along the Haynes Inlet crossing; as well as information collected from field reconnaissance and numerous meetings conducted with Native American Tribes, agencies, oyster growers and Pacific Connector since June 2006. The study describes the various scour and sedimentation study results and indicates that no significant bottom scour is expected along the proposed route due to river and tidal flow currents. The PCS (2012) study indicated that in consideration of the scour estimates conducted for the Project, a pipeline burial depth of 5 feet is proposed along the entire Haynes Inlet water route to minimize or eliminate potential risks of exposure to the pipeline.

2.2.9.9 Dust Control

Quantifying volumes of water necessary for dust control requires anticipating the rainfall for the areas during the year of construction. However, during dry seasons, Pacific Connector estimates that there will be approximately five 3,000-gallon water trucks per spread on a given day. Pacific Connector anticipates five construction spreads for the project which will total 75,000 gallons for 25 water trucks. Watering trucks would spray only enough water to control the dust or to reach the optimum soil moisture content to create a surface crust. Runoff should not be generated during this operation. Water may be obtained through municipal sources or withdrawn from surface water or groundwater sources. Pacific Connector will apply for the required water withdrawal permits through the OWRD. As part of the application process, OWRD provides the application(s) to ODEQ and ODFW for review. These agencies comment if there are concerns regarding the impacts the withdrawal(s) may have on water quality, and/or fish and wildlife species and their habitat, respectively. Private owners will be contacted to discuss water acquisition during landowner negotiations in the year prior to construction. Table 2.2-12 provides potential dust control water sources.
Table 2.2-12
Potential Dust Control Water Sources for the PCGP Project

<table>
<thead>
<tr>
<th>County</th>
<th>MP</th>
<th>Source</th>
<th>Tract Owner</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coos</td>
<td>16.50</td>
<td>Aqueduct Lake</td>
<td>Coos County Sheep Company</td>
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<td>Coos</td>
<td>37.00</td>
<td>Brewster Lake (WI-602)</td>
<td>Carolyn Long</td>
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<tr>
<td>Douglas</td>
<td>50.20</td>
<td>Lang Creek Reservoir</td>
<td>Seneca Jones Timber Company</td>
</tr>
<tr>
<td>Douglas</td>
<td>79.00</td>
<td>Big Lick Reservoir</td>
<td>Ronald, Raynor, Calvin Clack</td>
</tr>
<tr>
<td>Jackson</td>
<td>128.50</td>
<td>Indian Lake Reservoir</td>
<td>David Schott</td>
</tr>
<tr>
<td>Jackson</td>
<td>133.40</td>
<td>Eagle Point Irrigation Can. Crossing</td>
<td>Meriweather Southern OR Land-Timber</td>
</tr>
<tr>
<td>Jackson</td>
<td>141.00</td>
<td>Star Ranch Lake</td>
<td>C2 Cattle Co Limited Partnership</td>
</tr>
<tr>
<td>Jackson</td>
<td>144.00</td>
<td>Unnamed Reservoir</td>
<td>C2 Cattle Co Limited Partnership</td>
</tr>
<tr>
<td>Jackson</td>
<td>145.00</td>
<td>Gardener Reservoir</td>
<td>C2 Cattle Co Limited Partnership</td>
</tr>
<tr>
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<td>High Line Canal</td>
<td>Unknown</td>
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<tr>
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<tr>
<td>Klamath</td>
<td>229.40</td>
<td>Low Line Canal</td>
<td>Unknown</td>
</tr>
</tbody>
</table>

Pacific Connector has indicated it may utilize a synthetic product such as Dustlock®, in addition to water, for dust control. Dustlock® is a naturally occurring by-product of the vegetable oil refining process. Dustlock® penetrates into the bed of the material and bonds to make a barrier that is naturally biodegradable, ensuring that the surrounding ground and water are not contaminated, and minimizing any potential effects to fish and wildlife. While there are no known health risks by the use of Dustlock® to fish and wildlife resources, Pacific Connector will not use Dustlock® within 150 feet of riparian areas. Appendix B to the POD (provided as a stand alone document) is the Air, Noise and Fugitive Dust Plan that Pacific Connector developed in consultation with the BLM and Forest Service.

2.2.9.10 Hydrostatic Testing

After backfilling, the pipeline will be strength tested in accordance with U.S. Department of Transportation (DOT) regulations to ensure that the system is capable of operating at the maximum operating pressure. Should a leak or break occur, the line would be repaired and retested until the specifications are achieved. Hydrostatic testing is one acceptable method for strength testing.

Water for hydrostatic testing will be obtained from commercial or municipal sources or from surface water right owners. Table 1.6-2 in Resource Report 1 provides the proposed water source locations for hydrostatic testing. If water for hydrostatic testing is acquired from surface water sources, Pacific Connector would obtain all necessary appropriations and withdrawal permits, including from OWRD, prior to use. As part of this process, OWRD would have the applications reviewed by ODEQ and ODFW to determine if there are concerns about the impact water withdrawals may have on water resources, including concerns relating to the timing, seasonality, and method of
withdrawal. OWRD would provide public notice and opportunity to comment on the applications.

Permission to discharge the hydrostatic test water will be obtained through ODEQ. Discharge rates would range from several hundred gallons per minute to several thousand gallons per minute. The specific hydrostatic discharge rate at each discharge location cannot be estimated at this time because the discharge rate is dependent on a number of factors specific to each discharge location. These variables include: the volume of water to be discharged, topographic conditions of the discharge location, elevation differences between test sections and the direction of flow (uphill/downhill) between the test section, size of the test head piping, kind and size of the discharge structure to be utilized, infiltration properties of the surrounding soils, and location of any sensitive resources such as wetlands and waterbodies or facilities (i.e., roads, residences, etc.) in the vicinity of the discharge location. The discharge rate would be controlled to prevent scour, erosion, and potential effects or sediment migration to sensitive resources or facilities (see ECRP in Appendix 1B to Resource Report 1/Appendix I to the POD).

Pacific Connector developed a Hydrostatic Testing Plan (see Appendix M to the POD, provided as a stand alone document) in consultation with the BLM and Forest Service as well as the Center for Lakes and Reservoirs and Aquatic Bioinvasion Research and Policy Institute (Portland State University). This Plan outlines the general hydrostatic testing process and describes the BMPs to minimize or avoid potential effects that could result from hydrostatic testing. One of the purposes of the Plan was to develop BMPs to prevent the potential transfer of invasive species and pathogens from one watershed to another and to address FERC Staff’s recommended mitigation measure #39 in the FEIS (FERC, 2009 – Section 5.2). The Plan describes the potential invasive species and pathogens that were of concern to the BLM, Forest Service, and Portland State University and the BMPs that will be implemented. The details and rationale for these BMPs are described in the Plan and summarized below.

If determined to be feasible for hydrostatic testing requirements, water will be returned to its withdrawal source location after use; however, cascading water from one test section to another to minimize water withdrawal requirements may make it impractical to release water within the same watershed where the water was withdrawn. If hydrostatic test source water cannot be returned to the same water basin from where it was withdrawn, Pacific Connector would employ an effective and practical water treatment method (chlorination, filtration, or other appropriate method) to disinfect the water that would be transferred across water basin boundaries. The hydrostatic test water will be treated after it is withdrawn and prior to hydrostatic testing.

Pacific Connector will implement a three-step BMP treatment process to prevent the potential spread of invasive species and forest pathogens from non-municipal surface water sources used during hydrostatic testing. The hydrostatic test water treatment process will incorporate screening/filtration during water withdrawal, chlorine treatment, and upland discharge at least 150 feet from wetlands or waterbodies with no direct discharge to these features. All hydrostatic test water will be discharged through a dewatering device such as a straw bale structure or sediment bag, in a manner to promote infiltration. Further, all hydrostatic discharge locations will be monitored after construction to ensure noxious weeds have not established. Hydrostatic test water will be obtained from commercial or municipal sources, private supply wells, or surface water rights owners as listed in Table 1 of the Hydrostatic Testing Plan (see Appendix M
to the POD). As part of the application process, OWRD provides the application(s) to the ODEQ and ODFW for review. These agencies comment if there are concerns regarding the impacts the withdrawal(s) may have on water quality, and/or fish and wildlife species and their habitat, respectively.

As explained in the Hydrostatic Test Plan, Pacific Connector proposes to use a treatment of 2 parts per million (ppm) or 2 milligrams per liter (mg/L) of free chlorine residual with a detention time of 30 minutes to treat all non-municipal surface waters that would be used as a water source for hydrostatic testing purposes. Chlorinated water will be discharged according to the ODEQ, May 19, 1997, Memorandum for Chlorinated Water Discharges (see Attachment C to Appendix M to the POD) to prevent water quality impacts, potential effects to aquatic species, and to minimize potential impacts to sensitive areas. The hydrostatic test water discharge locations are shown on the Environmental Alignment Sheets.

2.2.9.11 Restoration

After the pipe has been installed, the trench will be backfilled with the native material that was excavated from the trench. FERC’s Wetland and Waterbody Procedures call for the upper 1 foot of the trench to be backfilled with clean gravel or native cobbles in all waterbodies that contain cold water fisheries. However, Pacific Connector has modified this requirement in the ECRP for instances where the existing substrate is not gravel or cobbles and site access is limited. Where clean gravel or cobbles are placed in the upper one-foot of trench backfill on fish-bearing streams, the specifications provided by ODFW or an authorized agency representative for federal lands will be utilized. Backfill material will match the natural streamed material size, gradation, and composition as closely as possible. The streambed profile will be restored to pre-existing contours and grade conditions. To restore the streambanks, Pacific Connector will explore options such as tree revetments, stream bars/flow deflectors, toe-rock, and vegetation riprap before using hard bank protection. Streambanks will be returned to their preconstruction contours or shaped to a stable angle. Erosion control fiber fabric or matting will be installed on slopes adjacent to streams. On some banks, depending on site-specific conditions, fiber rolls may also be installed to stabilize bank toes. The streambanks will be seeded and woody riparian vegetation planted for stabilization according to the ECRP (see Appendix 1B to Resource Report 1/Appendix I to the POD). It is not expected that riprap will be required for streambank stabilization, but if used would be limited to the areas where flow conditions preclude effective vegetation stabilization techniques. Riprap will be a last resort intended to limit damage. As indicated in the Stream Risk Assessment (see JPA_DEQ-R15), Pacific Connector will conduct pre-construction surveys once easements for the alignment have been acquired and will collect information at that time to refine the risk analysis and support selection of site-suitable BMPs, where appropriate. Where crossings occur on BLM and NFS lands, these agencies will be consulted during stream restoration efforts.

All areas where grading is required for pipeline construction will be regraded and contoured to blend into the surrounding landscape and to re-establish natural drainage patterns. The emphasis during recontouring will be to return the entire right-of-way to its approximate original contours, to stabilize slopes, control surface drainage, and to aesthetically blend into the adjacent contours. Ruts and other scars will be regraded and all drainage ditches will be returned to their preconstruction condition.
Pacific Connector will revegetate TEWAs with weed-free native plant species, and seed mixtures will be certified as weed-free. On a site-specific basis and in consultation with individual landowners, riparian areas (of both perennial and intermittent waterbodies) within Pacific Connector’s permanent easement will be restored and enhanced using plantings of native shrubs and trees to within 25 feet of the streambanks, depending on existing land use and vegetation conditions. On federal lands, Pacific Connector has committed to extending the riparian strip plantings along all streams (perennial or intermittent) within federally designated Riparian Reserves to up to 100 feet from the OHWM (subject to the 6-foot (shrubs) and 15-foot (trees) restrictions on either side of the centerline). The extended riparian planting area within Riparian Reserves will occur to 100 feet or to the limit of the existing riparian vegetation where it does not extend to 100 feet.

Species’ placement will be correlated to moisture regime requirements based on three categories of wet, moist, or dry ground (see ECRP Plan in Appendix 1B to Resource Report 1/Appendix I to the POD). Riparian revegetation species will incorporate fast growing native trees and shrubs (cottonwoods and willows) placed closest to the bank top to provide canopy recovery as quickly as possible to shade and overhang the waterbodies. Plantings will conform to FERC’s Wetland and Waterbody Procedures (part VI.D.1) which recommend that trees exceeding 15 feet tall grow no closer than 15 feet to the pipeline centerline (see Drawings 3430.34-X-0015 and 3430.34-X-0016 in the ECRP).

All revegetated areas will be monitored for the first 2 to 3 years following construction to verify successful revegetation and implement corrective action, should it be required. Monitoring and maintenance will continue until revegetation is successful and acceptable to the landowner and land managing agency. Throughout operation of the pipeline, Pacific Connector will continue to monitor and maintain the right-of-way.

2.2.9.12 Peak Flows

Vegetation management or clearing activities that create sizable canopy openings can increase water yields (Forest Service, 2000). Sizeable canopy openings can result in decreased evapotranspiration (due to decreased leaf area), decreased interception by the canopy, increased snow accumulation and melt rates, greater snow accumulation and more rapid snowmelt compared to locations lacking large canopy openings, resulting in increased peak flows (Grant et al., in review). Clearing can also reduce cloud water interception, having the opposite effect (Grant et al., in review). Due to the linear nature of the pipeline (resulting in low harvest intensity as opposed to the clearing created by timber harvests), the proportionally small affected acres within the watersheds, and with the measures discussed below, the effect that construction and operation of the PCGP Project would have on peak flows and rain-on-snow events is expected to cause no measurable or consequential effect to peak flows. The pipeline will cross 15 Fifth Field Watersheds within the transient snow zone (2,000 to 5,000-foot elevation range), affecting a total of 2,121 acres within the transient snow zone (see Table 2A-11 in Appendix 2A). This represents about 0.16 percent of the total acreage of these 15 watersheds. There are 860,646 acres of transient snow zone present within the 15 watersheds (see Table 2A-11 in Appendix 2A). The 2,121 acres affected by the Project represent less than 1 percent of the acreage present in these watersheds which encompass a total of 1,570,620 acres.
Increase in peak flows generally diminishes with decreasing intensity of percentage of watershed harvested, and the magnitude of any effect diminishes with increasing basin size (Grant et al., in review). Only clearing that permanently alters canopy cover could affect long-term peak flows; disturbance in existing agricultural and rangeland areas, grasslands, and shrubs (where the restored vegetation would provide similar cover) would have no long-term effects. When only considering forest clearing within these 15 watersheds, pipeline disturbance to forested vegetation types would represent only 0.07 percent of the total area of these watersheds. When considering the total forested vegetation types disturbed within the total transient snow zone area within the watershed, the Project's forest clearing represents 0.14 percent (see Table 2A-11).

The greatest forest clearing disturbance within the transient snow zone on a percentage basis will occur within the Spencer Creek Watershed. The pipeline will disturb a total of 125.86 acres of forested vegetation within the 21,913 acres transient snow zone in this 54,242-acre watershed, which represents 0.57 percent of the total watershed area in the transient snow zone (see Table 2A-11).

In the Trail Creek Watershed the pipeline will disturb a total of 107.33 forested acres within the 30,107-acre transient snow zone in this 35,343-acre watershed, which represents 0.36 percent of the total watershed area in the transient snow zone (see Table 2A-11).

The Little Butte Creek Watershed will have the largest area of disturbance within the transient snow zone with 434.01 acres, including 298.32 acres of forested vegetation, 53.70 acres young regenerating and clear-cut forest, 32.82 acres of Oregon white oak forest, and 103.42 acres of grasslands or shrublands. Thirty-two acres of disturbance will occur within two minor land use types including industrial areas and roads. The Project's forest clearing (298.32 acres) within this watershed represents 0.19 percent of the total area within the watershed in the transient snow zone (see Table 2A-11).

Because of the pipeline's linear nature, disturbance within the transient snow zone will occur across a broad number of watersheds and various vegetation types and affect a only a small percentage of the total watershed and the total area of the watershed within the transient snow zone. Although permanent canopy removal in forested areas along the right-of-way would increase the potential for snow accumulation, it is not expected that forest clearing within any of the watersheds would have a measurable/noticeable influence on peak flows, considering the minor amount of forested clearing the Project would have within the transient snow zone within the watersheds crossed. In addition, the design measures are intended to ensure that impacts will have an immeasurable effect on forest hydrology. These measures include:

1. Where feasible, the pipeline route has been primarily aligned along ridgelines and watershed boundaries where it would traverse the Coast and Cascade Mountain Ranges. This alignment minimizes clearing effects within any single watershed.
2. The size of construction work areas have been minimized to the extent practical to minimize clearing.
3. After construction, disturbed areas will be returned to a stable approximate original contour configuration to restore preconstruction drainage patterns.
4. BMPs will be used to minimize runoff and erosion and to promote infiltration. These BMPs include:

- compaction mitigation, surface roughening, and use of waterbars on slopes to promote onsite infiltration and to minimize runoff;

- applying slash or mulch on disturbed areas to ensure effective ground cover requirements are achieved; and

- replanting cleared forested areas.

5. Pacific Connector is also revising the CMP to mitigate for potential effects on BLM and NFS lands. The BLM and Forest Service have proposed a suite of off-site mitigation projects which include placement of LWD in steams, road surfacing and drainage repairs, road decommissioning, fish passage culvert replacements, reallocation of Matrix lands to LSR, terrestrial restoration, fire protection, and fuels reduction which would improve the watershed conditions crossed by the Project.

2.2.9.13 Stream Temperature/Shade Assessment

Because of the pipeline’s linear nature, it is not possible to avoid crossing waterbodies and riparian areas. However, the number of stream crossings required for the pipeline was minimized by identification of a pipeline route that follows ridgelines and watershed boundaries to ensure the long-term safety, stability and integrity of the proposed pipeline as it crosses the Coast and Cascade mountain ranges.

Vegetative cover that provides shade, especially during summer, is one factor that regulates water temperature. Construction across waterbodies would necessitate removal of trees and riparian shrubs at the crossing locations. Available information on the effects of pipeline construction in other regions on water temperature has found no change or no measurable change. The total width of riparian area affected by shade tree removal would be small (less than 100 feet) relative to the length of any stream crossed. In one study, construction across two coldwater, fish-bearing streams in Alberta required removing forested riparian vegetation; water temperatures at construction sites and downstream did not increase above temperatures at control sites upstream from construction (Brown et al., 2002). Similarly, water temperatures measured at four coldwater streams in New York before and during pipeline construction and for 3 years following construction showed no short-term or long-term effects on water quality parameters, including water temperature, even though such effects were expected because streambank vegetation had to be cleared, which reduced shading (Blais and Simpson, 1997). In the Alberta study, the highest water temperature recorded was 66°F (19°C in August). In the New York study, the highest temperature was 79°F (26°C) sometime between August and October.

Following requests by the Forest Service, Pacific Connector modeled water temperatures on 6 different stream segments on NFS lands in the Umpqua River basin on tributaries to East Fork Cow Creek (5 crossings) and on the upper Rogue River basin on Little Butte Creek (North State Resources, 2009 – provided as a stand alone document). Temperature models were run on 6 different stream segments on NFS lands in the Umpqua River basin on tributaries to East Fork Cow Creek (5 crossings) and on the upper Rogue River basin on Little Butte Creek (North State Resources, 2009). Of the three smallest streams modeled, average temperature increase ranged from 1.0 to 8.6 °C right after construction. Because these streams were so small they
likely also would have temperatures reduced rapidly downstream of the clearing from groundwater inflow and likely would have no measurable effects on streams they flow into downstream. The two 5 and 6 foot wide streams would have estimated maximum increases ranging from 0.4 to 0.5 °C with maximum temperature remaining at or below 15.6 °C in these two streams just downstream of crossing. These temperatures would remain well within suitable range for salmonids. The largest stream (22 feet) estimated increase was estimated to be 0.02 to 0.1 °C depending on the temperature model. The modeled results, based on assumptions used about rate of vegetation regrowth, found that most temperature increases remained within the first 5 years, but were approaching pre-project temperatures within 10 years. Conditions at other streams along the pipeline route may vary from these due to site-specific differences, but these results may be fairly representative of changes that may occur at forested streams along the route. Overall results suggest that other than the very smallest streams where fish resources would be limited changes in temperature from vegetation removal are likely to remain small and immeasurable having unsubstantial effects on fish resources.

Similarly, GeoEngineers (2013) modeled thermal impacts within Fourth Field Watersheds where streams would be crossed by the pipeline where riparian shading vegetation would be removed within the 75-foot wide construction corridor and would be affected within the 30-foot maintenance corridor over the long term. Model results show a maximum predicted increase of 0.16°C over one 75 foot clearing. The analysis showed that elevated water temperatures would return to ambient levels within a maximum distance of 25 feet downstream of the pipeline corridor, based on removal of existing riparian vegetation over a cleared corridor width of 75 feet (GeoEngineers, 2013 – provided as a stand alone document/5-JPA_DEQ-R26). The results are similar to the more geographically-limited results obtained by North States Resources (2009) which suggested more thermal impact. The conclusion drawn by GeoEngineers (2013) was that the magnitude of thermal impact caused by pipeline construction would not be expected to cause a thermal barrier to fish migration.

Pacific Connector has proposed supplemental riparian plantings as outlined in Section 10.12 of the ECRP (see Appendix 1B to Resource Report 1) to help ensure that the core cold-water habitat temperature criteria are not exceeded at the maximum point of impact. These measures are designed to speed up the rate of riparian area recovery and provide more effective shade immediately following construction. Plantings and vegetation regrowth in riparian areas would help moderate potential temperature increases in the short term (a few years). Pacific Connector would install supplemental transplanted trees on the Umpqua National Forest within the riparian areas of East Fork Cow Creek (i.e., 15-20 feet tall with full crowns) to increase riparian area canopy closure and placing large woody debris and boulders to create micro-topography within the wetted stream channel (see Section10.12 in the ECRP/Appendix 1B to Resource Report 1/Appendix I to the POD). Shading from transplanted vegetation and micro-topographic features incorporated into the final grading plan are likely to reduce the heat load enough to reduce the likelihood of measurable water temperature increases. Pacific Connector modeled the potential benefit of post project effective shade created by these mitigation measures on the Umpqua National Forest. The results of the 10-year post project modeling time step was used to predict the benefits of the mitigation measures because the trees that would be transplanted provide at least the same shade values as predicted for this time step. The predicted water temperature changes are small, with less than a 0.3 °C (0.5 °F) change at the point of maximum impact, with no increase at the stream network scale (North State Resources, 2009). Inclusion of the measures improves the certainty that riparian area clearance and stream channel disturbance activities within
the construction right-of-way would not cause measurable water temperature increases at the maximum point of impact or at the stream network scale.

Given that mitigation for loss of effective shade would occur and that predictive modeling shows that the local impacts are small in magnitude and spatially limited, the cumulative effects of the proposed project on the thermal regime in the Coos, Coquille, South Umpqua, Rogue, Klamath, and Lost River basins is expected to be exceptionally minor and well below detection in the field.

To minimize the potential effects on stream temperature by the removal of riparian vegetation, Pacific Connector has incorporated the following mitigation measures into the project design:

1. narrowing the construction right-of-way at waterbody crossings to 75 feet where feasible based on site-specific topographic conditions;
2. locating TEWAs 50 feet back from waterbody crossings to minimize impacts to riparian vegetation, where feasible; and
3. replanting the streambanks after construction to stabilize banks and to reestablish a riparian strip across the right-of-way for a minimum width of 25 feet back from the streambanks.

On NFS lands, the Forest Service has requested that the riparian vegetation strip be extended up to 100 feet on either side of waterbodies in Riparian Reserves. Pacific Connector has agreed to implement this measure on both NFS lands and BLM lands. The riparian strip will generally be replanted with willow cuttings to provide a quick cover for shading and streambank stability as described in the ECRP. Quick cover plantings may be shorter in height than vegetation removed during constructions, thus providing less shade. Other appropriate species will also be installed such as dogwood and other similar species. In upland areas, adaptable species will be substituted for willows based on the moisture regime at each site.

The riparian strip will be maintained to allow an herbaceous cover 10 feet in width centered over the pipeline to facilitate corrosion and leak surveys. Trees that are within 15 feet of the pipeline and are greater than 15 feet in height will be selectively removed from the corridor. The remaining area of the construction right-of-way within the riparian strip will be replanted with trees that would provide greater height and stream shading over time. Plantings/seedling will be done with native vegetation of a local source.

Stream crossings and associated vegetation clearing will be conducted consistent with FERC’s Wetland and Waterbody Procedures, which were developed with input from regulatory agencies and the industry, and have been in use on FERC-regulated projects for more than 15 years. If a project is built following the FERC’s Wetland and Waterbody Procedures, it allows FERC to describe impacts on waterbodies and conclude impacts would be reasonable.

To address water quality concerns in the Umpqua and Rogue River Basins, ODEQ issued TMDLs in 2006 and 2008, respectively. For nonpoint sources (which includes near stream vegetation disturbance), heat allocations are translated into effective shade surrogate measures (stream side vegetation objectives) to provide site-specific targets for land managers. Attainment of these measures ensures compliance with the nonpoint source allocations (ODEQ, 2006 and 2008). Compliance with Oregon water quality
standards and applicable TMDLs will be addressed during the 401 certification process prior to construction.

During the ODEQ 401 process, Pacific Connector will develop a source specific implementation plan to outline mitigation for predicted thermal impacts (GeoEngineers, 2012a). This mitigation will have as its goal restoring shade along affected stream channels and nearby channels within the same 4th field HUCs. Mitigation for construction-related impacts will occur to the extent allowed by landowners on the affected streambanks. This mitigation will incorporate riparian revegetation required by the Forest Service and/or the BLM for impacts to riparian reserves on federal lands. The length of channel banks planted by Pacific Connector will be determined prior to pipeline construction once a clear understanding of landowner wishes regarding streambank planting are known. Contiguous lengths of streambank planting will be preferred over planting on multiple small parcels, particularly for mitigation of permanent impacts. Mitigation ratios of 1:1 for construction-phase impacts or 2:1 for permanent impacts will be applied as outlined in ODEQ's September 2011 letter.

2.2.9.14 Hyporheic Exchange

In response to ODEQ's March 2010 letter, Pacific Connector conducted a hyporheic exchange analysis on the waterbodies and ditches crossed by the proposed pipeline (GeoEngineers, 2010a - provided in the JPA stand alone document/3-JPA_DEQ-R29). The assessment focused on determining if construction has the potential to affect the structure and function of the hyporheic zone, and if so, which stream crossing may be most sensitive to changes in hyporheic zone structure and organization. Historically, pipeline construction has not typically been considered as having a potential effect on hyporheic zone function, presumably because of the nature of the construction process having relatively limited, localized and temporary change to the subsurface conditions under streams and rivers. GeoEngineers (2010a) developed weighting factors to assign criteria of high, moderate, and low sensitivity to the crossing locations.

Thirteen stream crossings fall under a high sensitivity category, which would suggest a high likelihood of a functioning hyporheic zone, mostly associated with larger waterbodies with greater floodplain widths and instream morphologic features. Two of the 'high' sensitivity crossings, including the Coos River crossing at MP 11.13R and the Rogue River crossing at MP 122.65, will be crossed by HDD rather than open trenching across the stream channel.

A 'moderate' sensitivity indicates that the stream crossing displays some indicators that a hyporheic zone is active and functional. Approximately 118 crossings fit this category, most of them upper to middle watershed streams. A 'low' sensitivity indicates that the stream crossing does not likely support either an extensive or functional hyporheic zone. Approximately 169 stream crossings fit into this category. Many of these low scoring stream crossings are bedrock-controlled, are dominated by finer-grained material, or are canals and ditches. Eleven stream crossings were not assigned any point values or ranking due to there being no channel or channel forming processes observed at the crossing location in the field.

Water quality parameters, including water temperature and intragralve dissolved oxygen, might potentially be affected at crossings where hyporheic exchange is extensive and active. Thus, streams with a 'high' and 'moderate' sensitivity would be the streams where water quality could potentially be compromised due to alteration of the hyporheic
zone. Those crossings with a 'low' sensitivity indicate that little hyporheic exchange is currently operating in the stream, and thus would not likely impact water quality.

Hyporheic exchange is a difficult stream attribute to measure without detailed site-specific study, but qualitative observations of bed and bank material, stream gradient, location within a watershed, and morphological features can help indicate whether a stream has an active and functional hyporheic zone. The analysis used these qualitative parameters to rank how sensitive a stream crossing may be to potential hyporheic zone alteration. Overall, the majority of the PCGP crossings fall into a 'moderate' or 'low' sensitivity category, where water quality (including water temperature and intragravel dissolved oxygen) is unlikely to be significantly or measurably altered by pipeline construction. The pipeline construction methods and BMPs described in the GeoEngineers (2010a) report further reduce the potential for pipeline construction to adversely alter the hyporheic zone. Specifically, the BMPs which are of particular importance to reduce the potential impacts to the hyporheic zone, include the following:

- Native material that is removed from the pipeline trench during excavation across stream channels will be used to backfill once the pipe is in place in order to minimize potential changes to preconstruction permeability.

- Trench plugs will be installed at the base of slopes adjacent to wetlands and waterbodies and where needed to avoid draining of wetlands or affecting the original wetland or waterbody hydrology.

While the potential impact of pipeline construction on hyporheic exchange is considered to be low at all stream crossings considering the proposed construction methods, Pacific Connector proposes these additional measures to further reduce the potential for even localized impacts to water quality from hyporheic exchange at the stream crossings identified as having high hyporheic sensitivity:

- Document streambed stratigraphy prior to construction, if possible, or if not possible, during construction to aid in site restoration. Such documentation will be conducted by staff trained in recognizing and observing river channel processes. If done during construction, this may be performed by the Environmental Inspector after receiving suitable training.

- Segregate active streambed gravels and cobbles from underlying streambed materials (including fractured bedrock) to their natural depth and replace gravels/cobbles to this natural pre-construction depth.

- Below active stream gravels, replace native material in a manner to match upstream and downstream stratigraphy and permeability to the maximum extent practicable.

2.2.9.15 Surface Water Operation Impacts and Mitigation

Operation of the PCGP Project will not result in any impacts to surface water use or quality. Vegetation maintenance will be limited adjacent to waterbodies to allow a riparian strip at least 25 feet wide, as measured from the waterbody's mean high water mark, to permanently revegetate with native plant species across the entire right-of-way.
On NFS and BLM lands where Riparian Reserves are affected, up to a 100-foot riparian strip will be planted. To facilitate periodic pipeline corrosion/leak surveys, a corridor centered on the pipeline and up to 10 feet wide will be maintained in an herbaceous state. In addition, trees that are located within 15 feet of the pipeline and that are greater than 15 feet in height will be cut and removed from the right-of-way.

Table 2A-7 in Appendix 2A lists existing roads requiring improvements that are within 100 feet of waterbodies. Gravel and dirt roads that are classified as limited-strength roads are generally not designed or constructed for all-weather use. Road surfaces during the late fall, winter and early spring are generally more susceptible to damage because of moisture conditions and freeze/thaw cycles. Road use at this time could cause damage and rutting, accelerating erosion and sedimentation potential from concentrated runoff. As detailed in the Transportation Management Plan (TMP) (see Appendix Y to the POD), to minimize the potential for both road-related and off-road resource damage, Pacific Connector will perform road surfacing structural capacity assessments to a standard acceptable to the jurisdictional agencies. Where necessary, additional road surfacing (aggregate or bituminous as appropriate) may be placed as needed for the planned use. In addition, Pacific Connector will install appropriate erosion and sediment control BMPs along the access roads as determined necessary by Pacific Connector’s Environmental Inspector in cooperation with agency representatives. Pacific Connector has also developed a Transportation Management Plan for Non-Federal Lands (TMPNFL – see Appendix 8H in Resource Report 8), which describes the measures Pacific Connector and its contractor(s) will implement for private roads.

2.2.10 Required Surface Water Construction Permits

Table 1.10-1 in Resource Report 1 summarizes the permits that will be required for the proposed PCGP Project before commencement of construction across waterbodies or before withdrawal or discharge of hydrostatic test water. Pacific Connector will apply for all necessary waterbody crossing permits. Concurrence with the FWS and the National Marine Fisheries Service (NMFS) will be required for several of the crossings due to listed species and Essential Fish Habitat (see Resource Report 3). Mitigative measures to offset project impacts will be negotiated, as necessary, between Pacific Connector and the regulatory agencies. Pacific Connector will prepare and file applications with the appropriate agencies in 2013.

2.3 WETLANDS

Wetlands and other waters of the state and U.S. were delineated along the proposed PCGP alignment between 2006 and 2008. The delineation study area consisted of a 400-foot wide corridor (project corridor) centered on the proposed pipeline alignment. The project corridor included all areas required for installation of the pipeline including those areas outside of the 400-foot wide corridor (construction right-of-way, contractor yards and staging areas, rock source disposal sites, access roads and TEWAs) and aboveground facilities (i.e., meter stations, block valves, compressor station). The results of this delineation are documented in Pacific Connector’s Wetland Delineation Report submitted to FERC as a stand alone document.

Wetland delineation fieldwork was performed by multiple two-person delineation teams using the routine determination methodology outlined in the 1987 *Corps of Engineers Wetland Delineation Manual* (Environmental Laboratory, 1987). This approach requires the presence of three parameters — hydrophytic vegetation, hydric soil, and wetland
hydrology – for an area to be considered a wetland. Due to the size and complexity of the study area and the number of delineators involved, a project specific delineation protocol was developed to ensure that data was collected in a consistent manner.

As part of the fieldwork, delineation teams walked all portions of the project corridor where right-of-entry permission had been granted. The boundaries of all wetland and other waters (e.g., lakes, rivers, streams) encountered within these areas were flagged with blue and yellow survey tape or with 36-inch blue wire stake flags tied with yellow survey tape. Wetland/water boundaries were delineated in the field as follows:

- Wetland boundaries were determined using paired wetland/upland data plots and were commonly based on topography, changes from upland to wetland dominated plant communities, changes from hydric to non-hydric soils, and/or the presence/absence of wetland hydrology indicators.

- Perennial waterbodies were delineated using the “ordinary high water line” (OHWL) as defined in OAR 141-085-0010 (150) and were flagged along both banks.

- Intermittent waterbodies were delineated by flagging the centerline of the channel. For intermittent streams of fairly uniform width, the top of bank at the maximum width within the project corridor was also flagged. This maximum width was later applied to the entire stream segment within the project corridor during the creation of the delineation map. For streams that were not uniform in width, the top of bank was flagged at multiple points within the project corridor to reflect the major changes in width. These widths were then applied to the appropriate stream sections during creation of the delineation map.

- Excavated drainage and irrigation ditches were flagged along their centerlines or along the top-of-bank on both sides of the channel, depending upon their size and/or depth.

- Lakes and ponds were delineated using the OHWL. If fringe wetlands were present, they were delineated separately.

The delineated wetlands and waterbodies are described in the wetland delineation report (submitted as a stand alone document). Wetland delineation data forms and other supporting information are included as appendices to the delineation report. Table 2A-3 in Appendix 2A to this Resource Report summarizes the following information for each wetland and waterbody feature:

- Field identification number;
- Pipeline milepost location;
- Cowardin Classification;
- Dominant Oregon Hydrogeomorphic (HGM) (if wetland);
- Acreage of wetland/water within the project survey corridor (400 feet width);
- Project impacts to the wetland/waterbody including:
  - Length of the pipeline crossing within the wetland;
- Estimated cubic yards of excavation;
- Acres of construction right-of-way in the wetland;
- Acres of TEWAs in the wetland;
- Acres of temporary access roads in the wetland;
- Total construction disturbance in the wetland; and
- Total permanent wetland vegetation type conversion (or fill).

For the portions of the project corridor where access has been denied by the property owner(s) and surveys have not currently been completed (see Table 2.3-1), wetlands and other waters have been mapped using existing maps and other data including USGS topographic maps, NRCS soil surveys, FWS National Wetland Inventory (NWI) maps and both current and historic aerial photography, as well as project specific LiDAR data flown for the project in 2006. Wetlands or other waters identified within these areas were designated as approximate boundaries.

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### 2.3.1 Wetlands Summary

#### 2.3.1.1 General Wetland Vegetation Structure

Due to basic similarities in vegetation structures throughout the PCGP Project corridor, a summary description is provided for the primary wetland vegetation types within the project corridor.

**Palustrine Emergent Habitats**

Most emergent wetland conditions within the PCGP Project corridor primarily consist of land disturbed by agriculture activities such as haying or grazing. These disturbed emergent communities are dominated by hydrophytic pasture grasses such as meadow foxtail (*Alopecurus pratensis*, FACW), rough bluegrass (*Poa trivialis*, FACW) and various bentgrasses (*Agrostis* spp., FAC). Soft rush (*Juncus effusus*, FACW) and white clover (*Trifolium repens*, FAC) are also commonly present. Within Douglas and Jackson counties, pennyroyal (*Mentha pulegium*, OBL) was also a common dominant species. Native emergent wetlands are uncommon within the project corridor, but when they occur (primarily within swales and irrigation canals) they generally contain cattail (*Typha latifolia*, OBL), small-fruited bulrush (*Scirpus microcarpus*, OBL), hardstem bulrush (*S. acutus*, OBL), manna grass (*Glyceria elata*, OBL), American sloughgrass (*Beckmannia syzigachne*, OBL) and various sedges (*Carex* spp., FACW to OBL).

**Palustrine Scrub/Shrub Habitats**

Scrub-shrub wetlands within the PCGP Project area have two primary vegetation types. Disturbed conditions, associated with grazing or earthwork activities, tend to support hardy invasive species such as Himalayan blackberry (*Rubus discolor*, FACU) and sweetbriar rose (*Rosa eglanteria*, FACW) around wetland fringes. Less disturbed, native shrub wetlands generally support a mixture of species such as Douglas' spirea (*Spiraea douglasii*, FACW), Pacific willow (*Salix lasiandra*, FACW+), salmonberry (*Rubus spectabilis*, FAC+) and Pacific ninebark (*Physocarpus capitatus*, FACW-).

**Palustrine Forested Habitats**

Almost all forested wetland habitats support Oregon ash (*Fraxinus latifolia*, FACW), with red alder (*Alnus rubra*) and black cottonwood (*Populus trichocarpa*, FAC) more common in the western portions (e.g., Coos and Douglas Counties) of the PCGP Project area. Western redcedar (*Thuja plicata*, FAC) and Sitka spruce (*Picea sitchensis*, FAC) are also common within project corridor wetlands within the Coast Range ecoregion. Forested habitats commonly support skunk cabbage (*Lysichiton americanum*, OBL) and
salmonberry (Rubus spectabilis, FAC+) within the understories of Coast Range forests, and lady fern (Athyrium filix-femina, FAC) and horsetails (Equisetum spp., FAC to FACW) are typical in other parts of the project corridor. Forested wetlands in the southeastern portions of the project corridor were relatively less common, but were generally swales or depressional areas dominated by Oregon ash with an understory of Himalayan blackberry, slough sedge (Carex obnupta, OBL) and spreading rush (Juncus patens, FACW).

**Geomorphic Setting**

Due to the length of the proposed PCGP alignment, the geomorphic setting descriptions in the following sections are broken out by Level III Ecoregion, as defined by Thorson et al. (2003). This information is intended to provide a wide landscape illustration within which each individual wetland/stream system resides to provide a better understanding of the habitat setting of the PCGP Project area. The PCGP Project traverses Ecoregions 1, 78, 4 and 9 between MPs 1.47R and 228.13. Ecoregions are areas of general similarity in ecosystems and in the type, quality, and quantity of environmental resources. They are designed to serve as a spatial framework for the research, assessment, management, and monitoring of ecosystems and ecosystem components. Ecological regions can be identified through the analysis of the spatial patterns and the composition of biotic and abiotic phenomena that affect or reflect differences in ecosystem quality and integrity. These phenomena include geology, physiography, vegetation, climate, soils, land use, wildlife distributions, and hydrology. A Roman numeral hierarchical scheme has been adopted for different levels of ecological regions. Level I is the coarsest level, dividing North America into 15 ecological regions. Level II divides the continent into 52 regions (Commission for Environmental Cooperation Working Group, 1997). At Level III, the continental United States contains 104 ecoregions and the conterminous United States has 84 ecoregions (EPA, 2003). Level IV is a further subdivision of Level III ecoregions. Maps of ecoregions are available on EPA’s website (EPA, 2003).

**Ecoregion 1: Coast Range (MPs 1.47R to 47)**

The Coast Range Ecoregion consists of all coastal land in Oregon from the Pacific Ocean to the crest of the Coastal Mountains Range. Specifically, this Ecoregion occurs between the Pacific Ocean and Willamette Valley/Klamath Mountains and includes the entire Oregon coastline and Coastal Mountains Range. Within the project corridor, typical landscapes include the beaches, dunes and estuaries of the Coastal Lowlands, the headlands and low mountains surrounding the Coastal Lowlands, and the Mid-Coastal Sedimentary subregion outside the fog belt. Within this ecoregion, the PCGP Project crosses the following Level IV Ecoregions (Thorson et al., 2003):

- 1a - Coastal Lowlands;
- 1b – Coastal Uplands; and
- 1g – Mid-Coastal Sedimentary.

**Watershed Setting.** The PCGP Project alignment within the Coast Range Ecoregion includes marine, estuarine, and freshwater systems including the following major waters: Pacific Ocean, Coos Bay, Coos River, and North Fork Coquille River. Tidal influences are evident in many streams within the Coast Range Ecoregion, particularly those within the Coastal Lowlands (1a) Level IV Ecoregion (Watershed Professionals Network,
Medium and large streams within this ecoregion are typically low gradient (0.5-2%), while headwater and smaller streams often have steep gradients (>30%) and are usually bordered by steep slopes. Typically rainstorms originating in the Pacific Ocean generate peak flows.

Streams within this ecoregion typically flow to the Pacific Ocean or into larger streams that drain to the Pacific Ocean. The following drainage basins, listed by HUC, are crossed by the PCGP Project:

Third field HUC (PNHFC, 2013b):
- 171003 - Southern Oregon Coastal Basin

Fourth field HUCs:
- 17100304 - Coos Sub-basin
- 17100305 - Coquille Sub-basin

Fifth field HUCs:
- 1710030403 - Coos Bay-Frontal Pacific Ocean
- 1710030505 - Coquille River
- 1710030504 - North Fork Coquille River
- 1710030503 - East Fork Coquille River
- 1710030501 - Middle Fork Coquille River

Topography. Topography within this ecoregion is mostly flat to gently sloping from the Pacific Ocean and lowlands toward coastal uplands, then steeply rising in the Coast Range Mountains. Typical elevations range from sea level to 600 feet above mean sea level (amsl) in the Coastal Lowlands subregion; 100 to 600 feet amsl in the Coastal Uplands subregion, and elevations of 200 to 3,000 feet amsl in the Mid-Coastal Sedimentary subregion.

Typical Plant Communities. Vegetation within the Coast Range Ecoregion typically consists of three major plant communities: forest (including those managed for timber), dunal/interdunal, and estuary communities. Each of these areas is briefly described below:

Coniferous Forest (Franklin and Dyrness, 1973)

- Tree Layer - Sitka spruce (Picea sitchensis), western hemlock (Tsuga heterophylla), Douglas-fir (Pseudotsuga menziesii), western redcedar (Thuja plicata), red alder (Alnus rubra), and bigleaf maple (Acer macrophyllum)
- Shrub Layer - salal (Gaultheria shallon), Pacific rhododendron (Rhododendron macrophyllum), red huckleberry (Vaccinium parvifolium), salmonberry (Rubus spectabilis), thimbleberry (R. parviflorus), and red elderberry (Sambucus racemosa)
• Herbaceous Layer - sword fern (*Polystichum munitum*), oxalis (*Oxalis oregana*), false lily-of-the-valley (*Maianthemum dilatatum*), stream violet (*Viola glabella*); and skunk cabbage (*Lysichiton americanum*)

Dunal/Interdunal (Franklin and Dyrness, 1973)

• Slough sedge (*Carex obnupta*), silverweed (*Potentilla anserina*) lodgepole pine (*Pinus contorta*), European beachgrass (*Ammophila arenaria*), salal, and sweetgale (*Myrica gale*)

Estuarine (Franklin and Dyrness, 1973)


Agricultural communities are not specifically identified as a vegetation type for this ecoregion, but typically consist of croplands and/or pastures that are either hayed or grazed by livestock.

**Typical Land Uses.** Typical land uses in the Coast Range Ecoregion include timber production, dairy farms with associated pastureland, urban/residential development, and outdoor recreation.

**Ecoregion 78: Klamath Mountains (MPs 47 to 90)**

The Klamath Mountains Ecoregion encompasses the Klamath and Siskiyou Mountains and lies between the Coast Range and Cascades, south of the Willamette Valley. It includes parts of the Umpqua and Rogue River-Siskiyou National Forests, and is typified by deeply dissected valleys and jutting ridges and foothills. Much of this ecoregion lies within a rain shadow, sheltered from the Pacific maritime influences by the Coastal Mountain Range. Within this ecoregion, the PCGP Project crosses the following Level IV Ecoregions (Thorson et al., 2003):

• 78c – Umpqua Interior Foothills;

• 78e – Inland Siskiyou;

• 78b – Oak Savanna Foothills

**Watershed Setting.** Drainage basins in this region are primarily oriented to the west. The Rogue and Umpqua Rivers represent the major basins. Major waterways include the South Umpqua River, Rogue River, South Myrtle Creek, Olala Creek, Days Creek, and the Medford Aqueduct system. Streams within this ecoregion typically have moderate to high gradients between about 2 and 30 percent (Watershed Professionals Network, 1999). Primary hydrologic inputs include winter precipitation, and occasional summer thunderstorms. Many streams are intermittent due to low precipitation during
the summer months. Precipitation in the form of rain or rain on snow generates the peak flows for this watershed area.

Streams within this ecoregion typically flow to the Pacific Ocean or tributaries of the ocean. The following drainage basins, listed by HUC, are included within the project corridor:

Third field HUC:
- 171003 - Southern Oregon Coastal Basin (PNHFC, 2013b)

Fourth field HUCs:
- 17100302 - South Umpqua Sub-basin

Fifth field HUCs:
- 1710030501 – Middle Fork Coquille River
- 1710030212 – Olalla Creek-Lookingglass Creek
- 1710030211 – Clark Branch-South Umpqua River
- 1710030210 – Myrtle Creek
- 1710030205 – Days Creek-South Umpqua River

**Topography.** The Klamath Mountains Ecoregion encompasses the Klamath and Siskiyou Mountains, which are typified by deeply dissected valleys and jutting ridges and foothills. Topography is typically steep (60% slopes) ridges and canyons. Typical elevations range from 600 to 3,000 feet amsl in the Umpqua Interior Foothills and back from 2,200 to 800 feet amsl in the Inland Siskiyous.

**Typical Plant Communities.** The Klamath Mountains support a mosaic of both California and Pacific Northwest conifer and hardwood tree species. Summer droughts are common in this ecoregion, and coupled with largely serpentine soil mineralogy, shape this ecoregion's hardy endemic plant communities. Common plant communities include:

Oak Savannah (Franklin and Dymness, 1973)
- Trce Layer – Oregon white oak (Quercus garryana), Douglas-fir, and Pacific madrone (Arbutus menziesii) dominant tree species
- Shrub Layer - poison oak (Rhus diversiloba); sweetbriar rose (Rosa eglanteria) also common
- Herbaceous Layer - Indian paintbrush (Castilleja spp.), blue wildrye (Elymus glaucus), field hedgearsely (Torilis arvensis), brome (Bromus spp.), and California oatgrass (Danthonia californica)

Mixed Conifer Hardwood Forests (Franklin and Dymness, 1973)
• Tree Layer - ponderosa pine (*Pinus ponderosa*), sugar pine (*P. lambertiana*), incense-cedar (*Calocedrus decurrens*), California laurel (*Umbellularia californica*) typical tree species; also includes Oregon white oak, Pacific madrone, and Douglas-fir

• Herbaceous Layer - California groundcone (*Boschniackia strobilacea*), rattlesnake plantain (*Goodyera oblongifolia*), spotted coral-root (*Corallorhiza maculata*), blue wildrye, bromes, and California oatgrass

Manzanita Shrublands (Franklin and Dyrness, 1973)

• Shrub Layer - white manzanita (*Arctostaphylos viscida*), greenleaf manzanita (*A. patula*), buckbrush (*Ceanothus cuneatus*), and poison oak

• Herb Layer - hedgehog dogtail (*Cynosurus echinatus*), bromes, and California oatgrass (when present – lack of herb layer is common)

**Typical Land Uses.** Typical land uses in the Klamath Mountains Ecoregion include timber production, outdoor recreation, mining, and grazing.

**Ecoregion 4: Cascades (MPs 90 to 153)**

Within the project corridor, the Cascades Ecoregion consists of the southern range of Oregon's Cascade Mountains, from Tiller to Butte Falls. It includes the area between Crater Lake and Mt. McLoughlin and parts of Rogue River-Siskiyou and Fremont-Winema National Forests. Within this ecoregion, the project corridor crosses the following Level IV Ecoregion (Thorson et al., 2003):

4e – High Southern Cascades Montane Forest

**Watershed Setting.** Basins within this ecoregion are oriented mostly to the west and drain to the Rogue and Umpqua Rivers or directly to the Pacific Ocean. Major waterbodies include South Umpqua River, and North and South Forks Little Butte Creek. Stream gradients are typically moderate to high (2-30%) in both Level IV Ecoregions (Watershed Professionals Network, 1999). Hydrologic inputs are primarily rain or snow and spring snowmelt. The following drainage basins, listed by HUC, are crossed by the PCGP Project alignment:

Third field HUC:
• 171003 - Southern Oregon Coastal Basin

Fourth field HUCs:
• 17100307 - Upper Rogue Sub-basin

Fifth field HUCs
• 1710030206 – Upper Cow Creek
• 1710030204 – Elk Creek-South Umpqua
• 1710030706 – Trail Creek
• 1710030707 – Shady Cove-Rogue River

• 1710030704 – Big Butte Creek

• 1710030708 - Little Butte Creek

**Topography.** High elevations and steep slopes characterize this ecoregion. Elevations typically range from 1,800 to 5,800 feet amsl in the High Southern Cascades Montane Forest subregion and from 1,200 to 3,800 feet amsl in the Umpqua Cascades subregion. The project corridor mostly runs parallel to these slopes rather than perpendicular to them.

**Typical Plant Communities.** The moist, temperate climate of this ecoregion supports a range of mid-elevation to alpine conifer species. Many of these forests are heavily managed for timber production.

**Open Coniferous Forest (Franklin and Dyrness, 1973)**

- Tree Layer - Douglas-fir, ponderosa pine, grand fir (*Abies grandis*), Pacific silver fir (*A. amabilis*) and incense-cedar are common trees at lower and mid-elevations (1,200-2,500 feet amsl); lodgepole pine, and Shasta red fir (*A. magnifica* var. *shastensis*) is subdominant at higher elevations (>2,500 feet amsl)

- Shrub Layer - big huckleberry (*Vaccinium membranaceum*), dwarf Oregon-grape (*Berberis nervosa*), prince’s-pine (*Chemophila umbellata*), and ocean-spray (*Holodiscus discolor*)

- Herbaceous Layer - twinflower (*Linnaea borealis*), pathfinder (*Adenocaulon bicolor*), long stolon sedge (*Carex pensylvanica*), squirreltail (*Sitanion hystrix*) and bear grass (*Xerophyllum tenax*).

**Typical Land Uses.** Typical land uses in the Cascades Ecoregion include timber production, outdoor recreation, and grazing.

**Ecoregion 9: Eastern Cascade Slopes and Foothills (MPs 153 to 231)**

The Eastern Cascade Slopes and Foothills Ecoregion is in the easternmost portion of the project corridor. It includes the areas from Mt. McLoughlin to the California border and south and east of Crater Lake. The eastern boundary runs generally south from Crater Lake to Mt. McLoughlin and continues south to the Oregon and California border. It lies within the rain shadow of the Cascades and is typically subject to summer droughts that require irrigation of its extensive agricultural areas. Within this ecoregion, the project corridor crosses the following Level IV Ecoregions (Thorson et al. 2003):

9g – Klamath/Goose Lake Basins

9i – Southern Cascades Slope

9j – Klamath Juniper Woodland

**Watershed Setting.** The western portions of this ecoregion are typically wetter than the eastern portions, due to the rain shadow effect of the southern Cascades. Basins are generally oriented toward the west and south and drain to the Lost and Klamath Rivers.
However, waterways near the study area orient both to the west and east. Major waterways within the study area include Klamath River, Lost River, and the Klamath Irrigation District agricultural canal system. Streams have very low gradients (0.5-2%) in the Klamath/Goose Lake Warm Wet Basins Ecoregion and moderate to high gradients (2-30%) in the Southern Cascade Slope and Klamath Juniper/Ponderosa Pine Woodland ecoregions (Watershed Professionals Network, 1999). Hydrologic inputs are primarily spring snowmelt and summer thunderstorms. The following drainage basins, listed by HUC, are crossed by the PCGP Project alignment:

Third field HUC
- 171003 – Southern Oregon Coastal Basin
- 180102 – Klamath River Basin

Fourth field HUC
- 17100307 – Upper Rogue Sub-basin
- 18010204 – Lost Sub-basin

Fifth field HUC
- 1710030708 – Little Butte Creek
- 1801020601 – Spencer Creek
- 1801020602 – John C. Boyle Reservoir- Klamath River
- 1801020412 – Lake Ewauna –Klamath River
- 1801020409 – Mills Creek-Lost River

Topography. Topography within this ecoregion includes relatively flat pastures/croplands surrounded by rolling hills, escarpments, and plateaus. Several mountains and volcanic peaks are also included in this ecoregion. Elevations are relatively high (4,000 to 8,000 feet amsl) throughout this area.

Typical Plant Communities. Nearly all plant communities within this ecoregion are subject to agricultural influences, either directly (i.e., conversion to croplands with irrigation) or indirectly (e.g., grazing of sagebrush shrublands). Droughty conditions influence dominant woody vegetation communities. Major plant communities include:

- Agricultural Areas (Franklin & Dyrness, 1973)
- Herbaceous Layer –irrigated wheat (*Triticum aestivum*), alfalfa (*Medicago sativa*), and hay crops
- Western Juniper/Ponderosa Pine Woodlands: (Franklin and Dyrness, 1973)
- Tree Layer - western juniper (*Juniperus occidentalis*), ponderosa pine dominant overstory species; quaking aspen (*Populus tremuloides*) occurs in mid-high elevation belt in riparian areas and wetlands
• Shrub Layer - big sagebrush (Artemisia tridentata), bitterbrush (Purshia tridentata) green rabbitbrush (Chrysothamnus viscidiflorus), gray horsebrush (tetradyemia canescens), and low sagebrush (A. arbuscula)

• Herbaceous Layer - cheatgrass (Bromus tectorum), beardless wildrye, basin wildrye (Elymus cinereus), squirreltail, yarrow (Achillea millefolium) and Oregon sunshine (Eriophyllum lanatum)

• Shrub-Steppe Communities (Franklin & Dyrness, 1973)

• Shrub Layer - big sagebrush, bitterbrush, and green rabbitbrush

• Herbaceous Layer - cheatgrass, beardless wildrye, basin wildrye, squirreltail, yarrow, Oregon sunshine, lupines (Lupinus spp.), and agoseris (Agoseris spp.)

Typical Land Uses. Typical land uses in the Cascades ecoregion include agriculture, grazing, timber production, and outdoor recreation.

2.3.2 Wetland Crossings

Pacific Connector has adopted a typical 75-foot wide construction right-of-way in non-agricultural wetland crossings to minimize wetland impacts. A number of individual crossings have been identified where a wider construction right-of-way will be necessary due to a combination of stock pile area requirements for topsoil segregation, crossing of adjacent waterbodies or other topographic or constructability and safety related issues. In these cases, Pacific Connector has requested variances from FERC’s Wetland and Waterbody Procedures to utilize a wider construction right-of-way (see Table 1A-1 in Appendix 1A to Resource Report 1).

2.3.2.1 Wetland Construction Methods

To minimize wetland impacts, Pacific Connector will implement the measures contained in FERC’s Wetland and Waterbody Procedures except for the cases where Pacific Connector has requested a variance for the wetland crossings as outlined in Table 1A-1 in Appendix 1A to Resource Report 1. According to the FERC’s Wetland and Waterbody Procedures, the construction right-of-way has been narrowed to minimize wetland disturbances, where feasible based on topographic and engineering constraints. Further, vegetation through wetlands will be cut to ground level in the construction right-of-way. Grading and stump removal will be performed only over the trench line, except where otherwise required for safety, as determined by a Pacific Connector Chief Inspector. Silt fences and/or straw bales will be installed at the edges of the construction right-of-way in wetlands where there is a possibility for excavated trench spoil to flow into undisturbed areas of the wetland. Where necessary, trench breakers will be installed where the trench enters and exits the wetland to prevent wetland draining and to maintain the hydrologic integrity of the wetland. To ensure habitat restoration, appropriate revegetation measures will be applied based on the wetland habitat types (see ECRP in Appendix 1B to Resource Report 1).

TEWAs have been located a minimum of 50 feet from the edge of wetlands, except as described in Table 1A-1 in Appendix 1A to Resource Report 1 (see also Environmental Alignment Sheets, provided under separate cover). Original topographic conditions and contours will be restored after completion of construction to ensure drainage patterns are
restored and any excess backfill will be spread over adjacent upland areas and stabilized during cleanup.

**Unsaturated Wetlands**

Topsoil will be segregated in wetlands that are unsaturated at the time of construction. Topsoil segregation will occur over the trench line and will be replaced to the original horizon and elevation. This will allow the hydrology (i.e., direction, volumes and rates of water flow) to be restored to preconstruction conditions and will promote reestablishment of hydrophytic wetland vegetation. Pipe stringing and fabrication may occur within the wetland adjacent to the trench or adjacent to the wetland in a TEWA. Fabrication in wetlands would require coating of field joints but would not include application of concrete coating in the wetland. Pacific Connector will follow section IV. 1. of FERC’s Wetland and Waterbody Procedures which limits concrete coating activities within 100 feet of a wetland or waterbody boundary.

**Wetlands with Saturated Soils**

In saturated wetlands, construction equipment will work on mats to minimize impacts from rutting and soil mixing. Low ground weight equipment may also be utilized in these areas to minimize wetland construction impacts. Construction will proceed as in unsaturated wetlands except topsoil segregation (from subsoil horizons) will not be feasible under saturated conditions. Under saturated soil conditions, it is generally not feasible/practical to segregate topsoil because the saturated topsoil and subsoil materials have low strength and do not readily stack. Saturated materials generally require more space to store because these materials spread out when piled/staked and blend/mix together on the confined right-of-way. Pipe stringing and fabrication in saturated wetlands may occur within the wetland adjacent to the trench or adjacent to the wetland in a TEWA.

**Flooded Wetlands**

In highly saturated or flooded wetland areas, Pacific Connector may use the push-pull installation technique. This technique involves pushing the prefabricated pipe from the edge of the wetland and/or pulling the pipe from the opposite bank with a winch. The trench will be excavated with a backhoe, dragline, clamshell dredge, or combination of equipment. The push-and-pull pads, pipe storage sites, and fabrication areas will be located outside the saturated portion of the wetland. Stringing and pre-fabrication of the pipe will be done in a TEWA adjacent to the wetland. Floats may be attached to the pipe to achieve positive buoyancy. After the pipe is pulled or floated into place, the floats will be cut and removed and the pipe will settle to the bottom of the trench. Excavated materials will be backfilled over the pipe.

**2.3.2.2 Pipeline Facilities**

The proposed construction right-of-way for the PCGP Project will generally be 95 feet in width in upland areas. Impacts to palustrine emergent and scrub-shrub wetlands will be temporary and short-term while impacts to palustrine forested wetlands are considered long-term impacts. Permanent wetland vegetation conversion impacts are impacts associated with maintaining the new pipeline right-of-way over the long-term during the life of the project. The permanent vegetation conversion impacts would occur in scrub-shrub and forested wetlands where periodic right-of-way vegetation maintenance
activities would convert scrub-shrub wetland types to emergent wetlands and forested wetlands to scrub-shrub and emergent wetland types.

Periodic vegetation maintenance along the right-of-way is required to facilitate corrosion, leak and safety surveys as required by DOT. To minimize permanent wetland conversion impacts, FERC’s Wetland and Waterbody Procedures specify that maintenance will not be conducted over the full width of the permanent easement in wetlands. FERC’s Wetland and Waterbody Procedures also specify that in wetlands only a 10-foot corridor centered over the pipeline may be maintained in an herbaceous state and that trees within 15 feet of the pipeline and 15 feet in height may be selectively cut and removed from the permanent easement.

2.3.2.3 Pipe Storage and Contractor Yards and Rock Source and Permanent Disposal Sites

Table 2.3-2 provides a list of the privately owned contractor and pipe storage yards that have been identified and which may be used during construction of the PCGP Project. Of the proposed 38 yards, 31 were surveyed for wetlands and access was denied to 7 of the sites. No wetland features are present on 19 of the surveyed yards; 12 yards contain wetland features or drainage ditches. Where wetlands or drainage ditches occur at any of the proposed yard sites, Pacific Connector will avoid wetland impacts by utilizing appropriate BMPs and working around them.

2.3.2.4 Access Roads

Existing egress and ingress points to and from the construction right-of-way have been identified in Table 8A-1 in Appendix 8A to Resource Report 8. Additionally, Table 8A-1 identifies which existing roads will need to be graded or widened to allow for large equipment turning radius, and which roads may need minor improvements, such as potholing, grading to remove ruts and/or limbing to remove overgrowth to accommodate oversized and heavy construction equipment. The existing access roads that are proposed for use and that require some level of improvement (i.e., blading/grading, filling potholes, brush clearing, widening, turnouts, etc.) were surveyed for wetlands and waterbodies (see wetland delineation report, submitted to FERC as a stand alone document). The wetland delineation report provides a constraints-based survey of wetlands and waterbodies along access roads where improvement will be necessary for project use. The purpose of this access road survey is to identify areas where improvements will be avoided/limited to avoid wetland resource impacts and to identify locations where BMPs need to be installed to minimize potential impacts. BMPs may include silt fence/straw bale sediment barriers or prefabricated construction mats to prevent rutting/compaction impacts.

Wetlands identified during the survey are included in the wetland delineation report (submitted as a stand alone document). Table 2A-7 in Appendix 2A provides the locations of where wetlands or waterbodies occur within 100 feet of a proposed access road that requires some type of road improvement (i.e., minor road widening, turnout, or curve widening). These wetlands are also shown on the USGS topographic maps provided in the Mapping Supplement.
<table>
<thead>
<tr>
<th>Name</th>
<th>County</th>
<th>Size (acres)</th>
<th>Description</th>
<th>Wetland and Waterbody Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>North Spit Dock Yard</td>
<td>Coos</td>
<td>4.79</td>
<td>Old industrial dock; gravel and grassy surface</td>
<td>Over half of the site has been paved/graded. A ditch and a depressional area are located on western side of site. Pacific Connector would avoid these areas if site is used.</td>
</tr>
<tr>
<td>Weyerhaeuser Cove</td>
<td>Coos</td>
<td>N/A</td>
<td>Old industrial; half is paved</td>
<td>Within the undeveloped portion of this site there are five drainage features and one wetland. These features would be avoided by project activities if this site is used.</td>
</tr>
<tr>
<td>Coquille Sawmill Yard</td>
<td>Coos</td>
<td>7.47</td>
<td>Old industrial; abandoned sawmill; previously utilized as a contractor's yard</td>
<td>No wetlands present. Coquille River along west side of site.</td>
</tr>
<tr>
<td>Fairview Yard</td>
<td>Coos</td>
<td>2.24</td>
<td>Old industrial; gravelized and dirt surfaces</td>
<td>No wetlands or streams features present.</td>
</tr>
<tr>
<td>Coquille Yard</td>
<td>Coos</td>
<td>21.84</td>
<td>Old industrial, vacant lot</td>
<td>Riparian strip adjacent to river to be avoided by project activities if site used. Potential seasonal wetlands in shallow, compacted depressions - hydrophytic vegetation present in vacant lot.</td>
</tr>
<tr>
<td>Georgia Pacific-Coos Bay</td>
<td>Coos</td>
<td>107.1</td>
<td>Active Sawmill &amp; Lumber Yard</td>
<td>The only wetland features at this active sawmill/yard are associated with Isthmus Slough and wetlands on adjacent lands. These wetlands would not be affected by project activities.</td>
</tr>
<tr>
<td>Glendale#1</td>
<td>Douglas</td>
<td>4.43</td>
<td>Vacant lot/old industrial</td>
<td>Not surveyed (access denied)</td>
</tr>
<tr>
<td>Glendale#2</td>
<td>Douglas</td>
<td>6.80</td>
<td>Vacant lot/old industrial</td>
<td>Not surveyed (access denied)</td>
</tr>
<tr>
<td>Old Highway 99 Yard</td>
<td>Douglas</td>
<td>8.76</td>
<td>Gravel-surfaced vacant lot</td>
<td>Not surveyed (access denied)</td>
</tr>
<tr>
<td>Sutherlin John Murphy Yard</td>
<td>Douglas</td>
<td>85.49</td>
<td>Old industrial, formerly John Murphy Plywood Mill; a portion has an asphalt surface</td>
<td>Not surveyed (access denied)</td>
</tr>
<tr>
<td>Sutherlin Central Avenue</td>
<td>Douglas</td>
<td>0.18</td>
<td>Old industrial; formerly Gerretsen Building Supply Co.</td>
<td>Entirely paved or graded - no wetlands</td>
</tr>
<tr>
<td>Gravel Pit South Winston</td>
<td>Douglas</td>
<td>128.93</td>
<td>Operational gravel pit</td>
<td>Excavated ponds and wetlands present on floodplain in areas of past aggregate mining areas. The southern portion of site (10 acres) is current aggregate operation.</td>
</tr>
<tr>
<td>Green #1 Yard</td>
<td>Douglas</td>
<td>9.37</td>
<td>Old industrial, vacant lot</td>
<td>No wetlands or streams.</td>
</tr>
<tr>
<td>Green District Yard</td>
<td>Douglas</td>
<td>7.05</td>
<td>Old industrial log yard, gravel-surfaced</td>
<td>Unnamed stream present along north edge of</td>
</tr>
<tr>
<td>Name</td>
<td>County</td>
<td>Size (acres)</td>
<td>Description</td>
<td>Wetland and Waterbody Features</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>------------</td>
<td>--------------</td>
<td>------------------------------</td>
<td>--------------------------------</td>
</tr>
<tr>
<td>Days Creek Yard</td>
<td>Douglas</td>
<td>178.65</td>
<td>Parking lot</td>
<td>Site will not be affected. Potential of seasonal wetlands in low areas in the center of site – to be avoided by project activities.</td>
</tr>
<tr>
<td>Riddle Pasture</td>
<td>Douglas</td>
<td>22.69</td>
<td>Pasture</td>
<td>Not surveyed (access denied).</td>
</tr>
<tr>
<td>Riddle Main Street</td>
<td>Douglas</td>
<td>8.78</td>
<td>Old industrial; vacant lot</td>
<td>No wetlands present. Drainage ditch on west side end to be avoided.</td>
</tr>
<tr>
<td>Green Diamond Pipe</td>
<td>Douglas</td>
<td>67.28</td>
<td>Active mining operation</td>
<td>No wetlands or streams.</td>
</tr>
<tr>
<td>Milo Yard</td>
<td>Douglas</td>
<td>N/A</td>
<td>Former quarry</td>
<td>Two excavated ponds in center site: wet swale along east side of site. Ponds will not be affected and swale will be matted if necessary to minimize temporary project disturbance.</td>
</tr>
<tr>
<td>Highway 99 Hayfield Yard</td>
<td>Douglas</td>
<td>96.35</td>
<td>Agriculture (hayfield)</td>
<td>Not surveyed (access denied).</td>
</tr>
<tr>
<td>Weaver Road Yard</td>
<td>Douglas</td>
<td>7.75</td>
<td>Old industrial log storage yard</td>
<td>No wetland present. Drainage along north side edge. Channel will not be altered or affected by project activities.</td>
</tr>
<tr>
<td>Hult Chip Yard (Pipe)</td>
<td>Douglas</td>
<td>13.31</td>
<td>Old industrial; paved or graveled</td>
<td>No wetlands present. S. Umpqua River along southwest edge.</td>
</tr>
<tr>
<td>Hult Chip Yard (Parking)</td>
<td>Douglas</td>
<td>2.65</td>
<td>Old industrial; gravel surface</td>
<td>No wetlands present.</td>
</tr>
<tr>
<td>Hult Chip Yard (Roll)</td>
<td>Douglas</td>
<td>8.90</td>
<td>Old industrial; paved</td>
<td>No wetlands present. Drainage ditch (wetland) on east side of railroad but will not be affected by project activities.</td>
</tr>
<tr>
<td>Burrill Lumber</td>
<td>Jackson</td>
<td>64.11</td>
<td>Old Lumber Mill/log yard, lumber/log yard</td>
<td>Small shallow depressions support hydrophytic species from seasonal ponding. Ponding likely due to past soils soil compaction from previous site landuse. A drainage ditch crosses through the yard from north to south.</td>
</tr>
<tr>
<td>Burrill Real Estate – Medford Industrial Park</td>
<td>Jackson</td>
<td>92.05</td>
<td>Vacant Lot in Industrial Park</td>
<td>Narrow wetland ditched drainages along southern, western, and eastern edges and two bisecting the site. Seasonal wetland mosaic in western portion of yard. The drainage features would be matted to cross and the wetlands would be avoided by project activities.</td>
</tr>
<tr>
<td>Name</td>
<td>County</td>
<td>Size (acres)</td>
<td>Description</td>
<td>Wetland and Waterbody Features</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>-----------</td>
<td>--------------</td>
<td>--------------------------------------------------</td>
<td>-------------------------------</td>
</tr>
<tr>
<td>Avenue F and 11th Street</td>
<td>Jackson</td>
<td>26.17</td>
<td>Industrial business and vacant leveled lot</td>
<td>No wetlands or streams.</td>
</tr>
<tr>
<td>Oregon Opportunities</td>
<td>Jackson</td>
<td>5.18</td>
<td>Undeveloped/vacant lot in Industrial Park</td>
<td>Seasonal emergent wetland is present along railroad tracks on north end of site. Temporary construction mats or geotextile fabric and gravel padding would be used as a temporary access pad to railroad tracks if offloading pipe is necessary.</td>
</tr>
<tr>
<td>Avenue C and 7th Street – Elite Cabinet and Doors</td>
<td>Jackson</td>
<td>26.40</td>
<td>Undeveloped land within industrial park</td>
<td>Scattered seasonal wetlands and a drainage ditch present.</td>
</tr>
<tr>
<td>Rogue Aggregates</td>
<td>Jackson</td>
<td>117.22</td>
<td>Active aggregate quarry and processing facility and undeveloped land</td>
<td>No wetlands present. Several small ephemeral streams cross the site the function of these drainages will not be affected by project activities. North end of site within floodplain.</td>
</tr>
<tr>
<td>Collins Pacific</td>
<td>Klamath</td>
<td>N/A</td>
<td>Active Wood Products Plant</td>
<td>No wetlands present.</td>
</tr>
<tr>
<td>Klamath Amuchastegui Building</td>
<td>Klamath</td>
<td>25.44</td>
<td>Site has been built (July 2007)</td>
<td>Not surveyed (access denied – site built)</td>
</tr>
<tr>
<td>Klamath Falls Industrial Oil</td>
<td>Klamath</td>
<td>39.46</td>
<td>Undeveloped site</td>
<td>No wetlands present.</td>
</tr>
<tr>
<td>Klamath Falls Memorial Drive</td>
<td>Klamath</td>
<td>48.00</td>
<td>Undeveloped site</td>
<td>Wetland is present along east side of site adjacent to railroad which would be avoided by project activities.</td>
</tr>
<tr>
<td>Klamath Falls Memorial Drive Pipe Yard</td>
<td>Klamath</td>
<td>24.7</td>
<td>Old industrial/vacant lot</td>
<td>No wetlands present.</td>
</tr>
<tr>
<td>Klamath Falls North of Cross Road East</td>
<td>Klamath</td>
<td>30.56</td>
<td>Farmland</td>
<td>No wetlands present. Wet area from irrigation runoff in low area by access road – will not be affected.</td>
</tr>
<tr>
<td>Klamath Falls North of Cross Road West</td>
<td>Klamath</td>
<td>37.37</td>
<td>Farmland</td>
<td>No wetland or streams present.</td>
</tr>
<tr>
<td>Merrill Siding</td>
<td>Klamath</td>
<td>9.78</td>
<td>Railroad siding</td>
<td>No wetlands present.</td>
</tr>
</tbody>
</table>

1. This yard is incorporated in the construction footprint as TEWA 1.46. The area (acres) of this yard is included in the temporary extra work area impacts for the project.
2. This yard is incorporated in the construction footprint as TEWA 94.52-W. The area (acres) of this yard is included in the temporary extra work area impacts for the project.
3. This yard is incorporated in the construction footprint as TEWAs 198.22-W, 198.42-W, 198.43-N, and 198.72-N. The area (acres) of this yard is included in the temporary extra work area impacts for the project.
4. The Wetland Delineation Report provides additional information (provided as a stand alone document).
2.3.2.5 Aboveground Facilities

There will be no wetland impacts as a result of construction of any of the PCGP Project aboveground facilities.

2.3.3 Wetland Construction and Operation Impacts and Mitigation

2.3.3.1 Impacts

Resource recovery time is considered an important factor in determining and evaluating impacts to wetlands. Impacts are considered to be temporary, long-term or permanent depending on the amount of time required for the re-establishment of wetland function. Recovery within a period of three years after construction is considered temporary. A recovery period of greater than 3 years is considered long-term. The non-recoverable loss of a particular wetland’s function is considered permanent.

The primary impact on wetlands from pipeline construction and operation will be the temporary, long-term, or permanent alteration of wetland vegetation (see Table 2.3-3). In herbaceous wetlands (palustrine emergent systems) this impact will be temporary because herbaceous vegetation regenerates quickly, and the hydrology of the wetland will not be altered. In forested or scrub-shrub wetlands, the impact may be long-term because the recovery period for these wetland types may require more than 3 years to reach preconstruction conditions, especially in forested systems. Clearing of wetland vegetation, especially in forested or scrub-shrub types can also result in the loss or alteration of wildlife habitat. Construction activities can temporarily displace wildlife from affected wetlands and can diminish the recreation and aesthetic values of the wetland in the areas affected by the project.

<table>
<thead>
<tr>
<th>Wetland Type</th>
<th>Potential Impact to Water Quality (Temperature)</th>
<th>Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td>PEM Palustrine Emergent</td>
<td>Low</td>
<td>Emergent systems contain few to no trees and therefore do not rely on shade for temperature regulation.</td>
</tr>
<tr>
<td>PSS Palustrine Scrub/Shrub</td>
<td>Low-Moderate</td>
<td>Shade impacts to scrub-shrub systems will be temporary (3-5 years) and would likely only have a small (immeasurable) effect on downstream water quality (temperature). After the initial clearing and construction, these wetlands will be re- planted with native shrubs.</td>
</tr>
<tr>
<td>PFO Palustrine Forested</td>
<td>Moderate</td>
<td>Clearing and required long-term maintenance of the pipeline may impact shading of forested wetlands. Due to the small size of forested wetlands along the proposed route and the narrow footprint of the cleared alignment (30-foot width, long-term maintenance corridor), shade impacts will likely have only a small (immeasurable) effect on downstream water quality (temperature). All disturbed riparian areas would be revegetated with woody species.</td>
</tr>
<tr>
<td>Wetland Type</td>
<td>Potential Impact to Water Quality (Temperature)</td>
<td>Rationale</td>
</tr>
<tr>
<td>-----------------------</td>
<td>-----------------------------------------------</td>
<td>--------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Riverine (Upper, lower and intermittent)</td>
<td>Moderate</td>
<td>Due to the narrow footprint of the cleared alignment, shade impacts will likely have only a small (immeasurable) effect on downstream water quality (temperature) where woody riparian vegetation is disturbed. All disturbed riparian areas would be revegetated with woody species.</td>
</tr>
<tr>
<td>Ditches</td>
<td>Low</td>
<td>Most of the ditches within the project area are located in areas with few trees.</td>
</tr>
<tr>
<td>Estuarine</td>
<td>Low</td>
<td>Generally the shores of the estuarine wetlands are not shaded by trees. Those that do have negligible impacts from tree removal due to the large size of the wetland relative to the narrow band of trees and shade available along the shoreline.</td>
</tr>
</tbody>
</table>

Where the pipeline traverses disturbed emergent wetlands, such as agricultural areas (cropland, hayfields and pastures), the typical 95-foot wide construction footprint in uplands will be maintained because these wetlands are degraded systems that are expected to fully recover within one full growing season. Furthermore, where wetland neck downs occur, TEWAs (set back 50 feet from the wetland area) are typically required on one or both sides of the wetland crossing to compensate for the reduction in the width of the construction right-of-way. These TEWAs are often located in forested or shrub vegetation types that have higher functional value than emergent wetland systems. The construction right-of-way in scrub-shrub or forested wetlands would be necked down to minimize impacts to these wetland systems that generally have a higher functional value. The Environmental Alignment Sheets (provided under separate cover) illustrate locations where the right-of-way has been necked down in wetlands to minimize impacts. These construction techniques will minimize disturbance and permanent impacts to wetlands by reducing the amount of clearing that is required to install the 36-inch pipeline. Pacific Connector has attempted to design the PCGP Project so that impacts to sensitive habitats are minimized and construction can still be completed efficiently.

Table 2A-3 in Appendix 2A lists the milepost location, classification and the crossing length of the excavated trench (in feet) as well as construction-related disturbance (in acres) for each wetland that will be affected by construction. Table 2A-8 in Appendix 2A provides a summary of the project’s wetland impacts by watershed (Fifth Field/HUC10) and Cowardin classification. The PCGP Project will cross a total of approximately 61,472.87 feet (11.64 miles) of wetlands. The construction right-of-way and temporary extra work areas will affect 238.96 acres of wetlands, including 76.28 acres of estuary wetlands, 137.69 acres of palustrine emergent wetlands, 16.93 acres of riverine wetlands, and 5.21 acres of palustrine forested wetlands. Additionally, 0.82 acre of palustrine scrub-shrub wetlands and 2.03 acres of palustrine unconsolidated bottom or aquatic bed wetlands (stock ponds) wetlands will be disturbed by the PCGP Project.

Permanent wetland vegetation type conversion impacts have been quantified for each forested or scrub-shrub wetland affected by the project where permanent maintenance of the pipeline’s operational corridor would convert the wetland to a different wetland type (see Table 2A-3 in Appendix 2A). Permanent vegetation type conversion impacts
for the project will affect a total of 1.48 acres of wetlands including 1.36 acres of palustrine forested and 0.12 acre of palustrine scrub-shrub wetlands.

The majority of the PCGP Project’s wetland crossings and impacts occur in Coos County between MPs 1.47R and 17.82 (within HUC 1710030403 – Coos Bay-Frontal Pacific Ocean) where 26,988.47 feet (5.11 miles) of wetlands will be crossed and a total of 131.73 acres of wetlands will be impacted during construction (see Table 2A-3 in Appendix 2A). The wetland crossing lengths within this HUC represent 44 percent of the project total, while the acres of impact represent approximately 55 percent of the total acres of wetlands affected by the PCGP Project. Furthermore, installing the pipe in Haynes Inlet between MPs 1.7R and 4.1R will cross 12,951.34 feet (2.45 miles) of estuarine wetlands, impacting 76.28 acres of wetland and open water habitats. The estuary crossing is 48 percent of the total wetland crossing length and 58 percent of the total wetland impact within the watershed. Various eelgrass surveys have been conducted with the Coos Bay Estuary (Oregon Department of Land Conservation and Development - ODLCD 1998; Clinton 2007); however, the most recent eelgrass survey indicates that approximately 1 acre of eelgrass would be impacted during the pipe installation within the Coos Bay Estuary (Ellis Ecological Services, 2009). Eelgrass densities within Coos Bay vary, and are defined as low-density (10 to 39 percent cover), medium-density (40 to 79 percent cover), and high-density (≥ 80 percent cover). The majority of eelgrass impacted within Coos Bay would consist of low-density, while no high-density eelgrass would be impacted. The remaining impacts within the bay would occur to sand/mud flats and shallow subtidal areas (Ellis Ecological Services, 2009 - provided in the JPA stand alone document/10-JPA-Appendix1).

The Coos Bay Water Route Construction Plan (PCS, 2012 - provided in the JPA stand alone document/9-JPA) describes the construction methods and mitigation measures that will be utilized during this crossing. Resource Report 10 describes the routing alternatives that were considered in the Coos Bay area and the rationale for the proposed route.

The Lake Ewauna – Upper Klamath River fifth field HUC (1801020412), crossed in Klamath County between MPs 189.01 and 205.59, will have the second longest length of wetland crossings – 19,206.38 feet (3.64 miles) and the second largest acreage of wetland impacts – 67.82 (see Table 2A-3 in Appendix 2A). The wetland crossing length within this HUC represents 31.24 percent of the project total and the acres of wetland impact represent 28.38 percent. The impacts (67.82 acres) within this HUC will occur almost entirely to disturbed emergent agricultural pasture and hayfield wetlands, ditches, and canals. The impacts would be temporary and short-term.

The Big Butte Creek fifth field HUC (1710030704) crossed by the project in Jackson County between MPs 129.54 and 135.04 will have the third longest length of wetland crossings – 3,466.41 feet (0.66 mile) and 7.46 acres of wetland impacts (see Table 2A-3 in Appendix 2A). The wetland crossing length within this HUC represents 5.64 percent of the project total, and the acres of wetland impact represent 3.12 percent. The wetland impact within this HUC will occur primarily to palustrine emergent wetlands and pasture and hayfield wetlands.

The Olalla Creek-Lookingglass Creek fifth field HUC (1710030212), crossed in Douglas County between MPs 52.98 and 62.41, will have 2,231.60 feet (0.42 mile) and 5.44 acres of wetland impacts (see Table 2A-3 in Appendix 2A). The wetland crossing length
within this HUC represents 3.63 percent of the project total while the acres of wetland impacts represent 2.28 percent. The wetlands impacts within the four HUCs (i.e., Coos Bay Frontal, Lake Ewauna – Upper Klamath River, Big Butte Creek and Olalla Creek-Lookingglass Creek) represent approximately 84.43 percent of the total wetland crossing length and 88.91 percent of the project’s wetland impacts.

Wetland impacts outside of these four HUCs will occur primarily to numerous small palustrine emergent wetlands and intermittent drainages where impacts would be temporary and short-term. Impacts to intermittent waterbodies and riparian vegetation are further discussed in Section 2.2 of this Resource Report as well as Sections 3.2 and 3.3 in Resource Report 3. Wetland impacts within these systems are expected to be fully restored within one or two growing seasons. It should be noted that wetland impacts across the entire 231.82-mile PCGP Project length will only impact 11 palustrine forested wetlands systems and 3 scrub-shrub wetlands where permanent vegetation type conversion impacts are expected due to operational maintenance and where habitat impacts would be considered long-term – lasting more than 3 years.

Table 2A-3a provides the total wetland impact on BLM and NFS lands crossed by the PCGP Project. A total of 71.24 miles of federal lands are crossed which are managed by the BLM (39.96 miles) and Forest Service (30.63 miles). On these lands, the project will cross a total of 1,137.87 feet (0.22 mile) of wetlands and impact a total of 3.02 acres in 88 wetland systems. Permanent wetland vegetation type conversion impacts associated with maintenance of the project’s operational corridor to facilitate corrosion and leak surveys, will impact a total of 0.14 acre of palustrine forest and scrub-shrub wetlands.

A function and values assessment of wetlands was conducted in order to determine which affected wetlands were high value wetlands. The HGM assessment is included as an appendix to the wetland delineation report, which is provided in the JPA stand alone document/11-JPA-AppendixN. The criteria used to assess wetlands were their water quality and quantity, the value of their fish and wildlife habitat, their native plant communities and species diversity, and their value for recreation and educational purposes.

Appendix 2A includes Table 2A-10 which lists the permanent and temporary impacts to high-value wetlands and the justification for their classification as high value wetlands. Long-term impacts to high-value wetlands could include permanent filling of wetlands resulting in loss of function or a type conversion from forest-shrub wetlands to herbaceous wetlands, which would result in a change in wetland function. Of the 1.48 acres of permanent wetland impacts, 0.62 acre would occur to high-value wetlands.

2.3.3.2 Mitigation

Overall impacts to wetlands from construction of the PCGP Project have been significantly avoided through routing efforts. Although the proposed pipeline alignment crosses a large number of wetlands and drainages, the cross-country route primarily follows ridgelines as it traverses the Coast, Klamath, and Cascade mountains and foothills. This ridgeline alignment provides the most stable landscape position for the pipeline and minimizes the number of wetlands and waterbodies that must be crossed.
as the route proceeds in a southeasterly direction over these mountain ranges toward the terminus near Malin, Oregon. Many of the unnamed waterbodies that are crossed are intermittent headwater streams that are expected to be dry during the summer construction window.

To minimize disturbance impacts where wetlands must be crossed, Pacific Connector has necked down the construction right-of-way through forested and scrub-shrub wetlands to 75 feet from a typical 95-foot wide construction footprint in upland areas, consistent with FERC's Wetland and Waterbody Procedures. Safety and constructability issues prevent further narrowing of the right-of-way in wetland areas. In addition, TEWAs have been located at least 50 feet away from the wetland boundary, except where the adjacent upland consists of actively cultivated or rotated cropland or other disturbed land. Where site-specific topographic or engineering constraints prevent this setback, a variance from FERC's Wetland and Waterbody Procedures has been requested (see Table 1A-1 in Appendix 1A to Resource Report 1).

Three HDDs and one DP have been incorporated into the PCGP Project design: 1) Coos River, 2) Rogue River, 3) Klamath River, and 4) South Umpqua River at MP 71.30. These construction methods will be utilized in an attempt to avoid impacts to these riverine systems and the aquatic resources that they support.

Additionally, the following measures will be implemented during construction to further minimize impacts to wetland resources:

**Erosion and Sedimentation Controls**

Construction activities can cause disturbance to the surface soils and subsequent erosion into adjacent wetlands. Erosion will be minimized by the installation of temporary erosion control devices between upland construction areas and wetlands. Permanent erosion control measures, including regrading or recontouring to re-establish pre-construction drainage patterns; installation of slope breakers; use of interceptor diversion dikes; and re-establishment of vegetative cover will be utilized on adjacent upland areas to minimize long-term sedimentation of the wetlands. Energy dissipation devices may be installed at the down-slope end of slope breakers to prevent erosion off the right-of-way into wetlands.

Trench plugs may be installed in upland slopes adjacent to wetlands to prevent trench erosion. Trench plugs will be installed, where necessary, at the edges of the wetland to prevent subsurface drainage along the pipeline and alteration of the wetland hydrology. Permanent erosion control structures, which may alter hydrology, will not be installed within wetland boundaries, but utilized in the adjacent upland areas to control erosion and sedimentation (e.g., slope breakers). The Erosion Control and Revegetation Plan (see Appendix 1B to Resource Report 1/Appendix I to the POD) provides detailed descriptions of the erosion control measures that would be implemented to minimize erosion and sedimentation.

**Compaction**

Compaction of wetland soils and soil mixing from rutting within wetlands will be minimized by using low ground weight equipment and/or by working from pre-fabricated timber mats. Where there is reasonable access around a wetland in upland areas,
construction equipment operating in wetland areas will be limited to that needed to clear the construction right-of-way, dig the trench, fabricate and install the pipe, backfill the trench, and restore the right-of-way. The construction right-of-way may be used for access when the wetland soil is firm enough to avoid rutting or the construction right-of-way has been appropriately stabilized to avoid rutting (e.g., with timber riprap, pre-fabricated equipment mats, or terra mats).

Topsoil Mixing
Soil characteristics can be changed during construction because of inadvertent mixing of topsoil and subsoils. To prevent such mixing in unsaturated wetlands, topsoil will be removed from directly over the trench and stockpiled for restoration as closely as possible to its original horizon. The wetland topsoil will be stockpiled in the wetland adjacent to the trench.

Potential Spills
Inadvertent spills of fluids used during construction, such as fuels and lubricants, could contaminate wetland soils and vegetation. To minimize the potential for spills and any impacts from such spills, Pacific Connector’s SPCC Plan (see Appendix 2B/Appendix X to the POD) will be implemented. In general, hazardous materials, chemicals, fuels, lubricating oils, and concrete-coating activities will be conducted in accordance with FERC’s Wetland and Waterbody Procedures and the SPCC Plan.

Hydrology
Permanent changes in surface and subsurface hydrology through a wetland can have a long-term impact on the wetland type and quality. To minimize these impacts, all disturbed areas within wetlands will be returned to their pre-construction contours, to the extent practicable, to maintain the wetlands’ hydrologic characteristics. Trench plugs will be installed, where necessary, to ensure that wetland hydrology is maintained (see Section 4.2.1 in the ECRP/Appendix 1B to Resource Report 1 or Appendix I to the POD).

Revegetation
During clearing, wetland vegetation will be cut just above ground level, leaving existing root systems in place to allow resprouting/regeneration. Stumps will only be removed from areas directly over the trench or where they create a safety hazard, as determined by Pacific Connector’s Chief Inspector. This will facilitate reestablishment of woody species by enabling sprouting from existing root systems. To further promote reestablishment of native wetland species, up to 12 inches of topsoil will be salvaged in all unsaturated wetlands over the trenchline and returned to the top of the trench after construction. Topsoil salvaging will promote re-establishment of wetland species by preserving the vegetative propagules (i.e., seeds, tubers, rhizomes, bulbs, etc.) in the soil. These propagules have the potential to re-establish by germinating or sprouting from the replaced topsoil.

Fertilizer or lime will not be used in wetlands. After construction, wetlands will be seeded using wetland seed mixtures to further promote vegetation re-establishment. These seed mixtures are provided in the Erosion Control and Revegetation Plan (see
Appendix 1B to Resource Report 1/Appendix I to the POD. Agricultural and disturbed, emergent wetlands, which are dominated by introduced species, will be seeded with Seed Mixtures 9, 10 and 11 depending on location. Wetlands that are dominated by native species will be seeded with Seed Mixture 12 or 16. However, some of these native species may be difficult to acquire commercially in the required quantity. Therefore, these species may be eliminated from the mixture and other adaptable native species substituted. Only native species would be utilized on BLM and NFS lands according to agency native seed policies.

On private lands, annual ryegrass and barley may be included as dominant species in the wetland seed mixtures because these species germinate quickly and provide a temporary vegetation cover for erosion and weed control during the period when wetland species are reestablishing. These annual species are not expected to persist in wetlands because they must germinate from seed each year. As the wetland species are re-establishing, these species would be out-competed because they are not well adapted to hydric soils. Annual ryegrass is the recommended wetland seeding species according to FERC's Wetland and Waterbody Procedures (Section VI. C. 5.). For forested and shrub wetlands including riparian areas associated with waterbodies, Table 10.12-1 in the Erosion Control and Revegetation Plan presents suggested native shrub and tree plantings which may be utilized during restoration based on site-specific moisture regimes.

Revegetation will be monitored periodically for the first 3 years following construction. Revegetation will be considered successful when the native vegetative cover of herbaceous and/or woody species is at least 80 percent of the type, density and distribution of the vegetation adjacent to the wetland areas that were not disturbed by construction. During right-of-way maintenance activities, Pacific Connector will not use herbicides or pesticides in or within 100 feet of wetlands unless allowed by the land management or permitting agency.

Compensatory Wetland Mitigation

Implementation of the Project would not require any permanent wetland fill. However, approximately 1.48 acres of wetland type conversion impacts would occur where maintenance of the pipeline's operational corridor would convert forested or scrub-shrub wetlands to a different wetland type to facilitate corrosion and leak surveys. To mitigate for the 1.48 acres of permanent wetland vegetation type conversion impacts, Pacific Connector proposes to utilize a compensatory wetland mitigation (CWM) site at the former Kentuck Golf Course in Coos County. The proposed CWM mitigation project would enhance approximately 6.28 acres of degraded golf course emergent wetlands to forested wetlands. The proposed mitigation would improve hydrologic function within the wetland by filling a manmade ditch, removing berms, increasing microtopography and throughflow times, and restoring historic channels. Impacts from pipeline construction would be primarily a result of conversion from a mixture of forested and shrub wetlands to a mixture of shrub and herbaceous wetlands. The CWM plan will entail converting existing, degraded pasture wetland within the former golf course to complex native forested wetland, essentially a reversal of the proposed impacts (see Appendix 2K).

To mitigate for the PCGP Project's temporary estuary impacts in Coos Bay (i.e., eelgrass and salt marsh), Pacific Connector has developed a mitigation plan (Ellis
Ecological Services, 2009), which is provided in the JPA stand alone document/10-JPA-AppendixI.

To provide for instream habitat enhancement of the construction right-of-way, Pacific Connector will salvage pieces of LWD with attached root wads and with tree-trunk lengths and diameters (dbh) as specified by ODFW or other regulatory agencies during clearing of the temporary construction right-of-way and TEWAs. During the permitting phase of the project, Pacific Connector will consult with the agencies on the number of pieces needed. Suitable LWD would be collected, transported, and stockpiled at designated locations. The LWD would be donated to ODFW and/or other conservation organizations to use for stream restoration and salmon recovery projects (as LWD structures or engineered log jams) that are being implemented within the watersheds affected by the PCGP Project. In addition, Pacific Connector is in the process of developing a CMP to mitigate for potential effects on BLM and NFS lands. The BLM and Forest Service have proposed a suite of off-site mitigation projects which are intended to be responsive to BLM RMP and Forest Service LRMP objectives that include:

- Compliance with the Aquatic Conservation Strategy of the Northwest Forest Plan;
- Habitat for T&E species including northern spotted owls, marbled murrelets, and coho;
- Mitigation of impacts on LSRs; and
- Specific resource issues as they occur by watershed.

The CMP includes the BLM and Forest Service mitigation summaries which provide the various offsite mitigation projects as supplemental mitigation to address important issues or land management plan objectives that cannot be mitigated on-site. The BLM’s and Forest Service’s mitigation summaries list the proposed projects by watershed. The mitigation projects include placement of LWD in steams, road surfacing and drainage repairs, road decommissioning, fish passage culvert replacements, reallocation of Matrix lands to LSR and the acquisition of matrix lands, terrestrial restoration, fire protection, fuels reduction, and projects to enhance special habitats.

Pacific Connector is assessing the BLM’s mitigation projects in relation to Project effects by watershed, along with the Forest Service’s mitigation projects that have been approved in principle by Pacific Connector. The BLM and Forest Service mitigation projects are also being reviewed with respect to the Project’s responsibilities to mitigate for the potential effects to ESA-listed species and their habitats during the consultation process with the U.S. Fish and Wildlife Service.

2.3.4 Wetland Crossing Permits

Pacific Connector will submit applications for the necessary 404 and 401 jurisdictional wetland permits from the COE, ODSL, and ODEQ. Mitigative measures to offset project impacts will be negotiated, as necessary, between Pacific Connector and the respective regulatory and resource agencies.
2.4 GROUNDWATER RESOURCES

This section describes the geology, hydrology, quality, and use of the principal aquifers within the PCGP Project area; the potential for impacts of the PCGP Project construction on those aquifers; and proposed measures to mitigate those impacts.

2.4.1 Regional Aquifers

The PCGP Project does not cross any regional aquifer systems. Groundwater is a critical natural resource providing domestic, industrial and agricultural water supply; base flow for rivers, lakes, streams, wetlands, and other beneficial uses. There are four general aquifer types (unconsolidated-deposit, pre-Miocene rock, volcanic and sedimentary rock, and Pliocene and younger basaltic rock) defined by their geologic and hydrologic characteristics within the PCGP Project area, which are described in detail below.

Groundwater is commonly available in shallow wells that are completed in unconsolidated-deposit aquifers that consist primarily of sand and gravel but contain variable quantities of clay and silt. Unconsolidated-deposit aquifers occur throughout the proposed pipeline alignment. They first occur in and around Coos Bay between MPs 1.47R and 23.43 for approximately 7.63 miles. Between MPs 55.28 and 69.70, they are crossed for approximately 3.12 miles. Near Klamath Falls, unconsolidated-deposit aquifers are found between MPs 191.85 and 214.91 for about 23.02 miles (USGS, 1994). Many of the larger, lower gradient streams in the area flow through unconsolidated deposits. These aquifers consist primarily of sand and gravel and are the most productive and widespread aquifers in Idaho, Oregon, and Washington. These unconsolidated-deposit aquifers typically provide freshwater for most public-supply, domestic, commercial, and industrial purposes (USGS, 1994).

Pre-Miocene Rock Aquifers. The majority of the proposed pipeline alignment from just south of Coos Bay between MPs 23.53 and 155.76 crosses aquifers in pre-Miocene rocks for about 132.37 miles. These aquifers consist of undifferentiated volcanic rocks, undifferentiated consolidated sedimentary rocks and undifferentiated igneous and metamorphic rocks principally in the mountainous areas of the PCGP Project. Within the Cascade Range and west of it, the consolidated sedimentary rocks are of marine origin and commonly yield saltwater. At depth, the saltwater can contaminate overlying freshwater aquifers. Permeability of the aquifers varies greatly. Water from wells completed in these aquifers is used mostly for domestic and agricultural (livestock watering) supplies (USGS, 1994).

Volcanic and Sedimentary Rock Aquifers. Due west of Medford, between MPs 134.24 and 156.88, the proposed pipeline alignment enters a groundwater area of volcanic and sedimentary rock aquifers for about 8.24 miles. These aquifers consist of a variety of volcanic and sedimentary rocks and are not as productive as the unconsolidated-deposit, Pliocene and younger basaltic-rock or Miocene basaltic-rock aquifers. Volcanic-and sedimentary-rock aquifers generally yield freshwater but locally yield saltwater. About 30 percent of the fresh groundwater withdrawals are used for public-supply, about 20 percent are used for domestic and commercial and about 50 percent are used for agricultural (primarily irrigation) purposes (USGS, 1994).
Pliocene and Younger Basaltic-rock Aquifers. Northeast of Medford between MPs 191.85 and 228.13, the proposed pipeline alignment passes south of Brown Mountain through Pliocene and younger basaltic-rock aquifers and crosses these for about 51.02 miles while passing in and out of unconsolidated-deposit aquifers. Pliocene and younger basaltic-rock aquifers consist primarily of thin, basaltic lava flows and beds of basaltic ash, cinders, and sand and yield freshwater that is used mostly for agricultural (primarily irrigation) purposes (USGS, 1994).

2.4.1.1 Groundwater Management Areas

Groundwater levels in a few areas have declined as a result of withdrawals by wells. State governments have taken steps to alleviate declines in some areas by enacting programs that either limit the number of additional wells that can be completed in a particular aquifer (Groundwater Management Area) or prevent further groundwater development (Critical Groundwater Area).

In areas where groundwater monitoring shows groundwater contamination at sufficiently high levels and the contamination is potentially related to non-point source activities on the land surface, ODEQ can declare a Groundwater Management Area (GWMA) under state law (Oregon Revised Statutes - ORS 468B.180). A local groundwater management committee comprised of affected and interested parties is formed. ODEQ then designates a lead agency responsible for developing an action plan to reduce existing contamination and prevent further groundwater contamination. The ODA is responsible for developing the portion of the action plan to address farming practices.

Oregon currently has three GWMAs: the Northern Malheur County Groundwater Management Area and the Lower Umatilla Basin Groundwater Management Area, declared over a decade ago; and the Southern Willamette Valley Groundwater Management Area declared in May 2004. ODEQ is assisting with implementation of the approved GWMA Action Plans in the Northern Malheur County and Lower Umatilla Basin. ODEQ samples groundwater quality monitoring networks, reviews data to assess groundwater quality trends and supports local efforts to implement BMPs to maintain and restore groundwater quality. The proposed pipeline alignment does not cross any GWMAs (ODEQ, 2013f). The Southern Willamette Valley GWMA, which is the GWMA nearest the project area, is located more than 50 miles northeast of Coos Bay.

2.4.1.2 EPA-Designated Sole Source Aquifers

The PCGP Project does not cross any EPA-designated sole source aquifers. The nearest EPA-designated sole source aquifer is the North Florence Dunal Aquifer, which is more than 35 miles to the north of the proposed pipeline alignment in Lane County, Oregon (EPA, 2013).

2.4.2 Groundwater Wells

Groundwater is a substantial source of drinking water in the areas traversed by the PCGP Project. About 95 percent of Oregonians in rural areas depend on groundwater. In many areas, groundwater is the only source of drinking water (ODEQ, 2012c). Records for groundwater supply wells in Oregon are maintained in separate databases by various agencies depending on the type and use of the well, as described below. The type of well and the use of the water dictate the level of regulation for the well.
Groundwater Wells that Supply Public Water Systems

Oregon implements its drinking water protection program through a partnership between the OHA and the ODEQ; the partnership addresses the assessment requirements of the 1996 Federal SDWA. The SDWA requires Source Water Assessments for all public water systems that have at least 15 hookups or serve more than 25 people year-round. About 80 percent of Oregonians get their drinking water from public water systems. ODEQ maintains the Drinking Water Protection database which includes public DWSA for both groundwater and surface water as well as the locations of public water system intakes and public groundwater wells. (ODEQ, 2012d)

FERC requires identification of public groundwater supply wells within 400 feet of the construction right-of-way and associated construction facilities. The ODEQ (2013c) Public Drinking Water database was reviewed, and according to the database there are no groundwater wells that supply public drinking water systems within 400 feet of the construction right-of-way or associated facilities. There are groundwater protection source areas (ODEQ, 2013d) that are crossed by the proposed pipeline alignment (see Table 2.4-1). None of the rock source and disposal sites, yards, access roads or aboveground facilities is located within a groundwater protection source area.

Table 2.4-1
Public Drinking Water Groundwater Protection Source Areas Crossed by the PCGP Project

<table>
<thead>
<tr>
<th>Starting Milepost</th>
<th>Ending Milepost</th>
<th>County</th>
<th>Public Groundwater Source Area</th>
<th>Public Drinking Water System ID</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.39R</td>
<td>6.74R</td>
<td>Coos</td>
<td>Kentucky Golf Course</td>
<td>4190858</td>
</tr>
<tr>
<td>195.09</td>
<td>196.14</td>
<td>Klamath</td>
<td>Production Metal Forming Inc</td>
<td>4195058</td>
</tr>
<tr>
<td>197.35</td>
<td>197.77</td>
<td>Klamath</td>
<td>Timber Resource Services LLC</td>
<td>4193994</td>
</tr>
<tr>
<td>198.45</td>
<td>199.23</td>
<td>Klamath</td>
<td>Collins Products LLC</td>
<td>4193955</td>
</tr>
<tr>
<td>199.23</td>
<td>199.62</td>
<td>Klamath</td>
<td>Collins Products LLC</td>
<td>4193995</td>
</tr>
<tr>
<td>199.26</td>
<td>199.66</td>
<td>Klamath</td>
<td>Columbia Plywood Corp</td>
<td>4194403</td>
</tr>
<tr>
<td>200.54</td>
<td>201.12</td>
<td>Klamath</td>
<td>Crossroads Mobile Home Park</td>
<td>4100446</td>
</tr>
</tbody>
</table>

Groundwater Wells with Water Rights

FERC requires identification of private groundwater wells within 200 feet of the construction right-of-way and associated construction facilities. The OWRD Groundwater Rights database was reviewed to determine where water rights have been obtained for groundwater wells (OWRD, 2013). Review of the database showed that there were three private wells within 200 feet of the construction right-of-way and associated construction facilities (see Table 2.4-2).

Table 2.4-2
Potential Private Wells within 200 Feet of the PCGP Project

<table>
<thead>
<tr>
<th>MP</th>
<th>Owner</th>
<th>Permit Number</th>
<th>Use</th>
<th>County</th>
</tr>
</thead>
<tbody>
<tr>
<td>217.34</td>
<td>J. Randall Pope</td>
<td>G-3957</td>
<td>Irrigation (Primary)</td>
<td>Klamath</td>
</tr>
<tr>
<td>224.04</td>
<td>Clark Unruh</td>
<td>G-12433</td>
<td>Irrigation (Supplemental)</td>
<td>Klamath</td>
</tr>
<tr>
<td>224.04</td>
<td>John Madden</td>
<td>G-365</td>
<td>Irrigation (Primary)</td>
<td>Klamath</td>
</tr>
</tbody>
</table>

Other Groundwater Wells

There are several types of groundwater wells in Oregon that are exempt from obtaining any kind of permit, and are therefore not registered or identified in a state database. These include wells for single or group domestic purposes not exceeding 15,000 gallons per day. Pacific Connector will attempt to identify any unregistered wells in the vicinity of the construction right-of-way during the easement acquisition process with individual
landowners prior to construction. Pacific Connector will supply landowners with documentation that explains the pipeline construction project and outlines the field investigation for identification of groundwater supplies. During the easement acquisition process, landowners will be requested to identify groundwater supply wells, springs, and seeps located on their property. Landowners will also be asked to identify the use of the water (see Appendix 2F – Groundwater Monitoring and Mitigation Plan).

Springs and Seeps
Springs and/or seeps that were identified during the wetland survey as water sources are noted in the wetland description in Table 2A-3 in Appendix 2A. Pacific Connector will further verify exact locations of wells or springs in the vicinity of the right-of-way during easement negotiations with landowners or managing entities. A Groundwater Supply Monitoring and Mitigation Plan is provided in Appendix 2F. It includes a discussion of identification of groundwater resources, determination of susceptibility to impacts and monitoring and mitigation if required for the protection of groundwater supply wells and springs and seeps.

2.4.3 Groundwater Quality
2.4.3.1 Potential Contaminated Groundwater
Pacific Connector reviewed ODEQ’s Environmental Cleanup Site Information (ECSI) (ODEQ, 2013e) database and the results are provided in Resource Report 8.

In 2005, DEQ and DHS completed source water assessments for more than 1,100 public water systems in Oregon. These assessments include a delineation of drinking water protection areas and provide data and information on the potential contamination risks to drinking water (natural and manmade). The 2005 GIS layer and maps of potential contamination sources were reviewed for groundwater contamination risks within 200 feet of the proposed pipeline.

Two sites in Klamath County are within 200 feet of the proposed pipeline construction disturbance; they are associated with the Collins Products, LLC public water system (source water is groundwater wells). One site, near MP 199.04, is associated with the Collins Products Truck Shop and is identified as underground storage tanks that have been removed and cleaned up. The site is rated lower to higher risk. The other site, near MP 199.57, associated with this public water system is located on Highway 97 and the PCS is located southeast of the wells. The risk at this site is stated as moderate. The PCGP Project will not impact these sites. According to the DEQ website (2013), the source water assessments and potential contamination sources have not been updated since 2005.

Pacific Connector has developed a Contaminated Substances Discovery Plan, included as Appendix E to the POD. This plan outlines practices to protect human health and worker safety and to prevent further contamination in the event of an unanticipated discovery of contaminated soil, water, or groundwater during construction
2.4.3.2 Shallow Groundwater

Areas where seasonal high groundwater table could occur along the proposed route are identified in Table 7A-2 in Appendix 7A to Resource Report 7. These areas will change seasonally and in response to precipitation.

2.4.4 Groundwater Construction and Operation Impacts and Mitigation

The primary pipeline construction activities that could affect groundwater are clearing of vegetation, excavation and dewatering of the trench, soil mixing and compaction, and fuel and lubricant handling. Although pipeline construction activities could affect groundwater resources, potential impacts will be avoided or minimized by the use of standard construction techniques and adherence to FERC's Wetland and Waterbody Procedures and Pacific Connector's SPCC Plan (see Appendix 2B/Appendix X to the POD).

2.4.4.1 Clearing

Clearing and grading can remove vegetation that acts as a filter or affects the groundwater recharge rate. Vegetation will only be cleared where necessary, and vegetation will be allowed to revert (with certain limitations) upon completion of construction. Shallow aquifers could experience minor impacts from changes in overland water flow and recharge caused by clearing and grading.

2.4.4.2 Trench Excavation and Dewatering

Trench excavation would be too shallow and too narrow to alter groundwater flow or have a significant effect on the major aquifer systems underlying the proposed Pacific Connector project. Dewatering of the pipeline trench will require pumping of groundwater and will be necessary in areas where there is a high water table (such as in alluvium) and where access to the trench is required for construction, such as at tie-in locations where welds are required to be made in the trench. The potential effect of groundwater withdrawal on aquifer users will depend on the rate and duration of pumping. Pipeline construction activities within a particular location are typically completed within several days, and any lowering of the groundwater table is expected to be temporary and localized. Pacific Connector will minimize the amount of time the trench remains open to allow the water table to return to original elevations as soon as possible.

In order to recharge the aquifer and prevent silt-laden waters from flowing into waterbodies and wetlands, Pacific Connector proposes to discharge all water from dewatering activities into upland areas using straw bale dewatering structures or silt bags as described in the ECRP (Appendix 1B to Resource Report 1/Appendix I to the POD). On federal lands, dewatering activities will be coordinated with the BLM or Forest Service. Implementation of these procedures is expected to minimize the impact on groundwater during dewatering operations. Trenching and dewatering could result in adverse impacts to springs and wetlands from disruption of water supply. Generally these impacts are temporary and water tables should be quickly re-established when backfilling is complete. However, alteration of the natural soil strata could potentially result in new migration pathways for groundwater away from waterbodies including springs and seeps. Pacific Connector will follow FERC's Wetland and Waterbody
Procedures requiring the use of trench breakers or installation of trench plugs at the edges of waterbodies and wetlands and on slopes and will also use these structures as necessary to ensure spring or seep discharges which flow over the trench line are not intercepted and/or diverted by the trench, thereby eliminating these potential impacts. Trench plugs are installed after the pipeline is installed in the trench and prior to trench backfilling.

To avoid long-term changes in water table elevation and subsurface hydrology, excavated topsoil and subsoils would be segregated, where appropriate, and returned as nearly as possible to their original soil horizon. With the use of these measures, impacts to groundwater pathways, including springs and seeps, are not likely.

Because pipeline construction activity is generally limited to surface disturbance and shallow trenching, is temporary, and is contained within the approved construction work areas, groundwater wells (both public and private) beyond 200 feet of the construction work areas are not expected to be affected by the pipeline. Pre-construction surveys will be conducted as described in Pacific Connector’s Groundwater Supply and Mitigation Plan (see Appendix 2F) to confirm the presence and locations of groundwater wells, both public and private. Pacific Connector developed the Groundwater Supply Monitoring and Mitigation Plan (see Appendix 2F) in order to identify monitoring and mitigation measures to prevent and/or minimize impacts to groundwater. There are three phases to the plan:

1. Identification of groundwater supplies through records review, field surveys, and landowners;
2. Determination of susceptibility — public groundwater supplies may be susceptible to adverse impacts; however, none have been identified within 400 feet of the proposed construction disturbance. Other groundwater wells, springs, and seeps within 200 feet of the proposed construction disturbance that could be susceptible to possible adverse effects would be identified prior to construction. Pre-construction monitoring would be conducted with landowner permission to establish baseline conditions; and
3. Monitoring — at the landowner’s request, pre- and post-construction monitoring would be conducted for affected wells and seeps.

Should it be determined after construction that there has been an impact on groundwater supply (either yield or quality), Pacific Connector would work with the landowner to ensure a temporary supply of water, and if determined necessary, Pacific Connector would replace a permanent water supply. Mitigation measures would be coordinated with the individual landowner in order to meet the landowner’s specific needs. Mitigation measures for groundwater wells, springs, and seeps would be specific to each property and would be determined during landowner negotiations.

2.4.4.3 Soil Mixing and Compaction

To avoid long-term changes in water table elevation and subsurface hydrology, excavated topsoil and subsoils will be segregated, where appropriate, and returned as nearly as possible to their original soil horizon. Compaction of soils from the passage of heavy machinery could reduce the ability of the soil to absorb or retain water. However, this impact would be localized and would not significantly affect groundwater resources and groundwater quality. Section 7.3.5 of Resource Report 7 discusses mitigation measures for soil compaction.
2.4.4.4 Blasting

An analysis of potential blasting locations for the project is described in Section 5.2 in the Geologic Hazards and Mineral Resources Report, provided as a stand alone report. According to this analysis, blasting may be required at a number of locations along the alignment during pipeline installation. As a result of blasting, temporary changes in water level and turbidity may affect groundwater quality and bedrock supply well systems located along the pipeline near the construction right-of-way. As noted in the Geologic Hazards and Mineral Resources Report, any potential impacts, if any, are expected to be temporary and localized because of the small amount of blasting agents generally needed for trenching.

In areas where hard shallow bedrock is encountered, Pacific Connector will first attempt to utilize specialized excavation methods to reach the required pipeline design burial depth. These excavation methods may include ripping, using hydraulic hammers or rock saws. However, if these methods prove to be ineffective or inefficient, blasting may be necessary to achieve the required trench depth. Where blasting is necessary, mitigation measures will be incorporated into the blasting program to minimize potential adverse impacts to the environment, nearby water sources, structures or utilities. If blasting is required, all applicable federal, state and local regulations will be observed and all necessary permits will be obtained. All blasting activities would be conducted by licensed blasting contractors in accordance with all applicable regulatory requirements.

Where blasting is necessary, Pacific Connector’s blasting contractor will prepare blasting plans for Pacific Connector’s review and approval specific to the area to avoid potential impacts. The blasting contractor will conduct appropriate pre-construction investigations, as needed, and develop specific blasting operation and monitoring plans to address site variables (soil and rock types, etc.) which would incorporate locations of existing groundwater wells or springs and seeps. Limits will be set for blast peak particle velocity to a level that will protect water wells, springs and other nearby structures from any structural damage. Additional information is provided in the Blasting Plan (see Appendix C to the POD, provided as a stand alone document).

Should it be determined after construction that there has been an impact on groundwater supply (either yield or quality), Pacific Connector would ensure a temporary supply of water, and if determined necessary, would replace a permanent water supply. Mitigation measures would be coordinated with the individual landowner in order to meet the landowner’s specific needs. Pacific Connector has committed to these measures in the Groundwater Supply Monitoring and Mitigation Plan (see Appendix 2F).

2.4.4.5 Drain Tiles

The BLM has identified that French drains were installed to stabilize Elk Creek Road near MPs 34.02 and 37.15. The pipeline crosses agricultural lands in Klamath County which are underlain by drain tiles. The drain tiles are located along approximately 20 miles of the 40-mile agricultural area crossed by the project. The tiles are mostly small (4 to 6 inches) and depending upon the exact pipeline location and groundwater levels, impacts to the drain tiles are unknown at this time. Pacific Connector has not obtained the exact locations of the drain tiles along the proposed alignment but will identify the presence of drain tiles on individual properties during right-of-way easement acquisition.
Drain tile repair and/or replacement will be a part of the easement damage negotiations, and are further described in Resource Report 7.

2.4.4.6 Fuel Handling

Groundwater contamination could occur from an inadvertent spill of fuels, lubricants and other materials used during construction. Implementation of proper storage, containment and handling procedures will minimize the chance of such releases. Prompt cleanup responses will prevent migration of contaminants to the groundwater. Pacific Connector has developed a SPCC Plan (see Appendix 2B/Appendix X to the POD) that describes measures which will be implemented to prevent and control inadvertent spills of hazardous materials. These measures include, but are not limited to:

- prohibiting fueling, lubricating and hazardous material storage in or adjacent to sensitive areas shown on the Environmental Alignment Sheets (provided under separate cover);
- implementing trench dewatering procedures to prevent contamination (such as using pump containment structures and equipment inspection);
- specifying collection and disposal procedures for wastes generated during equipment maintenance;
- utilizing emergency response procedures; and
- developing standard procedures for excavation and off-site disposal of any soils contaminated by spillage.

Prior to construction, the SPCC Plan will identify the types and quantities of hazardous materials that will be stored/used during construction. Project personnel will be trained and prepared to demonstrate their ability to implement the SPCC Plan to federal, state or local inspectors.

Equipment fueling and storage of fuel, oil and other fluids during construction could create a potential long-term contamination hazard to aquifers. Hazardous liquid spills or leaks could contaminate groundwater and affect aquifer users. Soil contamination could continue to add pollutants to the groundwater long after a spill has occurred. This type of impact will be avoided or minimized by restricting the location of fueling and hazardous material storage (as shown on the Environmental Alignment Sheets) and by requiring immediate cleanup in the event of a spill or leak. Pacific Connector will prohibit fueling activities and storage of hazardous materials within 200 feet of all private water supply wells and within 400 feet of all public supply wells unless implemented in accordance with the SPCC Plan.

2.5 REFERENCES


Forest Service and Bureau of Land Management. 1994a. Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl.
Forest Service and Bureau of Land Management. 1994b. Standards and Guidelines for Management of Habitat for Late-Successional and Old-Growth Forest Related Species Within the Range of the Northern Spotted Owl.


Oregon Department of Environmental Quality. 2013e. Land Quality Environmental Cleanup Site Information Database. Accessed online: http://www.deq.state.or.us/q/ecsi/ecsi.htm.


Appendix 2C

Stream Fluming Procedures
Pacific Connector
GAS PIPELINE

Pacific Connector Gas Pipeline, LP

Stream Fluming Procedures

Pacific Connector Gas Pipeline Project

June 2013
STREAM FLUMING PROCEDURES

During construction various local, state and federal permits will require that flowing streams with coldwater fisheries be crossed utilizing a "dry crossing" technique. Fluming is one of the methods which may be utilized to achieve a dry crossing of a flowing stream. The purpose of this appendix is to outline the techniques that will be utilized to flume stream crossings during construction of the project. These guidelines are subject to change based on permits issued by regulatory agencies.

1.0 Purpose of Flumed Stream Crossings

The primary purpose of fluming a stream is to assure that in-stream construction activities comply with water quality standards for turbidity that have been established by the state to protect aquatic life and other beneficial uses. Overall, a properly installed and maintained flume can be very effective in reducing turbidity during in-stream construction. In most cases, detectable increases in turbidity are limited to short durations when the flume is installed and when the flume is removed from the streambed.

However, installation of a flume does not guarantee that compliance with water quality standards will occur. Flumes require monitoring and occasional repair during the crossing period to ensure the integrity of the structure(s). Adequate pumps play an integral role in a successful flumed crossing.

2.0 Where Flumes Will Be Installed

Any minor or intermediate waterbody with water flowing in the streambed at the time of construction, which has a coldwater fishery as defined by the Oregon Department of Fish and Wildlife (ODFW), may be flumed. A list of streams where dry open cut crossing methods (fluming, dam and pump or diverted open cut) may be utilized is provided as part of Resource Report 2.

3.0 General Layout of a Typical Flumed Stream Crossing

Figure 1 shows a plan view of a typical flumed stream crossing. The primary components of a flumed crossing include:

- flume pipe or multiple flume pipes;
- sandbag/plastic dams;
- spoil storage and staging areas;
- pumps and pump containment structure(s);
- dewater structure(s);
- erosion control structures; and
- spill containment and cleanup materials.
FIGURE 1
PLAN VIEW OF TYPICAL FLUMED STREAM CROSSING
A single or multiple flume pipe(s) are used to temporarily convey the stream flow over the construction area, thereby reducing the introduction of sediments into the water column during ditching and backfilling. The sandbag/plastic dams are used to support and seal the ends of the flume pipe(s) and to direct stream flow into the flume pipe and over the construction area. These structures are also utilized to prevent downstream water from flowing upstream into the construction area. They also serve to contain water that infiltrates into the construction area before it can be removed by the pumps and discharged to an upland area. Finally, the downstream structure serves to contain turbid water, which rises quickly in the construction area during backfilling of the trench.

All waterbodies with water in the streambed at the time of construction must have an equipment crossing bridge.

The temporary spoil storage area is where spoil trenched from the streambed will be stored until backfilling is completed. These temporary extra work areas are identified on the Environmental Alignment Sheets. FERC's Wetland and Waterbody Procedures prohibit the location of staging areas or additional right-of-way within 50 feet of the stream banks or edge of adjacent wetlands unless site-specific conditions such as topography prevent the setback and a variance is approved. Trench spoil must be placed at least 10 feet away from stream banks at all flowing stream crossings. In addition, these areas must be enclosed with silt fence and/or straw bales to prevent runoff of the spoil into the stream.

Adequate pumps are essential for the successful completion of flumed stream crossings. During several phases of the crossing process, it will be necessary to quickly remove large quantities of water from the construction area to prevent overflow or leakage of the sandbag/plastic dams or the temporary equipment crossing bridge. The most effective means of quickly removing water from the construction area is by utilizing well-maintained pumps with adequate pumping rates. In addition, backup pumps will be located on-site, hooked up and maintained as fully operational during the entire crossing process. Backup pumps will be tested prior to the start of construction. Pumps will be located in a spill containment structure that is designed to fully contain any spills of fuel or oil (see Figure 2).

Dewater structures (see Figure 3) will be utilized to reduce the velocity of pump discharge water and subsequent erosion of upland areas. These structures are essential in preventing erosion and the flow of turbid water overland and back into the stream - such overflow effectively defeats the purpose of the flumed crossing by introducing turbid water into the stream.

Runoff control structures are utilized to prevent runoff from the spoil piles or from drainage of water from the trackhoe bucket from flowing around the sandbag/plastic dam or temporary equipment crossing bridges and adding sediment to the stream. Containment and control materials are necessary to respond to any spills of fuel or lubricating oils from operating equipment. A Spill Prevention, Containment, and Countermeasures (SPCC) Plan will be implemented by the contractor in accordance with the provisions of that plan. Erosion control structures address the prevention of runoff from the right-of-way into the stream during and after construction is complete.
Figure 2
Typical Pump Containment Structure
Figure 3
Typical Dewater Structure
4.0 Materials Required to Install and Maintain a Flumed Stream Crossing

The materials discussed below will accommodate most stream crossings. However, certain situations will arise where additional materials are required. Those streams that require additional materials will be addressed on a case-by-case basis.

Typically, scrap steel pipe will be utilized to construct the flume. Before the flume pipe is installed in the stream, it will be inspected to assure that it is free of grease, oil or other pollutants. In addition, excessive dirt will be removed from the flume pipe. If oil or grease is present on the flume pipe, it will be steam-cleaned before the flume pipe is placed in the stream.

Both the inlet and outlet of the flume pipe will be sandbagged and lined with plastic to create a proper seal (see Figure 4). The reason for sandbagging the downstream end of the flume is to create a contained area where turbid water is trapped and to prevent downstream water from flowing up the streambed and flooding the trench.

Sandbags will be filled with a non-leachable material such as clean, pre-washed sand. Sandbags are most effective if they are only filled to approximately 2/3 their capacity. Bags filled to capacity conform poorly to the adjacent bags and make creation of a seal more difficult. The bags must be tied securely before they are installed. If the bags are left untied, they tend to spill upon removal from the streambed and are nearly impossible to remove with a trackhoe. It is preferable to utilize burlap sandbags to construct the upstream and downstream dams. Plastic bags tend to rip when removed from the stream and are often too porous to adequately contain small grain sand.

Sandbags alone are often not sufficient to completely seal the upstream and downstream ends of the flume pipes. The dams are typically more effective when sheets of thick plastic are interwoven within the sandbags (see Figure 5). The plastic, when applied as shown on Figure 5, will effectively seal the dams and will greatly reduce the amount of water leaking into the construction area from behind the upstream and downstream sandbag dam.

5.0 Flume Pipe Design

A number of flume pipe designs have been used with varying degrees of success. To improve success, flume pipes with wings welded to the front end of the pipe provide for better conveyance of stream flow into the mouth of the flume (see Figure 6). The most effective wings extend to each stream bank and are angled slightly upstream. Where the bottom of the stream is other than rock, the wings extend approximately 12 inches below the bottom of the flume pipe and are pushed into the stream substrate utilizing a trackhoe during installation. The upstream and downstream portions of the wings are then sandbagged and overlain with plastic as needed to prevent leaks as shown in Figure 7.

The flume pipe(s) installed at the crossing will be of sufficient length so that the integrity of the upstream and downstream sandbag dams are not jeopardized by excessive top of ditch widths within the stream or adjacent stream banks. It is tempting to restrict the flumed width to an area smaller than the actual construction right-of-way. However, experience has shown that the contractor often needs to utilize the majority of the construction right-of-way to complete the crossing. Therefore, the flume pipes must be long enough to span the entire construction right-of-way through the stream (see Figure 4).
Figure 6
Upstream Flume Wings
Figure 7
Sand Bag and Plastic Dam
As a general rule, a flume pipe of at least 80 feet in length will be utilized for crossings. The diameter of the flume pipe(s) will depend on the stream discharge at the time of the crossing. However, in all cases the flume pipe diameter will be oversized to accommodate any storm events that might occur during the crossing period.

6.0 Installation of the Flume Pipe

Short-term elevated levels of turbidity are expected to occur during installation of the flume pipe. However, several measures can be taken to minimize the increased turbidity. Before the contractor attempts to install the flume pipe, all materials necessary to complete the installation process will be located on-site. Installation of the flume cannot begin until all of the precautions outlined in the SPCC Plan have been undertaken. Turbidity sampling will be conducted during all flumed crossings in accordance with the Stormwater Pollution Prevention Plan.

Installing the Flume Utilizing Only Sandbag/Plastic Dams

The first step in installing the flume pipe is to clear away any large rocks and boulders from the sandbag/plastic dam area and under the flume pipe that will prohibit placement of the flume pipe or affect the integrity of the sandbag/plastic dam. It may be necessary to utilize a trackhoe to assist in removing these rocks. However, under no circumstances will the bucket be allowed to dig into the streambed to remove rocks. Rather, the edge of the bucket should be utilized to roll the rocks to the side or a thumb on the bucket will be used to pick up and move rock obstacles.

Before the flume pipe is installed, the contractor will lay at least three rows of sandbags on the streambed (at least two sandbag layers tall) to support the upstream and downstream portions of the flume pipe (see Figure 5). The sandbags may be laid on top of the plastic sheeting that will be used to help seal the sandbag dam. The plastic will be laid such that when it is wrapped around the sandbag dam, the plastic sheeting lays on the upstream face of the dam so that water pressure holds the plastic firmly against the sandbag dam face. The sandbags will be properly seated over the plastic and onto the stream bottom and packed as tightly together as possible.

Once the first rows of sandbags are in place, the flume pipe can be lowered into position. The flume pipe will be lifted over the stream and carefully aligned before it is lowered onto the sandbags over the streambed. The contractor will not push or pull the flume pipe over the stream banks and into the water. Rather, the flume pipe will be suspended over the crossing and lowered into place.

After the flume pipe is laid on the sandbags, the contractor will begin to construct the upstream sandbag/plastic dam. First, the winged upstream portion of the flume pipe will be pushed into the streambed substrate, where possible. Sandbags will be installed upstream and downstream of the wings and interwoven with plastic sheeting to form a tight seal. Typically, the sandbag/plastic dam will extend at least three feet above the water level of the stream to accommodate increased stream discharge during the crossing period (see Figure 7).

After the upstream sandbag/plastic dam is complete, the contractor will immediately begin installation of the downstream dam. The downstream sandbag/plastic dam will be constructed to a height at least three feet above the downstream water level.
7.0 Maintenance of the Flume During Construction

Flumed crossings require constant monitoring and occasional repair during the crossing process. The longer the flume remains in the water, the greater the probability that the dams will begin to leak and that water will invade the construction area in significant quantities. Therefore, it is imperative that once trenching within the stream begins that the construction process is carried to completion non-stop. Typically, this involves installing the flume on the day immediately proceeding construction of the crossing. Ditching of the stream channel should begin early the following morning and the pipe pulled under the flume pipe immediately following completion of the trench. Backfilling should commence immediately following the straining of the drag section. For most streams it typically, requires 3 to 7 days to install the flume, dig the trench, install the pipe drag section under the flume, backfill the trench and restore and stabilize the stream banks. Smaller streams (less than 10 feet in width) generally require less time to cross using fluming procedures.

While the flume is in place, the contractor will provide a sufficient crew that will be responsible for maintaining the flumed crossing. The crew will apply additional plastic to the dams and add additional sandbags as necessary. In addition, the crew will be responsible for operating the pumps and maintaining the discharge structures. When the crossing is complete, the crew will immediately install the erosion control structures pursuant to FERC’s Wetland and Waterbody Procedures.

To be adequately prepared to repair the flume, the contractor must have on-site rolls of thick plastic sheeting and extra filled and tied sandbags. These materials need to be stored directly adjacent to the stream crossing so that they are readily accessible should the need to repair the flume arise.

8.0 Length of the Drag Section

One of the biggest problems encountered during construction of flumed stream crossings is the installation of extremely long drag sections across the stream in a single drag section. The extra length requires that the flume be in place longer than necessary which increases the probability of serious problems with the integrity of the sandbag/plastic dams. In addition, the extra time required to dig additional ditch to accommodate long drag sections can result in integrity problems with the flume dams.

Segments must be kept short and extend only the distance necessary to allow for later tie-in to the upland portions of the pipeline. On most streams the drag section to be pulled under the flume should only be long enough to incorporate the sag bends. In other locations, it may be necessary to install additional pipe to complete the crossing.

The entire drag section must be made up prior to the start of in-stream trenching. Once the drag section is complete (welds x-rayed and joints coated), the drag section can be installed immediately following trenching.

9.0 Trenching Under the Flume Pipes

At some point prior to initiating trenching, chains should be hung from the flume pipe over the ditch line. These chains will be utilized to hang the pump heads or intake pipe into the ditch.
Digging the ditch under the flume requires careful preparation and execution. Two trackhoes will begin trenching from each stream bank at the same time. The trackhoes will begin by trenching under the flume pipe(s) and dig back to the stream banks. Finally, the trackhoes will dig the upland portion of the ditch necessary to install the drag section.

Generally, pumping water from the construction area is not necessary during trenching as the amount of spoil removed from the streambed generally exceeds the volume of water that infiltrates the construction area. However, at times the water flow into the construction area becomes excessive, pumping is necessary to avoid overflow or leakage from the downstream dam.

10.0 Spoil Storage During Trenching

Spoil must be stored in a manner such that runoff from the spoil does not flow into the stream or off the right-of-way. For streams in flat topography, runoff from the spoil storage pile is not typically a problem. However, on steep sloping stream banks water can run back down the right-of-way and enter the stream upstream or downstream of the dams creating a water quality problem. The problem can be compounded as the trackhoes working on the stream banks lift water saturated spoil from the stream and lay it on the right-of-way adjacent to the stream bank before it can be conveyed uphill by additional equipment. To accomplish runoff control during trenching, diversion structures or trenches will be dug within the right-of-way to direct the runoff back into the construction area as shown on Figure 8.

11.0 Spoil Transfer During Construction

Some of the stream crossings may occur adjacent to steep upland areas. In these cases, it will be necessary to utilize additional equipment (trackhoes, dozers, loaders) to transfer spoil dug by the trackhoes at each stream bank to the temporary spoil storage area.

In most cases, the contractor will utilize dozers to push the spoil to the temporary storage area. In other areas, trackhoes will be required to transfer spoil dug by the trackhoe working on the stream bank uphill to a flatter area where it can be moved by dozers. When two trackhoes are utilized to transfer spoil uphill, the trackhoe working on the stream bank places the spoil into a pit (see Figure 9). The spoil from the pit is then picked up by the second trackhoe and lifted further uphill. The pit will significantly reduce the amount of water from the spoil that runs downhill. The pit can be maintained and dug by the trackhoe working uphill from the crossing.

12.0 Installing the Pipe

While trenching is being conducted, the contractor will hook up the drag section to the sideboom tractors so that the pipe may be installed as soon as trenching is completed. It will be necessary at many crossings to float the pipe across the trench (i.e., it may not be feasible to completely dewater the ditch). While the drag section is being slid under the flume pipe, it is essential that pumps be operated to assure that turbid water does not leak through or flow over the dams. The contractor will operate the pumps at a rate so that water displaced by the pipe is immediately removed and discharged to the dewater site.
13.0 Dewatering the Construction Area

Proper operation of pumps is essential to the successful completion of a flumed stream crossing. Pumps will be utilized by the contractor as necessary to control the level of water in the construction area. The purpose of the pumps is not to completely dewater the trench.

If the water level in the construction area exceeds the upstream or downstream level of the dams, the environmental inspectors will notice small amounts of turbid water escaping into the stream either upstream or downstream of the dams. This is known as "bleeding" and the problem can be quickly resolved by increasing the pumping rate and reducing the water level within the construction area. Although bleeding will not typically result in a violation of water quality standards downstream, if left unchecked it can quickly result in erosion of the dams and serious downstream water quality problems.

The contractor will utilize pumps at each crossing to control the water level in the construction area. The contractor will also install backup pumps that will be tested and fully functional prior to the start of the crossing process. Pumps will be installed and tested and the dewater sites constructed the day prior to any in-stream construction. For most crossings, the contractor will setup three pumps. Additional pumps may be required at a few of the stream crossings. Two of the pumps will serve to remove water from the construction area and the third pump will serve as a backup should one of the primary pumps fail.

The pumps will be set in a containment area as shown on Figure 2. The primary purpose of the containment area is to fully contain any fuel or lubricating oil spills. If hydraulic pumps are used, the hose couplings on the side of the pump body will be oriented in the containment area such that they point perpendicularly away from the stream banks. The purpose of orienting the couplings away from the stream is to protect the stream should one of these couples fail and hydraulic fluid escape.

The contractor will carefully inspect each pump prior to its delivery to the crossing site. In particular, any frayed hoses or apparent leaks will be repaired before the pumps are delivered to the crossing site. Pump heads and the hoses will be cleaned of any free hydraulic oil prior to placing the pump heads into the stream.

All pumps will be installed with individual intake hoses or hydraulic heads, trash filters and discharge hoses. All three hydraulic heads will remain in the water during the entire construction process including backfill. In this manner, the backup pump can be immediately employed should one of the primary pumps fail.

Each of the pumps (including the backup pump) will be equipped with a minimum of 300 feet of discharge hose. It is important to stretch the hose on the backup pump and install a dewater structure for that pump at the same time the primary pumps are installed. Hoses should be free of leaks and in good operating condition.
In many cases, it is difficult to locate dewater sites where water will flow away from wetlands or streams. In these cases, careful attention will be paid to the dewater sites and alternative sites (which require additional discharge hose) selected prior to the start of in-stream construction. Often it is necessary to move the location of the dewater site several times during construction of the stream crossing to avoid dewater from reaching sensitive areas.

Dewater structures will be constructed of straw bales and plastic and wooden stakes as shown on Figure 3. The intent of the design provided on Figure 3 is to allow the water to fill the dewater structure and flow evenly over the tops of the bales. Straw bales will be securely staked to the ground utilizing wooden stakes. Alternative structures are also provided in the Erosion Control and Revegetation Plan.

14.0 Backfilling the Ditch

The highest potential for water quality problems during a flumed crossing is during backfilling of the ditch. Quick backfilling into the ditch by the contractor can cause the water level in the construction area to overflow or leak through the downstream dam. Pumps must be carefully managed during backfilling to control the water level in the construction area. The contractor must carefully monitor the effectiveness of the pumps and control the rate of backfill to preclude bleeding through the downstream dam. If backfilling occurs too quickly, the pumps will not be capable of removing the water from the construction area quick enough to prevent the escape of turbid water.

To prevent turbidity, backfilling of the ditch will be conducted in a slow, well-planned manner. Backfilling will begin in the center of the stream directly under the flume pipes and proceed toward each bank simultaneously. In this manner, much of the water in the ditch will be pushed to the ditch outside of the stream channel. If upland portions of the trench are backfilled first, the water in the ditch is pushed into the stream channel and will inevitably leak through or overflow the downstream dam.

Once backfilling of the entire stream channel is complete, the contractor will compact the streambed and construct solid plugs on both banks. Water will remain trapped in the ditch outside of the stream channel. This water will be pumped from the ditch at a later time in the manner described for dewatering the construction area (see Section 13).

15.0 Flume Removal

After the ditch is backfilled, clean gravel fill is placed on the top one foot of the ditch (where necessary). Plugs will be installed at each stream bank and the stream banks stabilized and the flume will be removed from the crossing. To prevent excessive increases in turbidity during flume removal, the contractor will remove all of the sandbags from the downstream dam. A trackhoe can be utilized to remove the top layers of the sandbags as long as the operator takes great care not to dig into the streambed or to increase turbidity.

After the downstream sandbags are completely removed from the streambed (except those few left directly under the flume), the contractor will begin removing the sandbags from the upstream dam. The top rows of sandbags should be removed by hand until the water begins to overflow the top of the dam and flows slowly over the construction area. For the first 10 to 30 minutes, turbidity downstream of the crossing area could increase considerably. However, the streambed portion of the construction area will be flushed clean of sediments left over from construction and the water
will flow clear over the disturbed stream bed area. After the turbidity level has decreased to acceptable levels or that of upstream levels, the contractor can proceed with removing the remainder of the upstream dam sandbags.

Once the majority of the sandbags are removed, the flume pipe will be removed. The flume pipe will be raised directly from the streambed in a single movement. Under no circumstances will the contractor drag the flume pipe from the streambed. Rather, it will be lifted and then carried from the crossing area. After the flume is removed, the remaining few sandbags, which were laid directly under the flume pipe, can be removed by hand.
Appendix 2G

HDD Feasibility Analyses

(Coos, Rogue, and Klamath Rivers)
January 15, 2013

Williams Pacific Connector Gas Pipeline, LLC
295 Chipeta Way
Salt Lake City, Utah 84108

Attention: Bethany Green

Subject: HDD Feasibility Study
Coos River HDD
Coos Bay, Oregon
File No. 16724-008-00

GeoEngineers, Inc. (GeoEngineers) is pleased to submit this Horizontal Directional Drilling (HDD) Feasibility Study for the proposed Coos River HDD as part of the Brunschmid route alternative of the Pacific Connector Gas Pipeline Project in Coos Bay, Oregon. The Vicinity Map, Figure 1, shows the site location with respect to topography and the surrounding area.

Williams Pacific Connector Gas Pipeline, LLC (Williams) is considering constructing a new 36-inch high-pressure natural gas pipeline by means of HDD methods across the Coos River, near Coos Bay, Oregon. Jared Ellsworth requested that we provide this study to assess the feasibility of installing the proposed pipeline beneath the Coos River using HDD construction methods.

PURPOSE AND SCOPE OF SERVICE

The purpose of our services was to evaluate the existing surface and subsurface soil and groundwater conditions at the site in order to evaluate the feasibility of using HDD installation methods to install the proposed pipeline beneath the Coos River. Our specific scope of services included the following:

1. Completed a site reconnaissance to observe surface conditions and locate borings.
2. Prepared a preliminary HDD profile to assist in choosing appropriate depths for the exploratory borings.
3. Coordinated utility locating near the proposed boring locations by the public “One Call” utility locating service.
4. Explored subsurface conditions at the site as follows:
   a. Four drilled borings along the conceptual HDD alignment using mud rotary drilling techniques and rock coring, as appropriate.
b. Obtained samples at representative intervals from the borings using split spoon samples and standard penetration tests (SPT).

c. Classified soils encountered in the borings in general accordance with ASTM International (ASTM) Standard Practice D 2488. We maintained a log of the materials encountered in each exploration.

5. Performed index tests necessary to characterize the subsurface materials. Testing included:
   a. Thirteen Atterberg limits determinations in general accordance with ASTM D 4318.
   b. One grain size determination in general accordance with ASTM C 136.
   c. Ten percent fines determinations in general accordance with ASTM C 1140.

6. Evaluated HDD risks and considerations. We evaluated risks and considerations with respect to: 1) length, diameter and geometry; 2) hydraulic fracture and inadvertent drilling fluid returns potential; 3) hole stability; and 4) construction layout, property acquisitions and easements.

7. Prepared this report summarizing the findings of our exploration program, laboratory testing, and feasibility evaluation.

SITE DESCRIPTION

Surface Conditions

The proposed HDD alignment is oriented in a generally northwest-southeast (entry to exit) direction, as shown in Figure 2. The north side (entry) of the proposed HDD is situated on a gently sloping (less than 10 percent) field between approximately Elevation 8 feet and 17 feet above mean sea level (MSL). The south side (exit) is located on a relatively flat alluvial valley floor at about Elevation 5 feet. The north bank of the Coos River is approximately 500 feet south of the entry point and the south bank is approximately 650 feet north of the exit point. Two relatively short berms are located on either side of the river between approximately Elevation 10 and 15 feet. Coos River Highway parallels the river on the north side and South Coos River Highway parallels the river on the south side.

The open field on the north side of the HDD is located adjacent to Coos River Highway and is approximately 250-feet wide measured parallel to the highway and is approximately 550-feet long. The field is vegetated with low grass and a few deciduous trees on the north end. The ground surface was soft due to recent rains saturating the near surface soils. The surface of the site on the south side of the HDD is relatively flat and vegetated with low grasses.
Subsurface Conditions

Site Geology

The geologic mapping we reviewed (Beaulieu and Baldwin, 1973) shows the site underlain by quaternary aged marsh and peat deposits overlying the Tertiary aged Flournoy Formation. The peat and marsh is described as unconsolidated organic soils of silt, clay and sand. The Flournoy Formation is described as rhythmically bedded siltstone and sandstone.

Subsurface Explorations

We explored subsurface conditions at the site between the dates of December 6, 2012 and December 7, 2012 by advancing four drilled borings to maximum depths of 101.5 feet bgs at the locations shown in Figure 2. A representative from GeoEngineers maintained logs of the materials encountered in each boring and collected disturbed soil samples at 5-foot intervals. Appendix A presents the boring logs and a description of the subsurface exploration and laboratory-testing programs. Laboratory-testing results are shown in the boring logs in Appendix A.

The materials encountered in our borings were consistent with the geologic mapping for the site. In general, the borings completed on the north side of the crossing encountered fat clay with organic matter, organic clay, and clayey sand overlying siltstone at depths of 48 to 96 feet below ground surface (bgs). The borings completed on the south side of the crossing generally encountered interbedded silt, silty sand, sand with silt, and fat clay to the maximum depths explored. Refer to the boring logs for more details on the subsurface conditions encountered in each boring.

Groundwater

During our subsurface explorations we were not able to measure groundwater levels due to presence of drilling fluid. However, based on the observed relative moisture content of the samples, we estimate that groundwater was at or near the ground surface at the time of drilling. We anticipate that groundwater levels will fluctuate with precipitation, site utilization and other factors. During heavy prolonged precipitation, and probably during most of the winter months, we expect that groundwater will be near or at the surface of the site.

HDD PLAN AND PROFILE

We developed the conceptual HDD plan and profile based on the general centerline of the Brunschmid route alternative provided to us by Williams, as shown in Figure 2. The proposed HDD has a horizontal design length of approximately 1,602 feet. The conceptual entry and exit points were selected to allow for adequate depth of cover beneath the Coos River Highway and the Coos River as shown in Figure 2.

We designed the entry and exit angles at 10 degrees, and 8 degrees respectively, with a bottom tangent elevation of -65 feet MSL to achieve a minimum depth of cover of 43.6 feet below the Coos River.

HDD FEASIBILITY CONCLUSIONS

Based on our evaluation, it is our opinion that the HDD method of installation at this site is feasible. The following section provides a discussion of the considerations for design and construction.
Hole Stability

In general, the alluvial soils encountered by our borings along the proposed HDD alignment have a low risk of hole instability.

Hydraulic Fracture and Inadvertent Returns

In general, it is our opinion that there is a relatively high risk of hydraulic fracture along the conceptual HDD profile. The risk of inadvertent surface returns is considered moderate along the alignment. However, the risk of inadvertent surface returns increases to high within approximately 150 feet of entry and exit.

The contractor's means and methods, effectiveness at cleaning cuttings from the pilot and reamed holes, and the ability to maintain drilling fluid returns will be instrumental in reducing the risk of hydraulic fracture and inadvertent returns during construction.

Workspace Considerations

There is not adequate area for a pipe stringing and fabrication workspace on the northwest side of the proposed HDD. Therefore, the Coos River HDD must be drilled from the northwest (entry) side to the southeast (exit) side so that the stringing area will be to the southeast. Depending on temporary workspace that can be obtained on the southeast side of the conceptual HDD, there may be enough linear area for a pipe stringing and fabrication workspace that will allow assembly of a single product pipe string. However, in order to achieve pullback with a single product pipe string, it will need to be curved slightly to the south.

There is adequate area for workspaces at the conceptual entry and exit points as shown in Figure 2. Grading will not likely be required to prepare entry and exit workspaces in these areas. Near the conceptual entry and exit points, it will likely be necessary to provide a stable working platform such as a timber matted or gravel workspace and an entrance road during construction, particularly if construction is completed during the wet winter season, or when heavy prolonged precipitation occurs. In addition, construction roads will be required to access the entry and exit points and the product pipe stringing area, unless construction is completed during the latter part of the dry summer months when precipitation has not recently occurred and groundwater levels are at their lowest point throughout the year.

LIMITATIONS

We have prepared this report for use by Williams, their authorized agents and other approved members of the design team involved with this project. GeoEngineers' report is not intended for use by others, and the information contained herein is not applicable to other sites. Our report, conclusions and interpretations should not be construed as a warranty of the subsurface conditions.

Variations in subsurface conditions are possible between the explorations. Subsurface conditions may also vary with time. A contingency for unanticipated conditions should be included in the project budget and schedule for such an occurrence. We recommend completing a HDD design for this project should it move forward, and that sufficient monitoring, testing and consultation be provided by GeoEngineers during construction to confirm that the conditions encountered are consistent with those indicated by the explorations, to provide recommendations for design changes should the conditions revealed during the
work differ from those anticipated, and to evaluate whether earthwork and pipeline installation activities comply with contract plans and specifications.

The scope of our services does not include services related to construction safety precautions. Our recommendations are not intended to direct the contractor's methods, techniques, sequences or procedures, except as specifically described in our report for consideration in design.

Within the limitations of scope, schedule and budget, our services have been executed in accordance with generally accepted practices in this area at the time the report was prepared. No warranty or other conditions, express, written or implied, should be understood.

Any electronic form, facsimile or hard copy of the original document (email, text, table and/or figure), if provided, and any attachments are only a copy of the original document. The original document is stored by GeoEngineers, and will serve as the official document of record.

Please refer to Appendix B, titled "Report Limitations and Guidelines for Use," for additional information pertaining to use of this report.

REFERENCES

We appreciate the opportunity to provide services to you for this project. Please contact us if you have any questions or wish to discuss this report.

Sincerely,
GeoEngineers, Inc.

Andrew E. Sparks, PE
Senior Geotechnical Engineer

Trevor N. Hoyle, PE
Principal

Attachments:
Figure 1. Vicinity Map
Figure 2. Conceptual Plan and Profile
Appendix A. Field Exploration and Laboratory Testing Program
Appendix B. Report Limitations and Guidelines for use

Disclaimer: Any electronic form, facsimile or hard copy of the original document (email, text, table, and/or figure), if provided, and any attachments are only a copy of the original document. The original document is stored by GeoEngineers, Inc. and will serve as the official document of record.

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Coos River HDD Alternative

Explanation

- PCGP Route Mile Markers (1-mile)
- Brunschnid Wetland Mitigation Alternative
- PCGP Proposed Route

Notes:
1. The locations of all features shown are approximate.
2. This drawing is for information purposes.
3. It is unlawful to copy or reproduce all or any part of this document without permission.

Data Sources: Pipeline route from Williams. Topo map service and street map data (2008) from ESRI.
CONCEPTUAL SITE PLAN AND PROFILE

COOS RIVER HDD
COOS COUNTY, OREGON

FIGURE 2

Notes:
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document.

Notes:
GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

LEGEND:
...
APPENDIX A
Field Exploration and Laboratory Testing Program
APPENDIX A

FIELD EXPLORATION AND LABORATORY TESTING PROGRAM

We explored subsurface conditions at the site by drilling four borings with a track-mounted drill rig using mud rotary drilling methods. Western States Soil Conservation of Hubbard, Oregon drilled the borings up to depths of 101.5 feet bgs. Figure 2 shows the approximate boring locations. A representative from our office observed field activities, classified the soil and rock encountered, obtained representative samples, observed groundwater conditions where possible and prepared a log of each exploration. The borings were backfilled with a bentonite and cement grout mixture at the conclusion of each exploration.

Soil samples were obtained by performing standard penetration tests (SPTs) in general accordance with ASTM test method D 1586. The sampler was driven with a 140-pound hammer falling 30 inches. The number of blows required to drive the sampler 1 foot, or as otherwise indicated, into the soils is shown adjacent to the sample symbols on the boring logs. Disturbed samples were obtained from the split barrel sampler for subsequent classification and index testing.

Soils encountered in the borings were classified in the field by a GeoEngineers representative in general accordance with ASTM D 2488, the Standard Practice for the Classification of Soils (Visual-‐Manual Procedure) which is described in Figure A-1. The boring logs are presented in Figures A-3 through A-6. Soil classifications and sampling intervals are shown in the boring logs. Inclined lines at the material contacts shown on the log indicate uncertainty as to the exact contact elevation, rather than the inclination of the contact itself.

The relative density of the SPT samples recovered at each interval was evaluated based on correlations with lab and field observations in general accordance with the values outlined in Table A-1 below.

**Table A-1. Correlation Between Blow Counts and Relative Density** *

<table>
<thead>
<tr>
<th>Cohesive Soils (Clay/Silt)</th>
<th>Very Soft</th>
<th>Soft</th>
<th>Medium Stiff</th>
<th>Stiff</th>
<th>Very Stiff</th>
<th>Hard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blows, N</td>
<td>&lt; 2</td>
<td>2 - 4</td>
<td>4 - 8</td>
<td>8 - 16</td>
<td>16 - 32</td>
<td>&gt;32</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cohesionless Soils (Gravel/Sand/Silty Sand) **</th>
<th>Very Loose</th>
<th>Loose</th>
<th>Medium Dense</th>
<th>Dense</th>
<th>Very Dense</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blows, N</td>
<td>0 - 4</td>
<td>4 - 10</td>
<td>10 - 30</td>
<td>30 - 50</td>
<td>&gt; 50</td>
</tr>
</tbody>
</table>

Notes:


** Classification applies to soils containing additional constituents; that is, organic clay, silty or clayey sand, etc.

Laboratory Testing

General

Samples obtained from the explorations were transported to our Portland, Oregon laboratory and examined to confirm or modify field classifications, as well as to evaluate engineering properties of the samples. Representative soil samples were selected for laboratory testing consisting of percent fines and Atterberg limits determinations, and sieve analyses. The laboratory-testing procedures are discussed in more detail below.
Percent Fines Determinations

Percent fines determinations were performed on ten soil samples obtained from the borings. The tests were used to evaluate the relative amounts of coarse and fine grained particles present in the samples and were completed in general accordance with the ASTM D 1140 test procedure. The results of the testing are presented on the boring logs at their respective sample depths.

Sieve Analyses

Sieve analyses were performed on selected soil samples to evaluate the grain size characteristics of selected soil samples. We completed the sieve analyses in general accordance with ASTM C 136. The results of the sieve analyses are shown in Figures A-7 through A-9.

Atterberg Limits Testing

Atterberg limits were performed on selected soil samples. The tests were used to classify and evaluate index properties of the soil. The liquid limit and the plastic limit were estimated through a procedure performed in general accordance with ASTM D 4318. The results of the Atterberg limits testing are shown in Figures A-10 through A-12.
## SOIL CLASSIFICATION CHART

### MAJOR DIVISIONS

<table>
<thead>
<tr>
<th>SYMBOLS</th>
<th>TYPICAL DESCRIPTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAJOR DIVISIONS</td>
<td>SYMBOLS</td>
</tr>
<tr>
<td>GRAVELS AND GRAVELLY SOILS</td>
<td>GW</td>
</tr>
<tr>
<td>COARSE GRAINED SOILS</td>
<td>GP</td>
</tr>
<tr>
<td>MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE</td>
<td>GM</td>
</tr>
<tr>
<td>SAND AND SANDY SOILS</td>
<td>GC</td>
</tr>
<tr>
<td>Silt and Finer Amounts</td>
<td>SW</td>
</tr>
<tr>
<td>SANDS WITH FINES</td>
<td>SP</td>
</tr>
<tr>
<td>MORE THAN 50% OF COARSE FRACTION PASSING NO. 4 SIEVE</td>
<td>SM</td>
</tr>
<tr>
<td>FINE GRAINED SOILS</td>
<td>SC</td>
</tr>
<tr>
<td>SILTS AND CLAYS</td>
<td>ML</td>
</tr>
<tr>
<td>LIQUID LIMIT LESS THAN 50</td>
<td>CL</td>
</tr>
<tr>
<td>SILTS AND CLAYS</td>
<td>OL</td>
</tr>
<tr>
<td>LIQUID LIMIT GREATER THAN 50</td>
<td>MH</td>
</tr>
<tr>
<td>ORGANIC CLAYS AND CLAYS OF MEDIUM TO HIGH PLASTICITY</td>
<td>CH</td>
</tr>
<tr>
<td>HIGHLY ORGANIC SOILS</td>
<td>OH</td>
</tr>
<tr>
<td>PT</td>
<td>PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS</td>
</tr>
</tbody>
</table>

### ADDITIONAL MATERIAL SYMBOLS

<table>
<thead>
<tr>
<th>SYMBOLS</th>
<th>TYPICAL DESCRIPTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>AC</td>
<td>Asphalt Concrete</td>
</tr>
<tr>
<td>CC</td>
<td>Cement Concrete</td>
</tr>
<tr>
<td>CR</td>
<td>Crushed Rock/Quarry Spalls</td>
</tr>
<tr>
<td>TS</td>
<td>Topsoil/Forest Duff/Sod</td>
</tr>
</tbody>
</table>

### Sampler Symbol Descriptions

- **2.4-inch I.D. split barrel**
- **Standard Penetration Test (SPT)**
- **Shelby tube**
- **Piston**
- **Direct-Push**
- **Bulk or grab**

Blowcount is recorded for driven samplers as the number of blows required to advance sampler 12 inches (or distance noted). See exploration log for hammer weight and drop.

A "P" indicates sampler pushed using the weight of the drill rig.

**Note:** Multiple symbols are used to indicate borderline or dual soil classifications.

---

**Groundwater Contact**
- Measured groundwater level in exploration, well, or piezometer
- Groundwater observed at time of exploration
- Perched water observed at time of exploration
- Measured free product in well or piezometer

**Material Description Contact**
- Distinct contact between soil strata or geologic units
- Approximate location of soil strata change within a geologic soil unit

**Laboratory / Field Tests**
- %F: Percent fines
- AL: Atterberg limits
- CA: Chemical analysis
- CP: Laboratory compaction test
- CS: Consolidation test
- DS: Direct shear
- HA: Hydrometer analysis
- MC: Moisture content
- MD: Moisture content and dry density
- CC: Organic content
- PM: Permeability or hydraulic conductivity
- PP: Pocket penetrometer
- PPM: Parts per million
- SA: Sieve analysis
- TX: Triaxial compression
- UC: Unconfined compression
- VS: Vane shear

**Sheen Classification**
- NS: No Visible Sheen
- SS: Slight Sheen
- MS: Moderate Sheen
- HS: Heavy Sheen
- NT: No Tested

---

**KEY TO EXPLORATION LOGS**

GEOENGINEERS

**FIGURE A-1**
EXPLANATION OF BEDROCK TERMS

Scale of Relative rock Weathering (ODOT; 1987)

<table>
<thead>
<tr>
<th>Designation</th>
<th>Field Identification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fresh</td>
<td>Crystals are bright. Discontinuities may show some minor surface staining. No discoloration in rock fabric.</td>
</tr>
<tr>
<td>Slightly Weathered</td>
<td>Rock mass is generally fresh. Discontinuities are stained and may contain clay. Some discoloration in rock fabric. Decomposition extends up to 1 inch into rock.</td>
</tr>
<tr>
<td>Moderately Weathered</td>
<td>Rock mass is decomposed 50% or less. Significant portions of rock show discoloration and weathering effects. Crystals are dull and show visible chemical alteration. Discontinuities are stained and may contain secondary mineral deposits.</td>
</tr>
<tr>
<td>Predominantly Decomposed</td>
<td>Rock mass is more than 50% decomposed. Rock can be excavated with geologist’s pick. All discontinuities exhibit secondary mineralization. Complete discoloration of rock fabric. Surface of core is friable and usually pitted due to washing out of highly altered minerals by drilling water.</td>
</tr>
<tr>
<td>Decomposed</td>
<td>Rock mass is completely decomposed. Original rock “fabric” may be evident. May be reduced to soil with hand pressure.</td>
</tr>
</tbody>
</table>

Scale of Relative Rock Hardness (ODOT, 1987)

<table>
<thead>
<tr>
<th>Term</th>
<th>Hardness Designation</th>
<th>Field Identification</th>
<th>Approximate Unconfined Compressive Strength</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extremely Soft</td>
<td>R0</td>
<td>Can be indented with difficulty by thumbnail. May be moldable or friable with finger pressure.</td>
<td>&lt; 100 psi</td>
</tr>
<tr>
<td>Very Soft</td>
<td>R1</td>
<td>Crumbles under firm blows with point of a geology pick. Can be pecked by a pocket knife. Scratched with fingernail.</td>
<td>100-1000 psi</td>
</tr>
<tr>
<td>Soft</td>
<td>R2</td>
<td>Can be pecked by a pocket knife with difficulty. Cannot be scratched with fingernail. Shallow indentation made by firm blow of geology pick.</td>
<td>1000-4000 psi</td>
</tr>
<tr>
<td>Medium Hard</td>
<td>R3</td>
<td>Can be scratched by knife or pick. Specimen can be fractured with a single firm blow of hammer/geology pick.</td>
<td>4000-8000 psi</td>
</tr>
<tr>
<td>Hard</td>
<td>R4</td>
<td>Can be scratched with knife or pick only with difficulty. Several hard hammer blows required to fracture specimen.</td>
<td>8000-16000 psi</td>
</tr>
<tr>
<td>Very Hard</td>
<td>R5</td>
<td>Cannot be scratched by knife or sharp pick. Specimen requires many blows of hammer to fracture or chip. Hammer rebounds after impact.</td>
<td>&gt; 16000 psi</td>
</tr>
</tbody>
</table>

Rock Quality Designation (RQD)

<table>
<thead>
<tr>
<th>RQD (Percent)</th>
<th>Description of Rock Quality</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 to 25</td>
<td>Very Poor</td>
</tr>
<tr>
<td>25 to 50</td>
<td>Poor</td>
</tr>
<tr>
<td>50 to 75</td>
<td>Fair</td>
</tr>
<tr>
<td>75 to 90</td>
<td>Good</td>
</tr>
<tr>
<td>90 to 100</td>
<td>Excellent</td>
</tr>
</tbody>
</table>

RQD is a modified core recovery measurement which expresses the number of hard and sound rock pieces of 4” or more in size as a percentage of the total length of core run.

Discontinuity Spacing (ODOT; 1987)

<table>
<thead>
<tr>
<th>Description for Bedding, Foliation, or Flow Banding</th>
<th>Spacing</th>
<th>Description of Joints, Faults, or Other Fractures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very Thickly</td>
<td>&gt;10 feet</td>
<td>Very Widely</td>
</tr>
<tr>
<td>Thickly</td>
<td>3-10 feet</td>
<td>Widely</td>
</tr>
<tr>
<td>Medium</td>
<td>1-3 feet</td>
<td>Moderately Close</td>
</tr>
<tr>
<td>Thinly</td>
<td>2-12 inches</td>
<td>Closely</td>
</tr>
<tr>
<td>Very Thinly</td>
<td>&lt; 2 inches</td>
<td>Very Closely</td>
</tr>
</tbody>
</table>

EXPLANATION OF BEDROCK TERMS

FIGURE A-2
Note: See Figure A-1 for explanation of symbols.

Log of Boring CR-1

Project: Coos River HDD Feasibility
Project Location: Coos Bay, Oregon
Project Number: 16724-001-08
Field Data Table:

<table>
<thead>
<tr>
<th>Elevation (ft)</th>
<th>Depth (ft)</th>
<th>Interval</th>
<th>Recovered (in)</th>
<th>Collected Sample</th>
<th>Parent Material Type</th>
<th>Water Level</th>
<th>Group Classification</th>
<th>Material Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>55</td>
<td>2</td>
<td></td>
<td>5002&quot;</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>50</td>
<td>2</td>
<td></td>
<td>5002&quot;</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>45</td>
<td>12</td>
<td></td>
<td>26</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Orange-gray siltstone; predominantly decomposed, very soft</td>
</tr>
<tr>
<td>40</td>
<td>12</td>
<td></td>
<td>25</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>35</td>
<td>12</td>
<td></td>
<td>25</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>12</td>
<td></td>
<td>25</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>12</td>
<td></td>
<td>25</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>12</td>
<td></td>
<td>25</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>12</td>
<td></td>
<td>25</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>12</td>
<td></td>
<td>25</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>12</td>
<td></td>
<td>25</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>12</td>
<td></td>
<td>25</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Remarks:

- AL, Pl = 38
- Becomes orange-gray-blue mottled, very stiff (weakly to moderately cemented)
- Becomes gray; fresh, very soft

Note: See Figure A-1 for explanation of symbols.

Log of Boring CR-1 (continued)

Project: Coos River HDD Feasibility
Project Location: Coos Bay, Oregon
Project Number: 16724-001-08
Log of Boring CR-2

Project: Coos River HDD Feasibility
Project Location: Coos Bay, Oregon
Project Number: 16724-001-08

Note: See Figure A-1 for explanation of symbols.
Log of Boring CR-2 (continued)

**Project**: Coos River HDD Feasibility

**Project Location**: Coos Bay, Oregon

**Project Number**: 16724-001-08

**Figure A-4**

Sheet 2 of 3
<table>
<thead>
<tr>
<th>Elevation (feet)</th>
<th>Interval</th>
<th>Offensive</th>
<th>Collected Sample</th>
<th>Water Level</th>
<th>Graphic Log</th>
<th>Geologic Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>80</td>
<td>12</td>
<td>10</td>
<td>16</td>
<td></td>
<td></td>
<td>Orange-gray mottled fat clay with fine sand and trace organic matter (stiff, wet) (weakly to moderately cemented)</td>
</tr>
<tr>
<td>85</td>
<td>10</td>
<td>16</td>
<td>17</td>
<td></td>
<td></td>
<td>With gravel, very stiff</td>
</tr>
<tr>
<td>95</td>
<td>12</td>
<td>32</td>
<td>19</td>
<td></td>
<td></td>
<td>Becomes gray</td>
</tr>
<tr>
<td>100</td>
<td>2</td>
<td>50°</td>
<td>20</td>
<td></td>
<td></td>
<td>Brown-gray silstone; fresh, very soft</td>
</tr>
</tbody>
</table>

Note: See Figure A-1 for explanation of symbols.

Log of Boring CR-2 (continued)
FIELD DATA

Elevation (feet)

Depth (feet)

Interval

Recovered (in)

Biosediment

Collected Sample

Geologic Symbol

Water Level

Graphic Log

Material Classification

MATERIAL DESCRIPTION

Remarks

ML

Brown sandy silt with organic matter (woody debris) (very soft, wet)

SA

Brownish gray silt with occasional organic matter (very soft, wet)

SM

Gray silty fine to medium sand with trace organic matter (loose, wet)

Gray fine to medium sand with silt (very loose, wet)

Becomes loose with organic matter (woody debris)

Log of Boring CR-3

Project: Coos River HDD Feasibility

Project Location: Coos Bay, Oregon

Project Number: 16724-001-08

Figure A-5

Sheet 1 of 3

Note: See Figure A-1 for explanation of symbols.
<table>
<thead>
<tr>
<th>Elevation (ft)</th>
<th>Depth (ft)</th>
<th>Intake</th>
<th>Recovered (in)</th>
<th>Blower Flow</th>
<th>Collect Sample</th>
<th>Vane Test</th>
<th>Graphic Log</th>
<th>Soft Material</th>
<th>Moisture Content</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
<td>16</td>
<td>12</td>
<td>16</td>
<td>SE</td>
<td>30</td>
<td>SA</td>
<td>36</td>
<td>Gray silt to medium sand with trace organic matter (medium dense, wet)</td>
<td>34</td>
<td>SA; %F = 19</td>
</tr>
<tr>
<td>55</td>
<td>15</td>
<td>18</td>
<td>15</td>
<td>SE</td>
<td>30</td>
<td>SA</td>
<td>36</td>
<td>Lacks organic matter</td>
<td>34</td>
<td>SA; %F = 19</td>
</tr>
<tr>
<td>60</td>
<td>14</td>
<td>18</td>
<td>12</td>
<td>SE</td>
<td>32</td>
<td>SA</td>
<td>46</td>
<td>With trace coarse sand</td>
<td>46</td>
<td>SA; %F = 29</td>
</tr>
<tr>
<td>65</td>
<td>13</td>
<td>18</td>
<td>13</td>
<td>SE</td>
<td>32</td>
<td>SA</td>
<td>33</td>
<td>Lacks medium and coarse sand</td>
<td>33</td>
<td>SA; %F = 23</td>
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<tr>
<td>70</td>
<td>19</td>
<td>12</td>
<td>14</td>
<td>SE</td>
<td>34</td>
<td>SA</td>
<td></td>
<td>Becomes dense</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: See Figure A-1 for explanation of symbols.

Log of Boring CR-3 (continued)

Project: Coos River HDD Feasibility
Project Location: Coos Bay, Oregon
Project Number: 16724-001-08

Figure A-5
Sheet 2 of 3
Note: See Figure A-1 for explanation of symbols.
Log of Boring CR-4

Project: Coos River HDD Feasibility
Project Location: Coos Bay, Oregon
Project Number: 16724-001-08

Note: See Figure A-1 for explanation of symbols.
<table>
<thead>
<tr>
<th>Depth (ft)</th>
<th>Interval</th>
<th>Recovered (in)</th>
<th>Blent Size</th>
<th>Sample Name</th>
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<th>Group Classification</th>
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<tr>
<td>50</td>
<td>18</td>
<td>5</td>
<td>3A</td>
<td>SM</td>
<td>53</td>
<td>Gray silty fine to medium sand with trace organic matter (loose, wet)</td>
<td>53</td>
<td>SA, CS = 48</td>
</tr>
<tr>
<td>55</td>
<td>18</td>
<td>3</td>
<td>3A</td>
<td>ML</td>
<td>55</td>
<td>Gray fine sandy silt (soft, wet)</td>
<td>55</td>
<td></td>
</tr>
<tr>
<td>60</td>
<td>18</td>
<td>3</td>
<td>3A</td>
<td></td>
<td>10</td>
<td>Becomes very soft with decreased sand content</td>
<td>57</td>
<td>%F = 78</td>
</tr>
<tr>
<td>65</td>
<td>18</td>
<td>0</td>
<td>3A</td>
<td></td>
<td>11</td>
<td>Becomes brownish gray, very soft</td>
<td>57</td>
<td></td>
</tr>
<tr>
<td>70</td>
<td>18</td>
<td>2</td>
<td>22</td>
<td>SP-SM</td>
<td>13</td>
<td>Gray silty sand (very loose, wet)</td>
<td>57</td>
<td></td>
</tr>
<tr>
<td>75</td>
<td>12</td>
<td>28</td>
<td>15</td>
<td>SP</td>
<td></td>
<td>Gray fine to medium sand (medium dense, wet)</td>
<td>57</td>
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</tbody>
</table>

Note: See Figure A-1 for explanation of symbols.

Log of Boring CR-4 (continued)

Project: Coos River HDD Feasibility
Project Location: Coos Bay, Oregon
Project Number: 16724-001-08

Figure A-6
Sheet 2 of 2
U.S. STANDARD SIEVE SIZE

PERCENT PASSING BY WEIGHT

GRAIN SIZE IN MILLIMETERS

COBBLES | GRAVEL | SAND | SILT OR CLAY
| COARSE | FINE | COARSE | MEDIUM | FINE |

Symbol | Sample ID | Sample Depth (feet) | Moisture Content (%) | Gravel (%) | Sand (%) | Fines (%) | USCS Class | Soil Classification
--- | --- | --- | --- | --- | --- | --- | --- | ---
| | | | | | | | | Clayey fine to coarse sand with trace fine gravel

| CR-2 S-3 | 15 | 59 | 1 | 51 | 47 | SC | | Fine to medium sand with silt
| CR-3 S-3 | 15 | 34 | 0 | 88 | 12 | SP-SM | | Silty fine to medium sand
| CR-3 S-6 | 30 | 42 | 0 | 60 | 40 | SM | | Silty fine to medium sand
| CR-3 S-8 | 40 | 34 | 0 | 81 | 19 | SM | |

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Sieve Analysis Results

Coos River HDD Feasibility

Figure A - 7
U.S. STANDARD SIEVE SIZE

PERCENT PASSING BY WEIGHT

GRANULOMETRY TABLE

<table>
<thead>
<tr>
<th>Sample ID</th>
<th>Sample Depth (feet)</th>
<th>Moisture Content (%)</th>
<th>Gravel (%)</th>
<th>Sand (%)</th>
<th>Fines (%)</th>
<th>USCS Class</th>
<th>Soil Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>CR-3 S-10</td>
<td>50</td>
<td>36</td>
<td>0</td>
<td>81</td>
<td>19</td>
<td>SM</td>
<td>Silty fine to medium sand</td>
</tr>
<tr>
<td>CR-3 S-12</td>
<td>60</td>
<td>46</td>
<td>0</td>
<td>71</td>
<td>29</td>
<td>SM</td>
<td>Silty fine to coarse sand</td>
</tr>
<tr>
<td>CR-3 S-14</td>
<td>70</td>
<td>33</td>
<td>0</td>
<td>77</td>
<td>23</td>
<td>SM</td>
<td>Silty fine sand</td>
</tr>
</tbody>
</table>

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Sieve Analysis Results

Coos River HDD Feasibility

GeoEngineers

Figure A - 8
U.S. STANDARD SIEVE SIZE

PERCENT PASSING BY WEIGHT

GRAIN SIZE IN MILLIMETERS

COBBLES | GRAVEL | SAND | SILT OR CLAY
|        |        |      |        |
|        |        |      |        |
|        |        |      |        |

Sieve Analysis Results

Coos River HDD Feasibility

GeoEngineers

Figure A - 9

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### Atterberg Limits Test Results

<table>
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<tr>
<th>Sample ID</th>
<th>Sample Depth (feet)</th>
<th>Moisture Content (%)</th>
<th>Liquid Limit (%)</th>
<th>Plasticity Index (%)</th>
<th>USCS</th>
<th>Soil Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CR-1 S-1</td>
<td>5</td>
<td>52</td>
<td>59</td>
<td>31</td>
<td>CH</td>
<td>Fat clay with occasional organics</td>
</tr>
<tr>
<td>CR-1 S-3</td>
<td>15</td>
<td>51</td>
<td>76</td>
<td>44</td>
<td>CH</td>
<td>Fat clay with trace organics</td>
</tr>
<tr>
<td>CR-1 S-5</td>
<td>25</td>
<td>45</td>
<td>54</td>
<td>28</td>
<td>CH</td>
<td>Fat clay with some gravel</td>
</tr>
<tr>
<td>CR-1 S-6</td>
<td>40</td>
<td>37</td>
<td>64</td>
<td>38</td>
<td>CH</td>
<td>Fat clay with some gravel</td>
</tr>
</tbody>
</table>

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PLASTICITY CHART

Atterberg Limits Test Results

Coos River HDD Feasibility

GeoENGINEERS

Figure A-11
Atterberg Limits Test Results

Coos River HDD Feasibility

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APPENDIX B

Report Limitations and Guidelines for Use
APPENDIX B
REPORT LIMITATIONS AND GUIDELINES FOR USE

This appendix provides information to help you manage your risks with respect to the use of this report.

Geotechnical Services Are Performed for Specific Purposes, Persons and Projects

This report has been prepared for the exclusive use of Williams and their authorized agents. This report is not intended for use by others, and the information contained herein is not applicable to other sites.

GeoEngineers structures our services to meet the specific needs of our clients. For example, a geotechnical or geologic study conducted for a civil engineer or architect may not fulfill the needs of a construction contractor or even another civil engineer or architect that are involved in the same project. Because each geotechnical or geologic study is unique, each geotechnical engineering or geologic report is unique, prepared solely for the specific client and project site. Our report is prepared for the exclusive use of our Client. No other party may rely on the product of our services unless we agree in advance to such reliance in writing. This is to provide our firm with reasonable protection against open-ended liability claims by third parties with whom there would otherwise be no contractual limits to their actions. Within the limitations of scope, schedule and budget, our services have been executed in accordance with our Agreement with the Client and generally accepted geotechnical practices in this area at the time this report was prepared. This report should not be applied for any purpose or project except the one originally contemplated.

A Geotechnical Engineering or Geologic Report Is Based on a Unique Set of Project-specific Factors

This report has been prepared for the proposed Coos River HDD associated with the Pacific Connector Gas Pipeline Project in Coos Bay, Oregon. GeoEngineers considered a number of unique, project-specific factors when establishing the scope of services for this project and report. Unless GeoEngineers specifically indicates otherwise, do not rely on this report if it was:

- not prepared for you,
- not prepared for your project,
- not prepared for the specific site explored,
- completed before important project changes were made.

For example, changes that can affect the applicability of this report include those that affect:

- the function of the proposed structure,
- elevation, configuration, location, orientation or weight of the proposed structure,
- composition of the design team,
- project ownership.

1 Developed based on material provided by ASFE, Professional Firms Practicing in the Geosciences; www.asfe.org.
If important changes are made after the date of this report, GeoEngineers should be given the opportunity to review our interpretations and recommendations and provide written modifications or confirmation, as appropriate.

Subsurface Conditions Can Change

This geotechnical or geologic report is based on conditions that existed at the time the study was performed. The findings and conclusions of this report may be affected by the passage of time, by manmade events such as construction on or adjacent to the site, or by natural events such as floods, earthquakes, slope instability or groundwater fluctuations. Always contact GeoEngineers before applying a report to determine if it remains applicable.

Most Geotechnical and Geologic Findings Are Professional Opinions

Our interpretations of subsurface conditions are based on field observations from widely spaced sampling locations at the site. Site exploration identifies subsurface conditions only at those points where subsurface tests are conducted or samples are taken. GeoEngineers reviewed field and laboratory data and then applied our professional judgment to render an opinion about subsurface conditions throughout the site. Actual subsurface conditions may differ, sometimes significantly, from those indicated in this report. Our report, conclusions and interpretations should not be construed as a warranty of the subsurface conditions.

Geotechnical Engineering Report Recommendations Are Not Final

Do not over-rely on the preliminary construction recommendations included in this report. These recommendations are not final, because they were developed principally from GeoEngineers' professional judgment and opinion. GeoEngineers' recommendations can be finalized only by observing actual subsurface conditions revealed during construction. GeoEngineers cannot assume responsibility or liability for this report's recommendations if we do not perform construction observation.

Sufficient observation, testing and consultation by GeoEngineers should be provided during construction to confirm that the conditions encountered are consistent with those indicated by the explorations, to provide recommendations for design changes should the conditions revealed during the work differ from those anticipated, and to evaluate whether or not earthwork activities are completed in accordance with our recommendations. Retaining GeoEngineers for construction observation for this project is the most effective method of managing the risks associated with unanticipated conditions.

A Geotechnical Engineering or Geologic Report Could Be Subject to Misinterpretation

Misinterpretation of this report by other design team members can result in costly problems. You could lower that risk by having GeoEngineers confer with appropriate members of the design team after submitting the report. Also, retain GeoEngineers to review pertinent elements of the design team's plans and specifications. Contractors can also misinterpret a geotechnical engineering or geologic report. Reduce that risk by having GeoEngineers participate in pre-bid and preconstruction conferences, and by providing construction observation.
Do Not Redraw the Exploration Logs

Geotechnical engineers and geologists prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in a geotechnical engineering or geologic report should never be redrawn for inclusion in architectural or other design drawings. Only photographic or electronic reproduction is acceptable, but recognize that separating logs from the report can elevate risk.

Give Contractors a Complete Report and Guidance

Some owners and design professionals believe they can make contractors liable for unanticipated subsurface conditions by limiting what they provide for bid preparation. To help prevent costly problems, give contractors the complete geotechnical engineering or geologic report, but preface it with a clearly written letter of transmittal. In that letter, advise contractors that the report was not prepared for purposes of bid development and that the report's accuracy is limited; encourage them to confer with GeoEngineers and/or to conduct additional study to obtain the specific types of information they need or prefer. A pre-bid conference can also be valuable. Be sure contractors have sufficient time to perform additional study. Only then might an owner be in a position to give contractors the best information available, while requiring them to at least share the financial responsibilities stemming from unanticipated conditions. Further, a contingency for unanticipated conditions should be included in your project budget and schedule.

Contractors Are Responsible for Site Safety on Their Own Construction Projects

Our geotechnical recommendations are not intended to direct the contractor's procedures, methods, schedule or management of the work site. The contractor is solely responsible for job site safety and for managing construction operations to minimize risks to on-site personnel and to adjacent properties.

Read These Provisions Closely

Some clients, design professionals and contractors may not recognize that the geoscience practices (geotechnical engineering or geology) are far less exact than other engineering and natural science disciplines. This lack of understanding can create unrealistic expectations that could lead to disappointments, claims and disputes. GeoEngineers includes these explanatory “limitations” provisions in our reports to help reduce such risks. Please confer with GeoEngineers if you are unclear how these “Report Limitations and Guidelines for Use” apply to your project or site.

Geotechnical, Geologic and Environmental Reports Should Not Be Interchanged

The equipment, techniques and personnel used to perform an environmental study differ significantly from those used to perform a geotechnical or geologic study and vice versa. For that reason, a geotechnical engineering or geologic report does not usually relate any environmental findings, conclusions or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. Similarly, environmental reports are not used to address geotechnical or geologic concerns regarding a specific project.
Biological Pollutants

GeoEngineers' Scope of Work specifically excludes the investigation, detection, prevention or assessment of the presence of Biological Pollutants. Accordingly, this report does not include any interpretations, recommendations, findings, or conclusions regarding the detecting, assessing, preventing or abating of Biological Pollutants and no conclusions or inferences should be drawn regarding Biological Pollutants, as they may relate to this project. The term “Biological Pollutants” includes, but is not limited to, molds, fungi, spores, bacteria, and viruses, and/or any of their byproducts.

If Client desires these specialized services, they should be obtained from a consultant who offers services in this specialized field.
TO: Pacific Connector Gas Pipeline, LP (Pacific Connector)

FROM: Alan Snider, PE, Principal
       Adam Alderman, PE, Senior Engineer
       Trevor Hoyles, PE, Associate

DATE: August 24, 2007

FILE: 8169-021-00, Task 1200

SUBJECT: Rogue River HDD – Preliminary Feasibility Analysis

INTRODUCTION

This report was prepared to support an application submitted to the Federal Energy Regulatory Commission (FERC or Commission) by Pacific Connector Gas Pipeline, LP (Pacific Connector) to construct and operate the Pacific Connector Gas Pipeline (PCGP) Project, a new 230-mile, 36-inch-diameter interstate natural gas transmission system and related facilities. The PCGP will extend from the proposed Jordan Cove Liquefied Natural Gas (LNG) Import Terminal (Jordan Cove Terminal), being developed by Jordan Cove Energy Project, L.P. (JCEP) to interconnects with three interstate natural gas pipelines near Malin, Oregon. The PCGP is the proposed send-out pipeline for the proposed Jordan Cove Terminal.

Pacific Connector Gas Pipeline LLC, the general partner for the Pacific Connector Gas Pipeline LP, entered into an Engineering, Procurement and Construction Management Agreement (“EPCM Agreement”) and an Operations and Maintenance Agreement (“O&M Agreement”) with Williams Pacific Connector Gas Operator, LLC (Williams Pacific Operator), whereby Williams Pacific Operator will design, manage the procurement and construction, commission and operate, maintain and manage the day-to-day business affairs of PCGP, as a contractor for the owners.

This technical memorandum presents our preliminary evaluation of the proposed pipeline crossing of the Rogue River approximately 2 miles north of Shady Cove in Jackson County, Oregon. This preliminary evaluation is based on a site visit and information acquired from the subsurface explorations.

PRELIMINARY FEASIBILITY ANALYSIS

SITE FEASIBILITY

The HDD entry workspace may be accessed via a private drive off of Old Ferry Road and will likely require clearing and extensive grading improvements prior to construction. The exit workspace and stringing area will be in a relatively open valley that generally slopes gently up toward the west. The exit workspace may be accessed via a private drive off of Ragsdale Road. The exit workspace will likely require some minor clearing and grading to a level condition due to the sloping topography at the base of the slope where it’s located.

SUBSURFACE CONDITIONS

The subsurface soil and groundwater conditions at the proposed Rogue River HDD crossing were evaluated by completing seven borings to depths up to 230 feet below existing ground surface elevation. Boring B-1 was drilled on the west side (exit side) of the river near the top of the butte east of the exit point. Due to the
elevation at which boring B-1 was drilled, the base of the borehole is higher than the revised preliminary design HDD profile which now extends beyond the butte. Boring B-2 was completed off of Ragsdale Road on the east side of the butte west of the river. Boring B-3 was completed within the turnout along the east side of Highway 62. Borings B-4 and B-5 were completed on the eastern bank of the river (entry side). The boring locations are shown relative to the proposed alignment on Figure 1, attached. After the alignment was initially revised, borings B-6 and B-7 were completed on the west side of the river.

We observed 3 to 6 feet of medium dense sands and gravels in borings B-2 and B-3, respectively. Generally medium fractured strong to extremely strong basalt was encountered below the soil in boring B-2. RQD values in the basalt encountered in boring B-2 were generally greater than 50 percent with two thin zones where the RQD values were less than 50 percent. The bedrock encountered below the soil in boring B-3 consisted of approximately 21 feet of closely fractured medium strong basalt overlying generally medium fractured moderately strong to strong breccia. RQD values in the basalt were generally greater than 60 percent while the RQD values in the breccia were generally greater than 75 percent. We observed dense gravels with cobbles and boulders to depths of 13 and 27 feet in borings B-4 and B-5, respectively. Below the soil in each of these borings we observed closely to widely fractured medium strong to very strong breccia. RQD values in the breccia were generally greater than 70 percent.

Boring B-6 was completed near the proposed alignment approximately 250 feet east of the exit point. We encountered very stiff to hard clay to a depth of about 15 feet bgs where completely weathered, claystone was encountered to a depth of approximately 19 feet. Below the claystone, completely weathered to fresh, weak to moderately strong breccia with close to wide fracturing was observed to the completion depth of the boring at 101 feet. RQD values in the breccia typically ranged from 60 to 93 percent except for the two coring runs between depths of 91 and 101 feet where the RQD was 30 percent or less. The zone of low RQD values is far below the anticipated depth of the drill profile.

Boring B-7 was completed on the butte approximately 900 feet east of the proposed exit point to a depth of 250 feet. The boring encountered very dense sandy clay to a depth of 7.5 feet where a unit of basalt was encountered to a depth of 11 feet. Below a depth of 11 feet, the subsurface conditions consisted of silty gravel with sand to a depth of 23 feet. Below the gravel, a unit of sandy clay that is likely a residual basalt layer to a depth of 35 feet where breccia was observed to the bottom of the boring at a depth of 250 feet. Occasional thin layers of ash 18-24 inches thick were observed in the breccia. The RQD values in the breccia typically ranged from 40 to 100 percent. Several zones of fractured rock with lower RQD values were observed.

**GEOMETRIC EVALUATION**

Based on preliminary information, the design length of the Rogue River HDD crossing is approximately 3,050 feet. The proposed entry point is located in a relatively flat, lightly wooded area east of Rogue River and west of Old Ferry Road. The exit point is located near the base of a west facing slope that forms a small butte east of the exit point. The entry angle is 8 degrees and the exit angle is 5 degrees. Both then entry and exit curves have been designed with a radius of curvature 3,600 feet. The bottom tangent elevation of the preliminary design is approximately Elevation 1,350 feet. The preliminary design provides approximately 58 feet of cover at the eastern and western banks of the Rogue River.

**CONCLUSIONS**

Based on our preliminary evaluation, it is our opinion that the construction of the Rogue River HDD crossing is likely feasible. Because gravelly soils were observed overlying the bedrock in Borings B-4 and B-5 near
the proposed entry point, mitigation measures such as excavation, installing a large diameter steel casing, or other methods may be required through the gravelly overburden to provide support for the drilled hole during HDD operations. It should be noted that this preliminary evaluation is based on the limited amount of information currently available and is only valid for this specific location and alignment.

Due to the highly variable nature of the breccia encountered in boring B-7, we recommend completing a minimum of one additional borehole. We recommend locating the new borehole (B-8) approximately 1,300 feet east of the exit point to confirm that the rock quality along the proposed drill profile is suitable for drilling with HDD equipment. The drill profile may need to be modified at a later date to better suit the subsurface conditions.

Enclosures:  
Figure 1. Site Plan  
Figures 2 and 3. Rogue River HDD – Site Photos  
PCGP Rogue River Spreadsheet Calculations  
Proposed 36" Horizontal Directional Drill Rogue River Crossing Drawing  
Attachment A – Explorations Logs  
Figure A-1. Key to Exploration Logs  
Figures A-2 through A-8. Log of Borings

Disclaimer: Any electronic form, facsimile or hard copy of the original document (email, text, table, and/or figure), if provided, and any attachments are only a copy of the original document. The original document is stored by GeoEngineers, Inc. and will serve as the official document of record.
Looking east across river from turnout on Hwy 62

Photograph of east side of river near entry
Looking east toward entry from Ragsdale Rd

Looking west from Hwy 62 toward exit and Ragsdale Rd
PCGP Rogue River

Entry Angle = 8°
Exit Angle = 5°
L₁ = 290 ft
L₂ = 402 ft
Radius₁ = 3600 ft
Radius₂ = 3600 ft
Entry Station = 6483+79
Entry Elevation = 1425.8 ft
Exit Elevation = 1498.8 ft
Crossing Length = 3050.00 ft
Pipe Length = 3060.77 ft

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<th>Station</th>
<th>Elevation (ft)</th>
<th>Delta Elev.(ft)</th>
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<td>Entry</td>
<td>6483+79.28</td>
<td>1425.76</td>
</tr>
<tr>
<td>PC₁</td>
<td>6480+89.50</td>
<td>1385.03</td>
</tr>
<tr>
<td>PT₁</td>
<td>6475+88.48</td>
<td>1350.00</td>
</tr>
<tr>
<td>PC₂</td>
<td>6471+86.69</td>
<td>1350.00</td>
</tr>
<tr>
<td>PT₂</td>
<td>6468+72.93</td>
<td>1363.70</td>
</tr>
<tr>
<td>Exit</td>
<td>6453+29.28</td>
<td>1498.75</td>
</tr>
</tbody>
</table>

Pipe Diameter = 36 in.
Wall Thickness = 0.900 in.
Pipe Grade = X-70
MAOP = 1440 psi

PCGP Rogue River

Entry @ 8°
Station 6483+79.28
Elevation (ft) 1425.76

292.6 ft
502.7 ft
401.8 ft
314.2 ft
1549.5 ft

P.C. #1 (3600 ft R)
Station 6480+89.50
Elevation (ft) 1385.03

P.T. #1
Station 6475+88.48
Elevation (ft) 1350.00

P.C. #2 (3600 ft R)
Station 6471+86.69
Elevation (ft) 1350.00

P.T. #2
Station 6468+72.93
Elevation (ft) 1363.70

Exit @ 5°
Station 6453+29.28
Elevation (ft) 1498.75

NOT TO SCALE
ATTACHMENT A

EXPLORATION LOGS
SOIL CLASSIFICATION CHART

<table>
<thead>
<tr>
<th>MAJOR DIVISIONS</th>
<th>SYMBOLS</th>
<th>TYPICAL DESCRIPTIONS</th>
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<td>SYMBOLS</td>
<td>TYPICAL DESCRIPTIONS</td>
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<tr>
<td></td>
<td>Graph</td>
<td>Letter</td>
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<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>GRAVELS AND GRAVELLY SOILS</strong></td>
<td>CLEANS GRAVELS (LITTLE OR NO FINES)</td>
<td>GW</td>
</tr>
<tr>
<td><strong>MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE</strong></td>
<td>GRAVELS WITH FINES (APPROXIMATE AMOUNT OF FINES)</td>
<td>CP</td>
</tr>
<tr>
<td><strong>SAND AND SANDY SOILS</strong></td>
<td>CLEAN SANDS (LITTLE OR NO FINES)</td>
<td>GM</td>
</tr>
<tr>
<td><strong>MORE THAN 30% OF FINE PASSING NO. 4 SIEVE</strong></td>
<td>SANDS WITH FINES (APPROXIMATE AMOUNT OF FINES)</td>
<td>GC</td>
</tr>
<tr>
<td><strong>SILTS AND CLAYS</strong></td>
<td>LIQUID LIMIT LESS THAN 50</td>
<td>ML</td>
</tr>
<tr>
<td><strong>MORE THAN 25% PASSING NO. 200 SIEVE</strong></td>
<td>SILTS AND CLAYS</td>
<td>CL</td>
</tr>
<tr>
<td><strong>MORE THAN 50% PASSING NO. 200 SIEVE</strong></td>
<td>LIQUID LIMIT GREATER THAN 50</td>
<td>OL</td>
</tr>
<tr>
<td><strong>HIGHLY ORGANIC SOILS</strong></td>
<td></td>
<td>PT</td>
</tr>
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</table>

**ADDITIONAL MATERIAL SYMBOLS**

<table>
<thead>
<tr>
<th>SYMBOLS</th>
<th>TYPICAL DESCRIPTIONS</th>
</tr>
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<tbody>
<tr>
<td>CC</td>
<td>Cement Concrete</td>
</tr>
<tr>
<td>AC</td>
<td>Asphalt Concrete</td>
</tr>
<tr>
<td>CR</td>
<td>Crushed Rock/Quarry Spalls</td>
</tr>
<tr>
<td>TS</td>
<td>Topsoil/Forest Duff/Sod</td>
</tr>
</tbody>
</table>

**Measured groundwater level in exploration, well, or piezometer**

**Groundwater observed at time of exploration**

**Perched water observed at time of exploration**

**Measured free product in well or piezometer**

**Stratigraphic Contact**

Distinct contact between soil strata or geologic units

**Gradual change between soil strata or geologic units**

**Approximate location of soil strata change within a geologic soil unit**

**Laboratory / Field Tests**

<table>
<thead>
<tr>
<th>Test</th>
<th>Description</th>
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<tbody>
<tr>
<td>%F</td>
<td>Percent fines</td>
</tr>
<tr>
<td>AL</td>
<td>Atterberg limits</td>
</tr>
<tr>
<td>CA</td>
<td>Chemical analysis</td>
</tr>
<tr>
<td>CP</td>
<td>Laboratory compaction test</td>
</tr>
<tr>
<td>CM</td>
<td>Consolidation test</td>
</tr>
<tr>
<td>DS</td>
<td>Direct shear</td>
</tr>
<tr>
<td>HA</td>
<td>Hydrometer analysis</td>
</tr>
<tr>
<td>MC</td>
<td>Moisture content</td>
</tr>
<tr>
<td>MD</td>
<td>Moisture content and dry density</td>
</tr>
<tr>
<td>OC</td>
<td>Organic content</td>
</tr>
<tr>
<td>PM</td>
<td>Permeability or hydraulic conductivity</td>
</tr>
<tr>
<td>PP</td>
<td>Pocket penetrometer</td>
</tr>
<tr>
<td>SA</td>
<td>Sieve analysis</td>
</tr>
<tr>
<td>TX</td>
<td>Triaxial compression</td>
</tr>
<tr>
<td>UC</td>
<td>Unconfined compression</td>
</tr>
<tr>
<td>VS</td>
<td>Vane shear</td>
</tr>
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</table>

**Sheen Classification**

<table>
<thead>
<tr>
<th>Sheen</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>NS</td>
<td>No Visible Sheen</td>
</tr>
<tr>
<td>SS</td>
<td>Slight Sheen</td>
</tr>
<tr>
<td>MS</td>
<td>Moderate Sheen</td>
</tr>
<tr>
<td>HS</td>
<td>Heavy Sheen</td>
</tr>
<tr>
<td>NT</td>
<td>Not Tested</td>
</tr>
</tbody>
</table>

**Sampler Symbol Descriptions**

- 2.4-inch I.D. split barrel
- Standard Penetration Test (SPT)
- Shelby tube
- Piston
- Direct-Push
- Bulk or grab

Blowcount is recorded for driven samplers as the number of blows required to advance sampler 12 inches (or distance noted). See exploration log for hammer weight and drop.

A "P" indicates sampler pushed using the weight of the drill rig.

**NOTE:** The reader must refer to the discussion in the report text and the logs of explorations for a proper understanding of subsurface conditions. Descriptions on the logs apply only at the specific exploration locations and at the time the explorations were made; they are not warranted to be representative of subsurface conditions at other locations or times.
### MATERIAL DESCRIPTION

**GROUP SYMBOL:**

- **CL:** Red sandy clay with gravel and occasional cobbles (hard, moist)
- **GP-GM:** Gray sandy gravel with some silt and occasional cobbles (very dense, moist)
- **GM:** Brown and red silty gravel (very dense, moist)
- **CL:** Brown-orange-white mottled sandy clay (hard, moist)
- **SSTN:** Brown and red silty sandstone; highly weathered, moderately strong, closely fractured
  
  Very weak between 28.5-29 feet

---

**LOG OF BORING B-1**

**Project:** Pacific Connector Gas Pipeline Project  
**Project Location:** Rogue River  
**Project Number:** 8169-021-00

---

Note: See Figure A-1 for explanation of symbols.
<table>
<thead>
<tr>
<th>Elevation feet</th>
<th>Interval</th>
<th>Recovered (in)</th>
<th>Blown/Foot</th>
<th>Sub-Sample Number</th>
<th>Testing</th>
<th>Water Level</th>
<th>Geologic Log</th>
<th>Group Symbol</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>1490</td>
<td>80</td>
<td>97</td>
<td></td>
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<tr>
<td>1485</td>
<td>95</td>
<td>103</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1480</td>
<td>90</td>
<td>90</td>
<td></td>
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<tr>
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<td>95</td>
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<tr>
<td>1470</td>
<td>100</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**MATERIAL DESCRIPTION**

- Medium fractured below 81 feet, moderately weak to moderately strong
- Closely fractured below 84 feet
- Very closely fractured between 87.5 and 89 feet
- Closely to medium fractured below 91 feet

**NOTES**

- UC-990 psi

Bottom of hole at 101 feet
Groundwater not encountered during drilling

---

**LOG OF BORING B-1 (continued)**

- Project: Pacific Connector Gas Pipeline Project
- Project Location: Rogue River
- Project Number: 8169-021-00

Figure: A-2
Sheet 3 of 3
<table>
<thead>
<tr>
<th>Elevation (feet)</th>
<th>MATERIAL DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>80</td>
<td>Widely fractured below 81.3 feet</td>
</tr>
<tr>
<td>90</td>
<td>Gray basaltic flow breccia; fresh, moderately strong to strong, closely fractured</td>
</tr>
<tr>
<td>100</td>
<td>Gray basalt; fresh, strong to extremely strong, closely fractured</td>
</tr>
<tr>
<td></td>
<td>Widely fractured below 91.5 feet</td>
</tr>
<tr>
<td></td>
<td>Closely fractured between 93.9 to 94.2 feet</td>
</tr>
<tr>
<td>105</td>
<td>Bottom of hole at 101 feet</td>
</tr>
<tr>
<td></td>
<td>Groundwater not encountered during drilling</td>
</tr>
</tbody>
</table>

LOG OF BORING B-2 (continued)

Project: Pacific Connector Gas Pipeline Project
Project Location: Rogue River
Project Number: 8169-021-00

Figure: A-3
Sheet 3 of 3
**LOG OF BORING B-3**

**Project:** Pacific Connector Gas Pipeline Project  
**Project Location:** Rogue River  
**Project Number:** 8169-021-00

---

**MATERIAL DESCRIPTION**

- **SM**  
  - Brown to red-brown silty fine to coarse sand with gravel (medium dense, moist)

- **BSLT**  
  - Dark gray medium grained basalt; moderately weathered, moderately strong, closely fractured  
  - Crushed zone from 6.6 to 8.5 feet with red silt and sand infilling  
  - Very closely fractured at 11 to 12 feet becomes medium fractured

- **BRDC**  
  - Dark blue-gray breccia; fresh, moderately strong, widely fractured  
  - Closed, quartz-filled fracture at 36.5 feet

---

**Note:** See Figure A-1 for explanation of symbols.
### MATERIAL DESCRIPTION

<table>
<thead>
<tr>
<th>Elevation Feet</th>
<th>Material Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1396</td>
<td>80 degree fracture with calcite mineralization at 43.5 feet</td>
</tr>
<tr>
<td>40</td>
<td>25 to 40 degree very thin quartz-filled veins</td>
</tr>
<tr>
<td>1390</td>
<td>closed fracture at 48.7 feet</td>
</tr>
<tr>
<td>45</td>
<td>becomes strong</td>
</tr>
<tr>
<td>1385</td>
<td>becomes weak, completely weathered, very closely fractured from 59.8 to 60 feet</td>
</tr>
<tr>
<td>50</td>
<td>Multi-colored breccia, moderately weathered, weak, medium fractured</td>
</tr>
<tr>
<td>1380</td>
<td>sheared/highly fractured zone from 60 to 61 feet</td>
</tr>
<tr>
<td>55</td>
<td>highly fractured/sheared zone from 61 to 61.7 feet</td>
</tr>
<tr>
<td>1375</td>
<td>decomposed zone from 65 to 65.5 feet</td>
</tr>
<tr>
<td>60</td>
<td>sheared fractures 68.2 and 68.5 feet</td>
</tr>
<tr>
<td>1370</td>
<td>completely decomposed zone at 71 to 72.2 feet</td>
</tr>
<tr>
<td>65</td>
<td>highly weathered from 72.2 to 73.5 feet</td>
</tr>
<tr>
<td>1365</td>
<td>gray breccia, slightly weathered, moderately strong, closely fractured</td>
</tr>
<tr>
<td>70</td>
<td>96</td>
</tr>
<tr>
<td>1360</td>
<td>100</td>
</tr>
<tr>
<td>75</td>
<td>96</td>
</tr>
<tr>
<td>1355</td>
<td>100</td>
</tr>
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</table>

**LOG OF BORING B-3 (continued)**

**Project:** Pacific Connector Gas Pipeline Project  
**Project Location:** Rogue River  
**Project Number:** 8169-021-00  
**Figure:** A-4  
**Sheet:** 2 of 3
MATERIAL DESCRIPTION

- Crushed zone at 79.2 to 80 feet fracture faces slicken sided
- Becomes dark blue altered breccia; slightly weathered, moderately strong, medium fractured
- Becomes widely spaced fractures

NOTES

UC=2,410 psi

Bottom of hole at 101 feet
Groundwater not measured

UC=4,040 psi
<table>
<thead>
<tr>
<th>Date(s) Drilled</th>
<th>06/02/06 - 06/03/06</th>
<th>Logged By</th>
<th>ABA</th>
<th>Checked By</th>
<th>TNH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drilling Contractor</td>
<td>Crux Drilling</td>
<td>Drilling Method</td>
<td>HWT/HQ-3</td>
<td>Sampling Methods</td>
<td>Grab / SPT / Coring</td>
</tr>
<tr>
<td>Auger Data</td>
<td>Tricone</td>
<td>Hammer Data</td>
<td>140 lb hammer/30 in drop</td>
<td>Drilling Equipment</td>
<td>Burley 4000 Track Rig</td>
</tr>
<tr>
<td>Total Depth (ft)</td>
<td>101</td>
<td>Surface Elevation (ft)</td>
<td>1,417.68</td>
<td>Groundwater Elevation (ft)</td>
<td>Not Encountered</td>
</tr>
<tr>
<td>Vertical Datum</td>
<td>Datum/ System</td>
<td>Existing(s):</td>
<td>Northing(y):</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**SAMPLES**

<table>
<thead>
<tr>
<th>Elevation (ft)</th>
<th>Depth Interval</th>
<th>Recovery (%)</th>
<th>Sub-Sample Number</th>
<th>Testing</th>
<th>Graphic Log</th>
<th>Group Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1425</td>
<td>100</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td>GW</td>
<td>Medium brown fine to coarse gravel with cobbles, boulders, sand and silt (very dense, moist)</td>
</tr>
<tr>
<td>1415</td>
<td>100</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1410</td>
<td>100</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1405</td>
<td>100</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td>BREC</td>
<td>Dark gray altered breccia; slightly weathered, moderately strong, medium fractured</td>
</tr>
<tr>
<td>1400</td>
<td>100</td>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>becomes widely to very widely fractured</td>
</tr>
<tr>
<td>1395</td>
<td>100</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>becomes widely fractured</td>
</tr>
<tr>
<td>1390</td>
<td>100</td>
<td>7</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>becomes medium fractured</td>
</tr>
<tr>
<td>1385</td>
<td>100</td>
<td>8</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>fracture with 1/2-inch wide crushed zone at 34.8</td>
</tr>
</tbody>
</table>

Note: See Figure A-1 for explanation of symbols.

**LOG OF BORING B-4**

Project: Pacific Connector Gas Pipeline Project
Project Location: Rogue River
Project Number: 8169-021-00

Figure: A-5
<table>
<thead>
<tr>
<th>MATERIAL DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>sheared fracture at 38.5 feet</td>
</tr>
<tr>
<td>sheared/highly fractured zone (40 degree angle) at 39.3 to 59.9 feet becomes medium to widely fractured</td>
</tr>
<tr>
<td>crushed zone from 48.3 to 48.5 feet</td>
</tr>
<tr>
<td>fracture with 1/2 inch crushed zone at 54 feet becomes closely to medium fractured; 2 in crushed zone at 56.2 feet; 1 in crushed zone at 56.7 feet</td>
</tr>
<tr>
<td>becomes medium fractured</td>
</tr>
<tr>
<td>becomes medium to widely fractured 1.5-inch zone of crushed rock at 66.6 feet becomes widely fractured</td>
</tr>
<tr>
<td>Crushed rock infilling fractures at 75.5 feet</td>
</tr>
</tbody>
</table>

---

**LOG OF BORING B-4 (continued)**

**GeoEngineers**

Project: Pacific Connector Gas Pipeline Project

Project Location: Rogue River

Project Number: 8169-021-00

Figure: A-5

Sheet 2 of 3
<table>
<thead>
<tr>
<th>Elevation feet</th>
<th>Depth feet</th>
<th>Interval</th>
<th>Recovered (in)</th>
<th>Blows/foot</th>
<th>Sub-Sample Number</th>
<th>Testing</th>
<th>Graphic Log</th>
<th>Group Symbol</th>
<th>Material Description</th>
<th>Sheen</th>
<th>Headspace Vapor PID (ppm)</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>80</td>
<td>1335</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>becomes medium fractured</td>
<td></td>
<td></td>
<td>UC=3,430 psi</td>
</tr>
<tr>
<td>90</td>
<td>1325</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>becomes widely fractured</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>100</td>
<td>1320</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Bottom of hole at 101 feet</td>
<td></td>
<td>Groundwater not measured</td>
<td></td>
</tr>
</tbody>
</table>

**LOG OF BORING B-4 (continued)**

GEOENGINEERS

Project: Pacific Connector Gas Pipeline Project
Project Location: Rogue River
Project Number: 8169-021-00

Figure: A-5
Sheet 3 of 3
<table>
<thead>
<tr>
<th>Date(s) Drilled</th>
<th>05/03/06 - 06/05/06</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drilling Contractor</td>
<td>Crux Drilling</td>
</tr>
<tr>
<td>Drilling Method</td>
<td>HWT/HQ-3</td>
</tr>
<tr>
<td>Sampling Methods</td>
<td>Grab / Coring</td>
</tr>
<tr>
<td>Auger Data</td>
<td>Tricone</td>
</tr>
<tr>
<td>Hammer Data</td>
<td>140 lb hammer/30 in drop</td>
</tr>
<tr>
<td>Drilling Equipment</td>
<td>Burley 4000 Track Rig</td>
</tr>
<tr>
<td>Total Depth (ft)</td>
<td>31.5</td>
</tr>
<tr>
<td>Surface Elevation (ft)</td>
<td>1,425.23</td>
</tr>
<tr>
<td>Groundwater Elevation (ft)</td>
<td>Not Encountered</td>
</tr>
<tr>
<td>Datum/ System</td>
<td>Easting(x): Noting(y)</td>
</tr>
</tbody>
</table>

**MATERIAL DESCRIPTION**

- **Group Symbol:** GW
- **Light brown fine to coarse gravel with cobbles, 6" boulders, sand and silt (very dense, moist) (alluvium)**

- **Group Symbol:** BREC
- **Highly weathered breccia**
- **Dark blue breccia; slightly weathered, moderately strong, very close to closely fractured**
- **sheared fracture at 31 feet**
- **Bottom of hole at 31.5 feet**
- **Groundwater not determined due to drilling fluid**

**LOG OF BORING B-5**

- **Project:** Pacific Connector Gas Pipeline Project
- **Project Location:** Rogue River
- **Project Number:** 8169-021-00

Note: See Figure A-1 for explanation of symbols.

**GEOENGINEERS**
<table>
<thead>
<tr>
<th>Date(s) Drilled</th>
<th>Logged By</th>
<th>BCR</th>
<th>Checked By</th>
<th>TNH</th>
</tr>
</thead>
<tbody>
<tr>
<td>06/26/06</td>
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</tr>
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</table>

<table>
<thead>
<tr>
<th>Drilling Contractor</th>
<th>Drilling Method</th>
<th>Sampling Methods</th>
<th>Drilling Equipment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crux Drilling</td>
<td>HWT/HQ-3</td>
<td>SPT / Coring</td>
<td>Burley 4000 Track Rig</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Auger Data</th>
<th>Hammer Data</th>
<th>Total Depth (ft)</th>
<th>Surface Elevation (ft)</th>
<th>Groundwater Elevation (ft)</th>
<th>Drilling Technique</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tricone</td>
<td>140 lb hammer/30 in drop</td>
<td>101</td>
<td>1,524.20</td>
<td>Not Encountered</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Vertical Datum</th>
<th>Datum/ System</th>
<th>Easting(x): Northing(y):</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### SAMPLES

**Elevation feet**

<table>
<thead>
<tr>
<th>Depth (feet)</th>
<th>Interval Recovered (in)</th>
<th>Hammer</th>
<th>Sample Number</th>
<th>Testing</th>
<th>Graphic</th>
<th>Material Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1520</td>
<td>5</td>
<td>100</td>
<td>22</td>
<td>1</td>
<td></td>
<td>CL Brown-yellow sandy clay with some fine gravel (very stiff, moist) (residual claystone?)</td>
</tr>
<tr>
<td>1515</td>
<td>10</td>
<td>100</td>
<td>34</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1510</td>
<td>15</td>
<td>100</td>
<td>52</td>
<td>3</td>
<td></td>
<td>RX Light gray to tan completely weathered claystone (hard, moist)</td>
</tr>
<tr>
<td>1505</td>
<td>20</td>
<td>100</td>
<td>69</td>
<td>4</td>
<td></td>
<td>BREC Brown-green completely weathered (weak, moist) (volcanic breccia)</td>
</tr>
<tr>
<td>1500</td>
<td></td>
<td>100</td>
<td>80</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1495</td>
<td></td>
<td>100</td>
<td>103</td>
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</tbody>
</table>

**Note:** See Figure A-1 for explanation of symbols.

### MATERIAL DESCRIPTION

- **CL**
  - Brown-yellow sandy clay with some fine gravel (very stiff, moist) (residual claystone?)

- **RX**
  - Light gray to tan completely weathered claystone (hard, moist)

- **BREC**
  - Brown-green completely weathered (weak, moist) (volcanic breccia)
  - Brown-green volcanic breccia; highly weathered, (very weak, closely fractured)
  - Moderately weak below 23.5 feet

- Slightly weathered to fresh and moderately strong and blue-gray below 33.2 feet

### LOG OF BORING B-6

**Project:** Pacific Connector Gas Pipeline Project  
**Project Location:** Rogue River  
**Project Number:** 8169-021-00

Figure: A-7  
Sheet 1 of 3
Blue below 36 feet

Fresh below 41 feet

Widely fractured between 47-49.5 feet

Weak to moderately weak below 54 feet
Very closely fractured from 54 to 55 feet

Blue claystone; fresh, moderately strong, weak) closely fractured
Blue volcanic breccia; fresh, moderately strong, closely fractured

Very closely fractured from 67.8 to 69.5 feet

Very closely fractured from 75.5 to 76 feet
Wide fractured below 76 feet

LOG OF BORING B-6 (continued)
<table>
<thead>
<tr>
<th>Elevation feet</th>
<th>Depth feet</th>
<th>Interval Recovered (in)</th>
<th>Bows/foot</th>
<th>Sub-Sample Number</th>
<th>Testing</th>
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</table>

Moderately weak below 85 feet

Closely fractured below 88.8 feet

Very closely to closely fractured below 92.5 feet

Moderately strong below 95 feet
Closely fractured below 96 feet

Very closely fractured from 99.3 to 99.6 feet

Bottom of hole at 101 feet
Groundwater not encountered due to drilling fluid
MATERIAL DESCRIPTION

**SC**
- Red with green, black and gray mottled residual sandy clay with gravel (hard, moist)

**BSLT**
- Black slightly weathered closely to very closely fractured, very strong basalt, abundant clay filled fractures

**GP**
- Brown-gray silty gravel with sand with occasional cobbles

**CL**
- Light brown sandy clay, residual basalt (?) very weak, very closely fractured
- Brown highly-completely measured volcanic rock, closely fractured, moderately strong
- Light brown-gray highly weathered, moderately strong, closely fractured basalt (?) very closely fractured 31-32' and 34-36'

Note: See Figure A-1 for explanation of symbols.

LOG OF BORING B-7

**Project:** Pacific Connector Gas Pipeline Project

**Project Location:** Rogue River

**Project Number:** 8169-021-00
<table>
<thead>
<tr>
<th>Depth feet</th>
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<td>BREC Gravish-green highly weathered, closely fractured, moderately weak, volcanic breccia in ash matrix</td>
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<tr>
<td>40</td>
<td>Reddish-pink between 41.5 and 49.5'</td>
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<tr>
<td>45</td>
<td>very closely fractured between 43 and 44.3</td>
</tr>
<tr>
<td>50</td>
<td>Dark gray to below 44'</td>
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<tr>
<td>55</td>
<td>Green, moderately strong and slightly weathered below 45'</td>
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<tr>
<td>60</td>
<td>Moderate fracture spacing between 47.2 and 49.4'</td>
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<tr>
<td>65</td>
<td>Moderately weathered below 50'</td>
</tr>
<tr>
<td>70</td>
<td>Moderately weak below 51'</td>
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<tr>
<td>75</td>
<td>Highly to completely weathered and weak below 53'</td>
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<tr>
<td>80</td>
<td>Gray slightly weathered, closely fractured, moderately strong volcanic breccia, very closely fractured 57.5 to 57.8'</td>
</tr>
<tr>
<td>90</td>
<td>ASH Grayish-blue slightly weathered to fresh, closely fractured weak volcanic ash</td>
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<tr>
<td>100</td>
<td>BREC Gray, fresh, very closely fractured, moderately strong volcanic breccia</td>
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<tr>
<td>105</td>
<td>medium fractured spacing below 61.3'</td>
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<tr>
<td>110</td>
<td>very closely fractured 65.9 to 66.7'</td>
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<tr>
<td>115</td>
<td>closely fractured below 69'; dark pink below 69'</td>
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<tr>
<td></td>
<td>moderately fractured below 72.5'; grayish-blue below 73.4'</td>
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</table>

LOG OF BORING B-7 (continued)

Project: Pacific Connector Gas Pipeline Project
Project Location: Rogue River
Project Number: 8169-021-00

Figure: A-8 Sheet 2 of 6
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<td>Pinkish-red between 87' and 89.2'</td>
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<td>Pinkish-red below 89.9'</td>
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<td>very closely fractured below 94'</td>
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<tr>
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<td>closely fractured below 97</td>
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<tr>
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<td></td>
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<td>very closely fractured and highly weathered below 99' and moderately weak closely fractured below 100'</td>
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<tr>
<td>105</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Grades to fresh and moderately strong below 105.8'</td>
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<td>very closely fractured between 107.2 and 108.1'</td>
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<tr>
<td>ASH</td>
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<td></td>
<td></td>
<td>Grayish-blue closely fractured fresh weak volcanic ash</td>
</tr>
<tr>
<td>BREC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Blue-gray closely fractured fresh, moderately weak, moderately strong breccia</td>
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<tr>
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<td>very closely fractured and weak between 113.3 and 114'</td>
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<td></td>
<td></td>
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<td>moderately strong below 115'</td>
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<td>very closely fractured 116-117'</td>
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**LOG OF BORING B-7 (continued)**

**GeoEngineers**

- **Project:** Pacific Connector Gas Pipeline Project
- **Project Location:** Rogue River
- **Project Number:** 8169-021-00
- **Figure:** A-8
- **Sheet:** 3 of 6
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<td>very closely fractured 124-125'</td>
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<td>very closely fractured 127.8 to 129'</td>
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<td>moderately strong to strong below 135'</td>
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<td>Moderately strong below 138'</td>
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<td>92</td>
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<td>165</td>
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<td>very closely fractured below 145'</td>
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<td>Gray medium fractured, fresh, moderately strong breccia becoming red-pink</td>
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<td>closely fractured below 160'</td>
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<td></td>
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<td>very closely fractured and weak below 164' and highly weathered</td>
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---

**LOG OF BORING B-7 (continued)**

GeoEngineers

Project: Pacific Connector Gas Pipeline Project
Project Location: Rogue River
Project Number: 8169-021-00

Figure: A-8
Sheet 4 of 6
<table>
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<td>Very closely fractured and slightly weathered below 170', closely fractured below 171.7', very strong</td>
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<td>43</td>
<td>Highly weathered 190-191' (?)</td>
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<td>Very closely fractured 192-192.5'</td>
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<td>53</td>
<td>Very closely fractured below 195', highly weathered below 197' (?)</td>
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<td>210</td>
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<td>Fresh below 202' and closely fractured</td>
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<td>Fresh, closely fractured, moderately strong, moderately weak breccia</td>
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<tr>
<td>220</td>
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<td>Very weak below 204.5'</td>
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**Notes**

- Slightly moderately weathered, closely fractured, weak volcanic ash
<table>
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<tr>
<th>Depth feet</th>
<th>Original Recovered (in)</th>
<th>Blows/foot</th>
<th>Sub-Sample Number</th>
<th>Testing</th>
<th>Water Level</th>
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<td>Blue-gray, fresh, medium fractured, moderately weak to moderately strong breccia.</td>
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<td>215</td>
<td>82</td>
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<td>very closely fractured 213.5-214'</td>
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<td>163</td>
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<td>Moderately strong and widely fractured below 216'</td>
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<td>medium fractured below 220'</td>
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<td></td>
<td></td>
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<td>closely fractured 221-222'</td>
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<td>very closely fractured 226.5-227.3'</td>
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<td></td>
<td>moderately weak 228 - 229.5'</td>
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<td>very closely fractured 228.5-229'</td>
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<tr>
<td>250</td>
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<td></td>
<td></td>
<td></td>
<td>Bottom of hole at 230 feet</td>
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<td></td>
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<td>Groundwater not encountered due to drilling fluid?</td>
</tr>
</tbody>
</table>

**LOG OF BORING B-7 (continued)**

**Project:** Pacific Connector Gas Pipeline Project

**Project Location:** Rogue River

**Project Number:** 8169-021-00

**Figure:** A-8

**Sheet:** 6 of 6
INTRODUCTION

This report was prepared to support an application submitted to the Federal Energy Regulatory Commission (FERC or Commission) by Pacific Connector Gas Pipeline, LP (Pacific Connector) to construct and operate the Pacific Connector Gas Pipeline (PCGP) Project, a new 230-mile, 36-inch-diameter interstate natural gas transmission system and related facilities. The PCGP will extend from the proposed Jordan Cove Liquefied Natural Gas (LNG) Import Terminal (Jordan Cove Terminal), being developed by Jordan Cove Energy Project, L.P. (JCEP) to interconnects with three interstate natural gas pipelines near Malin, Oregon. The PCGP is the proposed send-out pipeline for the proposed Jordan Cove Terminal.

Pacific Connector Gas Pipeline LLC, the general partner for the Pacific Connector Gas Pipeline LP, entered into an Engineering, Procurement and Construction Management Agreement ("EPCM Agreement") and an Operations and Maintenance Agreement ("O&M Agreement") with Williams Pacific Connector Gas Operator, LLC (Williams Pacific Operator), whereby Williams Pacific Operator will design, manage the procurement and construction, commission and operate, maintain and manage the day-to-day business affairs of PCGP, as a contractor for the owners.

This technical memorandum presents our preliminary evaluation of the proposed pipeline crossing of the Klamath River approximately 4 miles southwest of Klamath Falls in Klamath County, Oregon. This evaluation is based on a site visit and preliminary information acquired from four subsurface explorations.

PRELIMINARY FEASIBILITY ANALYSIS

SITE FEASIBILITY

The HDD entry workspace may be located in an open agricultural field on the east side of Klamath River. It could be accessed via a temporary access road along the alignment from Highway 97 west of the entry point. The entry workspace would likely require little clearing and grading prior to construction. As currently envisioned, the exit workspace would be located in an open area on the west side of the river with the pipe stringing area west of the exit workspace (Figure 1). The exit workspace could be accessed via existing roads. Minor clearing and grading should be anticipated within the pipe stringing area.

SUBSURFACE CONDITIONS

The subsurface soil and groundwater conditions at the proposed HDD crossing of the Klamath River were evaluated by completing four borings to depths up to 101 feet below existing ground surface elevation. Borings B-1 and B-2 were drilled on the west side (proposed exit side) of the river as shown in Figure 1. Borings B-3 and B-4 were drilled on the east side of the river also shown in Figure 1. Based on the observed
subsurface conditions prior to completing the laboratory testing program, subsurface soil and groundwater conditions at the site vary considerably between the proposed entry and exit points.

Borings B-1 and B-2 encountered alluvial soils consisting of gravels, sands, silts and clays to a depth of about 15 feet below ground surface (bgs). Below the alluvial soils, sandstone was encountered to the extent of the borings at depths of approximately 101 feet. The sandstone was generally moderately strong to strong and very closely to medium fractured. In boring B-1, the Rock Quality Designation (RQD) values were typically greater than 65 percent between depths of 15 and 35 feet. Between depths of 35 and 40 feet, the RQD value was 40 percent. Below a depth of 45 feet, the RQD values were generally greater than 75 percent except in the interval of 55.5 to 60.5 feet where the RQD value was 68 percent. In boring B-2, the Rock Quality Designation (RQD) values were typically greater than 60 percent between depths of 14.5 and 41 feet. Below a depth of 41 feet, the RQD values were generally greater than 70.

Borings B-3 and B-4 were completed entirely in alluvial soils to depths of 100 and 101 feet, respectively. The soils encountered in both borings consisted of stiff to very stiff silts and clays with the exception of an approximately 4- to 5-foot thick unit of loose to medium dense silty sand that was observed in both borings at a depth of approximately 5 feet.

**GEOMETRIC EVALUATION**

Based on preliminary information, the design length of the Klamath River HDD crossing is approximately 2,300 feet. The proposed entry point is located in an open agricultural field on the east side of the Klamath River. The exit point is located in an open area on the west side of the river. The entry angle is 10 degrees and the exit angle is 8 degrees, with radii of curvature of 3,600 feet for both the entry and exit curves. The bottom tangent elevation of the preliminary design is approximately Elevation 4,015 feet. The preliminary design provides approximately 60 feet of cover below the bottom of the river.

**CONCLUSIONS**

Based on our preliminary evaluation, it is our opinion that the construction of the Klamath River HDD crossing is feasible from a geometric, land use, and geotechnical perspective. Due to the entirely differing subsurface conditions along the proposed alignment, we strongly recommend that at least two additional borings be completed in the river in order to determine the depth and orientation of the contact between the alluvial soils and the bedrock along the proposed drill profile. The information gained from the additional borings will help to determine the most practical sequencing plan for drilling and reaming operations. The sequencing plan will be a critical factor for the successful completion of the crossing.
Memorandum to Pacific Connector Gas Pipeline, LP (Pacific Connector)
August 24, 2007
Page 3

There may also be a moderate risk of hydraulic fracture and inadvertent returns near the entry and exit points and also along the eastern portion of the alignment due to the silts observed along the proposed alignment. Additional evaluation of the hydraulic fracture and inadvertent return potential will be completed for the final design. It should be noted that this preliminary evaluation is based on the limited amount of information currently available and is only valid for this specific location and alignment.

Enclosures:

Figure 1. Site Plan
Figures 2 and 3. Klamath River HDD – Site Photos
PCGP Klamath River Spreadsheet Calculations
Proposed 36” Horizontal Directional Drill Klamath River Crossing Drawing

Attachment A – Exploration Logs
Figure A-1. Key to Exploration Logs
Figures A-2 through A-5. Log of Borings

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Looking east across river toward entry

Looking west toward pipe stringing area
PCGP Klamath River

Entry Angle = 10°
Exit Angle = 8°
L₁ = 90 ft
L₂ = 760 ft
Radius₁ = 3600 ft
Radius₂ = 3600 ft
Entry Station = 10541+45
Entry Elevation = 4085.8 ft
Exit Elevation = 4095.8 ft
Crossing Length = 2300.00 ft
Pipe Length = 2309.38 ft

<table>
<thead>
<tr>
<th>Station</th>
<th>Elevation (ft)</th>
<th>Delta Elev (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Entry=</td>
<td>10541+45.39</td>
<td>4085.84</td>
</tr>
<tr>
<td>PC₁ =</td>
<td>10540+55.39</td>
<td>4069.97</td>
</tr>
<tr>
<td>PT₁ =</td>
<td>10534+30.25</td>
<td>4015.28</td>
</tr>
<tr>
<td>PC₂ =</td>
<td>10526+69.79</td>
<td>4015.28</td>
</tr>
<tr>
<td>PT₂ =</td>
<td>10521+68.76</td>
<td>4050.32</td>
</tr>
<tr>
<td>Exit=</td>
<td>10518+45.39</td>
<td>4095.77</td>
</tr>
</tbody>
</table>

Pipe Diameter = 36 in.
Wall Thickness = 0.750 in.
Pipe Grade = X-70
MAOP = 1440 psi

NOT TO SCALE
ATTACHMENT A
EXPLORATION LOGS
# Soil Classification Chart

<table>
<thead>
<tr>
<th>Major Divisions</th>
<th>Symbols</th>
<th>Typical Descriptions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Coarse Grained Soils</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gravel and Gravelly Soils</td>
<td><strong>GW</strong></td>
<td>Well-graded gravel, gravel-sand mixtures</td>
</tr>
<tr>
<td>More than 50% of coarse fraction retained on No. 10 sieve</td>
<td><strong>GP</strong></td>
<td>Poorly-graded gravel, gravel-sand mixtures</td>
</tr>
<tr>
<td>Gravels With Fines (approximate amount of fines)</td>
<td><strong>GM</strong></td>
<td>Silty gravels, gravel-sand-silt mixtures</td>
</tr>
<tr>
<td>Clean Sands (little or no fines)</td>
<td><strong>GC</strong></td>
<td>Clayey gravels, gravel-sand-clay mixtures</td>
</tr>
<tr>
<td>Sand and Sandy Soils</td>
<td><strong>SW</strong></td>
<td>Well-graded sands, gravelly sands</td>
</tr>
<tr>
<td>More than 50% of coarse fraction passing No. 4 sieve</td>
<td><strong>SP</strong></td>
<td>Poorly-graded sands, gravelly sand</td>
</tr>
<tr>
<td>Sands With Fines (approximate amount of fines)</td>
<td><strong>SM</strong></td>
<td>Silty sands, sand-silt mixtures</td>
</tr>
<tr>
<td><strong>Fine Grained Soils</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Silts and Clays</td>
<td><strong>ML</strong></td>
<td>Inorganic clays, rock flour, clayey silts with slight plasticity</td>
</tr>
<tr>
<td>More than 50% passing No. 200 sieve</td>
<td><strong>CL</strong></td>
<td>Inorganic clays of low to medium plasticity, unconsolidated clays, sandy clays, silty clays, loam clay</td>
</tr>
<tr>
<td>Silts and Clays</td>
<td><strong>OL</strong></td>
<td>Organic silts and organic silty clays of low plasticity</td>
</tr>
<tr>
<td><strong>Highly Organic Soils</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Symbol</strong></td>
<td><strong>PT</strong></td>
<td>Peat, humus, swamp soils with high organic contents</td>
</tr>
</tbody>
</table>

**Additional Material Symbols**

- **CC**: Cement Concrete
- **AC**: Asphalt Concrete
- **CR**: Crushed Rock/Quarry Spalls
- **TS**: Toppsoil/Forest Duff/Sod

**Measured Groundwater Level in Exploration Well or Piezometer**

**Groundwater Observed at Time of Exploration**

**Perched Water Observed at Time of Exploration**

**Measured Free Product in Well or Piezometer**

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**Stratigraphic Contact**
- Distinct contact between soil strata or geologic units
- Gradual change between soil strata or geologic units
- Approximate location of soil strata change within a geologic soil unit

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**Laboratory / Field Tests**

- **%F**: Percent fines
- **AL**: Atterberg limits
- **CA**: Chemical analysis
- **CP**: Laboratory compaction test
- **CS**: Consolidation test
- **DS**: Direct shear
- **HA**: Hydrometer analysis
- **MC**: Moisture content
- **MD**: Moisture content and dry density
- **OC**: Organic content
- **PM**: Permeability or hydraulic conductivity
- **PP**: Pocket penetrometer
- **SA**: Sieve analysis
- **TX**: Triaxial compression
- **UC**: Unconfined compression
- **VS**: Vane shear

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**Sheen Classification**

- **NS**: No Visible Sheen
- **SS**: Slight Sheen
- **MS**: Moderate Sheen
- **HS**: Heavy Sheen
- **NT**: Not Tested

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**NOTE**: Multiple symbols are used to indicate borderline or dual soil classifications.

**Sampler Symbol Descriptions**

- **2.4-inch I.D. split barrel**
- **Standard Penetration Test (SPT)**
- **Shelby tube**
- **Piston**
- **Direct-Push**
- **Bulk or grab**

Blow count is recorded for driven samplers as the number of blows required to advance sampler 12 inches (or distance noted). See exploration log for hammer weight and drop.

A "P" indicates sampler pushed using the weight of the drill rig.

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**KEY TO EXPLORATION LOGS**

**GEOENGINEERS**

**FIGURE A-1**
**LOG OF BORING B-1**

**GEOENGINEERS**

**Project:** Pacific Connector Gas Pipeline Project  
**Project Location:** Klamath River  
**Project Number:** 8169-021-00

Figure: A-2  
Sheet 1 of 3

---

**MATERIAL DESCRIPTION**

- **GM**  
  Brown silty gravel with abundant organics (very soft, moist) (fill)

- **PT**  
  Brown peat (very soft, moist to wet)

- **ML**  
  Brown with slight orange mottling (silt with trace sand (very stiff, moist)

- **SC**  
  Gray to green clayey sand (medium dense, moist)

- **CH**  
  Gray clay with sand and gravel (hard, moist)

- **SSTN**  
  Gray and green sandstone; medium grained with conglomerate lenses; fresh, strong, very closely fractured  
  Medium fractured, very strong below 16 feet

  Closely fractured below 23.8 feet

  Moderately strong below 26.5 feet  
  Very closely fractured between 26.5 and 27.2

  Medium fractured below 30.2 feet  
  Very closely fractured between 31.5 and 32.5 feet

**NOTES**

**UC=2,660 psi**
### MATERIAL DESCRIPTION

<table>
<thead>
<tr>
<th>Depth (feet)</th>
<th>Group Symbol</th>
<th>Material Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>35</td>
<td></td>
<td>Very closely fractured between 37.5 and 38 feet</td>
</tr>
<tr>
<td>40</td>
<td></td>
<td>Gray medium grained sandstone; fresh, moderately strong to strong, closely fractured</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Medium fractured between 41.8 and 43.4 feet</td>
</tr>
<tr>
<td>45</td>
<td></td>
<td>Very closely fractured between 45 and 45.3 feet</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Medium fractured, moderately strong below 45.3 feet</td>
</tr>
<tr>
<td>50</td>
<td></td>
<td>Widely fractured between 50.3 and 54 feet</td>
</tr>
<tr>
<td>55</td>
<td></td>
<td>Closely fractured between 57 and 57.8 feet</td>
</tr>
<tr>
<td>60</td>
<td></td>
<td>Widely fractured below 65.7 feet</td>
</tr>
<tr>
<td>65</td>
<td></td>
<td>Gray fine grained sandstone; fresh, moderately strong, widely fractured</td>
</tr>
<tr>
<td>70</td>
<td></td>
<td>Very closely fractured between 70.6 and 71 feet</td>
</tr>
</tbody>
</table>

---

**LOG OF BORING B-1 (continued)**

- **Project**: Pacific Connector Gas Pipeline Project
- **Project Location**: Klamath River
- **Project Number**: 8169-021-00

Figure: A-2

Sheet 2 of 3
<table>
<thead>
<tr>
<th>Elevation Feet</th>
<th>Depth Feet</th>
<th>SAMPLES</th>
<th>MATERIAL DESCRIPTION</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>401.5</td>
<td>82.6</td>
<td>Moderately fractured below 82.6 feet</td>
<td></td>
<td></td>
</tr>
<tr>
<td>404.5</td>
<td>86-89</td>
<td>Widely fractured between 86 and 89 feet</td>
<td></td>
<td></td>
</tr>
<tr>
<td>405.5</td>
<td>90.6-91</td>
<td>Very closely fractured between 90.6 and 91 feet</td>
<td>Widely fractured below 91 feet</td>
<td></td>
</tr>
<tr>
<td>396.5</td>
<td>101</td>
<td>Bottom of hole at 101 feet</td>
<td>Groundwater not determined due to drilling fluid</td>
<td></td>
</tr>
</tbody>
</table>

**LOG OF BORING B-1 (continued)**

**Project:** Pacific Connector Gas Pipeline Project

**Project Location:** Klamath River

**Project Number:** 8169-021-00

**Figure:** A-2

**Sheet** 3 of 3
LOG OF BORING B-2

**Project:** Pacific Connector Gas Pipeline Project

**Project Location:** Klamath River

**Project Number:** 8169-021-00

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**Date(s) Drilled:** 06/15/06 - 06/16/06

**Logged By:** BCR

**Checked By:** TNH

**Drilling Contractor:** Crux Drilling

**Drilling Method:** 6" HWT

**Sampling Methods:** SPT / D&M / Coring

**Auger Data:** Tri-Cone

**Hammer Data:** 140 lb hammer/30 in drop

**Drilling Equipment:** Burley 4000 Track Rig

**Total Depth (ft):** 100.5

**Surface Elevation (ft):** 4,093.20

**Groundwater Elevation (ft):** Not Encountered

**Includes:**

- **SAMPLES**
  - **Elevation (ft):**
    - 4060: 100
    - 4070: 100
    - 4080: 100
    - 4090: 100
    - 4095: 100
    - 4100: 100

- **Group Symbol:** OL
  - Brown and gray interbedded silt and organic silt with trace clay (very soft, wet)

- **Group Symbol:** ML
  - Gray silt with trace clay and gravel and organics (very stiff, moist)

- **Group Symbol:** SSTN
  - Dark gray to olive green sandstone; medium grained, with conglomerate lens; slightly weathered, moderately strong, closely fractured
  - Gray below 17 feet

- **Group Symbol:** Fresh below 26 feet

**NOTES:**

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**Figure:** A-3

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**GEOENGINEERS**
<table>
<thead>
<tr>
<th>Depth Feet</th>
<th>Interval</th>
<th>Recovered (in)</th>
<th>Blow/foot</th>
<th>Sub-Sample Number</th>
<th>Testing</th>
<th>Water Level</th>
<th>Graphic Log</th>
<th>Group Symbol</th>
<th>Material Description</th>
</tr>
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<td>36</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Very closely fractured between 36 and 36.5 feet</td>
</tr>
<tr>
<td>40</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Very closely fractured between 38.9 and 39.1 feet</td>
</tr>
<tr>
<td>45</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Gray to olive green sandstone; medium grained with conglomerate lenses; fresh, moderately strong, closely fractured</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Medium fractured between 42.5 and 44.5 feet</td>
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<td>Very closely fractured between 46.5 and 47.1 feet</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Very closely fractured between 47.8 and 48 feet</td>
</tr>
<tr>
<td>4045</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Very closely fractured between 52 and 52.3 feet</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Widely fractured below 53 feet</td>
</tr>
<tr>
<td>4040</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Closely fractured below 59.5 feet</td>
</tr>
<tr>
<td>4035</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Medium fractured below 61 feet; moderately strong to strong</td>
</tr>
<tr>
<td>4030</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Widely fractured below 71 feet</td>
</tr>
<tr>
<td>4020</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Closely fractured between 77 and 78 feet</td>
</tr>
</tbody>
</table>

**NOTES**

UC=5,400 psi

**LOG OF BORING B-2 (continued)**

**GeoEngineers**

Project: Pacific Connector Gas Pipeline Project

Project Location: Klamath River

Project Number: 8169-021-00

Figure: A-3

Sheet 2 of 3
<table>
<thead>
<tr>
<th>Elevation feet</th>
<th>Depth feet</th>
<th>Interval</th>
<th>Recovered (in)</th>
<th>Group</th>
<th>Symbol</th>
<th>Testing</th>
<th>Water Level</th>
<th>Notes</th>
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</thead>
<tbody>
<tr>
<td>80</td>
<td>100</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>100</td>
<td>90</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
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<tr>
<td>3995</td>
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<tr>
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<tr>
<td>3985</td>
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<tr>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**MATERIAL DESCRIPTION**

- Very closely fractured between 89.8 and 90 feet
- Closely fractured below 93 feet
- Very closely fractured between 96 and 96.3 feet
- Very closely fractured between 98.2 and 98.3 feet

**NOTES**

Bottom of hole at 100.5 feet
Groundwater not determined due to drilling fluid

**LOG OF BORING B-2 (continued)**

- Project: Pacific Connector Gas Pipeline Project
- Project Location: Klamath River
- Project Number: 8169-021-00

Figure: A-3
Sheet 3 of 3
MATERIAL DESCRIPTION

- Light tan silt with occasional fine sand, trace charcoal and organics
- Tan-brown silty fine to coarse sand (medium dense, wet)
- Gray silt fine to coarse sand with charcoal
- Light tan-gray silt (very stiff, moist)
- Grades to gray, becomes stiff
- Grades to green-gray
- Becomes very stiff
- Gray silt with interbedded layers of silty fine to coarse sand (stiff, moist)

Elevation (feet): 4085
Depth feet: 0
Recovered (in): 12
Blowfoot Number: 1
Testing Group Symbol: ML

Note: See Figure A-1 for explanation of symbols.
<table>
<thead>
<tr>
<th>Interval</th>
<th>Blows/ft</th>
<th>Sub-Sample Number</th>
<th>Water Level</th>
<th>Group</th>
<th>Symbol</th>
<th>Material Description</th>
<th>Sheen</th>
<th>Headspace Vapor PID (ppm)</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>18</td>
<td>11</td>
<td>7</td>
<td></td>
<td></td>
<td></td>
<td>Gray lean clay (stiff, moist)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>8</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Light green-gray lean clay (stiff, moist)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>9</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>grades to blue gray</td>
<td></td>
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</tr>
<tr>
<td>15</td>
<td>10</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>becomes very stiff</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>11</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>grades to gray and weakly cemented</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

LOG OF BORING B-3 (continued)

**Project:** Pacific Connector Gas Pipeline Project

**Project Location:** Klamath River

**Project Number:** 8169-021-00

Figure: A-4

Sheet 2 of 3
<table>
<thead>
<tr>
<th>Interval</th>
<th>Depth feet</th>
<th>Recovered (ln)</th>
<th>Size- Sample</th>
<th>Testing Graphic Log</th>
<th>Group Symbol</th>
<th>MATERIAL DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>18</td>
<td>80</td>
<td>22</td>
<td>16</td>
<td></td>
<td></td>
<td>grades to light green-gray and weakly cemented</td>
</tr>
<tr>
<td>18</td>
<td>85</td>
<td>21</td>
<td>17</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>18</td>
<td>90</td>
<td>20</td>
<td>18</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>18</td>
<td>95</td>
<td>15</td>
<td>19</td>
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<td></td>
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<tr>
<td>18</td>
<td>100</td>
<td>23</td>
<td>20</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Bottom of hole at 100 feet
Groundwater not determined due to drilling fluid

LOG OF BORING B-3 (continued)

Project: Pacific Connector Gas Pipeline Project
Project Location: Klamath River
Project Number: 8169-021-00

Figure: A-4
Sheet 3 of 3
## LOG OF BORING B-4

**Project:** Pacific Connector Gas Pipeline Project  
**Project Location:** Klamath River  
**Project Number:** 8169-021-00

**GEOENGINEERS**

**Figure:** A-5  
**Sheet:** 1 of 3

### MATERIAL DESCRIPTION

<table>
<thead>
<tr>
<th>Elevation (ft)</th>
<th>Depth (ft)</th>
<th>Interval Recovered (in)</th>
<th>Blows/foot</th>
<th>Sub-Sample Number</th>
<th>Testing</th>
<th>Graph Log</th>
<th>Group Symbol</th>
<th>Sheet</th>
<th>Project</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>4085</td>
<td></td>
<td>8</td>
<td>10</td>
<td>1</td>
<td></td>
<td></td>
<td>ML</td>
<td></td>
<td></td>
<td>Light brown clayey silt with sand (soft, moist to wet)</td>
</tr>
<tr>
<td>4080</td>
<td></td>
<td>18</td>
<td>24</td>
<td>2</td>
<td></td>
<td></td>
<td>SM</td>
<td></td>
<td></td>
<td>Dark brown fine to medium sand with trace to some silt (loose, moist to wet)</td>
</tr>
<tr>
<td>4075</td>
<td></td>
<td>18</td>
<td>31</td>
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<td>Light brown fine sandy silt (very stiff, moist)</td>
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<td>Dark gray silt (soft, moist)</td>
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<td>1 inch thick sand seam at 31.3 feet</td>
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**Note:** See Figure A-1 for explanation of symbols.
### MATERIAL DESCRIPTION

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<td>40-45</td>
<td>with trace clay below 45 feet</td>
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<td>45-50</td>
<td>Dark gray silt (very stiff, moist)</td>
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<td>50</td>
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<td>becomes stiff</td>
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### NOTES

- Switch to HU casing with pipeline

---

**LOG OF BORING B-4 (continued)**

- **Project:** Pacific Connector Gas Pipeline Project
- **Project Location:** Klamath River
- **Project Number:** 8169-021-00

**Figure:** A-5

**Sheet 2 of 3**
<table>
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<th>Elevation feet</th>
<th>Depth feet</th>
<th>Interval Recovered (m)</th>
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<th>Testing</th>
<th>Water Level Graphic Log</th>
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<td>17</td>
<td>16</td>
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<td>Dark gray silt with trace to some clay (very stiff, moist)</td>
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<tr>
<td>85</td>
<td>18</td>
<td>12</td>
<td>17</td>
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<td>becomes stiff</td>
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<td>90</td>
<td>18</td>
<td>14</td>
<td>18</td>
<td></td>
<td></td>
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<td>becomes very stiff</td>
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<td></td>
<td>Gray to dark olive green below 90 feet</td>
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<td>95</td>
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<td>Dark gray below 95 feet</td>
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<td>100</td>
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<td>14</td>
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<td></td>
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<td>Bottom of hole at 101 feet</td>
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<td>Groundwater not determined due to drilling fluid</td>
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</table>

**LOG OF BORING B-4 (continued)**

**Project:** Pacific Connector Gas Pipeline Project  
**Project Location:** Klamath River  
**Project Number:** 8169-021-00  
**Figure:** A- 5
NARRATIVE IN SUPPORT OF LAND USE APPLICATION
PROPOSED BLUE RIDGE ROUTE ALTERNATE ALIGNMENT
FOR THE PACIFIC CONNECTOR GAS PIPELINE

December 6, 2013 (Submitted)
May 2, 2014 (Supplemented)

Applicant: Pacific Connector Gas Pipeline, LP
295 Chipeta Way
Salt Lake City, UT 84108
(801) 584-6564
Contact: Bob Peacock

Applicant’s Representatives: Edge Environmental, Inc.
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Lakewood, CO 80228
(303) 988-8844
Contact: Carolyn Last

Perkins Coie LLP
1120 NW Couch Street, 10th Floor
Portland, OR 97209
(503) 727-2000
Contact: Mark D. Whitlow

Request: Approve the Blue Ridge Route alternate to the Brunschmid alternate alignment approved in Board of Commissioner's Final Decision and Order No. 14-01-007PL dated February 4, 2014, for a segment of the previously approved alignment for the Pacific Connector Gas Pipeline under Board of Commissioners Final Decision and Order No. 10-08-045PL dated September 8, 2010 and Board of Commissioners Final Decision and Order No. 12-03-018PL dated March 13, 2012.
# TABLE OF CONTENTS

I. INTRODUCTION .................................................................................................................. 1
   A. Background and Planning History .............................................................................. 2
   B. Procedural Status ....................................................................................................... 3

II. REQUESTED ALTERNATE ALIGNMENT ................................................................ 3
   A. Balance of County .................................................................................................... 4
      1. Exclusive Farm Use Zone ..................................................................................... 4
      2. Forest Zone .......................................................................................................... 6
      3. Special Regulatory Considerations/Inventory Maps ............................................ 10
   B. Coos Bay Estuary Management Plan (CBEMP) ...................................................... 24
      1. Zoning District 20-RS ......................................................................................... 27

III. CONCLUSION ................................................................................................................. 42
FIGURES:

Sheet 1  Overview Sheet

Sheet 2  Blue Ridge Route Alternate (Comparing Against Prior Brunschmid Route Alternate Alignment)
I. INTRODUCTION

Pacific Connector Pipeline Company, LP (hereafter "Pacific Connector" or "Applicant") submits this application requesting hearings body conditional use approval of an additional alternate alignment (hereafter the Blue Ridge Route alternate) to the previously approved Brunschmid alternate alignment, under Board of Commissioners Final Decision and Order No. 14-01-007PL dated February 4, 2014 for the Pacific Connector Gas Pipeline ("PCGP"). See attached Sheet 1. PCGP's original alignment crossing 49.72 miles of Coos County ("County"), under Final Decision and Order No. 10-08-045PL dated September 8, 2010 and Board of Commissioners Final Decision and Order No. 12-03-018PL dated March 13, 2012 (the "Original Decisions"), will remain valid and unmodified.\(^1\)

Following the Original Decisions, Pacific Connector filed a new application seeking approval of two alternate alignments for segments of the original PCGP alignment approved in the Original Decisions, which is now a final decision (herein referred to as "Pacific Connector II"), with the approved Pacific Connector II alternate alignments referred to as the Brunschmid and Stock Slough alternates.

This application, referred to as Pacific Connector III, will not seek to modify or amend the Pacific Connector II approvals, but will propose a new Blue Ridge Route alternate to the approved Brunschmid alternate alignment in Pacific Connector II. For clarification, the proposed Blue Ridge Route alternate alignment starts immediately south of the Coos River at approximately Mile Post ("MP") 11R, and is the route referred to in the Federal Energy Regulatory Commission ("FERC") Application as the "PCGP Modified Blue Ridge 2013 Route". See Sheet 1.

As noted in the Original Decisions, the pipeline's alignment requires approval by FERC. While this application proposes an additional alternate segment alignment for County approval, FERC will make the ultimate selection of the pipeline's alignment. As a practical matter, even though Pacific Connector seeks approval for alternate alignments along the route previously approved by the Original Decisions, only one continuous alignment approved by FERC for the entire pipeline will be constructed.

As discussed above, this application requests County approval of the Blue Ridge Route alternate alignment that would retain the first segment of the Brunschmid alternate to allow PCGP to

\(^1\) Since the PCGP alignment was approved in the Original Decisions, Pacific Connector has conducted a detailed analysis of that alignment. In many instances, the approved PCGP alignment has moved in minor ways to conform to the surveyed centerline or to accommodate small project refinements, without changing the location of the alignment into different ownerships or into a different zone within the same ownership. Based upon consultation with Planning staff, those refinements to the approved alignment do not constitute alternate segments which need additional approval with respect to applicable review criteria.
avoid the Brunschmid Wetland Reserve, would eliminate all crossings of Stock Slough, and would reduce the number of miles of crossings on private timberlands. As further discussed below, the proposed Blue Ridge Route alternate alignment affects only two Coos County zoning designations: Exclusive Farm Use and Forest ("EFU" and "F"). See Sheet 1.

This narrative explains the reasons for the requested Blue Ridge Route alternate alignment approval and demonstrates how the proposed Blue Ridge Route alternate alignment satisfies the applicable provisions of the Coos County Zoning and Land Development Ordinance ("CCZLDO"), the Coos Bay Estuary Management Plan ("CBEMP"), and are consistent with the Original Decisions.

A. Background and Planning History

Pacific Connector has applied for authorization from the Federal Energy Regulatory Commission ("FERC") under Section 7c of the Natural Gas Act ("NGA") to construct, install, own, operate, and maintain an interstate natural gas pipeline to transport natural gas to the Jordan Cove Liquefied Natural Gas ("LNG") Terminal in Coos Bay from the existing interstate natural gas transmission pipeline near Malin, Oregon. The 36-inch diameter pipeline will be approximately 232 miles in length and will provide natural gas for liquefaction by Jordan Cove Energy Project LP to be marketed domestically and throughout the Pacific Rim. Through this application to Coos County, the Applicant is seeking a determination from Coos County that the requested alternate alignment to a segment of the previously approved 49.72-mile segment of the PCGP located within Coos County is consistent with all applicable Coos County land use regulations.²

As discussed in the original application and recognized in the Original Decisions, because of the linear nature of the proposed interstate gas pipeline, it will traverse numerous zoning districts within the County, with slightly different use descriptions between zones:

1. within the Forest (F) zone, the pipeline use is characterized as a new gas distribution line with no greater than a 50-foot right of way; and

2. within the Agricultural (EFU) zone, the pipeline use is characterized as a utility facility necessary for public service.

As established in the Original Decisions and in Pacific Connector II, the subsurface nature of the proposed PCGP minimizes pipeline impacts following construction. Construction impacts will be minimized through appropriate methodologies and technologies. As was also established in the Original Decisions, Pacific Connector proposes to utilize a standard 95-foot wide temporary construction easement, with a 50-foot permanent right-of-way and associated temporary extra work areas ("TEWAs"). Other forms of temporary construction areas will be utilized, all of which have been designed to minimize the area of disturbance necessary in order to safely construct the pipeline and minimize the total overall project disturbance.

² By submitting this application, the Applicant is seeking to comply with applicable land use regulations and the consistency requirements of the Coastal Zone Management Act. However, submittal of this application is not a waiver of any federal jurisdiction over the Coos County segment of the PCGP.
B. Procedural Status

As stated above, Pacific Connector previously received land use approval in the Original Decisions from Coos County for the 49.72-mile segment of the PCGP located within Coos County.

This application does not seek to modify or amend the Original Decisions or the Pacific Connector II approvals, but references will be made to them for a number of reasons, including the characterization of the use in the various zoning districts, and regarding references to interpretations and findings in the Original Decisions that are equally applicable to this application. The application does not seek to modify or amend the related conditions. Accordingly, this application is not subject to the provisions of Section 5.0.350.

The Original Decisions and Pacific Connector II determined that Section 5.0.150 requiring that a property owner or contract purchaser sign the application is merely a procedural requirement that can be deferred to a later stage in the approval process. Condition of Approval No. 20 to the County's Final Decision and Order No. 12-03-018PL dated March 13, 2012 addresses this procedural issue. Thus, Pacific Connector proposes that Condition of Approval No. 20 be imposed by the County as part of the County's approval of this application.

II. REQUESTED ALTERNATE ALIGNMENT

As stated above, Pacific Connector requests approval of this alternate alignment in only two Coos County zoning designations: Forest (F), and Exclusive Farm Use (EFU), and one Coos Bay Estuary Management Plan (CBEMP) zoning districts: 20-RS. The Blue Ridge Route alternate alignment proposed by this application will not introduce the PCGP into any zoning district beyond those previously subject to the approved alignment in the Original Decisions, and will affect different ownerships only in relatively few instances. The proposed alternate alignment is described below.

The Blue Ridge Route alternative is now being pursued at the request of FERC as a potentially preferred alternate alignment. As discussed above, the Blue Ridge Route has the following benefits over the Brunschmid alternate alignment previously approved in Pacific Connector II:

1. The Blue Ridge Route will retain the segment of the approved Brunschmid alternate necessary to avoid the National Resources Conservation Service's (NRCS's) Brunschmid Wetland Reserve Program easement;

2. The Blue Ridge Route will avoid all remaining Stock Slough crossings that would have still been required by the unretained segment of the Brunschmid alternate; and

3. The Blue Ridge Route will avoid crossing multiple tracts of privately owned timberlands, and is the alternate now potentially preferred by FERC.
The approval of this application for the Blue Ridge alternate does not depend, however, on whether it is preferable to any other route, only whether it satisfies applicable approval criteria.

The remainder of this section summarizes the applicable approval criteria and Pacific Connector's responses for the requested alternate alignments.

**Blue Ridge Route Alternate**

**A. Balance of County**

Areas within Coos County outside of the estuarine areas for the Coos River and Coos Bay are described in the CCZLDO as the "Balance of County". The Balance of County includes the County's zoning districts except for those listed in the Coquille River Estuary Management Plan (CREMP) and the Coos Bay Estuary Management Plan (CBEMP). The zoning districts within the Balance of County crossed by the proposed Blue Ridge Route alternate alignment are the Exclusive Farm Use (EFU) and Forest (F) zones. They are discussed in sections 1 and 2 below. Section 3 then addresses the special regulatory considerations that the proposed Blue Ridge Route would be subject to in these zones.

**1. Exclusive Farm Use Zone**

The Original Decisions approved the PCGP to cross approximately 3.72 miles of properties zoned Exclusive Farm Use (EFU), all of which are privately owned. During the FERC review process, Pacific Connector was informed by FERC that another alternate alignment is needed for FERC's consideration. Of necessity, the new Blue Ridge Route alternate alignment will also cross EFU zoned parcels. See Sheet 2.

As demonstrated below, Pacific Connector's requested approval for an alternate alignment for a segment of the approved PCGP alignment in the EFU zone is consistent with the requirements of ORS Chapter 215, OAR 660, Division 33, and the applicable approval criteria of the CCZLDO.

**CCZLDO Section 4.9.450  Hearings Body Conditional Use**

*The following uses and their accessory uses may be allowed as hearings body conditional uses in the "Exclusive Farm Use" zone and the "Mixed Use" overlay subject to the corresponding review standard and development requirements in Section 4.9.600 and 4.9.700.*

**C. Utility facilities necessary for public service, except for the purpose of generating power for public use by sale and transmission towers over 200 feet in height. A facility is necessary if it must be situated in an agricultural zone in order for the service to be provided.**

The Applicant and planning staff determined that the utility facility use is allowed in both of the EFU and Mixed Use zones, subject only to General Conditions. As determined in the Original Decisions, CCZLDO Section 4.9.450 is more or less a direct codification of ORS 215.283(1)(c).³

³ ORS 215.283(1) provides, in relevant part:

(1) the following uses may be established in any area zoned for Exclusive Farm Use: * * * *

(c) utility facilities necessary for public service, including wetland waste treatment systems but not
Accordingly, under state law, utility facilities sited on EFU lands are subject only to ORS 215.275, as well as the administrative rules adopted by LCDC. See Final Decision and Order No. 10-08-045PL, page 116.

As determined in the initial Original Decisions, the PCGP is a "utility facility necessary for public service" under CCZLDO Section 4.9.450.C. In that, due to its linear nature and the points of connection it must make, it is necessary for some segments of the PCGP to be situated in agricultural land, in satisfaction of this review criterion and the companion criterion of ORS 215.275(1). Final Decision and Order, No. 10-08-045PL, pp. 115-23. The same is true of the selection of any alternate alignment. As recognized in the Original Decisions, ORS 215.275(6) exempts interstate natural gas pipelines from the provisions of ORS 215.275(2)-(5). OAR 660-33-0130 has a similar exemption.

As referenced above, the requested Blue Ridge Route alternate alignment would still need to cross EFU lands to achieve the following benefits:

1. This proposed alternate alignment would retain the segment of the previously approved Brunschmid alternate necessary to avoid an approved mitigation site on the north side of the Coos River (e.g., the Brunschmid Wetland Reserve Project, which has an easement held by the USDA Farm Services Agency).

2. This proposed alternate alignment avoids the remaining crossings of Stock Slough still required by the un-retained segment of the Brunschmid alternate. See Sheet 2.

3. This alternate alignment was proposed to FERC by an affected landowner for the purpose of reducing the number of miles of crossings of private timberlands.

4. Finally, the Blue Ridge alternate would reduce the number of miles of EFU land crossed by 1.59 miles from the number of miles of EFU land crossed by the Pacific Connector II Brunschmid alternate.

In sum, the PCGP is a locationally dependent linear facility and even the proposed Blue Ridge Route alternate alignment must cross some EFU land in order to achieve a reasonably direct route to achieve the benefits of the proposed alternate alignment. It is important to note that placing the pipeline under EFU land does not take cropland out of production. The pipeline easement agreement allows full use of the landowner’s property by the landowner for crop production once the pipeline is constructed.

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including commercial facilities for the purpose of generating electrical power for public use by sale or transmission towers over 200 feet in height. A utility facility necessary for public service may be established as provided in ORS 215.275.
CCZLDO Section 4.9.600  Siting Standards for Dwellings and Structures in the EFU Zone

The siting criteria of this section apply to dwellings and structures within the EFU zone. No dwellings are proposed and, under the County's prior interpretation in the Original Decisions, a subsurface interstate gas pipeline is not a "structure," so the provisions of this code section are not applicable to the proposed PCGP alternate alignment or its necessary components. See Final Decision and Order, No. 10-08-045PL, pp. 108-12.

CCZLDO Section 4.9.700

As stated above, the proposed alternate alignment in the EFU zone subsurface does not constitute a "structure" as above described. Accordingly, Section 4.9.700 which is applicable to "all dwellings and structures" does not apply to this application.

2. Forest Zone

The Original Decisions approved the PCGP alignment to cross approximately 39.47 miles of Forest-zoned lands within Coos County, 10.76 miles of which are on BLM-managed lands, with the remaining segments located on privately owned lands. The Blue Ridge Route alternate alignment would reduce the miles of private timber lands crossed from 9.32 miles to 5.31 miles (4.01 miles less) and will increase the number of BLM timber lands crossed from 1.43 miles to 7.64 miles (6.21 miles more).

The proposed Blue Ridge Route alternate alignment affects less privately-owned Forest-zoned land than the PCGP alignment previously approved by the Original Decisions. As discussed above, the changes in alignment within the Forest zone, as shown on Sheets 1 and 2, are occasioned by the continued need to avoid the Brunschmid Wetland Reserve Program (WRP) easement, the opportunity to avoid all Stock Slough crossings, and to cross fewer private timber land holdings. The Blue Ridge Route alternate alignment crosses other ownerships of Forest-zoned land than the previously approved PCGP alignment did, including the land owned by the owner requesting the Blue Ridge Route alternate alignment. Otherwise, the zoning districts crossed and applicable review criteria for the proposed Blue Ridge Route alternate alignment in the Forest-zoned land are the same as they were for the approved PCGP alignment in the Original Decisions.

CCZLDO Section 4.8.300  Administrative Conditional Uses

The following uses and their accessory uses may be allowed as administrative conditional uses in the "Forest" zone subject to applicable requirements in Section 4.8.400 and applicable siting criteria set forth in this Article and elsewhere in this Ordinance.

F. New electrical transmission lines with right-of-way widths of up to 100 feet as specified in ORS 772.210. New distribution lines (e.g. gas, oil, geothermal) with right-of-way 50 feet or less in width.
The PCGP is a new gas line with a permanent easement width of 50 feet. Therefore, the PCGP and its associated facilities are classified as an administrative conditional use within the Forest zone. See Final Decision and Order, No. 10-08-045PL, p. 87. However, as discussed below, the PCGP's crossing of EFU land requires Hearings Body conditional use procedures which upgrades the review procedure for all requests, but which does not change the substantive review criteria for the PCGP in the F zone.

**CCZLDO Section 4.8.400  Review Criteria for Conditional Uses in Section 4.8.300 and Section 4.8.350**

A use authorized by Section 4.8.300 and Section 4.8.350 may be allowed provided the following requirements are met. These requirements are designed to make the use compatible with forest operations and agriculture and to conserve values found on forest lands.

A. The proposed use will not force a significant change in, or significantly increase the cost of, accepted farming or forest practices on agriculture or forest lands; and

As detailed in the Original Decisions, this criterion is limited to regulation of “significant” impacts and cost increases. The criterion does not require that there be no impacts on farming and forest practices. Final Decision and Order, No. 10-08-045PL, p. 91. As explained in the Original Decisions, accepted forest practices in the vicinity of the pipeline corridor include timber production and harvesting, hauling harvested timber, logging road construction and maintenance, application of chemicals, and disposal of slash. The pipeline project will have effects on the timbered areas located in the Forest zone both during and after construction in the form of a cleared corridor. In the Original Decisions, the Board found that the PCGP’s limited impacts will not force a “significant” change in the accepted forest practices in the vicinity of the pipeline. Final Decision and Order, No. 10-08-045PL, p. 94. For the same reasons discussed in the Original Decisions, the proposed Blue Ridge Route alternate alignment for the subsurface interstate gas pipeline and its associated facilities in the F zone will not force a significant change in, or significantly increase the cost of, accepted farming or forest practices on agricultural or forest lands. As with the original PCGP alignment, although Pacific Connector will obtain a 50-foot permanent right-of-way for the Blue Ridge alternate, only 30 feet centered over the pipeline will be maintained as a cleared corridor through forested areas to protect the pipe from potential root damage and allow for ground and aerial surveillance inspections of the pipeline. The remaining 20 feet of permanent right-of-way for the alternate alignment, as well as the temporary construction areas, will be replanted in a manner consistent with Pacific Connector's Erosion Control and Revegetation Plan (“ECRP”). Both during and following construction, forestry activities will be able to continue on the forest lands nearby or adjoining the PCGP.

B. The proposed use will not significantly increase fire hazard or significantly increase fire suppression costs or significantly increase risks to fire suppression personnel; and
The Original Decisions included significant findings of fact and conclusions of law to the effect that the PCGP will not significantly increase fire hazards. See Final Decision and Order No. 10-08-045PL, pages 101-108. Specifically, the proposed pipeline will not significantly increase fire hazard. The pipeline will be subject to exacting safety requirements that will significantly minimize the risk of a fire caused by the pipeline itself. The pipeline and all associated facilities will be designed and maintained to conform with or exceed US Department of Transportation (DOT) requirements found in Title 49 Code of Federal Regulations (CFR), part 192 Transportation of Natural and Other Gas by Pipeline: Minimum Safety Standards; 18 CFR Section 380.15, Site and Maintenance Requirements; and other applicable federal and state regulations. Additionally, the Applicant will prepare a PCGP-specific safety plan. As a result of these stringent federal safety controls and the PCGP-specific safety plan, the risk of a release of gas from the pipeline is very remote. This criterion is satisfied.

C. All uses must comply with Section 4.8.600, Section 4.8.700 and Section 4.8.750.

The Applicant demonstrates compliance with Sections 4.8.600, 4.8.700 and 4.8.750 in the following sections of this application narrative set forth below.

D. A "Forest Management Covenant", which recognized the right of adjacent and nearby landowners to conduct forest operations consistent with the Forest Practices Act and Rules, shall be recorded in the deed records of the County prior to any final County approval for uses authorized in Section 4.8.300 H, J, and Q and Section 4.8.350 D, J, and Q.

The application does not seek approval of uses authorized in Section 4.8.300 H, J or Q or in Section 4.8.350 D, J, or Q. Accordingly, this criterion is inapplicable to this application.

CCZLDO Section 4.8.600 Mandatory Siting Standards Required for Dwellings and Structures in the Forest Zone

The following siting criteria shall apply to all dwellings, including replacement dwellings, and structures in the Forest and Forest Mixed Use zones.

No dwellings are proposed by this application. As detailed in the EFU section above, the Board previously determined that the PCGP is not a "structure" as that term is defined in CCZLDO Section 2.1.200 because the PCGP will be located under, rather than on top of, the land which it crosses. Final Decision and Order, No. 10-08-045PL, pp. 108-12. Consequently, the siting standards at CCZLDO Section 4.8.600 are not applicable to the proposed subsurface PCGP alternate alignment or its necessary components or associated facilities in the F zone.

CCZLDO Section 4.8.700 Fire Siting Safety Standards

All new dwellings and permanent structures and replacement dwellings and structures shall, at a minimum, meet the following standards.
As discussed above, the PCGP is neither a structure nor a dwelling. Consequently, the fire siting and safety standards of this Section are not applicable to this application.

**CCZLDO Section 4.8.750  Development Standards**

*All development and structures approved pursuant to Article 4.8 shall be sited in accordance with this Section.*

*A. Minimum Lot Size:*

The proposed Blue Ridge Route alternate alignment in the F zone will not require or create any land divisions. Consequently, the minimum lot size standard is not applicable.

*B. Setbacks: All buildings or structures with the exception of fences shall be set back a minimum of thirty-five (35) feet from any road right-of-way centerline or five (5) feet from any right-of-way line, whichever is greater.*

The PCGP is a linear, underground utility facility that crosses several property lines, but is not a building or structure. Final Decision and Order, No. 10-08-045PL, pp. 108-12. Consequently, the setback standard is not applicable to the proposed Blue Ridge Route alternate alignment in the F zone.

*C. Structure Height:*

*D. Lot Coverage:*

There are no requirements for either of these standards in the F zone.

*E. Fences, Hedges and Walls: No requirement, except for vision clearance provisions in Section 3.3.400 and Fire Siting and Safety Standards in Section 4.7.700.*

The PCGP is not a hedge, fence or wall, and therefore this standard does not apply to the proposed Blue Ridge Route alternate alignment in the F zone or its necessary components.

*F. Off-Street Parking and Loading: See Chapter X.*

The off-street parking and loading standards are not applicable to the proposed Blue Ridge Route alternate alignment use in the F zone.

*G. Minimum Road Frontage/Lot Width: 20 feet.*

The proposed Blue Ridge Route alternate alignment in the F zone will not impact the existing configuration of the parcels it crosses. Therefore, this standard is not applicable.
H. Minimizing Impacts:

This standard only applies to dwellings within the F zone. No dwellings are proposed by this application. Therefore, this standard is not applicable to the proposed Blue Ridge Route alternate alignment application in the F zone.

I. Riparian Vegetation Protection.

1. Riparian vegetation within 50 feet of a wetland, stream, lake or river, as identified on the Coastal Shoreland and Fish and Wildlife habitat inventory maps shall be maintained except that:

e. Riparian vegetation may be removed in order to site or properly maintain public utilities and road rights-of-way; or

The PCGP is a public utility project within the state of Oregon. Therefore, the proposed PCGP alternate alignment in the F zone is not subject to the 50-foot riparian protection vegetation zone, and riparian vegetation may be removed in order to site the PCGP pursuant to the exemption cited above. Nonetheless, the proposed Blue Ridge Route alternate alignment in the F zone will comply with all FERC requirements for wetland and waterbody protection and mitigation both during and after construction.

For the reasons set forth above, the proposed Blue Ridge Route alternate alignment should be approved as a conditional use within the F zone.

3. Special Regulatory Considerations/Inventory Maps

The CCZLDO provides special regulations for the use and development of land situated within resource or hazard areas identified on the Special Considerations Maps for the Balance of County (including the EFU and F zones crossed by the Blue Ridge Route alternate) as set forth on Table 4.7a of the CCZLDO. The following sections identify the special regulatory considerations proscribed by the Coos County Comprehensive Plan for each protected resource (Phenomenon) listed in the left-hand column of Table 4.7a, which indicates, by reference to APPENDIX I, the applicable Strategies which apply to the applicable special regulatory considerations regarding each of the stated Phenomenon. As discussed below, the Blue Ridge Route alternate alignment will not impact any areas of special regulatory consideration.

Mineral and Aggregate

Considerations:

1a. Preserve these in their original character until mined.

1b. Agriculture and forestry uses are acceptable per zone and use district requirements

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4 Planning Staff advises that the Coos County Special Considerations Map no longer exists and that the County relies on the detailed plan inventory maps referenced in CCZLDO Section 4.7.115.
1c. Allow new conflicting uses within 500 ft. subject to ESEE findings through the conditional use process.

**Strategy No. 1:**
Coos County shall manage its identified mineral and aggregate resources (except black sand prospects) in their original character until mined, except where conflicting uses are identified during implementation of the Plan, and such uses are justified based on consideration of the economic, social, environmental, and energy consequences of the conflicting uses, or where existing uses have been grandfathered.

Conflicting uses include dwellings and any other structure within 500 feet of the resource site. Where no conflicts are identified, agriculture, forest, or similar open space zoning shall be used to implement this strategy.

When a conflicting use is proposed at a given site, the decision about allowing development of the proposed use or development or protection of the aggregate resource shall be made through a conditional use process where findings are developed which address the economic, environmental, social, and energy consequences of allowing the proposed conflicting use, development of the aggregate resource, or both at the site. The following guidelines must be considered as part of the conditional use process:

**Consideration 1d:**
Non-exploratory mining operations are conditional uses, where allowed.

The Blue Ridge Route alternate alignment is not located within 500 feet of any mapped resource sites, with the exception of coal basin areas surrounding two ownerships within the Stock Slough area. However, under the provisions of Strategy 1, the mapped coal basin is described as commercially unviable and, accordingly, not designated as a Goal 5 resource. There is no proposed conflicting use. This strategy is satisfied.

**Strategy No. 2:**
Coos County shall regulate new recovery operations by designating such activities as conditional use in appropriate zones, except where permitted outright in forest zones, to ensure compatibility with adjacent uses.

Site restoration shall conform to the requirements of ORS 517.750 to 517.900, "Reclamation of Mining Lands."

This strategy recognizes that project review by the Hearings Body is necessary to minimize the adverse impacts that are typically associated with mining operations, and which often make such recovery activities incompatible with adjacent uses.

The proposed Blue Ridge Route alternate alignment is not a mining operation. Therefore, this strategy is not applicable.
Water Resources

Consideration 2a: Prohibits new residential and commercial development in rural areas other than committed areas when evidence or irreversible degradation by new withdrawal or septic tanks has been submitted.

Strategy No. 1: Coos County shall not permit further new residential and commercial development in rural areas where the Oregon State Water Resources Department (OSWRD), the Oregon State Environmental Quality commission (EQC), or the Oregon State Health Division (OSHD) has submitted compelling evidence to Coos County that water resources within that area would be irreversibly degraded by new consumptive withdrawal or by additional septic tank or other waste discharges.

The proposed Blue Ridge Route alternate alignment is neither a residential nor commercial development. Therefore, this strategy is not applicable.

Historical/Archeological Sites and Structures

Consideration 3a: Manage these for their original resource value.

Strategy No. 1: Coos County shall manage its historical, cultural and archeological areas, sites, structures and objects so as to preserve their original resource value.

This strategy recognizes that preservation of significant historical, cultural and archeological resources is necessary to sustain the County’s cultural heritage.

Pacific Connector will utilize several steps to ensure appropriate identification and preservation of historical and archaeological resources prior to and during the construction of the PCGP Project as directed by FERC and Oregon SHPO.

Pacific Connector has consulted with the Confederated Tribes of the Coos, Lower Umpqua, and Siuslaw Indians and the Coquille Indian Tribe regarding cultural resources issues throughout the life of the project. Throughout all of the archaeological and historical studies necessary, Pacific Connector will continue to consult with appropriate Tribes, Oregon SHPO and the FERC regarding the proposed alternate alignment, to ensure their continuing cooperation and concurrence.

Pacific Connector proposes that Condition No. 24 to the Original Decisions be imposed as a condition of approval to this application, with appropriate revisions to reflect the different areas of the County where the condition will apply.
Consideration 3b:
Develop proposals in identified archeological areas must have a "sign-off" by qualified person(s).

Strategy No. 3:
Coos County shall continue to refrain from wide-spread dissemination site-specific inventory information concerning identified archeological sites. Rather Coos County shall manage development in these areas so as to preserve their value as archeological resources.

This strategy shall be implemented by requiring development proposals to be accompanied by documentation that the proposed project would not adversely impact the historical and archeological values of the project's site. "Sufficient documentation" shall be a letter from a qualified archaeologist/historian and/or a duly authorized representative of a local Indian tribe(s). The Coos County Planning Department shall develop and maintain a list of qualified archaeologists and historians. In cases where adverse impacts have been identified, then development shall only proceed if appropriate measures are taken to preserve the archeological value of the site. "Appropriate measures" are deemed to be those, which do not compromise the integrity of remains, such as: (1) paving over the sites; (2) incorporating cluster-type housing design to avoid the sensitive areas; or (3) contracting with a qualified archaeologist to remove and re-inter the cultural remains or burial(s) at the developer's expense. If an archaeological site is encountered in the process of development, which previously had been unknown to exist, then, these three appropriate measures shall still apply. Land development activities found to violate the intent of this strategy shall be subject to penalties prescribed by ORS 97.745.

This strategy is based on the recognition that preservation of such archeologically sensitive areas is not only a community's social responsibility but is also a legal responsibility pursuant to Goal #5 and ORS 97.745. It also recognizes that historical and archeological sites are non-renewable, cultural resources.

Pacific Connector proposes that a condition similar to Condition No. 24 to the Original Decisions be imposed as a condition of approval to the Blue Ridge Route alternate alignment approval.

Consideration 3c:
Historical structures and sites can only be expanded, enlarged or modified if Coos County finds the proposal to be consistent with the original historical character of the structure or site.

Strategy No. 2:
Coos County shall permit the expansion, enlargement or other modification of identified historical structures or sites provided that such expansion, enlargement or other modification is consistent with the original historical character of the structure or site;

This strategy shall be implemented by requiring Planning Director review of site and architectural plans to ensure that the proposed project is consistent with the original historical character of the site and structure.
The proposed Blue Ridge Route alternate alignment for the pipeline will not involve the expansion, enlargement, or modification of any historical structures or sites. Therefore, neither Consideration 3c nor the corresponding Comprehensive Plan Strategy No. 2 is applicable to this application.

**Beaches and Dunes**

**Considerations:**

4a. Permit development within “limited development suitability” only upon establishment of findings. Requires Administrative Conditional Use.

4b. Prohibits residential, commercial, or industrial development within areas “unsuitable for development.” Permit other development only upon establishment of findings. Requires Administrative Conditional Use

4c. Cooperation with agencies to regulate: destruction of vegetation, erosion shore structures and other developments, requires Administrative Conditional Use and agency comments.

Planning staff has confirmed that the proposed Blue Ridge Route alternate alignment to the approved pipeline will not cross through any beach or dune areas; therefore these considerations and the corresponding strategies are not applicable.

**Non-Estuarine Shorelands Boundary**

**Consideration 5a:**
Protection of major marshes (wetlands), habitats, headlands, aesthetics, historical and archeological sites.

**Strategy No. 5:**
Coos County shall provide special protection to major marshes, significant wildlife habitat, coastal headlands, exceptional aesthetic resources, and historic and archeological sites located within the coastal Shorelands boundary of the ocean, coastal lakes and minor estuaries. Coos County shall consider: (a) “major marshes” to include certain extensive marshes associated with dune lakes in the Oregon Dunes National Recreation Area and wetlands associated with New River as identified in the Inventory text and maps, and on the Special Considerations Map; (b) “significant wildlife habitat” to include “sensitive big-game range,” Snowy Plover nesting areas, Bald Eagle, and Osprey nesting areas, Salmonid spawning and rearing areas, and wetlands; (c) “coastal headlands” to include Yoakum Point, Gregory Point, Shore Acres, Cape Arago south to Three-Mile Creek, Five Mile Point, and Coquille Point; (d) “exceptional aesthetic resources” to include the coastal headlands identified above, and other areas identified in the Coastal Shorelands Inventory; and (e) “historical, cultural and archeological sites” to include those identified in the Historical, Cultural and Archeological Sites Inventory and Assessment.
This strategy shall be implemented through plan designations and ordinance measures that limit uses in these special areas to those uses that are consistent with protection of natural values, such as propagation and selective harvesting of forest products, grazing, harvesting wild crops, and low intensity water-dependent recreation.

This strategy recognizes that special protective consideration must be given to key resources in coastal shorelands over and above the protections afforded such resources elsewhere in this plan.

Planning staff confirms that the proposed Blue Ridge Route alternate alignment does not cross through any coastal shorelands areas. Therefore, this strategy does not apply.

Consideration 5b:
Specifies allowed uses within C.S.B.

Strategy No. 7:
Coos County shall manage its rural areas within the “Coastal Shorelands Boundary” of the ocean, coastal lakes and minor estuaries through implementing ordinance measures that allow the following uses:

a. farm uses as provided in ORS 215;
b. propagation and harvesting of forest products consistent with the Oregon Forest Practices Act;
c. private and public water dependent recreation developments;
d. aquaculture;
e. water-dependent commercial and industrial uses and water-related uses only upon finding by the Board of Commissioners that such uses satisfy a need, which cannot otherwise be accommodated on shorelands in urban and urbanizable areas;
f. single family residences on existing lots, parcels, or units of land when compatible with the objectives and implementation standards of the Coastal Shorelands goal, and as otherwise permitted by the underlying zone;
g. any other uses, provided that the Board of Commissioners determines that such uses: (1) satisfy a need which cannot be accommodated at other upland locations or in urban or urbanizable areas; (2) are compatible with the objectives of Statewide Planning Goal #17 to protect riparian vegetation and wildlife habitat; and (3) the "other" use complies with the implementation standard of the underlying zone designation.

In addition, the above uses shall only be permitted upon a finding that such uses do not otherwise conflict with the resource preservation and protection policies established elsewhere in this plan.

This strategy recognizes: (1) that Coos County's rural shorelands are a valuable resource and accordingly merit special consideration; and (2) that Statewide Planning Goal #17 places strict limitations on land divisions within coastal shorelands.
Planning staff confirms that the proposed Blue Ridge Route alternate alignment does not cross through any coastal shorelands areas. Therefore, this strategy does not apply.

**Consideration 5c:**
Permits subdivision, major and minor partitions only upon findings.

**Strategy No. 8:**
Coos County shall permit subdivisions and partitions within the "Coastal Shorelands Boundary" of the ocean, coastal lakes or minor estuaries in rural areas only upon finding by the governing body: (1) that such land divisions will not conflict with agriculture and forest policies and ordinance provisions of the Coos County Comprehensive Plan and would be compatible with the objectives of Statewide Planning Goal #17 to protect riparian vegetation and wildlife and either; (2) that the new land divisions fulfill a need that cannot otherwise be accommodated in other uplands or in urban and urbanizable areas; or, (3) that the new land divisions are in a documented area, "committed" area; or, (4) that the new land divisions have been justified through a goal exception.

This strategy shall be implemented through provisions in ordinance measures that require the above findings to be made prior to the approval of the preliminary plat of a subdivision or partition.

This strategy recognizes that Coos County's rural shorelands are a valuable resource and accordingly merit special consideration under Statewide Planning Goal #17.

The proposed Blue Ridge Route alternate alignment will not require or result in a subdivision or partition within the Coastal Shorelands Boundary. Therefore, this strategy is not applicable.

**Consideration 5d:**
Maintain, restore or enhance riparian vegetation as consistent with water dependent uses. Requires Administrative Conditional Use.

**Strategy No. 11:**
Coos County shall maintain riparian vegetation within the shorelands of the ocean, coastal lakes, and minor estuaries, and when appropriate, restore or enhance it, as consistent with water-dependent uses.

Timber harvest, if permitted in the zoning ordinance, shall be regulated by the Oregon Forest Practices Act.

Where the County's Comprehensive Plan identifies riparian vegetation on lands in the coastal shorelands subject to forest operations governed by the FPA, the Act and Forest Practices Rules administered by the Department of Forestry will be used in such a manner as to maintain, and where appropriate, restore and enhance riparian vegetation.

This strategy shall be implemented by County review of and comment on state permit applications for waterfront development.
This strategy is based on the recognition that prohibiting excessive removal of vegetative cover is necessary to stabilize the shoreline and, for coastal lakes and minor estuaries, to maintain water quality and temperature necessary for the maintenance of fish habitat.

As stated above, Planning staff confirms that the proposed Blue Ridge Route alternate alignment does not cross through any coastal shorelands areas. Therefore, this strategy does not apply.

**Significant Wildlife Habitat**

*Consideration 6a:*
Conserve riparian vegetation adjacent to salmonid spawning and rearing areas: density restriction in Big Game Range.

*Strategy No. 1:*
Coos County shall consider as "5c" Goal #5 resources (pursuant to OAR 660-16-000) the following:

- "Sensitive Big-game Range"
- Bird Habitat Sites (listed in the following table)
- Salmonid Spawning and Rearing Areas

Uses and activities deemed compatible with the objective of providing adequate protection for these resources are all uses and activities allowed, or conditionally allowed by the Zoning and Land Development Ordinance, except that special care must be taken when developing property adjacent to salmonid spawning and rearing areas so as to avoid to the greatest practical extent the unnecessary destruction of riparian vegetation that may exist along streambanks. The Oregon Forest Practices Act is deemed adequate protection against adverse impacts from timber management practices.

This policy shall be implemented by:

a. County reliance on the Oregon Forest Practices Act to ensure adequate protection of "significant fish and wildlife habitat" against possible adverse impacts from timber management practices; and
b. The Zoning and Land Development Ordinance shall provide for an adequate riparian vegetation protection setback, recognizing that "virtually all acknowledged counties have adopted a 50-foot or greater standard" (DLCD report on Coos County, November 28, 1984); and
c. Use of the "Special Considerations Map" to identify (by reference to the detail inventory map) salmonid spawning and rearing areas subject to special riparian vegetation protection; and
d. Stipulating on County Zoning Clearance Letters that removal of riparian vegetation in salmonid spawning and rearing areas shall be permitted only pursuant to the provisions of this policy.
e. Coos County shall adopt an appropriate structural setback along wetlands, streams, lakes and rivers as identified on the Coastal Shoreland and Fish and Wildlife Habitat inventory maps.
The Oregon Department of Fish and Wildlife and the Department of Forestry are working in conjunction with the requirements of this Plan and, are deemed adequate protection against adverse impacts from timber management practices.

Because the PCGP Project is a public utility, Pacific Connector may remove riparian vegetation within 50 feet of a wetland, stream, lake or river in order to site and properly maintain the pipeline. See CCZLDO Section 4.5.180(e). However, Pacific Connector will obtain comments from Oregon Department of Fish & Wildlife (ODFW) for any portion of the proposed alternate alignment which will require removal of riparian vegetation within 50 feet of an estuarine wetland, stream, lake or river proximate to inventoried salmonid spawning and rearing areas subject to special riparian vegetation protection. Regarding Big Game Ranges, Pacific Connector obtained GIS data for Big Game Winter Range areas from ODFW and was informed by ODFW that timing restrictions were imposed in Jackson and Klamath Counties, not in Coos and Douglas Counties. Accordingly, the proposed Blue Ridge Route alternate alignment will not negatively impact salmonid spawning and rearing areas or sensitive Big Game Ranges. The proposed Blue Ridge Route alternate alignment does not include a structure or housing component. Therefore, density restrictions associated with Big Game Ranges are not applicable. This strategy is satisfied.

Consideration 6b:
Protect wet meadows for agricultural use.

Strategy No. 4:
Coos County shall protect for agricultural purposes those land areas currently in agricultural use but defined as "wet meadow" wetland areas by the U.S. Fish and Wildlife Service, and also cranberry bogs, associated sumps and other artificial water bodies.

Implementation shall occur through the placement of the plan designation "Agriculture" on such areas.

This strategy recognizes:
a. That agriculture is an important sector of the local economy;
b. That some of the more productive lands in Coos County's limited supply of suitable agricultural lands are such seasonally flooded areas;
c. That designation of these areas for agricultural use is necessary to ensure the continuation of the existing commercial agricultural enterprise; and
d. That the present system of agricultural use in these areas represents a long-standing successful resolution of assumed conflicts between agricultural use and habitat preservation use, because the land is used agriculturally during months when the land is dry and therefore not suitable as wetland habitat, and provides habitat area for migratory wildfowl during the months when the land is flooded and therefore not suitable for most agricultural uses.

According to the Coos County map entitled “Wet Meadows”, the proposed Blue Ridge Route alternate alignment does not cross areas identified as Wet Meadow Wetlands in the Balance of County. This strategy does not apply.
Consideration 6c:
Manage riparian vegetation and non-agricultural wetland areas so as to preserve their significant habitat value, and protect their hydrologic and water quality benefits.

Strategy No. 2:
Coos County shall manage its riparian vegetation and identified non-agricultural wetland areas so as to preserve their significant habitat value, as well as to protect their hydrologic and water quality benefits. Where such wetlands are identified as suitable for conversion to agricultural use, the economic, social, environmental and energy consequences shall be determined, and programs developed to retain wildlife values, as compatible with agricultural use. This strategy is subordinate to Strategy #4, below.

This strategy does not apply to forest management actions, which are regulated by the Forest Practices Act.

This strategy recognizes that protection of riparian vegetation and other wetland areas is essential to preserve the following qualities deriving from these areas:

- natural flood control flow stabilization of streams and rivers
- environmental diversity habitat for fish and wildlife, including fish and wildlife of economic concern
- reduction of sedimentation
- recreational opportunities
- improved water quality
- recharge of aquifers

As stated above, because the proposed Blue Ridge Route alternate alignment is part of a public utility project, Pacific Connector may remove riparian vegetation within 50 feet of an estuarine wetland, stream, lake or river in order to site and properly maintain the pipeline. See CCZLDO Section 4.5.180(e).

To the extent that Pacific Connector is unable to avoid or minimize impacts to wetlands for the proposed alternate alignment, Pacific Connector would implement numerous measures to mitigate for wetland impacts and speed the restoration of affected areas. [Note: need to replace bracketed language with new evidentiary submittal: See Resource Report 2, Appendices 2C and 2G, attached as Exhibit A, for a detailed description of water body crossing methods.]

In addition, for the proposed Blue Ridge Route alternate alignment, Pacific Connector would comply with conditions in the Section 404 Permit obtained from the Army Corps of Engineers ("COE"), in the Removal/Fill permit from ODSL, and in the Section 401 Certification obtained from the Oregon Department of Environmental Quality ("ODEQ"). As part of the permitting process, the agencies would evaluate whether wetlands have been avoided to the maximum extent practicable, and whether the effects have been minimized or rectified to the extent practicable. The agencies also would specify additional requirements as necessary to comply with regulations. Pacific Connector would comply with additional procedures as specified in the permits. This strategy is satisfied.
Consideration 6d:
Restrict conflicting uses on "5c" bird sites except as permitted with ESEE balancing. 300 ft. setback from Bald Eagle nests.

Strategy No. 1A:
Coos County shall consider as Goal #5 "5c" resources the following bird habitat areas:
Location Township Range Section Area

Bald Eagle Nests
23S 13W 23 (Tenmile)
23S 11W 05 (Big Creek)
23S 12W 21 (Willow Point)
24S 12W 04 (Palouse)
24S 13W 36 (Mettman)
25S 11W 29 (Bessy Cr.)
25S 11W 33 (Dellwood)
25S 11W 22 (Rachel Cr.)
25S 11W 32 (Morgan Ridge)
26S 14W 14 (So. Slough)
27S 13W 09
28S 10W 09 (Brewster Gorge)
31S 12W 16 (Baker Creek)
29S 14W 31 (Twomile Creek)
28S 14W 11 (Randolph)

Great Blue Heron Colonies
24S 13W 27 SW¼
25S 14W 24 SE¼
23S 13W 26 (Saunders Lake)
24S 13W 23 (North Bay)
25S 11W 15 (Weyerhaeuser)
25S 12W 31 NW¼ (Catching Slough)
25S 14W 24 (North Spit)
26S 14W 11 (So. Slough)
25S 13W 24
26S 14W 14NE¼, SE¼
27S 14W 35 SE¼, NW¼ (Sevenmile)
26S 14W 14 NW¼
30S 15W 15 (Muddy Lake)
23S 12W 28 (Templeton Arm)

Band-Tailed Pigeon Mineral Springs
24S 13W 24&25 (Haynes)
25S 13W 24 (Coosston)
26S 13W 01
28S 14W 10 (Prosper)
29S 11W 26
29S 11W 35 (Blueslide)
29S 11W 36 (Rock Quarry)

Special consideration and care must be taken when developing property adjacent to "5c" bird sites so as to avoid, to the greatest practical extent, the unnecessary destruction of, or impact upon, said bird sites. The Oregon Forest Practices Act (FPA) is deemed adequate protection against adverse impacts from timber management practices.

This policy shall be implemented by:

a. County reliance upon the Oregon Department of Forestry and Oregon Department of fish and Wildlife insuring adequate protection of "5c" bird sites from possible adverse impacts of timber management practices thru the Forest Practices Act; and
b. Use of the "Special Considerations Map" and detailed inventories in the Plan to identify "5c" bird sites subject to special protection; and
c. For "5c" bird site protection, stipulating in the Zoning and Land Development Ordinance that conflicting uses shall be reviewed by the Oregon Department of Fish and Wildlife to determine that any proposed use is not expected to produce significant and unacceptable environmental impacts on any of the "5c" bird sites; and
d. Stipulating on County Zoning Clearance Letters that establishment of conflicting uses adjacent to "5c" bird sites shall be permitted only pursuant to the provisions of this policy.

Coos County shall require a location map for any development activity (except grazing) within its regulatory scope that is determined to be within a "5c" bird habitat. The location map shall be referred to the Oregon Department of Fish and Wildlife requesting an opinion within 10 days as to whether the development is likely to produce significant and unacceptable impacts upon the "5c" resource, and what safeguards it would recommend to protect the resource. ODFW's determination shall be reviewed by the Coos County Planning Director, who shall consider the ODFW findings and approve, approve with conditions, or deny an Administrative Conditional Use for the matter (ACU) based upon sound principles of conservation and appropriate balancing of the ESEE consequences so if conflicting uses are allowed the resource site is protected to some extent. The ACU will be processed pursuant to the Zoning and Land Development Ordinance.

Planning staff has confirmed that the proposed Blue Ridge Route alternate alignment is not located within "5c" bird sites. For avian species, Pacific Connector obtained biological data from the Oregon Biodiversity Information Center for the route in 2012. As Pacific Connector completes additional biological surveys, that information will be included in the biological survey report and analyzed by FERC as part of the proposed Project. Coos County shall also refer Pacific Connector's location maps for the proposed Blue Ridge Route alternate alignment to ODFW, and shall consider ODFW's determination of potential impacts, as required by this policy. This strategy is satisfied.

Natural Hazards

Consideration 7a:
Comply with floodplain overlay zone set forth in this Ordinance.
Strategy No. 1:
Coos County shall regulate development in known areas potentially subject to natural disasters and hazards, so as to minimize possible risks to life and property. Coos County considers natural disasters and hazards to include stream and ocean flooding, wind hazards, wind erosion and deposition, critical streambank erosion, mass movement (earthflow and slump topography), earthquakes and weak foundation soils.

This strategy shall be implemented by enacting special protective measures through zoning and other implementing devices, designed to minimize risks to life and property.

This strategy recognizes that it is Coos County's responsibility: (1) to inform its citizens of potential risks associated with development in known hazard areas; and (2) to provide appropriate safeguards to minimize such potential risks.

* These hazards are addressed under policies for “Dunes and Ocean and Lake Shorelands.”

This strategy has been satisfied by the County's adoption of the floodplain regulations in CCZLDO Section 4.6.205 Designation of Flood Areas. No portion of the proposed Blue Ridge Route alternate alignment will cross through the Coos County Floodplain Overlay zone in the Balance of County, only in the 20-RS zone discussed below.

Consideration 7b:
Support structural protection measures for bankline stabilization projects requiring state and federal permits when the applicant establishes that non-structure measures either are not feasible or inadequate to provide the necessary degree of protection.

Strategy No. 5:
Coos County shall promote protection of valued property from risks associated with critical streambank and ocean front erosion through necessary erosion-control stabilization measures, preferring nonstructural solutions where practical.

Coos County shall implement this strategy by making "Consistency Statements" required for State and Federal permits (necessary for structural streambank protection measures) that support structural protection measures when the applicant establishes that nonstructure measures either are not feasible or inadequate to provide the necessary degree of protection.

This strategy recognizes the risks and loss of property from unabated critical streambank erosion, and also, that state and federal agencies regulate structural solutions.

The proposed Blue Ridge Route alternate alignment is not part of a bankline stabilization project. Therefore, this strategy is not applicable.
Consideration 7c:
Issue zoning clearance letters in known areas potentially subjected to mass movement, including earth flow, slump topography, rockfall and debris flow pursuant to the provisions of natural hazards Strategy #6 in the Comp Plan.

Strategy No. 6:
Coos County shall permit the construction of new dwellings in known areas potentially subject to mass movement (earth flow/slump topography/rock fall/debris flow) only:

a. if dwellings are otherwise allowed by this comprehensive plan; and
b. after the property owner or developer files with the Planning Department a report certified by a qualified geologist or civil engineer stipulating:
   i. his/her professional qualifications to perform foundation engineering and soils analysis; and
   ii. that a dwelling can or cannot be safely constructed at the proposed site, and whether any special structural or siting measures should be imposed to safeguard the proposed building from unreasonable risk of damage to life or property.

This strategy recognizes the county is responsible for identifying potential hazard areas, informing its citizens of risks associated with development in known hazard areas, and establishing a process involving expert opinion so as to provide appropriate safeguards against loss of life or property.

Implementation shall occur through an administrative conditional use process, which shall include submission of a site investigation report by the developer that addresses the considerations above.

The proposed Blue Ridge Route alternate alignment does not include proposed dwellings. Therefore, Strategy No. 6 is not applicable.

Airport Surfaces Overlay Zone

Consideration 8a:
Comply with Airport Surfaces Overlay Zone set forth in this Ordinance.

Strategy No. 11:
Coos County shall cooperate with the Oregon State Aeronautics Division and the Federal Aviation Administration by developing an Airport Surfaces Overlay Zoning District to prevent the creation or establishment of hazards to air navigation. The Overlay Zoning district shall apply to the Bandon, Lakeside and Powers State Airports and shall encompass the primary surface, approach surface, transitional surfaces, horizontal surface and conical surface as identified in Volume VI, Airport Compatibility Guidelines as formulated by the Oregon Department of Transportation - Aeronautics Division, dated 1981.
This strategy has been satisfied by the County's adoption of the airport surfaces regulations established by CCZLDO Section 4.6.300 and Section 4.6.305. Compliance with the airport surfaces regulations is discussed immediately below.

**CCZLDO Section 4.6.300  Purpose.**

The purpose of the Airport Surface Floating zone is to protect public health, safety and welfare. It is recognized that obstructions to aviation have potential for endangering the lives and property of users of selected airports, and property of occupancy of land in the airport's vicinity; an obstruction may affect future instrument approach minimums; and obstructions may reduce the area available for the landing, take-off and maneuvering of aircraft, thus tending to destroy or impair the utility of the airport and the public investment therein.

**CCZLDO Section 4.6.305  Designation of Airport Surfaces**

Those lands lying beneath the approach surfaces, transition surfaces, horizontal surfaces and conical surfaces as they apply to the "Bandon, Lakeside and Power Airporis Approach and Clear Zone Inventory Map" shall be subject to the requirements of this floating zone.

The proposed Blue Ridge Route alternate alignment is not located under any of the County's Airport Surfaces Overlay Zoning Districts. Therefore, the airport surfaces regulations are not applicable.

**B. Coos Bay Estuary Management Plan (CBEMP)**

The proposed Blue Ridge Route alternate alignment will cross only one CBEMP zoning district: 20-RS.

The stated purpose of the CBEMP article in the CCZLDO is to provide requirements for individual zoning districts that are consistent with the CBEMP. The consistency of the Blue Ridge alternate with the applicable management unit purpose statements and applicable conditions is discussed below.

**Table 4.5  Development Standards**

The CBEMP purpose statement further explains that the land development standards of Table 4.5 govern all development within the Coos Bay Estuary Shorelands Districts. The proposed Blue Ridge alternate alignment will not alter the lot configurations and do not constitute a structure subject to height restrictions or building setbacks. Consequently, the standards included in Table 4.5 are not applicable to the PCGP itself nor its necessary components or associated facilities, or to the proposed alternate alignment.

**CCZLDO Section 4.5.150  How to Use This Article**

*This Article contains specific language that implements the Coos Bay Estuary Plan. The main purpose is to clearly stipulate where, and under what circumstances, development may occur.*
Follow the steps below to determine whether or not a proposed use or activity is, or may be, allowed at any specific site within the Coos Bay Estuary Shoreland Boundary.

1. Locate the subject site on the General Index Map.

2. Note the General Location Index Map (i.e. Lower Bay, Upper Bay, etc.) which is referenced on the General Index Map and advance to the General Location Index Map.

3. Locate the subject site on the General Location Index Map. Note the numbers and abbreviated district designations (i.e. "UD", "UW", "CS", etc.) for applicable zoning districts. (Note: management segments in the Plan are the same as zoning districts.)

4. Turn to the pages in the Ordinance which contain specific zoning district provisions which correspond to the map designations for the subject site.

5. For each applicable Shoreland or Aquatic District:

   a) Review the districts Management Objective. This narrative provides general policy guidance regarding uses and activities that are, or may be, allowed in the district.

   b) Review the district’s Uses, Activities, and Special Conditions Table to determine whether or not a proposed use or activity is allowable outright, allowable with conditions, or conditionally allowable subject to an Administrative or Hearings Body Conditional Use.

Symbols denote whether or not the specific use or activity listed in the tables is permitted outright, may be allowed subject to an Administrative Conditional Use, may be allowed subject to a Hearings Body conditional use, or prohibited in the specific district. The following symbols are pertinent:

P – means the use or activity is permitted outright subject only to the management objective.

S – indicates that the use or activity may be allowed subject to "Special Conditions" presented following the use and activity table. A few of the special conditions are non-discretionary, but most require local judgment and discretion and the development of findings to support any final decision about whether or not to allow the use or activity.

Some uses and activities may be identified as being subject to a special condition that is not discretionary or may not apply to a site-specific request. If such is the situation, the Planning Director shall make such determination and if "General Conditions" are not applicable regard the use or activity as permitted outright. Such determination shall consist of a statement of facts supporting the decision.
G – indicates the use or activity may be allowed subject to "General Conditions" presented following the use and activities table. "General Conditions" provide a convenient cross-reference to applicable Baywide Policies which may further limit or condition the uses and activities.

A few "General Conditions” may not apply to a site specific request. If such is the situation, the Planning Director shall make such determination and if "Special Conditions" are not applicable, regard the use or activity as permitted outright. Such determination shall consist of a statement of facts supporting the decision.

ACU – means the use or activity may be permitted as provided above or subject to "Special" or "General" conditions pursuant to an Administrative Conditional Use.

HB – means the use or activity may be permitted except as provided above or subject to "Special" or "General" conditions pursuant to a Hearings Body Conditional Use.

N – means the use or activity is prohibited.

N/A – means Not Applicable; the use or activity is not realistic considering the physical character of the district and therefore does not apply.

c) Review the designations which accompany each use and activity listed in the Table to determine what is allowed, what is not allowed and what conditions may apply. (The Table may list a use as conditionally allowable but a condition may negate the Table's designation).

By following the steps outlined above in CCZLDO Section 4.5.150, the Applicant determined the use is allowed in the zone, subject only to General Conditions. The application satisfies all related conditions and CBEMP policies for the Blue Ridge Route alternate alignment, as described below.

CCZLDO Section 4.5.175  Site-Specific Zoning Districts

The Coos County Development Ordinance divides the lands affected by the CBEMP into specific zoning districts. Each zoning district contains a "use and activities" table and "management objectives." Pursuant to CCZLDO Section 4.5.175, the use and activity tables for each district are subordinate to the management objectives, and, therefore, the uses and activities must be consistent with the applicable management objective. As stated above, the proposed Blue Ridge alternate alignment will only traverse CBEMP zoning district 20-RS. As demonstrated below, the proposed alternate alignment is consistent with the management objective, the allowed use and activities, and the applicable general and specific conditions of the 20-RS zoning district.
1. Zoning District 20-RS

The proposed Blue Ridge Route alternate alignment crosses the 20-RS zoning district on the south bank of the Coos River. See Sheet 1.

**CCZLDO Section 4.5.545 Management Objective:** This district shall be managed for rural uses along with recreational access. Enhancement of riparian vegetation for water quality, bankline stabilization, and wildlife habitat shall be encouraged, particularly for purposes of salmonid protection. This district contains two designated mitigation sites, U-17(a) and (b), "medium" priority, which shall be protected as required by Policy #22.

Planning staff has confirmed that the proposed PCGP alternate alignment will not impact mitigation sites U-17(a) and (b). Pacific Connector will use the HDD method to install the pipeline below the Coos River. Using this crossing method, the Blue Ridge Route alternate alignment will be installed beneath the bottom of the Coos River and will not impact log transport and will not impact fish habitat. Upon successful HDD completion, impacts to aquatic species, sensitive resources and water quality can be avoided. [Note: need to replace bracketed language with new evidentiary submittal: Additional details regarding the HDD process are included in Resource Report 2, Appendix 2G, copies of which are attached as Exhibit A. Appendix 2G is the GeoEngineers January 15, 2013 HDD Feasibility Analyses which discusses the HDD process in detail.] In order to ensure that a competent contractor with adequate expertise with attention to detail will successfully conduct the HDD operation is selected, the Applicant recommends the following condition of approval:

To minimize impacts to wetlands or waterbodies at the horizontal directional drill (HDD) bore under the Coos River, the applicant must comply with a plan for the HDD crossing of the Coos River approved by FERC under FERC’s Wetland and Waterbody Construction and Mitigation Procedures referenced at 18 C.F.R. 380.12(d)(2). The FERC Wetland and Waterbody Construction and Mitigation Procedures shall be the May 2013 version (notice of which was provided at 78 Federal Register 34374, June 7, 2013). The applicant shall submit a copy of the FERC-approved plan for the HDD crossing to the County Planning Department prior to beginning construction of the Coos River crossing.5

Construction will use appropriate measures to minimize impacts. All impacts will be mitigated as demonstrated in the Original Decisions. The Board previously found that the HDD construction method and mitigation met this management objective. Final Decision and Order, No. 10-08-045PL, pp. 70-72. See supplemental evidentiary letter of May 2, 2014 from Randy Miller, PCGP Project Environmental Lead, providing evidence regarding the proposed HDD construction methods, with reference to a prior letter report from GEOEngineers, dated January 15, 2013, and a related document dated June, 2013 titled “Drilling Fluid Contingency Plan for

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5 This condition of approval was proposed after consultation between the Applicant, the Coos County Planning Director, and County Counsel in response to the Hearings Officer’s recommendation in County File No. HBCU-13-04. For reasons detailed in the Coos County Supplemental Report dated December 12, 2013, the County reasoned that this condition would best ensure a successful HDD bore, meanwhile limiting potential liability. Furthermore, this condition was approved by the Board of County Commissioners in Pacific Connector II at a public hearing on January 9, 2014.
Horizontal Directional Drilling Operations”, copies of which are attached to Randy Miller’s
evidentiary letter.

**CCZLDO Section 4.5.546 Uses, Activities and Special Conditions**

The proposed Blue Ridge Route alternate alignment is permitted, subject to general conditions,
as a low intensity utility in the 20-RS district. The 20-RS General Conditions state that permitted uses and activities shall be consistent with Policy #23 and that inventoried resources
requiring mandatory protection in the district are subject to Policies #17 and #18. Additionally,
permitted uses occurring within "agricultural lands" or "forest lands" as identified in the "Special
Considerations Map" are limited to those permitted in Policies #28 and #34. The proposed Blue
Ridge Route alternate alignment crosses agricultural lands within 20-RS. The agricultural uses
under ORS Chapter 215 and their applicability to the PCGP are described above in Section IIA
under "Exclusive Farm Use." The proposed Blue Ridge Route alternate alignment does not cross
any lands identified on the Special Considerations Map in Forest lands. Uses are permitted as
stated in Policy #14 and must be consistent with Policy #27. On designated
mitigation/restoration sites, uses/activities may be permitted subject to Policy #22. However, the
proposed Blue Ridge Route alternate alignment will not impact any of the designated
mitigation/restoration sites within the 20-RS district. Finally, in rural areas, utilities, public
facilities, and services will only be provided subject to Policies #49, #50, and #51. As addressed
under the CBEMP Policy section below, the proposed Blue Ridge Route alternate alignment in
zoning district 20-RS is consistent with each of the identified policies.

**Appendix 3 – CBEMP Policies**

As detailed above, the proposed Blue Ridge Route alternate alignment crosses through the 20-RS
zoning district, as also discussed above, this crossing triggers CBEMP Policies #14, #17, #18,
#22, #23, #28, #34, #49, #50, and #51.

**Policy #14 General Policy on Uses within Rural Coastal Shorelands**

1. Coos County shall manage its rural areas within the "Coos Bay Coastal
Shorelands Boundary" by allowing only the following uses in rural shoreland areas, as
prescribed in the management units of this Plan, except for areas where mandatory protection is
prescribed by LCDC Goal #17 and CBEMP Policies #17 and #18:

   e. Water-dependent commercial and industrial uses, water-related uses, and
   other uses only upon a finding by the Board of Commissioners or its designee that such uses
   satisfy a need which cannot be accommodated on uplands or shorelands in urban and
   urbanizable areas or in rural areas built upon or irrevocably committed to nonresource use.

   g. Any other uses, including non-farm uses and non-forest uses, provided
   that the Board of Commissioners or its designee determines that such uses satisfy a need which
   cannot be accommodated at other upland locations or in urban or urbanizable areas. In
   addition, the above uses shall only be permitted upon a finding that such uses do not otherwise
   conflict with the resource preservation and protection policies established elsewhere in this
   Plan.
This strategy recognizes (1) that Coos County's rural shorelands are a valuable resource and accordingly merit special consideration, and (2) that ICDC Goal #17 places strict limitations on land divisions within coastal shorelands. This strategy further recognizes that rural uses "a through "g" above, are allowed because of need and consistency findings documented in the "factual base" that supports this Plan.

Zoning district 20-RS requires compliance with Policy #14. In the Original Decisions, the Board determined that the PCGP is characterized as "other uses" under Policy #14g. Final Decision and Order, No. 10-08-045PL, pp. 124-26. The proposed Blue Ridge Route alternate alignment could not be accommodated at other upland locations or in urban or urbanizable areas due to the fact that the PCGP alignment has been previously approved by the County and the alternate alignments must connect to the pipeline in the locations approved by the County in its Original Decisions and in Pacific Connector II. Therefore, this policy is met.

**Policy #17 Protection of "Major Marshes" and "Significant Wildlife Habitat" in Coastal Shorelands**

Local governments shall protect from development, major marshes and significant wildlife habitat, coastal headlands, and exceptional aesthetic resources located within the Coos Bay Coastal Shorelands Boundary, except where exceptions allow otherwise.

I. Local government shall protect:

a. "Major marshes" to include areas identified in the Goal #17, "Linkage Matrix", and the Shoreland Values Inventory map; and

b. "Significant wildlife habitats" to include those areas identified on the "Shoreland Values Inventory" map; and

c. "Coastal headlands"; and

d. "Exceptional aesthetic resources" where the quality is primarily derived from or related to the association with coastal water areas.

As confirmed by Planning staff, the proposed Blue Ridge Route alternate alignment in zoning district 20-RS will not cross Wet Meadow Wetlands identified as significant wildlife habitats.

As discussed below, the Applicant will utilize appropriate construction methods to avoid, minimize or mitigate impacts during construction. Based on Coos County's maps, and as confirmed by Planning staff, the proposed Blue Ridge Route alternate alignment does not cross identified major marshes, coastal headlands, or exceptional aesthetic resources.

II. This strategy shall be implemented through:

a. Plan designations, and use and activity matrices set forth elsewhere in this Plan that limit uses in these special areas to those that are consistent with protection of natural values; and

b. Through use of the Special Considerations Map, which identified such special areas and restricts uses and activities therein to uses that are consistent with the
protection of natural values. Such uses may include propagation and selective harvesting of
forest products consistent with the Oregon Forest Practices Act, grazing, harvesting wild crops,
and low-intensity water-dependent recreation.

c. Contacting Oregon Department of Fish and Wildlife for review and
comment on the proposed development within the area of the 3b or 5c bird sites.

This strategy recognizes that special protective consideration must be given to key resources in
coastal shorelands over and above the protection afforded such resources elsewhere in this Plan.

Policy #17 applies to inventoried resources requiring mandatory protection within the CBEMP
20-RS zoning district. As noted above, the proposed Blue Ridge Route alternate alignment will
not cross areas of Wet Meadow Wetlands identified as significant wildlife habitats on the
CBEMP Shorelands Values Map. Regardless, the proposed Blue Ridge Route alternate
alignment will be constructed using methods to avoid, minimize and mitigate impacts during
construction. Because the PCGP is a linear underground pipeline, any impacts are anticipated to
be temporary and short-term, with the affected land fully restored after construction. Pacific
Connector will utilize flume, dam and pump, and horizontal directional drilling (“HDD”)
construction methods to minimize impacts, and will utilize mitigation measures, such as erosion
and sedimentation controls, minimizing compaction, minimizing topsoil mixing and potential
spills, and facilitating revegetation. [Note: need to replace bracketed language with new
evidentiary submittal: More details regarding impacts and these construction and mitigation
methods are described in Resource Report 2, Section 2.2.8.2 and 2.3.3 and Appendix 2G.] Following construction, the subsurface Blue Ridge Route alternate alignment in the 20-RS
zoning district will create no impacts. This policy and its implementive strategies are satisfied.

Policy #18 Protection of Historical, Cultural and Archaeological Sites.

Local government shall provide protection to historical, cultural and archaeological sites and
shall continue to refrain from widespread dissemination of site-specific information about
identified archaeological sites.

I. This strategy shall be implemented by requiring review of all development
proposals involving a cultural, archaeological or historical site, to determine whether the
project as proposed would protect the cultural, archaeological and historical values of the site.

II. The development proposal, when submitted shall include a Plot Plan Application,
showing, at a minimum, all areas proposed for excavation, clearing and construction. Within
three (3) working days of receipt of the development proposal, the local government shall notify
the Coquille Indian Tribe and Coos, Siuslaw, Lower Umpqua Tribe(s) in writing, together with a
copy of the Site Plan Application. The Tribe(s) shall have the right to submit a written statement
to the local government within thirty (30) days of receipt of such notification, stating whether the
project as proposed would protect the cultural, historical and archaeological values of the site,
or if not, whether the project could be modified by appropriate measures to protect those values.
III. Upon receipt of the statement by the Tribe(s), or upon expiration of the Tribe(s) thirty day response period, the local government shall conduct an administrative review of the Site Plan Application and shall:

a. Approve the development proposal if no adverse impacts have been identified, as long as consistent with other portions of this plan, or

b. Approve the development proposal subject to appropriate measures agreed upon by the landowner and the Tribe(s), as well as any additional measures deemed necessary by the local government to protect the cultural, historical and archaeological values of the site. If the property owner and the Tribe(s) can not agree on the appropriate measures, then the governing body shall hold a quasijudicial hearing to resolve the dispute. The hearing shall be a public hearing at which the governing body shall determine by preponderance of evidence whether the development project may be allowed to proceed, subject to any modifications deemed necessary by the governing body to protect the cultural, historical and archaeological values of the site.

CCZLDO Section 3.2.700 makes it clear that the time for compliance with applicable requirements regarding protection of archaeological resources is at any time before a "zoning compliance letter"\(^6\) is requested, not at the time of conditional use permit approval. Pursuant to CCZLDO Section 3.2.700, this is accomplished through the submittal of a "plot plan showing exact location of excavation, clearing, and development." Therefore, the time for application for Policy #18 and CCZLDO Section 3.2.700 is prior to obtaining a zoning compliance (verification) letter under CCZLDO Section 3.1.200. Final Decision and Order, No. 10-08-045PL, p. 130.

Given the above, Pacific Connector recommends the following condition of approval, which is the same condition as Condition No. 24 imposed on the PCGP alignment in the Original Decisions:

At least 90 days prior to issuance of a zoning compliance (verification) letter under CCZLDO Section 3.1.200, the County Planning Department shall make initial contact with the affected Tribe(s) regarding the determination of whether any archeological sites exist within the CBEMP areas proposed for development, consistent with the provisions of CCZLDO Section 3.2.700. Once the Tribe(s) have commented or failed to timely comment under the provisions of CCZLDO Section 3.2.700, the County shall take one of the following actions: (1) if no adverse impacts to cultural, historical or archeological resources have been identified, the County may approve and issue the requested zoning compliance (verification) letter and related development proposal; (2) if the Tribe(s) and the applicant reach agreement regarding the measures needed to protect the identified resources, the development can be approved with any additional measures the County believes are necessary to protect those resources; or (3) if the County finds that there will be adverse impacts to identified CBEMP Policy #18 resources or to resources identified in Table 4.7a for the Balance of County and the applicant and the Tribe(s) have not reached agreement regarding protection of such resources, then the County Board of Commissioners shall hold a quasi-

\(^6\)Coos County has previously held in the Original Decisions that a "zoning compliance letter" under CCZLDO Section 3.2.700 is equivalent to a "zoning verification letter" under CCZLDO Section 3.1.200.
judicial hearing to resolve the dispute. The hearing shall be a public hearing at
which the governing body shall determine by preponderance of evidence whether
the development project may be allowed to proceed, subject to any modification
deemed necessary by the governing body to protect the cultural, historical and
archeological values of the site. For purposes of this condition, the public hearing
shall be subject to the provisions of Section 5.8.200 of the CCZLDO with the
Board of Commissioners serving as the Hearings Body.

Implementation of this proposed condition would ensure compliance with Policy #18.

Policy #22 Mitigation Sites: Protection Against Preemptory Uses Consistent with permitted
uses and activities:

I. This policy shall be implemented by:

a. Designating "high" and "medium" priority mitigation sites on the Special
   Considerations Map; and

According to Coos County's maps, and as confirmed by Planning staff, the proposed Blue Ridge
Route alternate alignment would not cross any designated mitigation site.

b. Implementing an administrative review process that allows uses otherwise
   permitted by this Plan but proposed within an area designated as a "high" or "medium" priority
   mitigation site only upon satisfying the following criteria:

The proposed Blue Ridge Route alternate alignment would not cross any approved mitigation
sites in zoning district 20-RS.

1. The proposed use must not entail substantial structural or capital
   improvements (such as roads, permanent buildings or noncontemporary water and sewer
   connections); and

This criterion does not apply.

2. The proposed use must not require any major alteration of the site
   that would affect drainage or reduce the usable volume of the site (such as extensive site
   grading/excavation or elevation from fill); and

This criterion does not apply.

3. The proposed use must not require site changes that would prevent
   the expeditious conversion of the site to estuarine habitat; or

This criterion does not apply.

Policy #23 Riparian Vegetation and Streambank Protection

I. Local government shall strive to maintain riparian vegetation within the
   shorelands of the estuary, and when appropriate, restore or enhance it, as consistent with water-

-32-
dependent uses. Local government shall also encourage use of tax incentives to encourage
maintenance of riparian vegetation, pursuant to ORS 308.792 - 308.803

Appropriate provisions for riparian vegetation are set forth in the CCZLDO Section
4.5.180 (OR 92-05-009PL).

Zoning district 20-RS through which the proposed Blue Ridge Route alternate alignment crosses
requires compliance with Policy #23.

First, in its Original Decisions, the Board has found that Policy #23 does not create a mandatory
approval standard, but rather, is aspirational, hortatory, and non-mandatory in nature. Final
Decision and Order, No. 10-08-045PL, p. 134. However, as indicated under subsection 1, this
policy is implemented through the requirements of CCZLDO Section 4.5.180, Riparian
Protection Standards in the Coos Bay Estuary Management Plan. Section 4.5.180 generally
requires that riparian vegetation within 50 feet of an estuarine wetland, stream, lake or river, as
identified on the Coastal Shorelands Fish and Wildlife habitat inventory maps, shall be
maintained. However, the standard provides the following exception, "[r]iparian vegetation may
be removed in order to site or properly maintain public utilities and road right-of-ways, provided
that the vegetation to be removed is the minimum necessary to accomplish the purpose." The
proposed Blue Ridge Route alternate alignment qualifies as a public utility, and is therefore
exempt from the 50-foot riparian vegetation maintenance requirements of CCZLDO Section
4.5.180 provided the vegetation removal is the minimum necessary for the proposed Blue Ridge
Route alternate alignment installation. However, Pacific Connector has designed the project to
minimize impacts to riparian vegetation as much as possible.

II. Local government shall encourage streambank stabilization for the purpose of
controlling streambank erosion along the estuary, subject to other policies concerning structural
and non-structural stabilization measures.

This strategy shall be implemented by Oregon Department of Transportation (ODOT)
and local government where erosion threatens roads. Otherwise, individual landowners in
cooperation with the Oregon International Port of Coos Bay, and Coos Soil and Water
Conservation District, Watershed Councils, Division of State Lands and Oregon Department of
Fish & Wildlife shall be responsible for bank protection.

This strategy recognizes that the banks of the estuary, particularly the Coos and
Milleloma Rivers are susceptible to erosion and have threatened valuable farm land, roads and
other structures.

While Pacific Connector will restore areas disturbed during construction to their pre-construction
condition, the proposed Blue Ridge Route alternate alignment does not include independent
streambank stabilization projects. Therefore, the provisions of subsection II are not applicable.
Policy #27  Floodplain Protection within Coastal Shorelands.

The respective flood regulations of local government set forth requirements for uses and activities in identified flood areas; these shall be recognized as implementing ordinances of this Plan.

This strategy recognizes the potential for property damage that could result from flooding of the estuary.

Zoning district 20-RS, through which the Blue Ridge Route alternate alignment crosses, requires compliance with Policy #27.

Policy #27 is satisfied through compliance with the implementing floodplain ordinance in the CCZLDO Article 4.6, the Floodplain Overlay zone. The Floodplain Overlay section provided below, describes how the proposed PCGP alternate alignment satisfies the applicable floodplain standards within CBEMP district 20-RS.

Floodplain Overlay Zone

Only a small segment of the proposed Blue Ridge Route alternate alignment will cross through the Coos County Floodplain Overlay zone in CBEMP district 20-RS. As described below, the proposed Blue Ridge Route alternate alignment satisfies each of the applicable floodplain approval criteria.

CCZLDO SECTION 4.6.205. Designation of Flood Areas

a. The area of Coos County that is within a special flood hazard area identified by the Federal Insurance Administration in a scientific and engineering report entitled "The Flood Insurance Study for Coos County, Oregon and Incorporated Areas", dated September 25, 2009, with accompanying Flood Insurance Map (FIRM) is hereby adopted by reference and declared to be part of this ordinance. The Flood Insurance Study and the FIRM are on file at the Coos County Planning Department.

The County has indicated that the Flood Insurance Rate Map (FIRM) is consistent with the Federal Emergency Management Agency’s (FEMA) flood hazard map for Coos County. As addressed below, the proposed Blue Ridge Route alternate alignment is consistent with the applicable floodplain approval criteria for all areas identified on the FEMA flood hazard map/FIRM as a designated flood area. The FEMA maps identify the 100-year floodplain, which is typically a larger area than the floodplain and floodway areas defined in the Floodplain Overlay standards.

7 "Floodplain" is defined by the Coos County Zoning and Land Development Ordinance (CCZLDO) as "the area adjoining a stream, tidal estuary or coast that is subject to periodic inundation from flooding."

8 "Floodway" is defined by the CCZLDO as "the normal stream channel and that adjoining area of the natural floodplain needed to convey the waters of a regional flood while causing less than one foot increase in upstream flood elevations." Pursuant to CCZLDO Sections 4.6.205 and 4.6.270 "floodways" are identified as special flood hazard areas in a Federal Insurance Administration report entitled "Flood Insurance Study for Coos County, Oregon and Incorporated Areas" and accompanying maps.

In a district in which the /FP zone is combined, those uses permitted by the underlying district are permitted outright in the /FP FLOATING ZONE, subject to the provisions of this article.


In a district with which the /FP is combined, those uses subject to the provisions of Article 5.2 (Conditional Uses) may be permitted in the /FP FLOATING ZONE, subject to the provisions of this article.

As detailed above, the proposed Blue Ridge Route alternate alignment is permitted either outright or conditionally in each of the base zones that it crosses. As described in this section of the narrative, it also satisfies each of the applicable Floodplain Overlay standards. Therefore, it is also a permitted use in the Floodplain Overlay zone.

CCZLDO SECTION 4.6.230. Procedural Requirements for Development within Special Flood Hazard Areas.

1. Structures. Prior to issuance of a zoning clearance letter (verification letter) pursuant to Section 3.1.200, a proposal for construction of a new structure or substantial improvement of an existing structure within a Special Flood Hazard Area shall be submitted with an "APPLICATION FOR DEVELOPMENT IN SPECIAL FLOOD HAZARD AREAS."

As determined in the Original Decisions and as mentioned above, the PCGP is not deemed to be a "structure" because it is principally below ground. Accordingly, the provisions of Section 4.6.230.1 do not apply to this application requesting approval of proposed Blue Ridge Route alternate alignment.

The following procedure and application requirements shall pertain to the following types of development:

4. Other Development. "Other development" includes mining, dredging, filling, grading, paving, excavation or drilling operations located within the area of a special flood hazard, but does not include such uses as normal agricultural operations, fill less than 12 cubic yards, fences, road and driveway maintenance, landscaping, gardening and similar uses which are excluded from definition because it is the County's determination that such uses are not of the type and magnitude to affect potential water surface elevations or increase the level of insurable damages.

Review and authorization of a floodplain application must be obtained from the Coos County Planning Department before "other development" may occur. Such authorization by the Planning Department shall not be issued unless it is established, based on a licensed engineer's certification that the "other development" shall not:
A natural gas pipeline is not expressly included in the specified list of "other development." However, because the PCGP construction process will involve the removal and replacement of soil and recontouring activities that are similar to the listed development activities, the following demonstrates that the proposed Blue Ridge Route alternate alignment is consistent with the "other development" standards. Based upon the Applicant's conversations with Planning staff, Pacific Connector submits that the PCGP should be characterized as "other development" under Section 4.6.230.4, in that the underground pipeline use is not of the type or magnitude to affect potential water surface elevations or increase the level of insurable damages. Accordingly, this criterion is satisfied.

a. result in any increase in flood levels during the occurrence of the base flood discharge if the development will occur within a designated floodway; or,

b. result in a cumulative increase of more than one foot during the occurrence of the base flood discharge if the development will occur within a designated flood plain outside of a designated floodway.

The proposed Blue Ridge Route alternate alignment will be installed below existing grades and no permanent structures will be placed above existing grades within the FEMA 100-year floodplain. In addition, at the completion of the proposed Blue Ridge Route alternate alignment installation, all construction areas will be restored to their pre-construction grade and condition. Therefore, development of the pipeline will not result in any increase in flood levels or result in a cumulative increase of more than one foot. These standards are met. Flood plain compliance should now be approved for the Blue Ridge alternate.

CCZLDO SECTION 4.6.235, Sites within Special Flood Hazard Area.

1. If a proposed building site is in a special flood hazard area, all new construction and substantial improvements (including placement of prefabricated buildings and mobile homes), otherwise permitted by this Ordinance, shall:

All new construction associated with the proposed Blue Ridge Route alternate alignment satisfies the following special flood hazard area criteria.

a. be designed (or modified) and adequately anchored to prevent flotation, collapse, or lateral movement and shall be installed using methods and practices that minimize flood damage. Anchoring methods may include, but are not limited to, use of over-the-top or frame ties to ground anchors (Reference FEMA "Manufactured Home Installation in Flood Hazard Areas" guidebook for additional techniques);

Installation methods and mitigation measures will avoid and/or minimize flotation, collapse, or lateral movement hazards and flood damage. This criterion is satisfied.
b. be constructed with materials and utility equipment resistant to flood damage;

The entire proposed Blue Ridge Route alternate alignment will be constructed with corrosion-protected steel pipe. Where deemed necessary, the proposed Blue Ridge Route alternate alignment will be installed with a concrete coating to protect against abrasion and maintain negative buoyancy. This criterion is satisfied.

c. be constructed by methods and practices that minimize flood damage; and

The proposed Blue Ridge Route alternate alignment will be constructed by methods and practices that minimize flood damage. This criterion is satisfied.

d. electrical, heating, ventilation, plumbing, and air conditioning equipment and other service facilities shall be designed and/or otherwise elevated or located so as to prevent water from entering or accumulating within the components during conditions of flooding.

The proposed subsurface Blue Ridge Route alternate alignment does not include electrical, heating, ventilation, plumbing, or air conditioning components. Therefore, this criterion is not applicable.

Consideration 7b:
Support structural protection measures for bankline stabilization projects requiring state and federal permits when the applicant establishes that non-structure measures either are not feasible or inadequate to provide the necessary degree of protection.

Strategy No. 5:
Coos County shall promote protection of valued property from risks associated with critical streambank and ocean front erosion through necessary erosion-control stabilization measures, preferring nonstructural solutions where practical.

Coos County shall implement this strategy by making "Consistency Statements" required for State and Federal permits (necessary for structural streambank protection measures) that support structural protection measures when the applicant establishes that nonstructure measures either are not feasible or inadequate to provide the necessary degree of protection.

This strategy recognizes the risks and loss of property from unabated critical streambank erosion, and also, that state and federal agencies regulate structural solutions.

The proposed Blue Ridge Route alternate alignment is not part of a bankline stabilization project. Therefore, this strategy is not applicable.

Consideration 7c:
Issue zoning clearance letters in known areas potentially subjected to mass movement, including earth flow, slump topography, rockfall and debris flow pursuant to the provisions of natural hazards Strategy #6 in the Comp Plan.
Strategy No. 6:
Coos County shall permit the construction of new dwellings in known areas potentially subject to mass movement (earth flow/slump topography/rock fall/debris flow) only:

a. if dwellings are otherwise allowed by this comprehensive plan; and
b. after the property owner or developer files with the Planning Department a report certified by a qualified geologist or civil engineer stipulating:
   i. his/her professional qualifications to perform foundation engineering and soils analysis; and
   ii. that a dwelling can or cannot be safely constructed at the proposed site, and whether any special structural or siting measures should be imposed to safeguard the proposed building from unreasonable risk of damage to life or property.

This strategy recognizes the county is responsible for identifying potential hazard areas, informing its citizens of risks associated with development in known hazard areas, and establishing a process involving expert opinion so as to provide appropriate safeguards against loss of life or property.

Implementation shall occur through an administrative conditional use process, which shall include submission of a site investigation report by the developer that addresses the considerations above.

The proposed Blue Ridge Route alternate alignment does not include proposed dwellings. Therefore, Strategy No. 6 is not applicable.

Airport Surfaces Overlay Zone

Consideration 8a:
Comply with Airport Surfaces Overlay Zone set forth in this Ordinance.

Strategy No. 11:
Coos County shall cooperate with the Oregon State Aeronautics Division and the Federal Aviation Administration by developing an Airport Surfaces Overlay Zoning District to prevent the creation or establishment of hazards to air navigation. The Overlay Zoning district shall apply to the Bandon, Lakeside and Powers State Airports and shall encompass the primary surface, approach surface, transitional surfaces, horizontal surface and conical surface as identified in Volume VI, Airport Compatibility Guidelines as formulated by the Oregon Department of Transportation - Aeronautics Division, dated 1981.

This strategy has been satisfied by the County's adoption of the airport surfaces regulations established by CCZLDO Section 4.6.300 and Section 4.6.305. Compliance with the airport surfaces regulations is discussed immediately below.

CCZLDO Section 4.6.300  Purpose
The purpose of the Airport Surface Floating zone is to protect public health, safety and welfare. It is recognized that obstructions to aviation have potential for endangering the lives and property of users of selected airports, and property of occupancy of land in the airport's vicinity; an obstruction may affect future instrument approach minimums; and obstructions may reduce the area available for the landing, take-off and maneuvering of aircraft, thus tending to destroy or impair the utility of the airport and the public investment therein.

CCZLDO Section 4.6.305 Designation of Airport Surfaces

Those lands lying beneath the approach surfaces, transition surfaces, horizontal surfaces and conical surfaces as they apply to the "Bandon, Lakeside and Power Airports Approach and Clear Zone Inventory Map" shall be subject to the requirements of this floating zone.

The proposed Blue Ridge Route alternate alignment is not located under any of the County's Airport Surfaces Overlay Zoning Districts. Therefore, the airport surfaces regulations are not applicable.

Policy #28 Recognition of LCDC Goal #3 (Agricultural Lands) Requirements for Rural Lands within the Coastal Shorelands Boundary

Unless otherwise allowed through an Exception, Coos County shall manage all rural lands designated within the Coastal Shorelands Boundary as being suitable for "Exclusive Farm Use" (EFU) designation consistent with the "Agricultural Use Requirements" of ORS 215. Allowed uses are listed in Appendix 1, of the Zoning and Land Development Ordinance.

This policy shall be implemented by using the Special Considerations Map (Policy #3) to identify EFU suitable areas, and to abide by the prescriptive use and activity requirements of ORS 215 in lieu of other management alternatives otherwise allowed for properties within the "EFU-overlay" set forth on the Special Considerations Map, and except where otherwise allowed by exceptions for needed housing and industrial sites.

The "EFU" zoned land within the Coastal Shorelands Boundary shall be designated as "Other Aggregate Sites" inventories by this Plan pursuant to ORS 215.298(2). These sites shall be inventoried as "1B" resources in accordance with OAR 660-16-000(5)(b). Coos County will re-evaluate these inventoried sites pursuant to the requirements of said rule at, or before, County's periodic review of the Comprehensive Plan (OR 92-08-013PL 10/28/92).

Zoning district 20-RS, through which the Blue Ridge Route alternate alignment crosses, requires compliance with Policy #28.

As stated above, this policy is implemented by using the County's detailed inventory plan maps identifying EFU suitable areas. Certain property along the PCGP alignment is designated as "Agricultural Lands." As described in detail in the EFU section of the narrative above, the PCGP is allowed as a utility facility necessary for public service under the agricultural provisions.
of ORS 215.283(1)(c) and ORS 215.275(6). Therefore, the Blue Ridge Route alternate alignment is consistent with the Policy #28 requirements for mapped Agricultural Lands.

In addition to referencing ORS Chapter 215, the Policy states that allowed uses are listed in Appendix 1 of the CCZLDO. However, Appendix 1 is entitled CCCP and does not apply within the CBEMP boundaries and does not provide a list of uses permitted within agricultural zones. Therefore, it appears that the reference is intended to be to Appendix 4, Agricultural Land Use, which does describe uses allowed within exclusive farm use zones. This interpretation was made by the Board in the Original Decisions. Final Decision and Order No. 10-08-045PL, at page 139. Subsection 1 of Appendix 4 states, "Land within such zones shall be used exclusively for farm use except as otherwise provided in ORS 215.213." ORS 215.213 describes uses permitted in exclusive farm use zones. ORS 215.213(1)(c) permits the following use allowed outright in any area zoned for exclusive farm use: "utility facilities necessary for public service, including wetland waste treatment systems but not including commercial facilities for the purpose of generating electrical power for public use by sale or transmission towers over 200 feet in height. A utility facility necessary for public service may be established as provided in ORS 215.275." As discussed in the EFU zone section of this narrative, the PCGP is a utility facility necessary for public service pursuant to ORS 215.275. Therefore, the proposed PCGP alternate alignment in district 20-RS is also an allowed use in those areas identified as Agricultural Lands on the CBEMP Special Considerations Map. Therefore, this policy is met.

**Policy #34 Recognition of LCDC Goal #4 (Forest Lands) Requirements for Forest Lands within the Coastal Shorelands Boundary.**

*Unless otherwise allowed through an Exception, Coos County shall manage all rural lands designated on the Special Considerations Map as "Forest Lands" within the Coastal Shorelands Boundary consistent with the "Forest Uses" requirements of LCDC Goal #4. Allowed uses are listed in Appendix 3 of the Zoning and Land Development Ordinance.*

*Where the County's Comprehensive Plan identified major marshes, significant wildlife habitat and riparian vegetation on coastal shorelands subject to forest operations governed by the Forest Practices Act, the Forest Practice program and rules of the Department of Forestry shall be carried out in such a manner as to protect and maintain the special shoreland values of the major marshes, significant wildlife habitat areas, and forest uses especially for natural shorelands and riparian vegetation.*

*This policy shall be implemented by using the Special Considerations Map (Policy #3) to identify "Forest Lands", and to abide by the prescriptive use and activity requirements of LCDC Goal #4 in lieu of other management alternatives otherwise allowed for properties within the "Forest Lands-Overlay" set forth on the Special Considerations Map, and except where otherwise allowed by Exception for needed housing and industrial sites.*

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9 The County is not a marginal lands county, so the provisions of ORS 215.213 do not apply. The parallel provisions of Oregon law applicable to non-marginal lands counties (set forth in ORS 215.283) do apply. ORS 215.283(1)(c) is identical to ORS 215.213(1)(c).
This policy recognizes that the requirements of LCDC Goal #4 are equal and not subordinate to other management requirements of this Plan for "Forest Lands" located within the Coastal Shorelands Boundary.

As confirmed by Planning staff, the proposed Blue Ridge Route alternate alignment does not cross any lands identified as Forest Lands within the Coastal Shorelands Boundary shown on the County's specific inventory maps. Therefore, development of the PCGP is consistent with this policy.

Policy #49 Rural Residential Public Services

Coos County shall provide opportunities to its citizens for a rural residential living experience, where the minimum rural public services necessary to support such development are defined as police (sheriff) protection, public education (but not necessarily a rural facility), and fire protection (either through membership in a rural fire protection district or through appropriate on-site fire precaution measures for each dwelling). Implementation shall be based on the procedures outlined in the County's Rural Housing State Goal Exception.

I. This strategy is based on the recognition:

   a. that physical and financial problems associated with public services in Coos Bay and North Bend present severe constraints to the systems' ability to provide urban level services, and b. that rural housing is an appropriate and needed means for meeting housing needs of Coos County's citizens.

Zoning district 20-RS through which the proposed Blue Ridge Route alternate alignment crosses requires compliance with Policy #49. The proposed Blue Ridge Route alternate alignment is not in need of rural residential public services nor will it preclude these services. This strategy is satisfied.

Policy #50 Rural Public Services

Coos County shall consider on-site wells and springs as the appropriate level of water service for farm and forest parcels in unincorporated areas and on-site DEQ-approved sewage disposal facilities as the appropriate sanitation method for such parcels, except as specifically provided otherwise by Public Facilities and Services Plan Policies #49, and #51. Further, Coos County shall consider the following facilities and services appropriate for all rural parcels: fire districts, school districts, road districts, telephone lines, electrical and gas lines, and similar, low-intensity facilities and services traditionally enjoyed by rural property owners. This strategy recognizes that LCDC Goal #11 requires the County to limit rural facilities and services.

Zoning district 20-RS through which the proposed Blue Ridge Route alternate alignment crosses requires compliance with Policy #50. The proposed Blue Ridge Route alternate alignment is not in need of rural public services nor will it preclude these services. This policy is satisfied.
Policy #51  Public Services Extension

I. Coos County shall permit the extension of existing public sewer and water systems to areas outside urban growth boundaries (UGBs) and unincorporated community boundaries (UCB's) or the establishment of new water systems outside UGB's and UCB's where such service is solely for:

Zoning district 20-RS through which the proposed Blue Ridge Route alternate alignment crosses requires compliance with Policy #51. The PCGP is not requesting a public services extension. This policy is satisfied.

III. CONCLUSION

For the reasons set forth above, the requested approvals for the Blue Ridge Route alternate alignment for a relatively short segment of the previously approved PCGP alignment in Coos County satisfies all of the applicable approval criteria within the requested zones. Consequently, the Applicant requests that the County approve the requested alternate segment alignment addressed in this application, with the conditions of approval proposed by Pacific Connector in the application.
NARRATIVE IN SUPPORT OF LAND USE APPLICATION
PROPOSED BLUE RIDGE ROUTE ALTERNATE ALIGNMENT
FOR THE PACIFIC CONNECTOR GAS PIPELINE

December 6, 2013 (Submitted)
May 2, 2014 (Supplemented)

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Request: Approve the Blue Ridge Route alternate to the Brunschmid alternate alignment approved in Board of Commissioner’s Final Decision and Order No. 14-01-007PL dated February 4, 2014, for a segment of the previously approved alignment for the Pacific Connector Gas Pipeline under Board of Commissioners Final Decision and Order No. 10-08-045PL dated September 8, 2010 and Board of Commissioners Final Decision and Order No. 12-03-018PL dated March 13, 2012.
# TABLE OF CONTENTS

I. INTRODUCTION .................................................................................................................. 1  
   A. Background and Planning History ................................................................................. 2  
   B. Procedural Status .......................................................................................................... 3  

II. REQUESTED ALTERNATE ALIGNMENT ..................................................................... 3  
   A. Balance of County ......................................................................................................... 4  
      1. Exclusive Farm Use Zone ......................................................................................... 4  
      2. Forest Zone ............................................................................................................. 6  
      3. Special Regulatory Considerations/Inventory Maps ............................................... 10  
   B. Coos Bay Estuary Management Plan (CBEMP) ............................................................. 24  
      1. Zoning District 20-RS ............................................................................................ 27  

III. CONCLUSION .................................................................................................................. 42
FIGURES:

Sheet 1  Overview Sheet

Sheet 2  Blue Ridge Route Alternate (Comparing Against Prior Brunschmid Route Alternate Alignment)
NARRATIVE IN SUPPORT OF LAND USE APPLICATION PROPOSED BLUE RIDGE ROUTE ALTERNATE ALIGNMENT FOR THE PACIFIC CONNECTOR GAS PIPELINE

I. INTRODUCTION

Pacific Connector Pipeline Company, LP (hereafter "Pacific Connector" or "Applicant") submits this application requesting hearings body conditional use approval of an additional alternate alignment (hereafter the Blue Ridge Route alternate) to the previously approved Brunschmid alternate alignment, under Board of Commissioners Final Decision and Order No. 14-01-007PL dated February 4, 2014 for the Pacific Connector Gas Pipeline ("PCGP"). See attached Sheet 1. PCGP's original alignment crossing 49.72 miles of Coos County ("County"), under Final Decision and Order No. 10-08-045PL dated September 8, 2010 and Board of Commissioners Final Decision and Order No. 12-03-018PL dated March 13, 2012 (the "Original Decisions"), will remain valid and unmodified.1

Following the Original Decisions, Pacific Connector filed a new application seeking approval of two alternate alignments for segments of the original PCGP alignment approved in the Original Decisions, which is now a final decision (herein referred to as "Pacific Connector II"), with the approved Pacific Connector II alternate alignments referred to as the Brunschmid and Stock Slough alternates.

This application, referred to as Pacific Connector III, will not seek to modify or amend the Pacific Connector II approvals, but will propose a new Blue Ridge Route alternate to the approved Brunschmid alternate alignment in Pacific Connector II. For clarification, the proposed Blue Ridge Route alternate alignment starts immediately south of the Coos River at approximately Mile Post ("MP") 11R, and is the route referred to in the Federal Energy Regulatory Commission ("FERC") Application as the "PCGP Modified Blue Ridge 2013 Route". See Sheet 1.

As noted in the Original Decisions, the pipeline's alignment requires approval by FERC. While this application proposes an additional alternate segment alignment for County approval, FERC will make the ultimate selection of the pipeline's alignment. As a practical matter, even though Pacific Connector seeks approval for alternate alignments along the route previously approved by the Original Decisions, only one continuous alignment approved by FERC for the entire pipeline will be constructed.

As discussed above, this application requests County approval of the Blue Ridge Route alternate alignment that would retain the first segment of the Brunschmid alternate to allow PCGP to

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1 Since the PCGP alignment was approved in the Original Decisions, Pacific Connector has conducted a detailed analysis of that alignment. In many instances, the approved PCGP alignment has moved in minor ways to conform to the surveyed centerline or to accommodate small project refinements, without changing the location of the alignment into different ownerships or into a different zone within the same ownership. Based upon consultation with Planning staff, those refinements to the approved alignment do not constitute alternate segments which need additional approval with respect to applicable review criteria.
avoid the Brunschmid Wetland Reserve, would eliminate all crossings of Stock Slough, and would reduce the number of miles of crossings on private timberlands. As further discussed below, the proposed Blue Ridge Route alternate alignment affects only two Coos County zoning designations: Exclusive Farm Use and Forest ("EFU" and "F"). See Sheet 1.

This narrative explains the reasons for the requested Blue Ridge Route alternate alignment approval and demonstrates how the proposed Blue Ridge Route alternate alignment satisfies the applicable provisions of the Coos County Zoning and Land Development Ordinance ("CCZLDO"), the Coos Bay Estuary Management Plan ("CBEMP"), and are consistent with the Original Decisions.

A. Background and Planning History

Pacific Connector has applied for authorization from the Federal Energy Regulatory Commission ("FERC") under Section 7c of the Natural Gas Act ("NGA") to construct, install, own, operate, and maintain an interstate natural gas pipeline to transport natural gas to the Jordan Cove Liquefied Natural Gas ("LNG") Terminal in Coos Bay from the existing interstate natural gas transmission pipeline near Malin, Oregon. The 36-inch diameter pipeline will be approximately 232 miles in length and will provide natural gas for liquefaction by Jordan Cove Energy Project LP to be marketed domestically and throughout the Pacific Rim. Through this application to Coos County, the Applicant is seeking a determination from Coos County that the requested alternate alignment to a segment of the previously approved 49.72-mile segment of the PCGP located within Coos County is consistent with all applicable Coos County land use regulations.2

As discussed in the original application and recognized in the Original Decisions, because of the linear nature of the proposed interstate gas pipeline, it will traverse numerous zoning districts within the County, with slightly different use descriptions between zones:

1. within the Forest (F) zone, the pipeline use is characterized as a new gas distribution line with no greater than a 50-foot right of way; and

2. within the Agricultural (EFU) zone, the pipeline use is characterized as a utility facility necessary for public service.

As established in the Original Decisions and in Pacific Connector II, the subsurface nature of the proposed PCGP minimizes pipeline impacts following construction. Construction impacts will be minimized through appropriate methodologies and technologies. As was also established in the Original Decisions, Pacific Connector proposes to utilize a standard 95-foot wide temporary construction easement, with a 50-foot permanent right-of-way and associated temporary extra work areas ("TEWAs"). Other forms of temporary construction areas will be utilized, all of which have been designed to minimize the area of disturbance necessary in order to safely construct the pipeline and minimize the total overall project disturbance.

2 By submitting this application, the Applicant is seeking to comply with applicable land use regulations and the consistency requirements of the Coastal Zone Management Act. However, submittal of this application is not a waiver of any federal jurisdiction over the Coos County segment of the PCGP.
B. Procedural Status

As stated above, Pacific Connector previously received land use approval in the Original Decisions from Coos County for the 49.72-mile segment of the PCGP located within Coos County.

This application does not seek to modify or amend the Original Decisions or the Pacific Connector II approvals, but references will be made to them for a number of reasons, including the characterization of the use in the various zoning districts, and regarding references to interpretations and findings in the Original Decisions that are equally applicable to this application. The application does not seek to modify or amend the related conditions. Accordingly, this application is not subject to the provisions of Section 5.0.350.

The Original Decisions and Pacific Connector II determined that Section 5.0.150 requiring that a property owner or contract purchaser sign the application is merely a procedural requirement that can be deferred to a later stage in the approval process. Condition of Approval No. 20 to the County's Final Decision and Order No. 12-03-018PL dated March 13, 2012 addresses this procedural issue. Thus, Pacific Connector proposes that Condition of Approval No. 20 be imposed by the County as part of the County's approval of this application.

II. REQUESTED ALTERNATE ALIGNMENT

As stated above, Pacific Connector requests approval of this alternate alignment in only two Coos County zoning designations: Forest (F), and Exclusive Farm Use (EFU), and one Coos Bay Estuary Management Plan (CBEMP) zoning districts: 20-RS. The Blue Ridge Route alternate alignment proposed by this application will not introduce the PCGP into any zoning district beyond those previously subject to the approved alignment in the Original Decisions, and will affect different ownerships only in relatively few instances. The proposed alternate alignment is described below.

The Blue Ridge Route alternative is now being pursued at the request of FERC as a potentially preferred alternate alignment. As discussed above, the Blue Ridge Route has the following benefits over the Brunschmid alternate alignment previously approved in Pacific Connector II:

1. The Blue Ridge Route will retain the segment of the approved Brunschmid alternate necessary to avoid the National Resources Conservation Service's (NRCS's) Brunschmid Wetland Reserve Program easement;

2. The Blue Ridge Route will avoid all remaining Stock Slough crossings that would have still been required by the unretained segment of the Brunschmid alternate; and

3. The Blue Ridge Route will avoid crossing multiple tracts of privately owned timberlands, and is the alternate now potentially preferred by FERC.
The approval of this application for the Blue Ridge alternate does not depend, however, on whether it is preferable to any other route, only whether it satisfies applicable approval criteria.

The remainder of this section summarizes the applicable approval criteria and Pacific Connector’s responses for the requested alternate alignments.

Blue Ridge Route Alternate

A. Balance of County

Areas within Coos County outside of the estuarine areas for the Coos River and Coos Bay are described in the CCZLDO as the "Balance of County". The Balance of County includes the County’s zoning districts except for those listed in the Coquille River Estuary Management Plan (CREMP) and the Coos Bay Estuary Management Plan (CBEMP). The zoning districts within the Balance of County crossed by the proposed Blue Ridge Route alternate alignment are the Exclusive Farm Use (EFU) and Forest (F) zones. They are discussed in sections 1 and 2 below. Section 3 then addresses the special regulatory considerations that the proposed Blue Ridge Route would be subject to in these zones.

1. Exclusive Farm Use Zone

The Original Decisions approved the PCGP to cross approximately 3.72 miles of properties zoned Exclusive Farm Use (EFU), all of which are privately owned. During the FERC review process, Pacific Connector was informed by FERC that another alternate alignment is needed for FERC’s consideration. Of necessity, the new Blue Ridge Route alternate alignment will also cross EFU zoned parcels. See Sheet 2.

As demonstrated below, Pacific Connector’s requested approval for an alternate alignment for a segment of the approved PCGP alignment in the EFU zone is consistent with the requirements of ORS Chapter 215, OAR 660, Division 33, and the applicable approval criteria of the CCZLDO.

CCZLDO Section 4.9.450 Hearings Body Conditional Use

The following uses and their accessory uses may be allowed as hearings body conditional uses in the "Exclusive Farm Use" zone and the "Mixed Use" overlay subject to the corresponding review standard and development requirements in Section 4.9.600 and 4.9.700.

C. Utility facilities necessary for public service, except for the purpose of generating power for public use by sale and transmission towers over 200 feet in height. A facility is necessary if it must be situated in an agricultural zone in order for the service to be provided.

The Applicant and planning staff determined that the utility facility use is allowed in both of the EFU and Mixed Use zones, subject only to General Conditions. As determined in the Original Decisions, CCZLDO Section 4.9.450 is more or less a direct codification of ORS 215.283(1)(c). 3

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3 ORS 215.283(1) provides, in relevant part:
(1) the following uses may be established in any area zoned for Exclusive Farm Use: ***.
(c) utility facilities necessary for public service, including wetland waste treatment systems but not
Accordingly, under state law, utility facilities sited on EFU lands are subject only to ORS 215.275, as well as the administrative rules adopted by LCDC. See Final Decision and Order No. 10-08-045PL, page 116.

As determined in the initial Original Decisions, the PCGP is a "utility facility necessary for public service" under CCZLDO Section 4.9.450.C. in that, due to its linear nature and the points of connection it must make, it is necessary for some segments of the PCGP to be situated in agricultural land, in satisfaction of this review criterion and the companion criterion of ORS 215.275(1). Final Decision and Order, No. 10-08-045PL, pp. 115-23. The same is true of the selection of any alternate alignment. As recognized in the Original Decisions, ORS 215.275(6) exempts interstate natural gas pipelines from the provisions of ORS 215.275(2)-(5). OAR 660-33-0130 has a similar exemption.

As referenced above, the requested Blue Ridge Route alternate alignment would still need to cross EFU lands to achieve the following benefits:

1. This proposed alternate alignment would retain the segment of the previously approved Brunschmid alternate necessary to avoid an approved mitigation site on the north side of the Coos River (e.g., the Brunschmid Wetland Reserve Project, which has an easement held by the USDA Farm Services Agency).

2. This proposed alternate alignment avoids the remaining crossings of Stock Slough still required by the un-retained segment of the Brunschmid alternate. See Sheet 2.

3. This alternate alignment was proposed to FERC by an affected landowner for the purpose of reducing the number of miles of crossings of private timberlands.

4. Finally, the Blue Ridge alternate would reduce the number of miles of EFU land crossed by 1.59 miles from the number of miles of EFU land crossed by the Pacific Connector II Brunschmid alternate.

In sum, the PCGP is a locationally dependent linear facility and even the proposed Blue Ridge Route alternate alignment must cross some EFU land in order to achieve a reasonably direct route to achieve the benefits of the proposed alternate alignment. It is important to note that placing the pipeline under EFU land does not take cropland out of production. The pipeline easement agreement allows full use of the landowner’s property by the landowner for crop production once the pipeline is constructed.

including commercial facilities for the purpose of generating electrical power for public use by sale or transmission towers over 200 feet in height. A utility facility necessary for public service may be established as provided in ORS 215.275.
CCZLDO Section 4.9.600  Siting Standards for Dwellings and Structures in the EFU Zone

The siting criteria of this section apply to dwellings and structures within the EFU zone. No dwellings are proposed and, under the County's prior interpretation in the Original Decisions, a subsurface interstate gas pipeline is not a "structure," so the provisions of this code section are not applicable to the proposed PCGP alternate alignment or its necessary components. See Final Decision and Order, No. 10-08-045PL, pp. 108-12.

CCZLDO Section 4.9.700

As stated above, the proposed alternate alignment in the EFU zone subsurface does not constitute a "structure" as above described. Accordingly, Section 4.9.700 which is applicable to "all dwellings and structures" does not apply to this application.

2. Forest Zone

The Original Decisions approved the PCGP alignment to cross approximately 39.47 miles of Forest-zoned lands within Coos County, 10.76 miles of which are on BLM-managed lands, with the remaining segments located on privately owned lands. The Blue Ridge Route alternate alignment would reduce the miles of private timber lands crossed from 9.32 miles to 5.31 miles (4.01 miles less) and will increase the number of BLM timber lands crossed from 1.43 miles to 7.64 miles (6.21 miles more).

The proposed Blue Ridge Route alternate alignment affects less privately-owned Forest-zoned land than the PCGP alignment previously approved by the Original Decisions. As discussed above, the changes in alignment within the Forest zone, as shown on Sheets 1 and 2, are occasioned by the continued need to avoid the Brunschmid Wetland Reserve Program (WRP) easement, the opportunity to avoid all Stock Slough crossings, and to cross fewer private timber land holdings. The Blue Ridge Route alternate alignment crosses other ownerships of Forest-zoned land than the previously approved PCGP alignment did, including the land owned by the owner requesting the Blue Ridge Route alternate alignment. Otherwise, the zoning districts crossed and applicable review criteria for the proposed Blue Ridge Route alternate alignment in the Forest-zoned land are the same as they were for the approved PCGP alignment in the Original Decisions.

CCZLDO Section 4.8.300  Administrative Conditional Uses

The following uses and their accessory uses may be allowed as administrative conditional uses in the "Forest" zone subject to applicable requirements in Section 4.8.400 and applicable siting criteria set forth in this Article and elsewhere in this Ordinance.

F. New electrical transmission lines with right-of-way widths of up to 100 feet as specified in ORS 772.210. New distribution lines (e.g. gas, oil, geothermal) with right-of-way 50 feet or less in width.
The PCGP is a new gas line with a permanent easement width of 50 feet. Therefore, the PCGP and its associated facilities are classified as an administrative conditional use within the Forest zone. See Final Decision and Order, No. 10-08-045PL, p. 87. However, as discussed below, the PCGP's crossing of EFU land requires Hearings Body conditional use procedures which upgrades the review procedure for all requests, but which does not change the substantive review criteria for the PCGP in the F zone.

**CCZLDO Section 4.8.400  Review Criteria for Conditional Uses in Section 4.8.300 and Section 4.8.350**

A use authorized by Section 4.8.300 and Section 4.8.350 may be allowed provided the following requirements are met. These requirements are designed to make the use compatible with forest operations and agriculture and to conserve values found on forest lands.

A. The proposed use will not force a significant change in, or significantly increase the cost of, accepted farming or forest practices on agriculture or forest lands; and

As detailed in the Original Decisions, this criterion is limited to regulation of “significant” impacts and cost increases. The criterion does not require that there be no impacts on farming and forest practices. Final Decision and Order, No. 10-08-045PL, p. 91. As explained in the Original Decisions, accepted forest practices in the vicinity of the pipeline corridor include timber production and harvesting, hauling harvested timber, logging road construction and maintenance, application of chemicals, and disposal of slash. The pipeline project will have effects on the timbered areas located in the Forest zone both during and after construction in the form of a cleared corridor. In the Original Decisions, the Board found that the PCGP’s limited impacts will not force a “significant” change in the accepted forest practices in the vicinity of the pipeline. Final Decision and Order, No. 10-08-045PL, p. 94. For the same reasons discussed in the Original Decisions, the proposed Blue Ridge Route alternate alignment for the subsurface interstate gas pipeline and its associated facilities in the F zone will not force a significant change in, or significantly increase the cost of, accepted farming or forest practices on agricultural or forest lands. As with the original PCGP alignment, although Pacific Connector will obtain a 50-foot permanent right-of-way for the Blue Ridge alternate, only 30 feet centered over the pipeline will be maintained as a cleared corridor through forested areas to protect the pipe from potential root damage and allow for ground and aerial surveillance inspections of the pipeline. The remaining 20 feet of permanent right-of-way for the alternate alignment, as well as the temporary construction areas, will be replanted in a manner consistent with Pacific Connector's Erosion Control and Revegetation Plan (“ECRP”). Both during and following construction, forestry activities will be able to continue on the forest lands nearby or adjoining the PCGP.

B. The proposed use will not significantly increase fire hazard or significantly increase fire suppression costs or significantly increase risks to fire suppression personnel; and
The Original Decisions included significant findings of fact and conclusions of law to the effect that the PCGP will not significantly increase fire hazards. See Final Decision and Order No. 10-08-045PL, pages 101-108. Specifically, the proposed pipeline will not significantly increase fire hazard. The pipeline will be subject to exacting safety requirements that will significantly minimize the risk of a fire caused by the pipeline itself. The pipeline and all associated facilities will be designed and maintained to conform with or exceed US Department of Transportation (DOT) requirements found in Title 49 Code of Federal Regulations (CFR), part 192 Transportation of Natural and Other Gas by Pipeline: Minimum Safety Standards; 18 CFR Section 380.15, Site and Maintenance Requirements; and other applicable federal and state regulations. Additionally, the Applicant will prepare a PCGP-specific safety plan. As a result of these stringent federal safety controls and the PCGP-specific safety plan, the risk of a release of gas from the pipeline is very remote. This criterion is satisfied.

C. All uses must comply with Section 4.8.600, Section 4.8.700 and Section 4.8.750.

The Applicant demonstrates compliance with Sections 4.8.600, 4.8.700 and 4.8.750 in the following sections of this application narrative set forth below.

D. A "Forest Management Covenant", which recognized the right of adjacent and nearby landowners to conduct forest operations consistent with the Forest Practices Act and Rules, shall be recorded in the deed records of the County prior to any final County approval for uses authorized in Section 4.8.300 H, J, and Q and Section 4.8.350 D, J, and Q.

The application does not seek approval of uses authorized in Section 4.8.300 H, J or Q or in Section 4.8.350 D, J, or Q. Accordingly, this criterion is inapplicable to this application.

CCZLDO Section 4.8.600 Mandatory Siting Standards Required for Dwellings and Structures in the Forest Zone

The following siting criteria shall apply to all dwellings, including replacement dwellings, and structures in the Forest and Forest Mixed Use zones.

No dwellings are proposed by this application. As detailed in the EFU section above, the Board previously determined that the PCGP is not a "structure" as that term is defined in CCZLDO Section 2.1.200 because the PCGP will be located under, rather than on top of, the land which it crosses. Final Decision and Order, No. 10-08-045PL, pp. 108-12. Consequently, the siting standards at CCZLDO Section 4.8.600 are not applicable to the proposed subsurface PCGP alternate alignment or its necessary components or associated facilities in the F zone.

CCZLDO Section 4.8.700 Fire Siting Safety Standards

All new dwellings and permanent structures and replacement dwellings and structures shall, at a minimum, meet the following standards.
As discussed above, the PCGP is neither a structure nor a dwelling. Consequently, the fire siting and safety standards of this Section are not applicable to this application.

**CCZLD0 Section 4.8.750 Development Standards**

*All development and structures approved pursuant to Article 4.8 shall be sited in accordance with this Section.*

**A. Minimum Lot Size:**

The proposed Blue Ridge Route alternate alignment in the F zone will not require or create any land divisions. Consequently, the minimum lot size standard is not applicable.

**B. Setbacks:** *All buildings or structures with the exception of fences shall be set back a minimum of thirty-five (35) feet from any road right-of-way centerline or five (5) feet from any right-of-way line, whichever is greater.*

The PCGP is a linear, underground utility facility that crosses several property lines, but is not a building or structure. Final Decision and Order, No. 10-08-045PL, pp. 108-12. Consequently, the setback standard is not applicable to the proposed Blue Ridge Route alternate alignment in the F zone.

**C. Structure Height:**

**D. Lot Coverage:**

There are no requirements for either of these standards in the F zone.

**E. Fences, Hedges and Walls:** *No requirement, except for vision clearance provisions in Section 3.3.400 and Fire Siting and Safety Standards in Section 4.7.700.*

The PCGP is not a hedge, fence or wall, and therefore this standard does not apply to the proposed Blue Ridge Route alternate alignment in the F zone or its necessary components.

**F. Off-Street Parking and Loading:** *See Chapter X.*

The off-street parking and loading standards are not applicable to the proposed Blue Ridge Route alternate alignment use in the F zone.

**G. Minimum Road Frontage/Lot Width:** *20 feet.*

The proposed Blue Ridge Route alternate alignment in the F zone will not impact the existing configuration of the parcels it crosses. Therefore, this standard is not applicable.
H. Minimizing Impacts:

This standard only applies to dwellings within the F zone. No dwellings are proposed by this application. Therefore, this standard is not applicable to the proposed Blue Ridge Route alternate alignment application in the F zone.

I. Riparian Vegetation Protection.

1. Riparian vegetation within 50 feet of a wetland, stream, lake or river, as identified on the Coastal Shoreland and Fish and Wildlife habitat inventory maps shall be maintained except that:

   e. Riparian vegetation may be removed in order to site or properly maintain public utilities and road rights-of-way; or

The PCGP is a public utility project within the state of Oregon. Therefore, the proposed PCGP alternate alignment in the F zone is not subject to the 50-foot riparian protection vegetation zone, and riparian vegetation may be removed in order to site the PCGP pursuant to the exemption cited above. Nonetheless, the proposed Blue Ridge Route alternate alignment in the F zone will comply with all FERC requirements for wetland and waterbody protection and mitigation both during and after construction.

For the reasons set forth above, the proposed Blue Ridge Route alternate alignment should be approved as a conditional use within the F zone.

3. Special Regulatory Considerations/Inventory Maps

The CCZLDO provides special regulations for the use and development of land situated within resource or hazard areas identified on the Special Considerations Maps for the Balance of County (including the EFU and F zones crossed by the Blue Ridge Route alternate) as set forth on Table 4.7a of the CCZLDO. The following sections identify the special regulatory considerations proscribed by the Coos County Comprehensive Plan for each protected resource (Phenomenon) listed in the left-hand column of Table 4.7a, which indicates, by reference to APPENDIX I, the applicable Strategies which apply to the applicable special regulatory considerations regarding each of the stated Phenomenon. As discussed below, the Blue Ridge Route alternate alignment will not impact any areas of special regulatory consideration.

Mineral and Aggregate

Considerations:

1a. Preserve these in their original character until mined.

1b. Agriculture and forestry uses are acceptable per zone and use district requirements

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4 Planning Staff advises that the Coos County Special Considerations Map no longer exists and that the County relies on the detailed plan inventory maps referenced in CCZLDO Section 4.7.115.
1c. Allow new conflicting uses within 500 ft. subject to ESEE findings through the conditional use process.

**Strategy No. 1:**
Coos County shall manage its identified mineral and aggregate resources (except black sand prospects) in their original character until mined, except where conflicting uses are identified during implementation of the Plan, and such uses are justified based on consideration of the economic, social, environmental, and energy consequences of the conflicting uses, or where existing uses have been grandfathered.

Conflicting uses include dwellings and any other structure within 500 feet of the resource site. Where no conflicts are identified, agriculture, forest, or similar open space zoning shall be used to implement this strategy.

When a conflicting use is proposed at a given site, the decision about allowing development of the proposed use or the development or protection of the aggregate resource shall be made through a conditional use process where findings are developed which address the economic, environmental, social, and energy consequences of allowing the proposed conflicting use, development of the aggregate resource, or both at the site. The following guidelines must be considered as part of the conditional use process:

**Consideration 1d:**
Non-exploratory mining operations are conditional uses, where allowed.

The Blue Ridge Route alternate alignment is not located within 500 feet of any mapped resource sites, with the exception of coal basin areas surrounding two ownerships within the Stock Slough area. However, under the provisions of Strategy 1, the mapped coal basin is described as commercially unviable and, accordingly, not designated as a Goal 5 resource. There is no proposed conflicting use. This strategy is satisfied.

**Strategy No. 2:**
Coos County shall regulate new recovery operations by designating such activities as conditional use in appropriate zones, except where permitted outright in forest zones, to ensure compatibility with adjacent uses.

Site restoration shall conform to the requirements of ORS 517.750 to 517.900, "Reclamation of Mining Lands."

This strategy recognizes that project review by the Hearings Body is necessary to minimize the adverse impacts that are typically associated with mining operations, and which often make such recovery activities incompatible with adjacent uses.

The proposed Blue Ridge Route alternate alignment is not a mining operation. Therefore, this strategy is not applicable.
Water Resources

Consideration 2a:
Prohibits new residential and commercial development in rural areas other than committed areas when evidence or irreversible degradation by new withdrawal or septic tanks has been submitted.

Strategy No. 1:
Coos County shall not permit further new residential and commercial development in rural areas where the Oregon State Water Resources Department (OSWRD), the Oregon State Environmental Quality commission (EQC), or the Oregon State Health Division (OSHD) has submitted compelling evidence to Coos County that water resources within that area would be irreversibly degraded by new consumptive withdrawal or by additional septic tank or other waste discharges.

The proposed Blue Ridge Route alternate alignment is neither a residential nor commercial development. Therefore, this strategy is not applicable.

Historical/Archeological Sites and Structures

Consideration 3a:
Manage these for their original resource value.

Strategy No. 1:
Coos County shall manage its historical, cultural and archeological areas, sites, structures and objects so as to preserve their original resource value.

This strategy recognizes that preservation of significant historical, cultural and archeological resources is necessary to sustain the County’s cultural heritage.

Pacific Connector will utilize several steps to ensure appropriate identification and preservation of historical and archaeological resources prior to and during the construction of the PCGP Project as directed by FERC and Oregon SHPO.

Pacific Connector has consulted with the Confederated Tribes of the Coos, Lower Umpqua, and Siuslaw Indians and the Coquille Indian Tribe regarding cultural resources issues throughout the life of the project. Throughout all of the archaeological and historical studies necessary, Pacific Connector will continue to consult with appropriate Tribes, Oregon SHPO and the FERC regarding the proposed alternate alignment, to ensure their continuing cooperation and concurrence.

Pacific Connector proposes that Condition No. 24 to the Original Decisions be imposed as a condition of approval to this application, with appropriate revisions to reflect the different areas of the County where the condition will apply.
Consideration 3b:
Develop proposals in identified archeological areas must have a "sign-off" by qualified person(s).

Strategy No. 3:
Coos County shall continue to refrain from wide-spread dissemination site-specific inventory information concerning identified archeological sites. Rather Coos County shall manage development in these areas so as to preserve their value as archeological resources.

This strategy shall be implemented by requiring development proposals to be accompanied by documentation that the proposed project would not adversely impact the historical and archaeological values of the project's site. "Sufficient documentation" shall be a letter from a qualified archaeologist/historian and/or a duly authorized representative of a local Indian tribe(s). The Coos County Planning Department shall develop and maintain a list of qualified archaeologists and historians. In cases where adverse impacts have been identified, then development shall only proceed if appropriate measures are taken to preserve the archaeological value of the site. "Appropriate measures" are deemed to be those, which do not compromise the integrity of remains, such as: (1) paving over the sites; (2) incorporating cluster-type housing design to avoid the sensitive areas; or (3) contracting with a qualified archaeologist to remove and re-inter the cultural remains or burial(s) at the developer's expense. If an archaeological site is encountered in the process of development, which previously had been unknown to exist, then, these three appropriate measures shall still apply. Land development activities found to violate the intent of this strategy shall be subject to penalties prescribed by ORS 97.745.

This strategy is based on the recognition that preservation of such archaeologically sensitive areas is not only a community's social responsibility but is also a legal responsibility pursuant to Goal #5 and ORS 97.745. It also recognizes that historical and archaeological sites are non-renewable, cultural resources.

Pacific Connector proposes that a condition similar to Condition No. 24 to the Original Decisions be imposed as a condition of approval to the Blue Ridge Route alternate alignment approval.

Consideration 3c:
Historical structures and sites can only be expanded, enlarged or modified if Coos County finds the proposal to be consistent with the original historical character of the structure or site.

Strategy No. 2:
Coos County shall permit the expansion, enlargement or other modification of identified historical structures or sites provided that such expansion, enlargement or other modification is consistent with the original historical character of the structure or site;

This strategy shall be implemented by requiring Planning Director review of site and architectural plans to ensure that the proposed project is consistent with the original historical character of the site and structure.
The proposed Blue Ridge Route alternate alignment for the pipeline will not involve the expansion, enlargement, or modification of any historical structures or sites. Therefore, neither Consideration 3c nor the corresponding Comprehensive Plan Strategy No. 2 is applicable to this application.

**Beaches and Dunes**

*Considerations:*

4a. Permit development within “limited development suitability” only upon establishment of findings. Requires Administrative Conditional Use.

4b. Prohibits residential, commercial, or industrial development within areas “unsuitable for development.” Permit other development only upon establishment of findings. Requires Administrative Conditional Use.

4c. Cooperation with agencies to regulate: destruction of vegetation, erosion shore structures and other developments, requires Administrative Conditional Use and agency comments.

Planning staff has confirmed that the proposed Blue Ridge Route alternate alignment to the approved pipeline will not cross through any beach or dune areas; therefore these considerations and the corresponding strategies are not applicable.

**Non-Estuarine Shorelands Boundary**

*Consideration 5a:*

Protection of major marshes (wetlands), habitats, headlands, aesthetics, historical and archeological sites.

*Strategy No. 5:*

Coos County shall provide special protection to major marshes, significant wildlife habitat, coastal headlands, exceptional aesthetic resources, and historic and archeological sites located within the coastal Shorelands boundary of the ocean, coastal lakes and minor estuaries. Coos County shall consider: (a) “major marshes” to include certain extensive marshes associated with dune lakes in the Oregon Dunes National Recreation Area and wetlands associated with New River as identified in the Inventory text and maps, and on the Special Considerations Map; (b) “significant wildlife habitat” to include “sensitive big-game range,” Snowy Plover nesting areas, Bald Eagle, and Osprey nesting areas, Salmonid spawning and rearing areas, and wetlands; (c) “coastal headlands” to include Yoakum Point, Gregory Point, Shore Acres, Cape Arago south to Three-Mile Creek, Five Mile Point, and Coquille Point; (d) “exceptional aesthetic resources” to include the coastal headlands identified above, and other areas identified in the Coastal Shorelands Inventory; and (e) “historical, cultural and archeological sites” to include those identified in the Historical, Cultural and Archeological Sites Inventory and Assessment.
This strategy shall be implemented through plan designations and ordinance measures that limit uses in these special areas to those uses that are consistent with protection of natural values, such as propagation and selective harvesting of forest products, grazing, harvesting wild crops, and low intensity water-dependent recreation.

This strategy recognizes that special protective consideration must be given to key resources in coastal shorelands over and above the protections afforded such resources elsewhere in this plan.

Planning staff confirms that the proposed Blue Ridge Route alternate alignment does not cross through any coastal shorelands areas. Therefore, this strategy does not apply.

**Consideration 5b:**
Specifies allowed uses within C.S.B.

**Strategy No. 7:**
Coos County shall manage its rural areas within the “Coastal Shorelands Boundary” of the ocean, coastal lakes and minor estuaries through implementing ordinance measures that allow the following uses:

a. farm uses as provided in ORS 215;
b. propagation and harvesting of forest products consistent with the Oregon Forest Practices Act.
c. private and public water dependent recreation developments;
d. aquaculture;
e. water-dependent commercial and industrial uses and water-related uses only upon finding by the Board of Commissioners that such uses satisfy a need, which cannot otherwise be accommodated on shorelands in urban and urbanizable areas;
f. single family residences on existing lots, parcels, or units of land when compatible with the objectives and implementation standards of the Coastal Shorelands goal, and as otherwise permitted by the underlying zone;
g. any other uses, provided that the Board of Commissioners determines that such uses: (1) satisfy a need which cannot be accommodated at other upland locations or in urban or urbanizable areas; (2) are compatible with the objectives of Statewide Planning Goal #17 to protect riparian vegetation and wildlife habitat; and (3) the "other" use complies with the implementation standard of the underlying zone designation.

In addition, the above uses shall only be permitted upon a finding that such uses do not otherwise conflict with the resource preservation and protection policies established elsewhere in this plan.

This strategy recognizes: (1) that Coos County's rural shorelands are a valuable resource and accordingly merit special consideration; and (2) that Statewide Planning Goal #17 places strict limitations on land divisions within coastal shorelands.
Planning staff confirms that the proposed Blue Ridge Route alternate alignment does not cross through any coastal shorelands areas. Therefore, this strategy does not apply.

Consideration 5c:
Permits subdivision, major and minor partitions only upon findings.

Strategy No. 8:
Coos County shall permit subdivisions and partitions within the "Coastal Shorelands Boundary" of the ocean, coastal lakes or minor estuaries in rural areas only upon finding by the governing body: (1) that such land divisions will not conflict with agriculture and forest policies and ordinance provisions of the Coos County Comprehensive Plan and would be compatible with the objectives of Statewide Planning Goal #17 to protect riparian vegetation and wildlife and either; (2) that the new land divisions fulfill a need that cannot otherwise be accommodated in other uplands or in urban and urbanizable areas; or, (3) that the new land divisions are in a documented area, "committed" area; or, (4) that the new land divisions have been justified through a goal exception.

This strategy shall be implemented through provisions in ordinance measures that require the above findings to be made prior to the approval of the preliminary plat of a subdivision or partition.

This strategy recognizes that Coos County's rural shorelands are a valuable resource and accordingly merit special consideration under Statewide Planning Goal #17.

The proposed Blue Ridge Route alternate alignment will not require or result in a subdivision or partition within the Coastal Shorelands Boundary. Therefore, this strategy is not applicable.

Consideration 5d:
Maintain, restore or enhance riparian vegetation as consistent with water dependent uses. Requires Administrative Conditional Use.

Strategy No. 11:
Coos County shall maintain riparian vegetation within the shorelands of the ocean, coastal lakes, and minor estuaries, and when appropriate, restore or enhance it, as consistent with water-dependent uses.

Timber harvest, if permitted in the zoning ordinance, shall be regulated by the Oregon Forest Practices Act.

Where the County's Comprehensive Plan identifies riparian vegetation on lands in the coastal shorelands subject to forest operations governed by the FPA, the Act and Forest Practices Rules administered by the Department of Forestry will be used in such a manner as to maintain, and where appropriate, restore and enhance riparian vegetation.

This strategy shall be implemented by County review of and comment on state permit applications for waterfront development.
This strategy is based on the recognition that prohibiting excessive removal of vegetative cover is necessary to stabilize the shoreline and, for coastal lakes and minor estuaries, to maintain water quality and temperature necessary for the maintenance of fish habitat.

As stated above, Planning staff confirms that the proposed Blue Ridge Route alternate alignment does not cross through any coastal shorelands areas. Therefore, this strategy does not apply.

Significant Wildlife Habitat

Consideration 6a:
Conserve riparian vegetation adjacent to salmonid spawning and rearing areas: density restriction in Big Game Range.

Strategy No. 1:
Coos County shall consider as "5c" Goal #5 resources (pursuant to OAR 660-16-000) the following:

- "Sensitive Big-game Range"
- Bird Habitat Sites (listed in the following table)
- Salmonid Spawning and Rearing Areas

Uses and activities deemed compatible with the objective of providing adequate protection for these resources are all uses and activities allowed, or conditionally allowed by the Zoning and Land Development Ordinance, except that special care must be taken when developing property adjacent to salmonid spawning and rearing areas so as to avoid to the greatest practical extent the unnecessary destruction of riparian vegetation that may exist along streambanks. The Oregon Forest Practices Act is deemed adequate protection against adverse impacts from timber management practices.

This policy shall be implemented by:

a. County reliance on the Oregon Forest Practices Act to ensure adequate protection of "significant fish and wildlife habitat" against possible adverse impacts from timber management practices; and
b. The Zoning and Land Development Ordinance shall provide for an adequate riparian vegetation protection setback, recognizing that "virtually all acknowledged counties have adopted a 50 foot or greater standard" (DLCD report on Coos County, November 28, 1984); and
c. Use of the "Special Considerations Map" to identify (by reference to the detail inventory map) salmonid spawning and rearing areas subject to special riparian vegetation protection; and
d. Stipulating on County Zoning Clearance Letters that removal of riparian vegetation in salmonid spawning and rearing areas shall be permitted only pursuant to the provisions of this policy.
e. Coos County shall adopt an appropriate structural setback along wetlands, streams, lakes and rivers as identified on the Coastal Shoreland and Fish and Wildlife Habitat inventory maps.
The Oregon Department of Fish and Wildlife and the Department of Forestry are working in conjunction with the requirements of this Plan and, are deemed adequate protection against adverse impacts from timber management practices.

Because the PCGP Project is a public utility, Pacific Connector may remove riparian vegetation within 50 feet of a wetland, stream, lake or river in order to site and properly maintain the pipeline. See CCZLDO Section 4.5.180(e). However, Pacific Connector will obtain comments from Oregon Department of Fish & Wildlife (ODFW) for any portion of the proposed alternate alignment which will require removal of riparian vegetation within 50 feet of an estuarine wetland, stream, lake or river proximate to inventoried salmonid spawning and rearing areas subject to special riparian vegetation protection. Regarding Big Game Ranges, Pacific Connector obtained GIS data for Big Game Winter Range areas from ODFW and was informed by ODFW that timing restrictions were imposed in Jackson and Klamath Counties, not in Coos and Douglas Counties. Accordingly, the proposed Blue Ridge Route alternate alignment will not negatively impact salmonid spawning and rearing areas or sensitive Big Game Ranges. The proposed Blue Ridge Route alternate alignment does not include a structure or housing component. Therefore, density restrictions associated with Big Game Ranges are not applicable. This strategy is satisfied.

**Consideration 6b:**
Protect wet meadows for agricultural use.

**Strategy No. 4:**
Coos County shall protect for agricultural purposes those land areas currently in agricultural use but defined as "wet meadow" wetland areas by the U.S. Fish and Wildlife Service, and also cranberry bogs, associated sumps and other artificial water bodies.

Implementation shall occur through the placement of the plan designation "Agriculture" on such areas.

This strategy recognizes:

a. That agriculture is an important sector of the local economy;
b. That some of the more productive lands in Coos County's limited supply of suitable agricultural lands are such seasonally flooded areas;
c. That designation of these areas for agricultural use is necessary to ensure the continuation of the existing commercial agricultural enterprise; and
d. That the present system of agricultural use in these areas represents a long-standing successful resolution of assumed conflicts between agricultural use and habitat preservation use, because the land is used agriculturally during months when the land is dry and therefore not suitable as wetland habitat, and provides habitat area for migratory wildfowl during the months when the land is flooded and therefore not suitable for most agricultural uses.

According to the Coos County map entitled "Wet Meadows", the proposed Blue Ridge Route alternate alignment does not cross areas identified as Wet Meadow Wetlands in the Balance of County. This strategy does not apply.
Consideration 6c:
Manage riparian vegetation and non-agricultural wetland areas so as to preserve their significant habitat value, and protect their hydrologic and water quality benefits.

Strategy No. 2:
Coos County shall manage its riparian vegetation and identified non-agricultural wetland areas so as to preserve their significant habitat value, as well as to protect their hydrologic and water quality benefits. Where such wetlands are identified as suitable for conversion to agricultural use, the economic, social, environmental and energy consequences shall be determined, and programs developed to retain wildlife values, as compatible with agricultural use. This strategy is subordinate to Strategy #4, below.

This strategy does not apply to forest management actions, which are regulated by the Forest Practices Act.

This strategy recognizes that protection of riparian vegetation and other wetland areas is essential to preserve the following qualities deriving from these areas:

- natural flood control flow stabilization of streams and rivers
- environmental diversity habitat for fish and wildlife, including fish and wildlife of economic concern
- reduction of sedimentation
- recreational opportunities
- improved water quality
- recharge of aquifers

As stated above, because the proposed Blue Ridge Route alternate alignment is part of a public utility project, Pacific Connector may remove riparian vegetation within 50 feet of an estuarine wetland, stream, lake or river in order to site and properly maintain the pipeline. See CCZLDO Section 4.5.180(e).

To the extent that Pacific Connector is unable to avoid or minimize impacts to wetlands for the proposed alternate alignment, Pacific Connector would implement numerous measures to mitigate for wetland impacts and speed the restoration of affected areas. [Note: need to replace bracketed language with new evidentiary submittal: See Resource Report 2, Appendices 2C and 2G, attached as Exhibit A, for a detailed description of water body crossing methods.]

In addition, for the proposed Blue Ridge Route alternate alignment, Pacific Connector would comply with conditions in the Section 404 Permit obtained from the Army Corps of Engineers ("COE"), in the Removal/Fill permit from ODSL, and in the Section 401 Certification obtained from the Oregon Department of Environmental Quality ("ODEQ"). As part of the permitting process, the agencies would evaluate whether wetlands have been avoided to the maximum extent practicable, and whether the effects have been minimized or rectified to the extent practicable. The agencies also would specify additional requirements as necessary to comply with regulations. Pacific Connector would comply with additional procedures as specified in the permits. This strategy is satisfied.
Consideration 6d:
Restrict conflicting uses on “5c” bird sites except as permitted with ESEE balancing. 300 ft. setback from Bald Eagle nests.

Strategy No. 1A:
Coos County shall consider as Goal #5 "5c" resources the following bird habitat areas:
Location Township Range Section Area

Bald Eagle Nests
23S 13W 23 (Tenmile)
23S 11W 05 (Big Creek)
23S 12W 21 (Willow Point)
24S 12W 04 (Palouse)
24S 13W 36 (Mettman)
25S 11W 29 (Bessy Cr.)
25S 11W 33 (Dellwood)
25S 11W 22 (Rachel Cr.)
25S 11W 32 (Morgan Ridge)
26S 14W 14 (So. Slough)
27S 13W 09
28S 10W 09 (Brewster Gorge)
31S 12W 16 (Baker Creek)
29S 14W 31 (Twomile Creek)
28S 14W 11 (Randolph)
Great Blue Heron Colonies
24S 13W 27 SW¼
25S 14W 24 SE¼
23S 13W 26 (Saunders Lake)
24S 13W 23 (North Bay)
25S 11W 15 (Weyerhaeuser)
25S 12W 31 NW¼ (Catching Slough)
25S 14W 24 (North Spit)
26S 14W 11 (So. Slough)
25S 13W 24
26S 14W 14NE¼, SE¼
27S 14W 35 SE½, NW¼ (Sevenmile)
26S 14W 14 NW¼
30S 15W 15 (Muddy Lake)
23S 12W 28 (Templeton Arm)
Band-Tailed Pigeon Mineral Springs
24S 13W 24&25 (Haynes)
25S 13W 24 (Cooston)
26S 13W 01
28S 14W 10 (Prosper)
29S 11W 26
29S 11W 35 (Blueslide)
29S 11W 36 (Rock Quarry)

Special consideration and care must be taken when developing property adjacent to "5c" bird sites so as to avoid, to the greatest practical extent, the unnecessary destruction of, or impact upon, said bird sites. The Oregon Forest Practices Act (FPA) is deemed adequate protection against adverse impacts from timber management practices.

This policy shall be implemented by:

a. County reliance upon the Oregon Department of Forestry and Oregon Department of fish and Wildlife insuring adequate protection of "5c" bird sites from possible adverse impacts of timber management practices thru the Forest Practices Act; and
b. Use of the "Special Considerations Map" and detailed inventories in the Plan to identify "5c" bird sites subject to special protection; and
c. For "5c" bird site protection, stipulating in the Zoning and Land Development Ordinance that conflicting uses shall be reviewed by the Oregon Department of Fish and Wildlife to determine that any proposed use is not expected to produce significant and unacceptable environmental impacts on any of the "5c" bird sites; and
d. Stipulating on County Zoning Clearance Letters that establishment of conflicting uses adjacent to "5c" bird sites shall be permitted only pursuant to the provisions of this policy.

Coos County shall require a location map for any development activity (except grazing) within its regulatory scope that is determined to be within a "5c" bird habitat. The location map shall be referred to the Oregon Department of Fish and Wildlife requesting an opinion within 10 days as to whether the development is likely to produce significant and unacceptable impacts upon the "5c" resource, and what safeguards it would recommend to protect the resource. ODFW's determination shall be reviewed by the Coos County Planning Director, who shall consider the ODFW findings and approve, approve with conditions, or deny an Administrative Conditional Use for the matter (ACU) based upon sound principles of conservation and appropriate balancing of the ESEE consequences so if conflicting uses are allowed the resource site is protected to some extent. The ACU will be processed pursuant to the Zoning and Land Development Ordinance.

Planning staff has confirmed that the proposed Blue Ridge Route alternate alignment is not located within "5c" bird sites. For avian species, Pacific Connector obtained biological data from the Oregon Biodiversity Information Center for the route in 2012. As Pacific Connector completes additional biological surveys, that information will be included in the biological survey report and analyzed by FERC as part of the proposed Project. Coos County shall also refer Pacific Connector's location maps for the proposed Blue Ridge Route alternate alignment to ODFW, and shall consider ODFW's determination of potential impacts, as required by this policy. This strategy is satisfied.

Natural Hazards

Consideration 7a:
Comply with floodplain overlay zone set forth in this Ordinance.
Strategy No. 1:
Coos County shall regulate development in known areas potentially subject to natural disasters and hazards, so as to minimize possible risks to life and property. Coos County considers natural disasters and hazards to include stream and ocean flooding, wind hazards, wind erosion and deposition, *critical streambank erosion, mass movement (earthflow and slump topography), earthquakes and weak foundation soils.

This strategy shall be implemented by enacting special protective measures through zoning and other implementing devices, designed to minimize risks to life and property.

This strategy recognizes that it is Coos County's responsibility: (1) to inform its citizens of potential risks associated with development in known hazard areas; and (2) to provide appropriate safeguards to minimize such potential risks.

*These hazards are addressed under policies for "Dunes and Ocean and Lake Shorelands."

This strategy has been satisfied by the County's adoption of the floodplain regulations in CCZLDO Section 4.6.205 Designation of Flood Areas. No portion of the proposed Blue Ridge Route alternate alignment will cross through the Coos County Floodplain Overlay zone in the Balance of County, only in the 20-RS zone discussed below.

Consideration 7b:
Support structural protection measures for bankline stabilization projects requiring state and federal permits when the applicant establishes that non-structure measures either are not feasible or inadequate to provide the necessary degree of protection.

Strategy No. 5:
Coos County shall promote protection of valued property from risks associated with critical streambank and ocean front erosion through necessary erosion-control stabilization measures, preferring nonstructural solutions where practical.

Coos County shall implement this strategy by making "Consistency Statements" required for State and Federal permits (necessary for structural streambank protection measures) that support structural protection measures when the applicant establishes that nonstructure measures either are not feasible or inadequate to provide the necessary degree of protection.

This strategy recognizes the risks and loss of property from unabated critical streambank erosion, and also, that state and federal agencies regulate structural solutions.

The proposed Blue Ridge Route alternate alignment is not part of a bankline stabilization project. Therefore, this strategy is not applicable.
Consideration 7c:
Issue zoning clearance letters in known areas potentially subjected to mass movement, including earth flow, slump topography, rockfall and debris flow pursuant to the provisions of natural hazards Strategy #6 in the Comp Plan.

Strategy No. 6:
Coos County shall permit the construction of new dwellings in known areas potentially subject to mass movement (earth flow/slump topography/rock fall/debris flow) only:

a. if dwellings are otherwise allowed by this comprehensive plan; and
b. after the property owner or developer files with the Planning Department a report certified by a qualified geologist or civil engineer stipulating:
   i. his/her professional qualifications to perform foundation engineering and soils analysis; and
   ii. that a dwelling can or cannot be safely constructed at the proposed site, and whether any special structural or siting measures should be imposed to safeguard the proposed building from unreasonable risk of damage to life or property.

This strategy recognizes the county is responsible for identifying potential hazard areas, informing its citizens of risks associated with development in known hazard areas, and establishing a process involving expert opinion so as to provide appropriate safeguards against loss of life or property.

Implementation shall occur through an administrative conditional use process, which shall include submission of a site investigation report by the developer that addresses the considerations above.

The proposed Blue Ridge Route alternate alignment does not include proposed dwellings. Therefore, Strategy No. 6 is not applicable.

Airport Surfaces Overlay Zone

Consideration 8a:
Comply with Airport Surfaces Overlay Zone set forth in this Ordinance.

Strategy No. 11:
Coos County shall cooperate with the Oregon State Aeronautics Division and the Federal Aviation Administration by developing an Airport Surfaces Overlay Zoning District to prevent the creation or establishment of hazards to air navigation. The Overlay Zoning district shall apply to the Bandon, Lakeside and Powers State Airports and shall encompass the primary surface, approach surface, transitional surfaces, horizontal surface and conical surface as identified in Volume VI, Airport Compatibility Guidelines as formulated by the Oregon Department of Transportation - Aeronautics Division, dated 1981.
This strategy has been satisfied by the County's adoption of the airport surfaces regulations established by CCZLDO Section 4.6.300 and Section 4.6.305. Compliance with the airport surfaces regulations is discussed immediately below.

**CCZLDO Section 4.6.300  Purpose.**

The purpose of the Airport Surface Floating zone is to protect public health, safety and welfare. It is recognized that obstructions to aviation have potential for endangering the lives and property of users of selected airports, and property of occupancy of land in the airport's vicinity; an obstruction may affect future instrument approach minimums; and obstructions may reduce the area available for the landing, take-off and maneuvering of aircraft, thus tending to destroy or impair the utility of the airport and the public investment therein.

**CCZLDO Section 4.6.305  Designation of Airport Surfaces**

Those lands lying beneath the approach surfaces, transition surfaces, horizontal surfaces and conical surfaces as they apply to the "Bandon, Lakeside and Power Airports Approach and Clear Zone Inventory Map" shall be subject to the requirements of this floating zone.

The proposed Blue Ridge Route alternate alignment is not located under any of the County's Airport Surfaces Overlay Zoning Districts. Therefore, the airport surfaces regulations are not applicable.

**B. Coos Bay Estuary Management Plan (CBEMP)**

The proposed Blue Ridge Route alternate alignment will cross only one CBEMP zoning district: 20-RS.

The stated purpose of the CBEMP article in the CCZLDO is to provide requirements for individual zoning districts that are consistent with the CBEMP. The consistency of the Blue Ridge alternate with the applicable management unit purpose statements and applicable conditions is discussed below.

**Table 4.5  Development Standards**

The CBEMP purpose statement further explains that the land development standards of Table 4.5 govern all development within the Coos Bay Estuary Shorelands Districts. The proposed Blue Ridge alternate alignment will not alter the lot configurations and do not constitute a structure subject to height restrictions or building setbacks. Consequently, the standards included in Table 4.5 are not applicable to the PCGP itself nor its necessary components or associated facilities, or to the proposed alternate alignment.

**CCZLDO Section 4.5.150  How to Use This Article**

This Article contains specific language that implements the Coos Bay Estuary Plan. The main purpose is to clearly stipulate where, and under what circumstances, development may occur.
Follow the steps below to determine whether or not a proposed use or activity is, or may be, allowed at any specific site within the Coos Bay Estuary Shoreland Boundary.

1. **Locate the subject site on the General Index Map.**

2. **Note the General Location Index Map (i.e. Lower Bay, Upper Bay, etc.) which is referenced on the General Index Map and advance to the General Location Index Map.**

3. **Locate the subject site on the General Location Index Map. Note the numbers and abbreviated district designations (i.e. "UD", "UW", "CS", etc.) for applicable zoning districts. (Note: management segments in the Plan are the same as zoning districts.)**

4. **Turn to the pages in the Ordinance which contain specific zoning district provisions which correspond to the map designations for the subject site.**

5. **For each applicable Shoreland or Aquatic District:**
   a) **Review the districts Management Objective. This narrative provides general policy guidance regarding uses and activities that are, or may be, allowed in the district.**
   
   b) **Review the district's Uses, Activities, and Special Conditions Table to determine whether or not a proposed use or activity is allowable outright, allowable with conditions, or conditionally allowable subject to an Administrative or Hearings Body Conditional Use.**

   Symbols denote whether or not the specific use or activity listed in the tables is permitted outright, may be allowed subject to an Administrative Conditional Use, may be allowed subject to a Hearings Body conditional use, or prohibited in the specific district. The following symbols are pertinent:

   - **P** – means the use or activity is permitted outright subject only to the management objective.
   - **S** – indicates that the use or activity may be allowed subject to "Special Conditions" presented following the use and activity table. A few of the special conditions are non-discretionary, but most require local judgment and discretion and the development of findings to support any final decision about whether or not to allow the use or activity.

   Some uses and activities may be identified as being subject to a special condition that is not discretionary or may not apply to a site-specific request. If such is the situation, the Planning Director shall make such determination and if "General Conditions" are not applicable regard the use or activity as permitted outright. Such determination shall consist of a statement of facts supporting the decision.
G – indicates the use or activity may be allowed subject to "General Conditions" presented following the use and activities table. "General Conditions" provide a convenient cross-reference to applicable Baywide Policies which may further limit or condition the uses and activities.

A few "General Conditions" may not apply to a site specific request. If such is the situation, the Planning Director shall make such determination and if "Special Conditions" are not applicable, regard the use or activity as permitted outright. Such determination shall consist of a statement of facts supporting the decision.

ACU – means the use or activity may be permitted as provided above or subject to "Special" or "General" conditions pursuant to an Administrative Conditional Use.

HB – means the use or activity may be permitted except as provided above or subject to "Special" or "General" conditions pursuant to a Hearings Body Conditional Use.

N – means the use or activity is prohibited.

N/A – means Not Applicable; the use or activity is not realistic considering the physical character of the district and therefore does not apply.

c) Review the designations which accompany each use and activity listed in the Table to determine what is allowed, what is not allowed and what conditions may apply. (The Table may list a use as conditionally allowable but a condition may negate the Table's designation).

By following the steps outlined above in CCZLD0 Section 4.5.150, the Applicant determined the use is allowed in the zone, subject only to General Conditions. The application satisfies all related conditions and CBEMP policies for the Blue Ridge Route alternate alignment, as described below.

CCZLD0 Section 4.5.175 Site-Specific Zoning Districts

The Coos County Development Ordinance divides the lands affected by the CBEMP into specific zoning districts. Each zoning district contains a "use and activities" table and "management objectives." Pursuant to CCZLD0 Section 4.5.175, the use and activity tables for each district are subordinate to the management objectives, and, therefore, the uses and activities must be consistent with the applicable management objective. As stated above, the proposed Blue Ridge alternate alignment will only traverse CBEMP zoning district 20-RS. As demonstrated below, the proposed alternate alignment is consistent with the management objective, the allowed use and activities, and the applicable general and specific conditions of the 20-RS zoning district.
1. **Zoning District 20-RS**

The proposed Blue Ridge Route alternate alignment crosses the 20-RS zoning district on the south bank of the Coos River. See Sheet 1.

**CCZLDO Section 4.5.545 Management Objective:** This district shall be managed for rural uses along with recreational access. Enhancement of riparian vegetation for water quality, bankline stabilization, and wildlife habitat shall be encouraged, particularly for purposes of salmonid protection. This district contains two designated mitigation sites, U-17(a) and (b), "medium" priority, which shall be protected as required by Policy #22.

Planning staff has confirmed that the proposed PCGP alternate alignment will not impact mitigation sites U-17(a) and (b). Pacific Connector will use the HDD method to install the pipeline below the Coos River. Using this crossing method, the Blue Ridge Route alternate alignment will be installed beneath the bottom of the Coos River and will not impact log transport and will not impact fish habitat. Upon successful HDD completion, impacts to aquatic species, sensitive resources and water quality can be avoided. [Note: need to replace bracketed language with new evidentiary submittal: Additional details regarding the HDD process are included in Resource Report 2, Appendix 2G, copies of which are attached as Exhibit A. Appendix 2G is the GeoEngineers January 15, 2013 HDD Feasibility Analyses which discusses the HDD process in detail.] In order to ensure that a competent contractor with adequate expertise with attention to detail will successfully conduct the HDD operation is selected, the Applicant recommends the following condition of approval:

*To minimize impacts to wetlands or waterbodies at the horizontal directional drill (HDD) bore under the Coos River, the applicant must comply with a plan for the HDD crossing of the Coos River approved by FERC under FERC’s Wetland and Waterbody Construction and Mitigation Procedures referenced at 18 C.F.R. 380.12(d)(2). The FERC Wetland and Waterbody Construction and Mitigation Procedures shall be the May 2013 version (notice of which was provided at 78 Federal Register 34374, June 7, 2013). The applicant shall submit a copy of the FERC-approved plan for the HDD crossing to the County Planning Department prior to beginning construction of the Coos River crossing.*

Construction will use appropriate measures to minimize impacts. All impacts will be mitigated as demonstrated in the Original Decisions. The Board previously found that the HDD construction method and mitigation met this management objective. Final Decision and Order, No. 10-08-045PL, pp. 70-72. See supplemental evidentiary letter of May 2, 2014 from Randy Miller, PCGP Project Environmental Lead, providing evidence regarding the proposed HDD construction methods, with reference to a prior letter report from GEOEngineers, dated January 15, 2013, and a related document dated June, 2013 titled “Drilling Fluid Contingency Plan for

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5 This condition of approval was proposed after consultation between the Applicant, the Coos County Planning Director, and County Counsel in response to the Hearings Officer’s recommendation in County File No. HBCU-13-04. For reasons detailed in the Coos County Supplemental Report dated December 12, 2013, the County reasoned that this condition would best ensure a successful HDD bore, meanwhile limiting potential liability. Furthermore, this condition was approved by the Board of County Commissioners in Pacific Connector II at a public hearing on January 9, 2014.
Horizontal Directional Drilling Operations", copies of which are attached to Randy Miller's evidentiary letter.

**CCZLDO Section 4.5.546 Uses, Activities and Special Conditions**

The proposed Blue Ridge Route alternate alignment is permitted, subject to general conditions, as a low intensity utility in the 20-RS district. The 20-RS General Conditions state that permitted uses and activities shall be consistent with Policy #23 and that inventoried resources requiring mandatory protection in the district are subject to Policies #17 and #18. Additionally, permitted uses occurring within "agricultural lands" or "forest lands" as identified in the "Special Considerations Map" are limited to those permitted in Policies #28 and #34. The proposed Blue Ridge Route alternate alignment crosses agricultural lands within 20-RS. The agricultural uses under ORS Chapter 215 and their applicability to the PCGP are described above in Section IIA under "Exclusive Farm Use." The proposed Blue Ridge Route alternate alignment does not cross any lands identified on the Special Considerations Map in Forest lands. Uses are permitted as stated in Policy #14 and must be consistent with Policy #27. On designated mitigation/restoration sites, uses/activities may be permitted subject to Policy #22. However, the proposed Blue Ridge Route alternate alignment will not impact any of the designated mitigation/restoration sites within the 20-RS district. Finally, in rural areas, utilities, public facilities, and services will only be provided subject to Policies #49, #50, and #51. As addressed under the CBEMP Policy section below, the proposed Blue Ridge Route alternate alignment in zoning district 20-RS is consistent with each of the identified policies.

**Appendix 3 – CBEMP Policies**

As detailed above, the proposed Blue Ridge Route alternate alignment crosses through the 20-RS zoning district, as also discussed above, this crossing triggers CBEMP Policies #14, #17, #18, #22, #23, #28, #34, #49, #50, and #51.

**Policy #14 General Policy on Uses within Rural Coastal Shorelands**

1. **Coos County shall manage its rural areas within the "Coos Bay Coastal Shorelands Boundary" by allowing only the following uses in rural shoreland areas, as prescribed in the management units of this Plan, except for areas where mandatory protection is prescribed by LCDC Goal #17 and CBEMP Policies #17 and #18:**

   e. **Water-dependent commercial and industrial uses, water-related uses, and other uses only upon a finding by the Board of Commissioners or its designee that such uses satisfy a need which cannot be accommodated on uplands or shorelands in urban and urbanizable areas or in rural areas built upon or irrevocably committed to nonresource use.**

   g. **Any other uses, including non-farm uses and non-forest uses, provided that the Board of Commissioners or its designee determines that such uses satisfy a need which cannot be accommodated at other upland locations or in urban or urbanizable areas. In addition, the above uses shall only be permitted upon a finding that such uses do not otherwise conflict with the resource preservation and protection policies established elsewhere in this Plan.**
This strategy recognizes (1) that Coos County’s rural shorelands are a valuable resource and accordingly merit special consideration, and (2) that LCDC Goal #17 places strict limitations on land divisions within coastal shorelands. This strategy further recognizes that rural uses "a through "g" above, are allowed because of need and consistency findings documented in the "factual base" that supports this Plan.

Zoning district 20-RS requires compliance with Policy #14. In the Original Decisions, the Board determined that the PCGP is characterized as "other uses" under Policy #14g. Final Decision and Order, No. 10-08-045PL, pp. 124-26. The proposed Blue Ridge Route alternate alignment could not be accommodated at other upland locations or in urban or urbanizable areas due to the fact that the PCGP alignment has been previously approved by the County and the alternate alignments must connect to the pipeline in the locations approved by the County in its Original Decisions and in Pacific Connector II. Therefore, this policy is met.

Policy #17 Protection of "Major Marshes" and "Significant Wildlife Habitat" in Coastal Shorelands

Local governments shall protect from development, major marshes and significant wildlife habitat, coastal headlands, and exceptional aesthetic resources located within the Coos Bay Coastal Shorelands Boundary, except where exceptions allow otherwise.

I. Local government shall protect:

a. "Major marshes" to include areas identified in the Goal #17, "Linkage Matrix", and the Shoreland Values Inventory map; and

b. "Significant wildlife habitats" to include those areas identified on the "Shoreland Values Inventory" map; and

c. "Coastal headlands"; and

d. "Exceptional aesthetic resources" where the quality is primarily derived from or related to the association with coastal water areas.

As confirmed by Planning staff, the proposed Blue Ridge Route alternate alignment in zoning district 20-RS will not cross Wet Meadow Wetlands identified as significant wildlife habitats.

As discussed below, the Applicant will utilize appropriate construction methods to avoid, minimize or mitigate impacts during construction. Based on Coos County’s maps, and as confirmed by Planning staff, the proposed Blue Ridge Route alternate alignment does not cross identified major marshes, coastal headlands, or exceptional aesthetic resources.

II. This strategy shall be implemented through:

a. Plan designations, and use and activity matrices set forth elsewhere in this Plan that limit uses in these special areas to those that are consistent with protection of natural values; and

b. Through use of the Special Considerations Map, which identified such special areas and restricts uses and activities therein to uses that are consistent with the
protection of natural values. Such uses may include propagation and selective harvesting of forest products consistent with the Oregon Forest Practices Act, grazing, harvesting wild crops, and low-intensity water-dependent recreation.

c. Contacting Oregon Department of Fish and Wildlife for review and comment on the proposed development within the area of the 5b or 5c bird sites.

This strategy recognizes that special protective consideration must be given to key resources in coastal shorelands over and above the protection afforded such resources elsewhere in this Plan.

Policy #17 applies to inventoried resources requiring mandatory protection within the CBEMP 20-RS zoning district. As noted above, the proposed Blue Ridge Route alternate alignment will not cross areas of Wet Meadow Wetlands identified as significant wildlife habitats on the CBEMP Shorelands Values Map. Regardless, the proposed Blue Ridge Route alternate alignment will be constructed using methods to avoid, minimize and mitigate impacts during construction. Because the PCGP is a linear underground pipeline, any impacts are anticipated to be temporary and short-term, with the affected land fully restored after construction. Pacific Connector will utilize flume, dam and pump, and horizontal directional drilling ("HDD") construction methods to minimize impacts, and will utilize mitigation measures, such as erosion and sedimentation controls, minimizing compaction, minimizing topsoil mixing and potential spills, and facilitating revegetation. [Note: need to replace bracketed language with new evidentiary submittal: More details regarding impacts and these construction and mitigation methods are described in Resource Report 2, Section 2.2.8.2 and 2.3.3 and Appendix 2G.] Following construction, the subsurface Blue Ridge Route alternate alignment in the 20-RS zoning district will create no impacts. This policy and its implementive strategies are satisfied.

Policy #18 Protection of Historical, Cultural and Archaeological Sites.

Local government shall provide protection to historical, cultural and archaeological sites and shall continue to refrain from widespread dissemination of site-specific information about identified archaeological sites.

I. This strategy shall be implemented by requiring review of all development proposals involving a cultural, archaeological or historical site, to determine whether the project as proposed would protect the cultural, archaeological and historical values of the site.

II. The development proposal, when submitted shall include a Plot Plan Application, showing, at a minimum, all areas proposed for excavation, clearing and construction. Within three (3) working days of receipt of the development proposal, the local government shall notify the Coquille Indian Tribe and Coos, Siuslaw, Lower Umpqua Tribe(s) in writing, together with a copy of the Site Plan Application. The Tribe(s) shall have the right to submit a written statement to the local government within thirty (30) days of receipt of such notification, stating whether the project as proposed would protect the cultural, historical and archaeological values of the site, or if not, whether the project could be modified by appropriate measures to protect those values.
III. Upon receipt of the statement by the Tribe(s), or upon expiration of the Tribe(s) thirty day response period, the local government shall conduct an administrative review of the Site Plan Application and shall:

a. Approve the development proposal if no adverse impacts have been identified, as long as consistent with other portions of this plan, or

b. Approve the development proposal subject to appropriate measures agreed upon by the landowner and the Tribe(s), as well as any additional measures deemed necessary by the local government to protect the cultural, historical and archaeological values of the site. If the property owner and the Tribe(s) cannot agree on the appropriate measures, then the governing body shall hold a quasijudicial hearing to resolve the dispute. The hearing shall be a public hearing at which the governing body shall determine by preponderance of evidence whether the development project may be allowed to proceed, subject to any modifications deemed necessary by the governing body to protect the cultural, historical and archaeological values of the site.

CCZLDO Section 3.2.700 makes it clear that the time for compliance with applicable requirements regarding protection of archeological resources is at any time before a "zoning compliance letter" is requested, not at the time of conditional use permit approval. Pursuant to CCZLDO Section 3.2.700, this is accomplished through the submittal of a "plot plan showing exact location of excavation, clearing, and development." Therefore, the time for application for Policy #18 and CCZLDO Section 3.2.700 is prior to obtaining a zoning compliance (verification) letter under CCZLDO Section 3.1.200. Final Decision and Order, No. 10-08-045PL, p. 130.

Given the above, Pacific Connector recommends the following condition of approval, which is the same condition as Condition No. 24 imposed on the PCGP alignment in the Original Decisions:

At least 90 days prior to issuance of a zoning compliance (verification) letter under CCZLDO Section 3.1.200, the County Planning Department shall make initial contact with the affected Tribe(s) regarding the determination of whether any archeological sites exist within the CBEMP areas proposed for development, consistent with the provisions of CCZLDO Section 3.2.700. Once the Tribe(s) have commented or failed to timely comment under the provisions of CCZLDO Section 3.2.700, the County shall take one of the following actions: (1) if no adverse impacts to cultural, historical or archaeological resources have been identified, the County may approve and issue the requested zoning compliance (verification) letter and related development proposal; (2) if the Tribe(s) and the applicant reach agreement regarding the measures needed to protect the identified resources, the development can be approved with any additional measures the County believes are necessary to protect those resources; or (3) if the County finds that there will be adverse impacts to identified CBEMP Policy #18 resources or to resources identified in Table 4.7a for the Balance of County and the applicant and the Tribe(s) have not reached agreement regarding protection of such resources, then the County Board of Commissioners shall hold a quasi-

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6 Coos County has previously held in the Original Decisions that a "zoning compliance letter" under CCZLDO Section 3.2.700 is equivalent to a "zoning verification letter" under CCZLDO Section 3.1.200.
judicial hearing to resolve the dispute. The hearing shall be a public hearing at which the governing body shall determine by preponderance of evidence whether the development project may be allowed to proceed, subject to any modification deemed necessary by the governing body to protect the cultural, historical and archeological values of the site. For purposes of this condition, the public hearing shall be subject to the provisions of Section 5.8.200 of the CCZLDO with the Board of Commissioners serving as the Hearings Body.

Implementation of this proposed condition would ensure compliance with Policy #18.

*Policy #22  Mitigation Sites: Protection Against Preemptory Uses Consistent with permitted uses and activities:*

I. This policy shall be implemented by:

a. Designating "high" and "medium" priority mitigation sites on the Special Considerations Map; and

According to Coos County’s maps, and as confirmed by Planning staff, the proposed Blue Ridge Route alternate alignment would not cross any designated mitigation site.

b. Implementing an administrative review process that allows uses otherwise permitted by this Plan but proposed within an area designated as a "high" or "medium" priority mitigation site only upon satisfying the following criteria:

The proposed Blue Ridge Route alternate alignment would not cross any approved mitigation sites in zoning district 20-RS.

1. The proposed use must not entail substantial structural or capital improvements (such as roads, permanent buildings or nontemporary water and sewer connections); and

This criterion does not apply.

2. The proposed use must not require any major alteration of the site that would affect drainage or reduce the usable volume of the site (such as extensive site grading/excavation or elevation from fill); and

This criterion does not apply.

3. The proposed use must not require site changes that would prevent the expeditious conversion of the site to estuarine habitat; or

This criterion does not apply.

*Policy #23  Riparian Vegetation and Streambank Protection*

I. Local government shall strive to maintain riparian vegetation within the shorelands of the estuary, and when appropriate, restore or enhance it, as consistent with water-
dependent uses. Local government shall also encourage use of tax incentives to encourage maintenance of riparian vegetation, pursuant to ORS 308.792 - 308.803.

Appropriate provisions for riparian vegetation are set forth in the CCZLDO Section 4.5.180 (OR 92-05-009PL).

Zoning district 20-RS through which the proposed Blue Ridge Route alternate alignment crosses requires compliance with Policy #23.

First, in its Original Decisions, the Board has found that Policy #23 does not create a mandatory approval standard, but rather, is aspirational, hortatory, and non-mandatory in nature. Final Decision and Order, No. 10-08-045PL, p. 134. However, as indicated under subsection I, this policy is implemented through the requirements of CCZLDO Section 4.5.180, Riparian Protection Standards in the Coos Bay Estuary Management Plan. Section 4.5.180 generally requires that riparian vegetation within 50 feet of an estuarine wetland, stream, lake or river, as identified on the Coastal Shorelands Fish and Wildlife habitat inventory maps, shall be maintained. However, the standard provides the following exception, "[r]iparian vegetation may be removed in order to site or properly maintain public utilities and road right-of-ways, provided that the vegetation to be removed is the minimum necessary to accomplish the purpose." The proposed Blue Ridge Route alternate alignment qualifies as a public utility, and is therefore exempt from the 50-foot riparian vegetation maintenance requirements of CCZLDO Section 4.5.180 provided the vegetation removal is the minimum necessary for the proposed Blue Ridge Route alternate alignment installation. However, Pacific Connector has designed the project to minimize impacts to riparian vegetation as much as possible.

II. Local government shall encourage streambank stabilization for the purpose of controlling streambank erosion along the estuary, subject to other policies concerning structural and non-structural stabilization measures.

This strategy shall be implemented by Oregon Department of Transportation (ODOT) and local government where erosion threatens roads. Otherwise, individual landowners in cooperation with the Oregon International Port of Coos Bay, and Coos Soil and Water Conservation District, Watershed Councils, Division of State Lands and Oregon Department of Fish & Wildlife shall be responsible for bank protection.

This strategy recognizes that the banks of the estuary, particularly the Coos and Millicoma Rivers are susceptible to erosion and have threatened valuable farm land, roads and other structures.

While Pacific Connector will restore areas disturbed during construction to their pre-construction condition, the proposed Blue Ridge Route alternate alignment does not include independent streambank stabilization projects. Therefore, the provisions of subsection II are not applicable.
Policy #27  Floodplain Protection within Coastal Shorelands.

The respective flood regulations of local government set forth requirements for uses and activities in identified flood areas; these shall be recognized as implementing ordinances of this Plan.

This strategy recognizes the potential for property damage that could result from flooding of the estuary.

Zoning district 20-RS, through which the Blue Ridge Route alternate alignment crosses, requires compliance with Policy #27.

Policy #27 is satisfied through compliance with the implementing floodplain ordinance in the CCZLDO Article 4.6, the Floodplain Overlay zone. The Floodplain Overlay section provided below, describes how the proposed PCGP alternate alignment satisfies the applicable floodplain standards within CBEMP district 20-RS.

Floodplain Overlay Zone

Only a small segment of the proposed Blue Ridge Route alternate alignment will cross through the Coos County Floodplain Overlay zone in CBEMP district 20-RS. As described below, the proposed Blue Ridge Route alternate alignment satisfies each of the applicable floodplain approval criteria.

CCZLDO SECTION 4.6.205. Designation of Flood Areas

a. The area of Coos County that is within a special flood hazard area identified by the Federal Insurance Administration in a scientific and engineering report entitled "The Flood Insurance Study for Coos County, Oregon and Incorporated Areas", dated September 25, 2009, with accompanying Flood Insurance Map (FIRM) is hereby adopted by reference and declared to be part of this ordinance. The Flood Insurance Study and the FIRM are on file at the Coos County Planning Department.

The County has indicated that the Flood Insurance Rate Map (FIRM) is consistent with the Federal Emergency Management Agency’s (FEMA) flood hazard map for Coos County. As addressed below, the proposed Blue Ridge Route alternate alignment is consistent with the applicable floodplain approval criteria for all areas identified on the FEMA flood hazard map/FIRM as a designated flood area. The FEMA maps identify the 100-year floodplain, which is typically a larger area than the floodplain and floodway areas defined in the Floodplain Overlay standards.

7 "Floodplain" is defined by the Coos County Zoning and Land Development Ordinance (CCZLDO) as "the area adjoining a stream, tidal estuary or coast that is subject to periodic inundation from flooding."

8 "Floodway" is defined by the CCZLDO as "the normal stream channel and that adjoining area of the natural floodplain needed to convey the waters of a regional flood while causing less than one foot increase in upstream flood elevations." Pursuant to CCZLDO Sections 4.6.205 and 4.6.270 "floodways" are identified as special flood hazard areas in a Federal Insurance Administration report entitled "Flood Insurance Study for Coos County, Oregon and Incorporated Areas" and accompanying maps.

In a district in which the /FP zone is combined, those uses permitted by the underlying district are permitted outright in the /FP FLOATING ZONE, subject to the provisions of this article.


In a district with which the /FP is combined, those uses subject to the provisions of Article 5.2 (Conditional Uses) may be permitted in the /FP FLOATING ZONE, subject to the provisions of this article.

As detailed above, the proposed Blue Ridge Route alternate alignment is permitted either outright or conditionally in each of the base zones that it crosses. As described in this section of the narrative, it also satisfies each of the applicable Floodplain Overlay standards. Therefore, it is also a permitted use in the Floodplain Overlay zone.

CCZLDO SECTION 4.6.230. Procedural Requirements for Development within Special Flood Hazard Areas.

1. Structures. Prior to issuance of a zoning clearance letter (verification letter) pursuant to Section 3.1.200, a proposal for construction of a new structure or substantial improvement of an existing structure within a Special Flood Hazard Area shall be submitted with an "APPLICATION FOR DEVELOPMENT IN SPECIAL FLOOD HAZARD AREAS."

As determined in the Original Decisions and as mentioned above, the PCGP is not deemed to be a "structure" because it is principally below ground. Accordingly, the provisions of Section 4.6.230.1 do not apply to this application requesting approval of proposed Blue Ridge Route alternate alignment.

The following procedure and application requirements shall pertain to the following types of development:

4. Other Development. "Other development" includes mining, dredging, filling, grading, paving, excavation or drilling operations located within the area of a special flood hazard, but does not include such uses as normal agricultural operations, fill less than 12 cubic yards, fences, road and driveway maintenance, landscaping, gardening and similar uses which are excluded from definition because it is the County's determination that such uses are not of the type and magnitude to affect potential water surface elevations or increase the level of insurable damages.

Review and authorization of a floodplain application must be obtained from the Coos County Planning Department before "other development" may occur. Such authorization by the Planning Department shall not be issued unless it is established, based on a licensed engineer's certification that the "other development" shall not:
A natural gas pipeline is not expressly included in the specified list of "other development." However, because the PCGP construction process will involve the removal and replacement of soil and reconnecting activities that are similar to the listed development activities, the following demonstrates that the proposed Blue Ridge Route alternate alignment is consistent with the "other development" standards. Based upon the Applicant's conversations with Planning staff, Pacific Connector submits that the PCGP should be characterized as "other development" under Section 4.6.230.4, in that the underground pipeline use is not of the type or magnitude to affect potential water surface elevations or increase the level of insurable damages. Accordingly, this criterion is satisfied.

a. result in any increase in flood levels during the occurrence of the base flood discharge if the development will occur within a designated floodway; or,

b. result in a cumulative increase of more than one foot during the occurrence of the base flood discharge if the development will occur within a designated flood plain outside of a designated floodway.

The proposed Blue Ridge Route alternate alignment will be installed below existing grades and no permanent structures will be placed above existing grades within the FEMA 100-year floodplain. In addition, at the completion of the proposed Blue Ridge Route alternate alignment installation, all construction areas will be restored to their pre-construction grade and condition. Therefore, development of the pipeline will not result in any increase in flood levels or result in a cumulative increase of more than one foot. These standards are met. Flood plain compliance should now be approved for the Blue Ridge alternate.

**CCZLDO SECTION 4.6.235. Sites within Special Flood Hazard Area.**

1. If a proposed building site is in a special flood hazard area, all new construction and substantial improvements (including placement of prefabricated buildings and mobile homes), otherwise permitted by this Ordinance, shall:

All new construction associated with the proposed Blue Ridge Route alternate alignment satisfies the following special flood hazard area criteria.

a. be designed (or modified) and adequately anchored to prevent flotation, collapse, or lateral movement and shall be installed using methods and practices that minimize flood damage. Anchoring methods may include, but are not limited to, use of over-the-top or frame ties to ground anchors (Reference FEMA "Manufactured Home Installation in Flood Hazard Areas" guidebook for additional techniques);

Installation methods and mitigation measures will avoid and/or minimize flotation, collapse, or lateral movement hazards and flood damage. This criterion is satisfied.
b. be constructed with materials and utility equipment resistant to flood damage;

The entire proposed Blue Ridge Route alternate alignment will be constructed with corrosion-protected steel pipe. Where deemed necessary, the proposed Blue Ridge Route alternate alignment will be installed with a concrete coating to protect against abrasion and maintain negative buoyancy. This criterion is satisfied.

c. be constructed by methods and practices that minimize flood damage; and

The proposed Blue Ridge Route alternate alignment will be constructed by methods and practices that minimize flood damage. This criterion is satisfied.

d. electrical, heating, ventilation, plumbing, and air conditioning equipment and other service facilities shall be designed and/or otherwise elevated or located so as to prevent water from entering or accumulating within the components during conditions of flooding.

The proposed subsurface Blue Ridge Route alternate alignment does not include electrical, heating, ventilation, plumbing, or air conditioning components. Therefore, this criterion is not applicable.

Consideration 7b:
Support structural protection measures for bankline stabilization projects requiring state and federal permits when the applicant establishes that non-structure measures either are not feasible or inadequate to provide the necessary degree of protection.

Strategy No. 5:
Coos County shall promote protection of valued property from risks associated with critical streambank and ocean front erosion through necessary erosion-control stabilization measures, preferring nonstructural solutions where practical.

Coos County shall implement this strategy by making "Consistency Statements" required for State and Federal permits (necessary for structural streambank protection measures) that support structural protection measures when the applicant establishes that nonstructure measures either are not feasible or inadequate to provide the necessary degree of protection.

This strategy recognizes the risks and loss of property from unabated critical streambank erosion, and also, that state and federal agencies regulate structural solutions.

The proposed Blue Ridge Route alternate alignment is not part of a bankline stabilization project. Therefore, this strategy is not applicable.

Consideration 7c:
Issue zoning clearance letters in known areas potentially subjected to mass movement, including earth flow, slump topography, rockfall and debris flow pursuant to the provisions of natural hazards Strategy #6 in the Comp Plan.
Strategy No. 6:
Coos County shall permit the construction of new dwellings in known areas potentially subject to mass movement (earth flow/slump topography/rock fall/debris flow) only:

a. if dwellings are otherwise allowed by this comprehensive plan; and
b. after the property owner or developer files with the Planning Department a report certified by a qualified geologist or civil engineer stipulating:
   i. his/her professional qualifications to perform foundation engineering and soils analysis; and
   ii. that a dwelling can or cannot be safely constructed at the proposed site, and whether any special structural or siting measures should be imposed to safeguard the proposed building from unreasonable risk of damage to life or property.

This strategy recognizes the county is responsible for identifying potential hazard areas, informing its citizens of risks associated with development in known hazard areas, and establishing a process involving expert opinion so as to provide appropriate safeguards against loss of life or property.

Implementation shall occur through an administrative conditional use process, which shall include submission of a site investigation report by the developer that addresses the considerations above.

The proposed Blue Ridge Route alternate alignment does not include proposed dwellings. Therefore, Strategy No. 6 is not applicable.

Airport Surfaces Overlay Zone

Consideration 8a:
Comply with Airport Surfaces Overlay Zone set forth in this Ordinance.

Strategy No. 11:
Coos County shall cooperate with the Oregon State Aeronautics Division and the Federal Aviation Administration by developing an Airport Surfaces Overlay Zoning District to prevent the creation or establishment of hazards to air navigation. The Overlay Zoning district shall apply to the Bandon, Lakeside and Powers State Airports and shall encompass the primary surface, approach surface, transitional surfaces, horizontal surface and conical surface as identified in Volume VI, Airport Compatibility Guidelines as formulated by the Oregon Department of Transportation - Aeronautics Division, dated 1981.

This strategy has been satisfied by the County's adoption of the airport surfaces regulations established by CCZLDO Section 4.6.300 and Section 4.6.305. Compliance with the airport surfaces regulations is discussed immediately below.

CCZLDO Section 4.6.300 Purpose
The purpose of the Airport Surface Floating zone is to protect public health, safety and welfare. It is recognized that obstructions to aviation have potential for endangering the lives and property of users of selected airports, and property of occupancy of land in the airport’s vicinity; an obstruction may affect future instrument approach minimums; and obstructions may reduce the area available for the landing, take-off and maneuvering of aircraft, thus tending to destroy or impair the utility of the airport and the public investment therein.

CCZLDO Section 4.6.305 Designation of Airport Surfaces

Those lands lying beneath the approach surfaces, transition surfaces, horizontal surfaces and conical surfaces as they apply to the "Bandon, Lakeside and Power Airports Approach and Clear Zone Inventory Map" shall be subject to the requirements of this floating zone.

The proposed Blue Ridge Route alternate alignment is not located under any of the County's Airport Surfaces Overlay Zoning Districts. Therefore, the airport surfaces regulations are not applicable.

Policy #28 Recognition of LCDC Goal #3 (Agricultural Lands) Requirements for Rural Lands within the Coastal Shorelands Boundary

Unless otherwise allowed through an Exception, Coos County shall manage all rural lands designated within the Coastal Shorelands Boundary as being suitable for "Exclusive Farm Use" (EFU) designation consistent with the "Agricultural Use Requirements" of ORS 215. Allowed uses are listed in Appendix 1, of the Zoning and Land Development Ordinance.

This policy shall be implemented by using the Special Considerations Map (Policy #3) to identify EFU suitable areas, and to abide by the prescriptive use and activity requirements of ORS 215 in lieu of other management alternates otherwise allowed for properties within the "EFU-overlay" set forth on the Special Considerations Map, and except where otherwise allowed by exceptions for needed housing and industrial sites.

The "EFU" zoned land within the Coastal Shorelands Boundary shall be designated as "Other Aggregate Sites" inventories by this Plan pursuant to ORS 215.298(2). These sites shall be inventoried as "1B" resources in accordance with OAR 660-16-000(5)(b). Coos County will re-evaluate these inventoried sites pursuant to the requirements of said rule at, or before, County's periodic review of the Comprehensive Plan (OR 92-08-013PL 10/28/92).

Zoning district 20-RS, through which the Blue Ridge Route alternate alignment crosses, requires compliance with Policy #28.

As stated above, this policy is implemented by using the County's detailed inventory plan maps identifying EFU suitable areas. Certain property along the PCGP alignment is designated as "Agricultural Lands." As described in detail in the EFU section of the narrative above, the PCGP is allowed as a utility facility necessary for public service under the agricultural provisions
of ORS 215.283(1)(c) and ORS 215.275(6). Therefore, the Blue Ridge Route alternate alignment is consistent with the Policy #28 requirements for mapped Agricultural Lands.

In addition to referencing ORS Chapter 215, the Policy states that allowed uses are listed in Appendix 1 of the CCZLDO. However, Appendix 1 is entitled CCCP and does not apply within the CBEMP boundaries and does not provide a list of uses permitted within agricultural zones. Therefore, it appears that the reference is intended to be to Appendix 4, Agricultural Land Use, which does describe uses allowed within exclusive farm use zones. This interpretation was made by the Board in the Original Decisions. Final Decision and Order No. 10-08-045PL, at page 139. Subsection 1 of Appendix 4 states, "Land within such zones shall be used exclusively for farm use except as otherwise provided in ORS 215.213." ORS 215.213 describes uses permitted in exclusive farm use zones. ORS 215.213(1)(c) permits the following use allowed outright in any area zoned for exclusive farm use: "utility facilities necessary for public service, including wetland waste treatment systems but not including commercial facilities for the purpose of generating electrical power for public use by sale or transmission towers over 200 feet in height. A utility facility necessary for public service may be established as provided in ORS 215.275." As discussed in the EFU zone section of this narrative, the PCGP is a utility facility necessary for public service pursuant to ORS 215.275. Therefore, the proposed PCGP alternate alignment in district 20-RS is also an allowed use in those areas identified as Agricultural Lands on the CBEMP Special Considerations Map. Therefore, this policy is met.

Policy #34  Recognition of LCDC Goal #4 (Forest Lands) Requirements for Forest Lands within the Coastal Shorelands Boundary.

Unless otherwise allowed through an Exception, Coos County shall manage all rural lands designated on the Special Considerations Map as "Forest Lands" within the Coastal Shorelands Boundary consistent with the "Forest Uses" requirements of LCDC Goal #4. Allowed uses are listed in Appendix 3 of the Zoning and Land Development Ordinance.

Where the County's Comprehensive Plan identified major marshes, significant wildlife habitat and riparian vegetation on coastal shorelands subject to forest operations governed by the Forest Practices Act, the Forest Practice program and rules of the Department of Forestry shall be carried out in such a manner as to protect and maintain the special shoreland values of the major marshes, significant wildlife habitat areas, and forest uses especially for natural shorelands and riparian vegetation.

This policy shall be implemented by using the Special Considerations Map (Policy #3) to identify "Forest Lands", and to abide by the prescriptive use and activity requirements of LCDC Goal #4 in lieu of other management alternatives otherwise allowed for properties within the "Forest Lands-Overlay" set forth on the Special Considerations Map, and except where otherwise allowed by Exception for needed housing and industrial sites.

---

9 The County is not a marginal lands county, so the provisions of ORS 215.213 do not apply. The parallel provisions of Oregon law applicable to non-marginal lands counties (set forth in ORS 215.283) do apply. ORS 215.283(1)(c) is identical to ORS 215.213(1)(c).

-40-
This policy recognizes that the requirements of LCDC Goal #4 are equal and not subordinate to other management requirements of this Plan for "Forest Lands" located within the Coastal Shorelands Boundary.

As confirmed by Planning staff, the proposed Blue Ridge Route alternate alignment does not cross any lands identified as Forest Lands within the Coastal Shorelands Boundary shown on the County's specific inventory maps. Therefore, development of the PCGP is consistent with this policy.

Policy #49  Rural Residential Public Services.

Coos County shall provide opportunities to its citizens for a rural residential living experience, where the minimum rural public services necessary to support such development are defined as police (sheriff) protection, public education (but not necessarily a rural facility), and fire protection (either through membership in a rural fire protection district or through appropriate on-site fire precaution measures for each dwelling). Implementation shall be based on the procedures outlined in the County's Rural Housing State Goal Exception.

I. This strategy is based on the recognition:

a. that physical and financial problems associated with public services in Coos Bay and North Bend present severe constraints to the systems' ability to provide urban level services, and b. that rural housing is an appropriate and needed means for meeting housing needs of Coos County's citizens.

Zoning district 20-RS through which the proposed Blue Ridge Route alternate alignment crosses requires compliance with Policy #49. The proposed Blue Ridge Route alternate alignment is not in need of rural residential public services nor will it preclude these services. This strategy is satisfied.

Policy #50  Rural Public Services

Coos County shall consider on-site wells and springs as the appropriate level of water service for farm and forest parcels in unincorporated areas and on-site DEQ-approved sewage disposal facilities as the appropriate sanitation method for such parcels, except as specifically provided otherwise by Public Facilities and Services Plan Policies #49, and #51. Further, Coos County shall consider the following facilities and services appropriate for all rural parcels: fire districts, school districts, road districts, telephone lines, electrical and gas lines, and similar, low-intensity facilities and services traditionally enjoyed by rural property owners. This strategy recognizes that LCDC Goal #11 requires the County to limit rural facilities and services.

Zoning district 20-RS through which the proposed Blue Ridge Route alternate alignment crosses requires compliance with Policy #50. The proposed Blue Ridge Route alternate alignment is not in need of rural public services nor will it preclude these services. This policy is satisfied.
Policy #51 Public Services Extension

I. Coos County shall permit the extension of existing public sewer and water systems to areas outside urban growth boundaries (UGBs) and unincorporated community boundaries (UCB's) or the establishment of new water systems outside UGB's and UCB's where such service is solely for:

Zoning district 20-RS through which the proposed Blue Ridge Route alternate alignment crosses requires compliance with Policy #51. The PCGP is not requesting a public services extension. This policy is satisfied.

III. CONCLUSION

For the reasons set forth above, the requested approvals for the Blue Ridge Route alternate alignment for a relatively short segment of the previously approved PCGP alignment in Coos County satisfies all of the applicable approval criteria within the requested zones. Consequently, the Applicant requests that the County approve the requested alternate segment alignment addressed in this application, with the conditions of approval proposed by Pacific Connector in the application.
May 2, 2014

Re: Pacific Connector Gas Pipeline / HBCU-13-06: Supplemental Evidentiary Submittal on Horizontal Direction Drilling (HDD) Methods and Mitigation

Dear Ms. Rolfe:

This letter supplements the application by describing the procedures and mitigation measures for horizontal direction drilling (HDD) beneath the Coos River. The proposed Blue Ridge Route alternate alignment starts immediately south of the Coos River at approximately MP 11R. Pacific Connector would use HDD to install the pipeline below the Coos River, including the area adjacent to and south of the river. The HDD method would be used in this location to install the pipeline 43 feet below the Coos River. The HDD bore entry and exit holes are proposed to be set back at approximately 500 feet from the shore of the Coos River.

Description of HDD Method
The HDD method involves boring under a water feature and pulling the pipeline into place through the borehole that has been reamed to accommodate the diameter of the pipeline. This procedure involves three main phases: pilot hole drilling, subsequent reaming passes, and pipe pullback.

Pilot Hole. The pilot hole establishes the ultimate position of the installed pipeline. For this operation, an initial hole is drilled from the entry point to the exit point on the opposite side of the crossing. The head of the pilot drill provides directional control during the drill string. By altering or steering the drill head, the operator can control the direction as the drill progresses. Thus, the pilot hole can be directed downward at an angle until the proper depth is achieved, then turned and directed horizontally for the required distance, and finally angled upward to the surface. Tracking and steering of the HDD drill head is generally guided using a two-wire system. The system consists of two insulated wires (approximately 0.25-inch diameter) that are laid on the ground and are charged with an electrical current. A magnetometer accelerometer probe located behind the drill bit detects the electric current to triangulate the drill bit for steering.

As the pilot drill string is advanced, additional sections of drill pipe are added at the drill rig located at the entry point. High-pressure jetting of drilling fluid at the drill head and, in harder soil formations, rotation of the drill bit, facilitates advancement of the drill string. The drilling fluid (mud) is typically a non-toxic bentonite clay mixed with fresh water to make a slurry. Once the pilot hole exits in an acceptable location, the reaming operation is initiated.
Reaming. During the reaming phase, a reaming head is attached to the drill pipe and pulled back through the pilot hole to enlarge it. Several reaming passes may be made with incrementally larger reaming heads to enlarge the hole to approximately 1.5 times the diameter of the pipeline. Various reaming heads can be utilized, depending on the substrate encountered. High-pressure drilling fluid is jetted through the reaming head to float out drill cuttings and debris, to cool the drilling head, and to provide a cake wall to stabilize the hole. Once the drill hole is enlarged to the proper diameter, the pipe is pulled back through the ream hole.

Pullback. The last step to complete a successful installation is the pullback of the pre-fabricated product pipe through the enlarged hole. The pullback process is the most critical step of the HDD process. A reinforced pullhead is welded to the leading end of the product pipe and to a swivel connected to the end of the drill pipe. The swivel is placed between the drill rig and the product pipe to reduce torsion and prevent rotation from being passed to the product pipe. During pullback, the pull section is supported with a combination of roller stands and/or product pipe handling equipment to direct the product pipe into the hole at the correct angle, reduce tension during pullback, and prevent the product pipe from being damaged. After the product pipe is in place, the installed crossing is hydrostatically tested, pigged, and tie-in welds on each side of the crossing are completed.

Feasibility, Potential Impacts and Contingency Plan
The proposed HDD crossing of the Coos River has been evaluated by GeoEngineers. A copy of letter report from GeoEngineers, dated January 15, 2013, is attached to this letter. The report determines that the HDD method of installation at the proposed location along the Coos River is feasible. The report also notes that the risk of hydraulic fracturing is considered moderate along the alignment," but that "the risk of inadvertent returns increases to high within approximately 150 feet of entry and exit."

Hydraulic fracture is a term typically used to describe the case where the down-hole fluid pressure exceeds the overburden pressure and shear strength of the formation above the drill path, resulting in the "inadvertent return" of drilling fluid to the ground surface. In practice, inadvertent returns typically occur in close proximity to the entry and exit points where annular pressures are high and soil cover is thin; thus, impacts to waterbodies can be minimized by locating the drill entry and exits points away from the waterbody.

Pacific Connector has planned the HDD crossing of the Coos River such that the entry and exit points will be set back approximately 500 feet from the Coos River; the area identified by GeoEngineers as having a "high" risk of inadvertent returns would be at least 350 feet from the Coos River.

As discussed above, the drilling fluid is primarily bentonite clay mixed with water to form a slurry. Bentonite is non-toxic to aquatic organisms (Hair et al. 2002; Breteler et al. 1985; Sprague and Logan 1979) but as with any fine particulate material, it can interfere with oxygen exchange by gills (EPA 1986). This is a localized effect, and if an inadvertent return resulted to in a release of drilling fluid to the Coos River, those impacts would be limited to individual fish in the vicinity of the hydraulic fracture. Fish move away from turbidity spots and plumes (Reid and Anderson 1999). If spawning habitat is nearby, redds could be affected as well. Spawning by Oregon Coast ESU coho, however, does not occur in the Coos River.
It is important to keep in mind that HDD is itself a mitigation measure: upon successful HDD completion, impacts to aquatic species, sensitive resources and water quality can be avoided. The applicant has prepared and submitted to FERC a "Drilling Fluid Contingency Plan for Horizontal Directional Drilling Operations" (June 2013), a copy of which is attached to this letter. That contingency plan describes the measures by which the applicant and its HDD contractor would prevent, contain and counter an inadvertent return. Measures for prevention are grouped in three categories: proper design of the HDD crossing; operations during construction; and monitoring for early detection of a hydraulic fracture or inadvertent return. The contingency plan describes measures for containment of inadvertent returns depending whether they occur on land or in the water. Notably, an inadvertent return in the vicinity of the entry or exit points would be on land and several hundred feet from the Coos River; to contain and control inadvertent returns on the land area, there will be earth-moving equipment such as backhoes or small bulldozers, portable pumps, hand tools, sand, silt fences, and hay bales available at the drilling site. Finally, the contingency plan presents a range of measures for countering a hydraulic fracture, while noting that the corrective measures will be site and problem specific, and that a combination of measures may be necessary.

Regulatory Requirements
Construction of the PCGP will be subject to the Federal Energy Regulatory Commission's rules. Pursuant to 18 C.F.R. 380.12(d)(2), the applicant must address FERC's Wetland and Waterbody Construction and Mitigation Procedures. The most recent version of the Wetland and Waterbody Construction Procedures are dated May 2013 (notice of availability was published in the Federal Register on June 7, 2013). The applicant's plans for the HDD crossing of the Coos River must be approved by FERC prior to construction. Consistent with these requirements, the applicant proposes that the approval of this application be subject to the same condition of approval included in the decision of the Coos County Board of Commissioners for File No. HBCU-13-04:

To minimize impacts to wetlands or waterbodies at the horizontal directional drill (HDD) bore under the Coos River, the applicant must comply with a plan for the HDD crossing of the Coos River approved by FERC under FERC's Wetland and Waterbody Construction and Mitigation Procedures referenced at 18 C.F.R. 380.12(d)(2). The FERC Wetland and Waterbody Construction and Mitigation Procedures shall be the May 2013 version (notice of which was provided at 78 Federal Register 34374, June 7, 2013). The applicant shall submit a copy of the FERC-approved plan for the HDD crossing to the County Planning Department prior to beginning construction of the Coos River crossing.

Thank you for the opportunity to provide additional evidence. We look forward to responding to any questions regarding our application.
Sincerely,

Williams Pacific Connector Gas Operator, LLC

Randy Miller
W Randall Miller
Project Environmental Lead
Pacific Connector Gas Pipeline, LLC

Attachment
January 15, 2013

Williams Pacific Connector Gas Pipeline, LLC
295 Chipeta Way
Salt Lake City, Utah 84108

Attention: Bethany Green

Subject: HDD Feasibility Study
        Coos River HDD
        Coos Bay, Oregon
        File No. 16724-008-00

GeoEngineers, Inc. (GeoEngineers) is pleased to submit this Horizontal Directional Drilling (HDD) Feasibility Study for the proposed Coos River HDD as part of the Brunschmid route alternative of the Pacific Connector Gas Pipeline Project in Coos Bay, Oregon. The Vicinity Map, Figure 1, shows the site location with respect to topography and the surrounding area.

Williams Pacific Connector Gas Pipeline, LLC (Williams) is considering constructing a new 36-inch high-pressure natural gas pipeline by means of HDD methods across the Coos River, near Coos Bay, Oregon. Jared Elsworth requested that we provide this study to assess the feasibility of installing the proposed pipeline beneath the Coos River using HDD construction methods.

PURPOSE AND SCOPE OF SERVICE

The purpose of our services was to evaluate the existing surface and subsurface soil and groundwater conditions at the site in order to evaluate the feasibility of using HDD installation methods to install the proposed pipeline beneath the Coos River. Our specific scope of services included the following:

1. Completed a site reconnaissance to observe surface conditions and locate borings.
2. Prepared a preliminary HDD profile to assist in choosing appropriate depths for the exploratory borings.
3. Coordinated utility locating near the proposed boring locations by the public “One Call” utility locating service.
4. Explored subsurface conditions at the site as follows:
   a. Four drilled borings along the conceptual HDD alignment using mud rotary drilling techniques and rock coring, as appropriate.
b. Obtained samples at representative intervals from the borings using split spoon samples and standard penetration tests (SPT).

c. Classified soils encountered in the borings in general accordance with ASTM International (ASTM) Standard Practice D 2488. We maintained a log of the materials encountered in each exploration.

5. Performed index tests necessary to characterize the subsurface materials. Testing included:
   a. Thirteen Atterberg limits determinations in general accordance with ASTM D 4318.
   b. One grain size determination in general accordance with ASTM C 136.
   c. Ten percent fines determinations in general accordance with ASTM D 1140.

6. Evaluated HDD risks and considerations. We evaluated risks and considerations with respect to: 1) length, diameter and geometry; 2) hydraulic fracture and inadvertent drilling fluid returns potential; 3) hole stability; and 4) construction layout, property acquisitions and easements.

7. Prepared this report summarizing the findings of our exploration program, laboratory testing, and feasibility evaluation.

SITE DESCRIPTION

Surface Conditions

The proposed HDD alignment is oriented in a generally northwest-southeast (entry to exit) direction, as shown in Figure 2. The north side (entry) of the proposed HDD is situated on a gently sloping (less than 10 percent) field between approximately Elevation 8 feet and 17 feet above mean sea level (MSL). The south side (exit) is located on a relatively flat alluvial valley floor at about Elevation 5 feet. The north bank of the Coos River is approximately 500 feet south of the entry point and the south bank is approximately 650 feet north of the exit point. Two relatively short berms are located on either side of the river between approximately Elevation 10 and 15 feet. Coos River Highway parallels the river on the north side and South Coos River Highway parallels the river on the south side.

The open field on the north side of the HDD is located adjacent to Coos River Highway and is approximately 250-feet wide measured parallel to the highway and is approximately 550-feet long. The field is vegetated with low grass and a few deciduous trees on the north end. The ground surface was soft due to recent rains saturating the near surface soils. The surface of the site on the south side of the HDD is relatively flat and vegetated with low grasses.
Subsurface Conditions

Site Geology

The geologic mapping we reviewed (Beaulieu and Baldwin, 1973) shows the site underlain by quaternary aged marsh and peat deposits overlying the Tertiary aged Flournoy Formation. The peat and marsh is described as unconsolidated organic soils of silt, clay and sand. The Flournoy Formation is described as rhythmically bedded siltstone and sandstone.

Subsurface Explorations

We explored subsurface conditions at the site between the dates of December 6, 2012 and December 7, 2012 by advancing four drilled borings to maximum depths of 101.5 feet bgs at the locations shown in Figure 2. A representative from GeoEngineers maintained logs of the materials encountered in each boring and collected disturbed soil samples at 5-foot intervals. Appendix A presents the boring logs and a description of the subsurface exploration and laboratory-testing programs. Laboratory-testing results are shown in the boring logs in Appendix A.

The materials encountered in our borings were consistent with the geologic mapping for the site. In general, the borings completed on the north side of the crossing encountered fat clay with organic matter, organic clay, and clayey sand overlying siltstone at depths of 48 to 96 feet below ground surface (bgs). The borings completed on the south side of the crossing generally encountered interbedded silt, silty sand, sand with silt, and fat clay to the maximum depths explored. Refer to the boring logs for more details on the subsurface conditions encountered in each boring.

Groundwater

During our subsurface explorations we were not able to measure groundwater levels due to presence of drilling fluid. However, based on the observed relative moisture content of the samples, we estimate that groundwater was at or near the ground surface at the time of drilling. We anticipate that groundwater levels will fluctuate with precipitation, site utilization and other factors. During heavy prolonged precipitation, and probably during most of the winter months, we expect that groundwater will be near or at the surface of the site.

HDD PLAN AND PROFILE

We developed the conceptual HDD plan and profile based on the general centerline of the Brunschmid route alternative provided to us by Williams, as shown in Figure 2. The proposed HDD has a horizontal design length of approximately 1,602 feet. The conceptual entry and exit points were selected to allow for adequate depth of cover beneath the Coos River Highway and the Coos River as shown in Figure 2.

We designed the entry and exit angles at 10 degrees, and 8 degrees respectively, with a bottom tangent elevation of -65 feet MSL to achieve a minimum depth of cover of 43.6 feet below the Coos River.

HDD FEASIBILITY CONCLUSIONS

Based on our evaluation, it is our opinion that the HDD method of installation at this site is feasible. The following section provides a discussion of the considerations for design and construction.
Hole Stability

In general, the alluvial soils encountered by our borings along the proposed HDD alignment have a low risk of hole instability.

Hydraulic Fracture and Inadvertent Returns

In general, it is our opinion that there is a relatively high risk of hydraulic fracture along the conceptual HDD profile. The risk of inadvertent surface returns is considered moderate along the alignment. However, the risk of inadvertent surface returns increases to high within approximately 150 feet of entry and exit.

The contractor’s means and methods, effectiveness at cleaning cuttings from the pilot and reamed holes, and the ability to maintain drilling fluid returns will be instrumental in reducing the risk of hydraulic fracture and inadvertent returns during construction.

Workspace Considerations

There is not adequate area for a pipe stringing and fabrication workspace on the northwest side of the proposed HDD. Therefore, the Coos River HDD must be drilled from the northwest (entry) side to the southeast (exit) side so that the stringing area will be to the southeast. Depending on temporary workspace that can be obtained on the southeast side of the conceptual HDD, there may be enough linear area for a pipe stringing and fabrication workspace that will allow assembly of a single product pipe string. However, in order to achieve pullback with a single product pipe string, it will need to be curved slightly to the south.

There is adequate area for workspaces at the conceptual entry and exit points as shown in Figure 2. Grading will not likely be required to prepare entry and exit workspaces in these areas. Near the conceptual entry and exit points, it will likely be necessary to provide a stable working platform such as a timber matted or gravel workspace and an entrance road during construction, particularly if construction is completed during the wet winter season, or when heavy prolonged precipitation occurs. In addition, construction roads will be required to access the entry and exit points and the product pipe stringing area, unless construction is completed during the latter part of the dry summer months when precipitation has not recently occurred and groundwater levels are at their lowest point throughout the year.

LIMITATIONS

We have prepared this report for use by Williams, their authorized agents and other approved members of the design team involved with this project. GeoEngineers’ report is not intended for use by others, and the information contained herein is not applicable to other sites. Our report, conclusions and interpretations should not be construed as a warranty of the subsurface conditions.

Variations in subsurface conditions are possible between the explorations. Subsurface conditions may also vary with time. A contingency for unanticipated conditions should be included in the project budget and schedule for such an occurrence. We recommend completing a HDD design for this project should it move forward, and that sufficient monitoring, testing and consultation be provided by GeoEngineers during construction to confirm that the conditions encountered are consistent with those indicated by the explorations, to provide recommendations for design changes should the conditions revealed during the
work differ from those anticipated, and to evaluate whether earthwork and pipeline installation activities comply with contract plans and specifications.

The scope of our services does not include services related to construction safety precautions. Our recommendations are not intended to direct the contractor's methods, techniques, sequences or procedures, except as specifically described in our report for consideration in design.

Within the limitations of scope, schedule and budget, our services have been executed in accordance with generally accepted practices in this area at the time the report was prepared. No warranty or other conditions, express, written or implied, should be understood.

Any electronic form, facsimile or hard copy of the original document (email, text, table and/or figure), if provided, and any attachments are only a copy of the original document. The original document is stored by GeoEngineers, and will serve as the official document of record.

Please refer to Appendix B, titled "Report Limitations and Guidelines for Use," for additional information pertaining to use of this report.

REFERENCES

We appreciate the opportunity to provide services to you for this project. Please contact us if you have any questions or wish to discuss this report.

Sincerely,
GeoEngineers, Inc.

Andrew E. Sparks, PE
Senior Geotechnical Engineer

Trevor N. Hoyles, PE
Principal

Attachments:
Figure 1. Vicinity Map
Figure 2. Conceptual Plan and Profile
Appendix A. Field Exploration and Laboratory Testing Program
Appendix B. Report Limitations and Guidelines for use

Disclaimer: Any electronic form, facsimile or hard copy of the original document (email, text, table, and/or figure), if provided, and any attachments are only a copy of the original document. The original document is stored by GeoEngineers, Inc. and will serve as the official document of record.

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APPENDIX A
Field Exploration and Laboratory Testing Program
APPENDIX A
FIELD EXPLORATION AND LABORATORY TESTING PROGRAM

We explored subsurface conditions at the site by drilling four borings with a track-mounted drill rig using mud rotary drilling methods. Western States Soil Conservation of Hubbard, Oregon drilled the borings up to depths of 101.5 feet bgs. Figure 2 shows the approximate boring locations. A representative from our office observed field activities, classified the soil and rock encountered, obtained representative samples, observed groundwater conditions where possible and prepared a log of each exploration. The borings were backfilled with a bentonite and cement grout mixture at the conclusion of each exploration.

Soil samples were obtained by performing standard penetration tests (SPTs) in general accordance with ASTM test method D 1586. The sampler was driven with a 140-pound hammer falling 30 inches. The number of blows required to drive the sampler 1 foot, or as otherwise indicated, into the soils is shown adjacent to the sample symbols on the boring logs. Disturbed samples were obtained from the split barrel sampler for subsequent classification and index testing.

Soils encountered in the borings were classified in the field by a GeoEngineers representative in general accordance with ASTM D 2488, the Standard Practice for the Classification of Soils (Visual-Manual Procedure) which is described in Figure A-1. The boring logs are presented in Figures A-3 through A-6. Soil classifications and sampling intervals are shown in the boring logs. Inclined lines at the material contacts shown on the log indicate uncertainty as to the exact contact elevation, rather than the inclination of the contact itself.

The relative density of the SPT samples recovered at each interval was evaluated based on correlations with lab and field observations in general accordance with the values outlined in Table A-1 below.

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<th>Cohesive Soils (Clay/Silt)</th>
<th>Very Soft</th>
<th>Soft</th>
<th>Medium Stiff</th>
<th>Stiff</th>
<th>Very Stiff</th>
<th>Hard</th>
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<td>2 - 4</td>
<td>4 - 8</td>
<td>8 - 16</td>
<td>16 - 32</td>
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<table>
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<th>Cohesiveless Soils (Gravel/Sand/Silty Sand) **</th>
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<th>Dense</th>
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<td>4 - 10</td>
<td>10 - 30</td>
<td>30 - 50</td>
<td>&gt; 50</td>
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</table>

Notes:
** Classification applies to soils containing additional constituents; that is, organic clay, silty or clayey sand, etc.

Laboratory Testing

General

Samples obtained from the explorations were transported to our Portland, Oregon laboratory and examined to confirm or modify field classifications, as well as to evaluate engineering properties of the samples. Representative soil samples were selected for laboratory testing consisting of percent fines and Atterberg limits determinations, and sieve analyses. The laboratory-testing procedures are discussed in more detail below.

GeoEngineers, Inc.
Fax No. 1674-001 08
Percent Fines Determinations

Percent fines determinations were performed on ten soil samples obtained from the borings. The tests were used to evaluate the relative amounts of coarse and fine grained particles present in the samples and were completed in general accordance with the ASTM D 1140 test procedure. The results of the testing are presented on the boring logs at their respective sample depths.

Sieve Analyses

Sieve analyses were performed on selected soil samples to evaluate the grain size characteristics of selected soil samples. We completed the sieve analyses in general accordance with ASTM C 136. The results of the sieve analyses are shown in Figures A-7 through A-9.

Atterberg Limits Testing

Atterberg limits were performed on selected soil samples. The tests were used to classify and evaluate index properties of the soil. The liquid limit and the plastic limit were estimated through a procedure performed in general accordance with ASTM D 4318. The results of the Atterberg limits testing are shown in Figures A-10 through A-12.
### SOIL CLASSIFICATION CHART

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<th>LETTER</th>
<th>TYPICAL DESCRIPTIONS</th>
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<td>GW</td>
<td>WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES</td>
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<td>GRAVELS WITH FINES</td>
<td>GP</td>
<td>POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES</td>
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<td>SILTY GRAVELS, GRAVEL - SAND MIXTURES</td>
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<td>OL</td>
<td>ORGANIC SILTS AND ORGANIC SILTY CLAYS</td>
</tr>
<tr>
<td></td>
<td>ORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY</td>
<td>MH</td>
<td>ORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY</td>
</tr>
<tr>
<td></td>
<td>ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY</td>
<td>CH</td>
<td>ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY</td>
</tr>
<tr>
<td></td>
<td>ORGANIC CLAYS AND SILTS OF MEDIUM TO HIGH PLASTICITY</td>
<td>OH</td>
<td>ORGANIC CLAYS AND SILTS OF MEDIUM TO HIGH PLASTICITY</td>
</tr>
<tr>
<td>HIGHLY ORGANIC SOILS</td>
<td>PLAT. HUMUS, SWAMP SOIL</td>
<td>PT</td>
<td>PLAT. HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS</td>
</tr>
</tbody>
</table>

**NOTE:** Multiple symbols are used to indicate borderline or dual soil classifications.

### ADDITIONAL MATERIAL SYMBOLS

<table>
<thead>
<tr>
<th>SYMBOLS</th>
<th>TYPICAL DESCRIPTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>AC</td>
<td>Asphalt Concrete</td>
</tr>
<tr>
<td>CC</td>
<td>Cement Concrete</td>
</tr>
<tr>
<td>CR</td>
<td>Crushed Rock/Quarry Spalls</td>
</tr>
<tr>
<td>TS</td>
<td>Tonsill Forest Dull/Sod</td>
</tr>
</tbody>
</table>

### Groundwater Contact

- Measured groundwater level in exploration, well, or piezometer
- Groundwater observed at time of exploration
- Perched water observed at time of exploration
- Measured free product in well or piezometer

### Graphic Log Contact

- Distinct contact between soil strata or geologic units
- Approximate location of soil strata change within a geologic soil unit

### Material Description Contact

- Distinct contact between soil strata or geologic units
- Approximate location of soil strata change within a geologic soil unit

### Laboratory / Field Tests

- %F: Percent fines
- AL: Atterberg Limits
- CA: Chemical analysis
- CP: Laboratory compaction test
- CS: Consolidation test
- DS: Direct shear
- HA: Hydrometer analysis
- MC: Moisture content
- MD: Moisture content and dry density
- GC: Organic content
- PM: Permeability or hydraulic conductivity
- PP: Pocket penetrometer
- PPM: Parts per million
- SA: Slake analysis
- TX: Triaxial compression
- UC: Unconfined compression
- VS: Vane shear

### Sheen Classification

- No Visible Sheen
- Slight Sheen
- Moderate Sheen
- Heavy Sheen
- Not Tested

### KEY TO EXPLORATION LOGS

- GeoEngineers

**FIGURE A-1**
EXPLANATION OF BEDROCK TERMS

Scale of Relative Rock Weathering (ODOT; 1987)

<table>
<thead>
<tr>
<th>Designation</th>
<th>Field Identification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fresh</td>
<td>Crystals are bright. Discontinuities may show some minor surface staining. No</td>
</tr>
<tr>
<td></td>
<td>discoloration in rock fabric.</td>
</tr>
<tr>
<td>Slightly Weathered</td>
<td>Rock mass is generally fresh. Discontinuities are stained and may contain clay. Some</td>
</tr>
<tr>
<td></td>
<td>discoloration in rock fabric. Decomposition extends up to 1 inch into rock.</td>
</tr>
<tr>
<td>Moderately Weathered</td>
<td>Rock mass is decomposed 50% or less. Significant portions of rock show discoloration</td>
</tr>
<tr>
<td></td>
<td>and weathering effects. Crystals are dull and show visible chemical alteration.</td>
</tr>
<tr>
<td></td>
<td>Discontinuities are stained and may contain secondary mineral deposits.</td>
</tr>
<tr>
<td>Predominantly</td>
<td>Rock mass is more than 50% decomposed. Rock can be excavated with geologist’s pick.</td>
</tr>
<tr>
<td>Decomposed</td>
<td>All discontinuities exhibit secondary mineralization. Complete discoloration of rock</td>
</tr>
<tr>
<td></td>
<td>fabric. Surface of core is flaky and usually plied due to washing out of highly</td>
</tr>
<tr>
<td></td>
<td>altered minerals by drilling water.</td>
</tr>
<tr>
<td>Decomposed</td>
<td>Rock mass is completely decomposed. Original rock “fabric” may be evident. May be</td>
</tr>
<tr>
<td></td>
<td>reduced to soil with hand pressure.</td>
</tr>
</tbody>
</table>

Scale of Relative Rock Hardness (ODOT, 1987)

<table>
<thead>
<tr>
<th>Term</th>
<th>Hardness Designation</th>
<th>Field Identification</th>
<th>Approximate Unconfined Compressive Strength</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extremely Soft</td>
<td>R0</td>
<td>Can be indented with difficulty by thumbnail. May be moldable or flake with finger pressure.</td>
<td>&lt; 100 psi</td>
</tr>
<tr>
<td>Very Soft</td>
<td>R1</td>
<td>Crumbles under firm blows with point of a geologist’s pick. Can be peeled by a pocket knife. Scratched with fingernail.</td>
<td>100–1000 psi</td>
</tr>
<tr>
<td>Soft</td>
<td>R2</td>
<td>Can be peeled by pocket knife with difficulty. Cannot be scratched with fingernail. Shallow indentation made by firm blow of geology pick.</td>
<td>1000–4000 psi</td>
</tr>
<tr>
<td>Medium Hard</td>
<td>R3</td>
<td>Can be scratched by knife or pick. Specimen can be fractured with a single firm blow of hammergeology pick.</td>
<td>4000–8000 psi</td>
</tr>
<tr>
<td>Hard</td>
<td>R4</td>
<td>Can be scratched with knife or pick only with difficulty. Several hard hammer blows required to fracture specimen.</td>
<td>8000–16000 psi</td>
</tr>
<tr>
<td>Very Hard</td>
<td>R5</td>
<td>Cannot be scratched by knife or sharp pick. Specimen requires many blows of hammer to fracture or chip. Hammer rebounds after impact.</td>
<td>&gt; 16000 psi</td>
</tr>
</tbody>
</table>

Rock Quality Designation (RQD)

<table>
<thead>
<tr>
<th>RQD (Percent)</th>
<th>Description of Rock Quality</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 to 25</td>
<td>Very Poor</td>
</tr>
<tr>
<td>25 to 50</td>
<td>Poor</td>
</tr>
<tr>
<td>50 to 75</td>
<td>Fair</td>
</tr>
<tr>
<td>75 to 90</td>
<td>Good</td>
</tr>
<tr>
<td>90 to 100</td>
<td>Excellent</td>
</tr>
</tbody>
</table>

RQD is a modified core recovery measurement which expresses the number of hard and sound rock pieces of 4” or more in size as a percentage of the total length of core run.

Discontinuity Spacing (ODOT; 1987)

<table>
<thead>
<tr>
<th>Description for Bedding, Foliation, or Flow Banding</th>
<th>Spacing</th>
<th>Description of Joints, Fractures, or Other Fractures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very Thickly</td>
<td>&gt;10 feet</td>
<td>Very Widely</td>
</tr>
<tr>
<td>Thickly</td>
<td>3–10 feet</td>
<td>Widely</td>
</tr>
<tr>
<td>Medium</td>
<td>1–3 feet</td>
<td>Moderately Close</td>
</tr>
<tr>
<td>Thinly</td>
<td>2–12 inches</td>
<td>Closely</td>
</tr>
<tr>
<td>Very Thinly</td>
<td>&lt; 2 inches</td>
<td>Very Closely</td>
</tr>
</tbody>
</table>
FIELD DATA

Elevation (feet)
0
5
10
15
20
25
30
35

Depth (feet)
0
5
10
15
20
25
30
35

Material
Grayish brown fine clay with occasional organic matter (very soft, wet)
With trace organic matter
Becomes medium stiff
Becomes blue-gray with some gravel, salt

REMARKS
AL; PI = 31
AL; PI = 44
AL; PI = 28

Note: See Figure A-1 for explanation of symbols.

Log of Boring CR-1

Project: Coos River HDD Feasibility
Project Location: Coos Bay, Oregon
Project Number: 16724-001-08
Note: See Figure A-1 for explanation of symbols.

Log of Boring CR-1 (continued)

Project: Coos River HDD Feasibility
Project Location: Coos Bay, Oregon
Project Number: 16724-001-08

Figure A-3
Sheet 2 of 2
Log of Boring CR-2

GeoEngineers

Project: Coos River HDD Feasibility
Project Location: Coos Bay, Oregon
Project Number: 16724-001-08

Figure A-4
Sheet 1 of 3
<table>
<thead>
<tr>
<th>Elevation (ft)</th>
<th>Field Description</th>
<th>Material Description</th>
<th>Group Classification</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
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</tr>
<tr>
<td>40</td>
<td></td>
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</tr>
<tr>
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</tr>
<tr>
<td>65</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>70</td>
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<td>75</td>
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</table>

Note: See Figure A-1 for explanation of symbols.

Log of Boring CR-2 (continued)

Project: Coos River HDD Feasibility
Project Location: Coos Bay, Oregon
Project Number: 16724-001-08
Figure A-4
Sheet 2 of 3
**Log of Boring CR-2 (continued)**

**Project:** Coos River HDD Feasibility  
**Project Location:** Coos Bay, Oregon  
**Project Number:** 16724-001-08  

---

### FIELD DATA

<table>
<thead>
<tr>
<th>Elevation Feet</th>
<th>Depth (ft)</th>
<th>Interval</th>
<th>Blown Foot</th>
<th>Sample Name</th>
<th>Testing</th>
<th>Water Level</th>
<th>Graphic Log</th>
<th>Group Classification</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>0</td>
<td>2</td>
<td>40°</td>
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<td>CN</td>
<td>CN</td>
<td>CH</td>
<td>AL: PI = 40</td>
</tr>
<tr>
<td>95</td>
<td>0</td>
<td>2</td>
<td>32°</td>
<td>AB</td>
<td>CN</td>
<td>CN</td>
<td>CN</td>
<td>CH</td>
<td></td>
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<tr>
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<td>0</td>
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<td>32°</td>
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<td>CN</td>
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<td>CN</td>
<td>CH</td>
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<tr>
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<td>CN</td>
<td>CN</td>
<td>CH</td>
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<tr>
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<td>CN</td>
<td>CH</td>
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</tr>
<tr>
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<td>CN</td>
<td>CH</td>
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<td>CN</td>
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</tr>
<tr>
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<td>AB</td>
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<td>CN</td>
<td>CN</td>
<td>CH</td>
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</tr>
<tr>
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<td>0</td>
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<td>32°</td>
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<td>CN</td>
<td>CN</td>
<td>CH</td>
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</tr>
<tr>
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<td>2</td>
<td>32°</td>
<td>AB</td>
<td>CN</td>
<td>CN</td>
<td>CN</td>
<td>CH</td>
<td></td>
</tr>
<tr>
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<td>0</td>
<td>2</td>
<td>32°</td>
<td>AB</td>
<td>CN</td>
<td>CN</td>
<td>CN</td>
<td>CH</td>
<td></td>
</tr>
<tr>
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<td>2</td>
<td>32°</td>
<td>AB</td>
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<td>CN</td>
<td>CN</td>
<td>CH</td>
<td></td>
</tr>
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<td>32°</td>
<td>AB</td>
<td>CN</td>
<td>CN</td>
<td>CN</td>
<td>CH</td>
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</tr>
<tr>
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<td>32°</td>
<td>AB</td>
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<td>CN</td>
<td>CN</td>
<td>CH</td>
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</tr>
<tr>
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<td>0</td>
<td>2</td>
<td>32°</td>
<td>AB</td>
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<td>CN</td>
<td>CN</td>
<td>CH</td>
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</tr>
</tbody>
</table>

**Note:** See Figure A-1 for explanation of symbols.
Log of Boring CR-3

Project: Coos River HDD Feasibility
Project Location: Coos Bay, Oregon
Project Number: 16724-001-08

Figure A-5
Sheet 1 of 3
<table>
<thead>
<tr>
<th>Elevation (ft)</th>
<th>Interval</th>
<th>Recovered (ft)</th>
<th>Blooform</th>
<th>Collected Sample</th>
<th>Testing</th>
<th>Material Description</th>
<th>Density, g/cu ft</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>35</td>
<td>12-14</td>
<td>7</td>
<td></td>
<td></td>
<td></td>
<td>Gray silty fine to medium sand with trace organic matter (medium dense, wet)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>40</td>
<td>12-16</td>
<td>8</td>
<td></td>
<td></td>
<td></td>
<td>Lacks organic matter</td>
<td>34</td>
<td>SA; W/F = 19</td>
</tr>
<tr>
<td>50</td>
<td>12-16</td>
<td>14</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>36</td>
<td>SA; W/F = 19</td>
</tr>
<tr>
<td>60</td>
<td>12-18</td>
<td>13</td>
<td></td>
<td></td>
<td></td>
<td>With trace coarse sand</td>
<td>46</td>
<td>SA; W/F = 29</td>
</tr>
<tr>
<td>70</td>
<td>12-19</td>
<td>15</td>
<td></td>
<td></td>
<td></td>
<td>Lacks medium and coarse sand</td>
<td>33</td>
<td>SA; W/F = 23</td>
</tr>
<tr>
<td>75</td>
<td>12-32</td>
<td>15</td>
<td></td>
<td></td>
<td></td>
<td>Becomes dense</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: See Figure A-1 for explanation of symbols.
<table>
<thead>
<tr>
<th>Depth (ft)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
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</tr>
<tr>
<td>90</td>
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<tr>
<td>35</td>
<td>-</td>
</tr>
<tr>
<td>30</td>
<td>-</td>
</tr>
</tbody>
</table>

**Note:** See Figure A-1 for explanation of symbols.

---

**Log of Boring CR-3 (continued)**

**Project:** Coos River HDD Feasibility

**Project Location:** Coos Bay, Oregon

**Project Number:** 16724-001-08

Figure A-5

Sheet 3 of 3
<table>
<thead>
<tr>
<th>Elevation (ft)</th>
<th>Depth (ft)</th>
<th>Internal</th>
<th>Recovered (in)</th>
<th>Sample Amount</th>
<th>Testing</th>
<th>Water Level</th>
<th>Graphic Log</th>
<th>Moisture Content %</th>
<th>CEC (meq/100g)</th>
<th>Description</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>18.4</td>
<td>5</td>
<td>5</td>
<td>5</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>Gray silty fine to medium sand with trace organic matter (loose, wet)</td>
<td>G3</td>
</tr>
<tr>
<td>53</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>BA, kF = 49</td>
<td></td>
</tr>
<tr>
<td>18.3</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Gray fine sandy silt (soft, wet)</td>
<td>ML</td>
</tr>
<tr>
<td>53</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td>kF = 53</td>
<td></td>
</tr>
<tr>
<td>57</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Becomes very soft with decreased sand content</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Ends at 62 ft</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Becomes brownish gray, very soft</td>
<td></td>
</tr>
<tr>
<td>66</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Gray silty sand (very loose, wet)</td>
<td>SM</td>
</tr>
<tr>
<td>57</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td>kF = 70</td>
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</tr>
<tr>
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<td>2</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>Gray fine sand with silt (medium dense, wet)</td>
<td>SP-SN</td>
</tr>
<tr>
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<td>15</td>
<td>15</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Gray fine to medium sand (medium dense, wet)</td>
<td>SP</td>
</tr>
<tr>
<td>Note: See Figure A-1 for explanation of symbols.</td>
<td></td>
<td></td>
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Log of Boring CR-4 (continued)

GeoEngineers
Project: Coos River HDD Feasibility
Project Location: Coos Bay, Oregon
Project Number: 16724-001-08
Figure A-6
Sheet 2 of 2
### Sieve Analysis Results

**Coos River HDD Feasibility**

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Sample ID</th>
<th>Sample Depth (feet)</th>
<th>Moisture Content (%)</th>
<th>Gravel (%)</th>
<th>Sand (%)</th>
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Atterberg Limits Test Results
Coos River HDD Feasibility

**Atterberg Limits Test Results**

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<th>Symbol</th>
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<th>Moisture Content (%)</th>
<th>Liquid Limit (%)</th>
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APPENDIX B

Report Limitations and Guidelines for Use
APPENDIX B
REPORT LIMITATIONS AND GUIDELINES FOR USE

This appendix provides information to help you manage your risks with respect to the use of this report.

Geotechnical Services Are Performed for Specific Purposes, Persons and Projects

This report has been prepared for the exclusive use of Williams and their authorized agents. This report is not intended for use by others, and the information contained herein is not applicable to other sites.

GeoEngineers structures our services to meet the specific needs of our clients. For example, a geotechnical or geologic study conducted for a civil engineer or architect may not fulfill the needs of a construction contractor or even another civil engineer or architect that are involved in the same project. Because each geotechnical or geologic study is unique, each geotechnical engineering or geologic report is unique, prepared solely for the specific client and project site. Our report is prepared for the exclusive use of our Client. No other party may rely on the product of our services unless we agree in advance to such reliance in writing. This is to provide our firm with reasonable protection against open-ended liability claims by third parties with whom there would otherwise be no contractual limits to their actions. Within the limitations of scope, schedule and budget, our services have been executed in accordance with our Agreement with the Client and generally accepted geotechnical practices in this area at the time this report was prepared. This report should not be applied for any purpose or project except the one originally contemplated.

A Geotechnical Engineering or Geologic Report Is Based on a Unique Set of Project-specific Factors

This report has been prepared for the proposed Coos River HDD associated with the Pacific Connector Gas Pipeline Project in Coos Bay, Oregon. GeoEngineers considered a number of unique, project-specific factors when establishing the scope of services for this project and report. Unless GeoEngineers specifically indicates otherwise, do not rely on this report if it was:

- not prepared for you.
- not prepared for your project.
- not prepared for the specific site explored.
- completed before important project changes were made.

For example, changes that can affect the applicability of this report include those that affect:

- the function of the proposed structure.
- elevation, configuration, location, orientation or weight of the proposed structure.
- composition of the design team.
- project ownership.

1 Developed based on material provided by ASFE, Professional Firms Practicing in the Geosciences; www.asfe.org.
If important changes are made after the date of this report, GeoEngineers should be given the opportunity to review our interpretations and recommendations and provide written modifications or confirmation, as appropriate.

**Subsurface Conditions Can Change**

This geotechnical or geologic report is based on conditions that existed at the time the study was performed. The findings and conclusions of this report may be affected by the passage of time, by manmade events such as construction on or adjacent to the site, or by natural events such as floods, earthquakes, slope instability or groundwater fluctuations. Always contact GeoEngineers before applying a report to determine if it remains applicable.

**Most Geotechnical and Geologic Findings Are Professional Opinions**

Our interpretations of subsurface conditions are based on field observations from widely spaced sampling locations at the site. Site exploration identifies subsurface conditions only at those points where subsurface tests are conducted or samples are taken. GeoEngineers reviewed field and laboratory data and then applied our professional judgment to render an opinion about subsurface conditions throughout the site. Actual subsurface conditions may differ, sometimes significantly, from those indicated in this report. Our report, conclusions and interpretations should not be construed as a warranty of the subsurface conditions.

**Geotechnical Engineering Report Recommendations Are Not Final**

Do not over-rely on the preliminary construction recommendations included in this report. These recommendations are not final, because they were developed principally from GeoEngineers' professional judgment and opinion. GeoEngineers' recommendations can be finalized only by observing actual subsurface conditions revealed during construction. GeoEngineers cannot assume responsibility or liability for this report's recommendations if we do not perform construction observation.

Sufficient observation, testing and consultation by GeoEngineers should be provided during construction to confirm that the conditions encountered are consistent with those indicated by the explorations, to provide recommendations for design changes should the conditions revealed during the work differ from those anticipated, and to evaluate whether or not earthwork activities are completed in accordance with our recommendations. Retaining GeoEngineers for construction observation for this project is the most effective method of managing the risks associated with unanticipated conditions.

**A Geotechnical Engineering or Geologic Report Could Be Subject to Misinterpretation**

Misinterpretation of this report by other design team members can result in costly problems. You could lower that risk by having GeoEngineers confer with appropriate members of the design team after submitting the report. Also, retain GeoEngineers to review pertinent elements of the design team's plans and specifications. Contractors can also misinterpret a geotechnical engineering or geologic report. Reduce that risk by having GeoEngineers participate in pre-bid and preconstruction conferences, and by providing construction observation.
Do Not Redraw the Exploration Logs

Geotechnical engineers and geologists prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in a geotechnical engineering or geologic report should never be redrawn for inclusion in architectural or other design drawings. Only photographic or electronic reproduction is acceptable, but recognize that separating logs from the report can elevate risk.

Give Contractors a Complete Report and Guidance

Some owners and design professionals believe they can make contractors liable for unanticipated subsurface conditions by limiting what they provide for bid preparation. To help prevent costly problems, give contractors the complete geotechnical engineering or geologic report, but preface it with a clearly written letter of transmittal. In that letter, advise contractors that the report was not prepared for purposes of bid development and that the report's accuracy is limited; encourage them to confer with GeoEngineers and/or to conduct additional study to obtain the specific types of information they need or prefer. A pre-bid conference can also be valuable. Be sure contractors have sufficient time to perform additional study. Only then might an owner be in a position to give contractors the best information available, while requiring them to at least share the financial responsibilities stemming from unanticipated conditions. Further, a contingency for unanticipated conditions should be included in your project budget and schedule.

Contractors Are Responsible for Site Safety on Their Own Construction Projects

Our geotechnical recommendations are not intended to direct the contractor's procedures, methods, schedule or management of the work site. The contractor is solely responsible for job site safety and for managing construction operations to minimize risks to on-site personnel and to adjacent properties.

Read These Provisions Closely

Some clients, design professionals and contractors may not recognize that the geoscience practices (geotechnical engineering or geology) are far less exact than other engineering and natural science disciplines. This lack of understanding can create unrealistic expectations that could lead to disappointments, claims and disputes. GeoEngineers includes these explanatory "limitations" provisions in our reports to help reduce such risks. Please confer with GeoEngineers if you are unclear how these "Report Limitations and Guidelines for Use" apply to your project or site.

Geotechnical, Geologic and Environmental Reports Should Not Be Interchanged

The equipment, techniques and personnel used to perform an environmental study differ significantly from those used to perform a geotechnical or geologic study and vice versa. For that reason, a geotechnical engineering or geologic report does not usually relate any environmental findings, conclusions or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. Similarly, environmental reports are not used to address geotechnical or geologic concerns regarding a specific project.
Biological Pollutants

GeoEngineers' Scope of Work specifically excludes the investigation, detection, prevention or assessment of the presence of Biological Pollutants. Accordingly, this report does not include any interpretations, recommendations, findings, or conclusions regarding the detecting, assessing, preventing or abating of Biological Pollutants and no conclusions or inferences should be drawn regarding Biological Pollutants, as they may relate to this project. The term "Biological Pollutants" includes, but is not limited to, molds, fungi, spores, bacteria, and viruses, and/or any of their byproducts.

If Client desires these specialized services, they should be obtained from a consultant who offers services in this specialized field.
Drilling Fluid Contingency Plan for Horizontal Directional Drilling Operations

Pacific Connector Gas Pipeline Project

June 2013
DRILLING FLUID CONTINGENCY PLAN FOR
HORIZONTAL DIRECTIONAL DRILLING OPERATIONS

1.0 INTRODUCTION

Pacific Connector Gas Pipeline, LP (Pacific Connector) proposes to construct a 36-inch diameter pipeline beneath the Coos River, Rogue River, and Klamath River in southwest Oregon. Pacific Connector is proposing to utilize the horizontal directional drilling (HDD) process to install the pipeline underneath these three rivers. HDD is an increasingly popular method of installation whereby surface and/or riverbed disturbance may be minimized with proper design and construction procedures. HDD installations may present a potential for surface and/or riverbed disturbance through the inadvertent release of drilling fluid. Contingency planning and prevention control of an inadvertent release of drilling fluid to resources has been a major consideration in selecting and designing the proposed HDD crossings.

Pacific Connector intends to protect public health and safety as well as natural resources in the event of an inadvertent return of drilling fluid. The HDD method was identified because it is environmentally conscientious and has been proven a safe and efficient method when feasible for crossing rivers. The purpose of this document is to aid Pacific Connector in developing a program designed to minimize the potential for occurrence of adverse effects resulting from an inadvertent return of drilling fluid to the ground surface and/or resources, otherwise commonly known as a frac out.

2.0 CAUSES OF DRILLING FLUID LOSS

2.1 GENERAL

Drilling fluid utilized in the HDD process is composed primarily of water and bentonite; naturally occurring clay. The primary purposes of this drilling fluid are to suspend and transport cuttings from the borehole, to stabilize the borehole, and to act as a coolant and lubricant during the drilling process. The drilling fluid generally consists of 1 to 5 percent active clays, approximately 0 to 40 percent inert solids, and water. The primary active clay component is bentonite. Bentonite is a naturally occurring, non-hazardous clay product. A material safety data sheet (MSDS) for a bentonite material, as supplied by WYO-BEN Inc. is attached.

Drilling fluid is transported under pressure through the drill string to the cutting bit. The total drilling fluid pressure at the cutting bit is a function of pumping pressures, the elevation difference between the drill rig and the cutting bit, and friction losses. Soil and rock formations around the drill path experience maximum drilling fluid pressures in the immediate proximity of the cutting bit or reaming tools.

Two primary processes by which drilling fluid circulation may be reduced or lost include the following.

1. Formational fluid loss occurs when drilling fluid flows into surrounding permeable soil units within the pore spaces of the soil or along pre-existing fractures or voids.
2. Hydraulic fracturing can occur where the combined resisting force of the available overburden pressure and the shear strength of the overburden soil is less than the hydrostatic pressure applied to the surrounding soil from the drilling fluid at the drill bit.

2.1.1 Formational Fluid Loss

Formational fluid losses typically occur when the drilling fluid flows through the pore spaces in the surrounding formation. Thus, a formation with a higher porosity potentially can lose a larger volume of fluid than a formation with a lower porosity. Silty sands, silts, and clays typically have a low susceptibility to formational fluid losses. Coarse sands and gravels with low percentages of silt and clay have a moderate-to-high susceptibility for fluid loss.

2.1.2 Hydraulic Fracture

Hydraulic fracture is a term typically used to describe the case where the down-hole fluid pressure exceeds the overburden pressure and shear strength of the formation above a drill path. Hydraulic fracture typically occurs when the drill path passes through relatively weak cohesive soils with low shear strength or very loose granular soils. Loose and silty sands and soft to medium stiff silts and clays typically have a higher hydraulic fracture potential. Medium dense to dense sands and gravels and very stiff to hard silts and clays have a low to moderate hydraulic fracture potential. Unfractured rock, because of its high shear strength, typically has a low potential for hydraulic fracture. HDD installations with greater depth or in formations with higher shear strength may reduce the potential for hydraulic fracturing.

2.2 Inadvertent Returns

Inadvertent returns occur when the lost drilling fluid emerges at the ground surface. Inadvertent returns, whether by formational fluid loss or hydraulic fracture, have the potential for releasing relatively large volumes of drilling fluid in a short period of time if the fluid pumps are not immediately disengaged.

In practice, inadvertent returns typically occur in close proximity to the entry and exit points where annular pressures are high and soil cover is thin. Inadvertent returns can also occur at locations along a drill path where there are low shear strength soils, the depth of soil cover is thin or along pre-existing fractures or voids. Other locations where inadvertent returns can occur include exploratory boring locations, or along the sides of structures such as piles or utility poles.

3.0 INADVERTENT RETURN PREVENTION, CONTAINMENT AND COUNTERMEASURES

3.1 Prevention

3.1.1 Design

The potential for inadvertent returns of drilling fluid can be reduced through proper HDD design. During design, the HDD crossing locations are selected and a design profile is developed. The primary factors in selecting the HDD profile are the type of surface topographic conditions, subsurface materials, and the desired depth of cover at the proposed pipeline crossing location.
Cohesive soils, such as clays, dense sands, and competent rock are considered ideal materials for horizontal drilling. Another important factor to be considered in the design of an HDD profile is an adequate depth of overburden material. The appropriate depth of overburden is determined based on complex calculations, and is different depending on the subsurface conditions.

The following summarizes some of the applicable processes by which each of the proposed HDD crossings are designed:

- **Surface Reconnaissance:** The proposed HDD site is evaluated for workspace, construction access and topographic relief.

- **Subsurface Exploration:** Subsurface conditions along a proposed HDD alignment are explored in order to assess drilling feasibility and to select an optimal drill path that passes through the most competent and desirable subsurface strata with the least potential for inadvertent returns.

- **Hydraulic Fracture Analysis:** Complex analyses are performed to calculate the safety factor against hydraulic fracture along the entire drill path. The analysis is based primarily on research completed by Delft Geotechnics, as discussed in Appendix B of The Army Corps of Engineers Report CPAR-GL-98 (Staehli, et al., 1998, “Installation of Pipelines Beneath Levees Using Horizontal Directional Drilling,” US Army Corps of Engineers, Waterways Experiment Station, CPAR-98-1). The input parameters for the model include subsurface material properties, hydrostatic water pressures, drilling fluid properties, penetration rates and pump rates. Based on the assumptions and interpretations utilized during the modeling process, the evaluation may indicate a high potential (low factor of safety) for hydraulic fracture along the drill path. If a higher strength layer is not present above the weaker layer, the design profile may be modified in an attempt at improving the safety factor against inadvertent returns.

3.1.2 HDD Operations

Another important factor in reducing the potential for inadvertent returns is the HDD contractor’s construction procedures. Frequently, inadvertent returns can be prevented through proper drilling procedures. The following operational elements, if executed properly, significantly reduce the potential for inadvertent returns:

- Maintaining adequate pump volumes;

- Monitoring and maintaining ideal drilling fluid properties; and,

- Maintaining appropriate penetration rates to maintain proper circulation.

The HDD contractor is responsible for execution of the HDD operation, including actions for detecting and controlling an inadvertent return. Pacific Connector will closely monitor the progress and actions of the HDD contractor.
3.1.3 Monitoring and Detection

HDD is a technically advanced process involving skilled operators. Early detection of a hydraulic fracture and/or an inadvertent return may prevent or reduce the volume of drilling fluid released to the ground surface. Early detection is highly dependent upon the skill and experience of the HDD contractor. Therefore, Pacific Connector plans to utilize well qualified HDD contractors that specialize in horizontal directional drilling to install the three proposed river crossings. The selection and monitoring of the HDD contractor will be the responsibility of Pacific Connector.

Each drilling situation is unique in that the behavior of the subsurface material is highly variable and difficult to predict. If an inadvertent return occurs in the river, detection may be difficult due to the high flow rates and turbidity of the river. However, recent developments in the HDD industry have provided down-hole annular pressure tools that help detect a change in the annular pressure of the drilled hole during pilot hole operations. Detection depends on the proper use of these new tools and a proper interpretation of other factors that may indicate an inadvertent return is imminent. An on-site environmental inspector at each waterway can also aid in identifying an inadvertent return so that corrective actions can be made in an attempt at reducing the amount of fluid released.

3.2 Containment

3.2.1 Terrestrial Inadvertent Returns

There is greater potential for an inadvertent return near the entry and exit locations of the HDD crossing. The entry and exit locations for the HDD crossings have dry land segments where inadvertent returns can be easily detected and contained. To isolate and contain potential drilling fluid releases at each of the drill sites, a berm may be built around the entire drilling site area. Hay bales or silt screen may be part of the berm on the river side of the drilling area. To contain and control inadvertent returns on the land area, there will be earth-moving equipment such as backhoes or small bulldozers, portable pumps, hand tools, sand, silt fences, and hay bales available at each of the drilling sites. Inadvertent returns will be contained and isolated using dirt berms, hay bales, or silt screens. Inadvertent returns will be cleaned and hauled or pumped to one of the drilling mud storage pits at the closest drilling site.

Once an inadvertent return is detected at the ground surface, the HDD contractor will take immediate corrective action. Drilling fluid pumps provide the only source of pressure to the drilling fluid; therefore, the most immediate corrective action is to shut off the drilling fluid pumps. Upon discontinuation of the drilling fluid pumps, the pressure in the hole will quickly dissipate. When the pressure diminishes down-hole, inadvertent returns of drilling fluid to the surface will slow and eventually stop. The mitigation response process will then be initiated. The drilling fluid released to the ground surface will be contained, where possible, through the use of containment structures; and a determination will be made whether alternative actions will be required prior to resuming the HDD process. If an inadvertent return occurs in an area where the fluid can be managed within containment structures, drilling activities will immediately resume and the area will be monitored throughout the remainder of the HDD process.
3.2.2 Aquatic Inadvertent Returns

The composition of the drilling fluid is primarily water and bentonite clay. Therefore a small volume of drilling fluid released into the river will quickly dissipate because of the anticipated high volumes and velocities of the Coos, Rogue, and Klamath Rivers at the proposed time of construction. In the event an inadvertent return is detected in a river, agencies will be notified. If corrective measures can be feasibly implemented, an assessment will be made to determine the most appropriate containment structure to be erected to minimize the volume of drilling fluid released into the river. However, it will likely be impractical to erect effective containment structures within the river to extract drilling fluid from the river.

The area downstream of the project site will be monitored to identify areas that may have substantial accumulations of drilling fluid. Potential accumulations will likely only occur in slow flowing areas that allow enough time for the suspended particulates to settle out of the water column. Where possible, drilling fluid volumes that represent significant adverse impacts to aquatic habitat will be removed from the substrate.

Areas where bentonite accumulations are removed will be monitored to assess the need for additional substrate. If the areas identified lack essential substrate materials including spawning gravels, these materials may be added to mitigate the impacts of the bentonite removal activities. These activities will not be conducted if clean-up measures will result in greater damage to the shoreline and watercourse. In areas where clean-up methods are identified to result in greater damage, the area will not be altered and bentonite accumulations will remain in place and likely flush out during periods of high flow. High flow periods are typically associated with naturally occurring elevated turbidity levels and the effect of allowing the bentonite to flush naturally is not expected to significantly alter water quality.

3.3 Countermeasures

If an inadvertent return occurs, the HDD operation will be stopped temporarily to determine an appropriate response plan. The HDD contractor and Pacific Connector will attempt to determine the cause of the hydraulic fracture and inadvertent return. Pacific Connector will implement procedures which may control the factors causing the hydraulic fracture and inadvertent return to minimize the chance of recurrence. Developing corrective measures will be a joint effort between Pacific Connector and the HDD contractor and will be site and problem specific. A combination of measures may be necessary to control hydraulic fracture and inadvertent return. Possible corrective measures that may be utilized to control or correct an inadvertent return are as follows:

1. Increase the drilling fluid viscosity in an attempt at sealing the point at which fluid is leaving the drilled hole. The drilling operation may be suspended for a short period (i.e. overnight) to allow the fractured zone to become sealed with the higher viscosity drilling fluid.

2. If increasing the drilling fluid viscosity is ineffective, lost circulation materials (LCM) may be introduced into the hole by incorporating them in the drilling fluid and pumping the material down-hole. The drilling operation may again be suspended for a short period (i.e. overnight) to allow the fractured zone to become sealed with the lost circulation materials.
3. Depending on the location of the fractured zone, a steel casing may be installed that is of sufficient size to receive the largest expected down-hole tools for the crossing. This casing installation provides a temporary conduit for drilling fluids to flow while opening the remaining section of the hole to a diameter acceptable for receiving the proposed pipe sections. To alleviate future concerns with the steel casing after the HDD installation is completed, the casing is generally extracted from the hole prior to or just after completing the HDD installation. However, there have been instances when attempts at extracting the steel casing were unsuccessful.

4. In the event drilling fluid flow is not regained through the annulus of the drilled hole and a steel casing installation is not utilized, the HDD contractor may elect to install a grout mixture into the drilled hole in an attempt to seal the fractured zone. The down-hole drilling assembly is generally extracted and existing hole is re-drilled to the point at which it had previously been drilled prior to having encountered the loss of drilling fluid.

5. In addition, a grouting program may be implemented from the surface in the event that the installation of grout into the drilled hole is unsuccessful. This approach is only practical in areas where drilling rigs with vertical drilling capabilities can access the HDD alignment. If a surface grouting program is utilized, the HDD drilling assembly is extracted from down-hole. Multiple holes are then drilled vertically on either side and along the HDD alignment to allow for grout slurry to be pumped into the fracture zone where the drilling fluid had previously been lost from the drilled hole. This process can take several days to complete in order to insert the grout in a grid pattern that covers the full fractured zone, during which time the HDD operation is suspended. Upon completion of the surface grouting program, the HDD operation will resume and the pilot hole will be reestablished through the grouted formation.

In some instances, it may be determined that the existing hole encountered a zone of unsatisfactory soil material and the hole may have to be abandoned. If the hole is abandoned, it will be filled with cuttings and drilling fluid.

4.0 RISK OF AQUATIC BIOLOGICAL IMPACTS

All three river crossings (Coos, Rogue, and Klamath) proposed for utilizing the HDD method of construction support resident and anadromous fish species including chinook and coho salmon and steelhead trout. Chinook and coho salmon and steelhead trout use these waterways as spawning, rearing, and migration habitats.

In the event an inadvertent return occurs into the river, drilling fluid will enter the waterway causing short term, temporary water quality impacts downstream of the project area including sedimentation and turbidity. Sediments discharged into aquatic systems have the potential, depending on the concentrations, to wear down fish gills and impair fish vision making it difficult to feed and also making the fish more susceptible to predation. However, these effects typically occur after relatively long-term exposure to concentrated sedimentation.

If drilling fluid accumulates in the substrate, it can adversely impact the quality and quantity of aquatic habitat available for aquatic species including salmonid spawning habitat and benthic macroinvertebrate rearing habitat. Drilling fluid that accumulates in the substrate may cover up food sources and smother fish eggs and other aquatic life in the riverbed. However, significant
impacts to substrate from inadvertent returns are not likely in the large river systems because of the anticipated high volumes and velocities within these rivers. For example, if inadvertent returns resulted in a release of drilling fluid in the Rogue River, the anticipated high volume and velocities of the water is expected to dilute the drilling fluid to a level that is not expected to significantly impact aquatic species or habitats. The rheologic properties of drilling fluid allow it to remain suspended within the water column for prolonged periods of time and would likely settle out in very slow moving water downstream of the release. The distance of expected transport would likely prevent significant concentrations of the fluid from accumulating in one area of the Rogue River. In the event drilling fluid is inadvertently released into any one of these rivers, the behavioral avoidance response of resident and anadromous fish species is presumed to be triggered within the immediate vicinity of the release and the fish are expected to return and utilize the affected area shortly after the inadvertent release has been halted. If significant concentrations are found during monitoring as a result of a release, corrective measures will be taken as described in the previous sections of this report.